

THE PRESIDENT'S COMMISSION ON
ACCIDENT AT THREE MILE ISLAND

IN THE MATTER OF:

TESTIMONY OF
HARLEY SILVER

PLACE: Bethesda, Maryland

DATE: Thursday, July 26, 1979

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CERTIFICATE

I certify that I have read this transcript and corrected any errors in the transcription that I have been able to identify, except for unimportant ^{spelling and} punctuation errors.

Date: 8-12-79

Harley Silver
Harley Silver

PRESIDENT'S COMMISSION ON THREE MILE ISLAND ACCIDENT

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In the Matter of: :

President's Investigation into :
the Three Mile Island Accident :

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Nuclear Regulatory Commission
7920 Norfolk Street
Room 442
Bethesda, Maryland

Thursday, July 26, 1979

Deposition of HARLEY SILVER, a witness of lawful age, taken by the Staff on behalf of the President's Commission on the Three Mile Island Accident, pursuant to notice, at the offices of the Nuclear Regulatory Commission, 7920 Norfolk Street, Bethesda, Maryland, at 10:00 a.m., Thursday, July 26, 1979.

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APPEARANCES:

On behalf of the Witness:

Office of General Counsel
Nuclear Regulatory Commission
By: MARIAN E. MOE, ESQ.

On behalf of the President's Commission:

KEVIN P. KANE, ESQ.
Deputy Chief Counsel for the President's Commission

WILLIAM M. BLAND, ESQ.
Technical Staff

MR. KANE: Mr. Silver, would you raise your right-hand, please.

Whereupon,

HARLEY SILVER

a witness of lawful age, was duly sworn, and testified as follows:

DIRECT EXAMINATION

BY MR. KANE:

Q Would you state your full name for the record, please.

A Harley Silver.

Q Mr. Silver, did you bring with you here today a brief statement of your educational and employment background?

A Yes, brief indeed. I did.

This is in fact a copy of my qualifications submitted at the Three-Mile Island hearing.

Q All right. And I see that this statement identifies your current position as Senior Project Manager, Division of Project Management, Office of Nuclear Reactor Regulation.

Is that your current position?

A That is correct.

Q As far as you know, is this a current statement of your educational and employment backgrounds?

A Yes.

MR. KANE: Let's have this marked as Exhibit No. 1 to this deposition.

(Whereupon, Exhibit No. 1, marked for identification.)

BY MR. KANE:

Q Mr. Silver, have you had your deposition taken before?

A No.

Q All right. Let me just briefly explain what we are doing here today.

You have been sworn in and although we are sitting here in a relatively informal fashion at this office, you should be aware that the testimony that you are giving here has the same force and solemnity it would have if you were testifying in a court of law.

My questions and your answers are being taken down by the court reporter here. It will be reduced to booklet form later on and later on you will be given the opportunity to inspect it and make corrections, if you deem it necessary.

On the other hand, it is very important to avoid the necessity for corrections as much as possible so that we have a reliable record upon which we can make a

determination as to what your testimony can be in connection with this investigation.

For that reason, I ask you at any point during your session here this morning that if you don't understand a question I am asking or if you think it needs clarification or if you want to expand upon any answer you have previously given, please feel free to stop and request permission to do so and we will straighten out the record at that point. That way we can minimize the necessity for any changes later on.

Lastly, just let me state two basic ground rules in a deposition, which are that you should allow me to finish my questions before you respond, even if you know what the question is going to be, simply because the reporter cannot take down both of us speaking at the same time.

Also, I would ask that you please make your responses audible since the reporter cannot take down a nod of the head or such gestures.

Do you understand that?

A Yes, I do.

Q All right. Now, would you briefly describe your duties as Senior Project Manager within the Division of Project Management?

A Basically, the basic duties of a Project Manager consist of managing the review of assigned licenses and cases, to assure that the review is done completely and within some agreed upon schedule and within the restrictions or confines or requirements of the appropriate regulations.

Q All right. Could you, just to make it clear as to how that process works, could you take us through the steps that you would be called upon to participate in as a Senior Project Manager from the time an application for a construction permit is submitted by a utility? Just in general, now, because I realize it is immensely detailed, but if we can get a brief description of the process.

A I can do this in general.

I would like to say I personally have not done a construction permit review. As it turns out, I have done only operating licenses..

Q Is that because that is the way it has turned out?

A I believe it is the way it turned out. There is no intent.

Q You could be assigned to a CP situation at any time?

A Yes.

Q All right. If you could take us through, then, that

process.

A All right. Let me give you the classical arrangement.

There have been considered recently changes in this process to accelerate reviews which, to my knowledge, have not actually been applied to any case but have been considered.

The classical procedure consists of, even before the tendering of an application, discussions with the potential applicant to assure that there is understanding on both sides of the licensing requirements and that to assure to the maximum extent possible that the application is complete, covers the ground that it should cover, that the public is aware of this potential application and participates or is able to participate in the process at the earliest possible point.

When the application is tendered, and the application of course consists of a formal application, the FSAR, the environmental report, and various other supporting documents, a schedule is established for an acceptance review which nominally is done within 30 days of receipt of the tendered application.

Q Is that the first point at which the Senior Project Manager would become involved or would the Senior Project

Manager be involved even in the pre-application discussions?

A During the pre-application discussions.

Q So from that point, the SP would be involved somewhat?

A Yes. The initial discussions, the pre-tendering discussions, may be a year or two in advance of the actual tendering. It just depends in large measure on the utility involved.

Frequently, they have come in to discuss the project, discuss the site, inform us of some of the basic features of the plan to the reactor, things of that kind, and to discuss review philosophy perhaps, things like that, prior to tendering.

The Acceptance Review is basically a review to ascertain that the application is complete. Each of the review groups would review the FSAR and other documents to ascertain that in fact it is complete or sufficiently complete for us to begin review of it.

This does not mean that this is indeed 100 percent complete, but close, in general.

The applicants would then be told in writing, of course, that the application is accepted for review, will be docketed and that a review will commence when the

application is docketed.

Additional copies would then be submitted as part of the docketing procedure.

And, in addition, frequently there are questions which are asked, two kinds of questions usually at that point. Round one questions is the need to increase the degree of completeness of the application and also, frequently what would actually constitute round one questions, that is technical questions getting into the review are questions which have been raised by the reviewers during the acceptance review.

The application is docketed, a review schedule is established and the review in fact begins.

Q Let me ask you, at this point, the Round One questions that arise in connection with the acceptance review, would those questions concern such basic things as design, site selection and things like that?

A Surely. Again, with regard to design, keep in mind that a Construction Permit Review generally does not go into details of the design but in principle at least the design criteria, although of course in fact there are many details that are submitted and reviewed.

Q In terms of general areas, what do the Round One

questions look to usually? You said design criteria, site selection.

A Well, there is no essential difference between Round One and Round Two questions, as far as scope.

Round One questions are, generally speaking, well theoretically are supposed to be Staff positions.

Theoretically, and I am afraid that is the right word, Round One questions are all the questions that the Staff has. The answers to those questions should theoretically remove or satisfy the reviewer's concerns.

Of course, in practice, this does not happen with all of the points. Some are resolved, there are still some questions remaining or some new questions arise during that period or, we do not agree with the applicant's response and it is not considered acceptable so that Round Two questions then consist of additional questions and Staff positions, that is the Staff requires that "such and such be done."

Q Would safety questions be raised usually at the Round One stage?

A Surely. Yes. Absolutely.

Q Would those safety questions relate to what, though?

A Anything.

Q Well, what I am trying to get at is how much detail you have at that point as to exactly how the plant is going to be laid out.

A There is difference in detail between the Round One and Round Two question, no essential difference between the Round One and Round Two in time. They are not points, but they are bands.

Q If there was a question about the safety features of the steam generator, for example, to be included in the plant, would that be raised at Round One or later on when you got more detail?

A Again, in a CP, we might not have the detailed information.

Q That is what I wanted to get to.

A But it had nothing to do with Round One or Round Two. It is, again, a matter of criteria.

Q It is the nature of the CP process, right?

A Right. The FSAR submittal of the operating license will contain much more detail about the design of the plant, the analyses that have been performed and so forth and at that time I would suspect many of the kinds of things you are thinking about would be discussed and reviewed during the operating license stage rather than the CP stage.

Again, criteria versus details is the distinction generally between CP and OL as far as the review is concerned.

Q Now, you did say there is an FSAR submitted with the CP application?

A No. That would be a PSAR, a Preliminary Safety Analysis Review.

Q One difference between the PSAR and the FSAR would be the matter of detail?

A The amount of detail, yes.

Q Fine. So that is Round One questions. What is the next thing.

A All right. Again, we review the responses to the Round One questions and issue so-called Round Two questions which, again, is entitled or theoretically entitled Staff Positions, which in fact may contain many questions in addition to positions by the Staff.

Q What are Staff Positions?

A A Staff Position is a statement by the Staff that we require such and such a feature or a criteria or a design requirement or whatever it may be.

Q These would usually be matters that the applicant has not already included within the application?

A Not necessarily. It could be that, yes. It could also be a question of disagreement between the applicant and ourselves. The applicant may, in response to a question, may respond in a way that we consider unsatisfactory or incomplete or what have you. And we would then issue a position statement what we require the system or whatever the item of review is to include.

Q And this would also raise further questions?

A And it may raise and frequently does raise additional questions, that is correct.

Q All right. What is the next step?

A Again, theoretically, those are the two rounds of questions. In practice, Round Two questions generally cover an extended period of time.

There are questions asked over that period of time or positions taken as the case may be.

The culmination of the review process, of course, is the preparation of the Safety Evaluation Report, which would happen at the end of the review process.

The Safety Evaluation is, of course, a report to the world of our review. It states what we did in the review and describes the design - - it describes the design for the CP or OL, as the case may be. It discusses what we reviewed

and what our conclusions about the review are.

If there are still items that are unresolved, which is, again, frequently the case, those are identified in the Safety Evaluation Report. Both in the body of the report and in one of the introductory sections, they are listed and identified.

The review, of course, is a continuing process, really from the time of submittal and the - - okay. The SER is issued formally. The open items are, even during the time of the preparation of the SER and its publication, are being worked on by the Staff and the applicant in an attempt to resolve these in any way that is acceptable to both sides.

The next step, the next formal step in the process would be a session or hearing, if you will, with the Advisory Commission on Reactor Safety Guards, ACRS, who examines the record up to that point, the FSAR and the Safety Evaluation being the principal documents, and does a review of their own of the plant.

They then write a report to the Chairman of the Commission as to what they consider to be problems in the design.

Q The ACRS at that point is looking for problems of

design?

A Well, okay. I said that.

Q What is the focus of this review?

A The focus of their reivew can be anything. They are an independent agency and they could look at any aspects of the thing they want. However, they understand what a CP is supposed to be for and an OL is supposed to be for and they are examining criteria essentially the same way we are.

Q Is their focus essentially on safety matters?

A Safety entirely.

Q Just safety?

A Yes.

Q Is it fair to say that the entire review process you have been talking about here, from CP application on from a Project Manager point of view, the primary focus is safety?

A From the licensing project manager's point of view, yes. That is from the point of view of my job, yes, entirely safety.

There is, of course, another aspect of this and that is environmental matters which generally review in parallel under the guidance or management and responsibility of an

Environmental Project Manager, who has similar responsibilities in the environmental world.

Q That is something I was not aware of. There are two Project Managers then that are at least involved in a project as it comes in for licensing. One is the Licensing Project Manager and the other is the Project Manager, correct, in the environmental field?

A The Environmental Project Manager, yes.

Q Above them, is there a senior project manager?

A No. The phrase "senior project manager" really refers to the level, I suppose - - in general, a project is assigned either to a project manager or a senior project manager. It is related to a GS grade and other factors.

Q Is the senior project manager usually a licensing project manager or can he also be an environmental project manager?

A I don't know how they or what the job titles are of the environmental group.

Q But if I understand the distinction, the licensing project manager looks at the questions of safety and the environmental project manager is looking at questions of environmental discharge, and things like that?

A That is correct.

Q The ACRS prepares, then, a report to a commission?

A It is a letter report, two or three or four pages, you know, that kind of thing. And they raise questions of their own or reinforce questions that are still open which have been identified by the Staff, and require or recommend that they be kept informed of the resolution to these items or that the Staff resolve them itself or that certain things be done prior to issuance of a CP or what have you.

Again, they can impose any requirements they see fit. I should not say "impose." Their's is an advisory function, but their opinions are given considerable weight by the Staff and presumably by the Commission.

The next step in that path would be continuation of the review in the sense that the open items are continuing to be resolved and any new issues raised by the ACRS are also addressed. A supplement to the Safety Evaluation would then be published which does both those things, resolves open items and addresses and resolves additional items by the ACRS.

Q You say a supplement to the SER?

A That is correct.

Q All right.

A Frequently there are several supplements. Perhaps not. There may be just the one if there are no open issues after that supplement. There might just be the one.

There have been as many as - - I have seen as many as 8 at times on plants.

Q All right. Once those supplements have been prepared and those open items have been resolved in that fashion, is that the point at which the construction permit is issued?

A Well, there, of course, is the hearing process which proceeds somewhat independently.

Once the SER is issued, the hearing process generally begins in earnest, let's say, the Safety Evaluation being the Staff's principal evidence or testimony as to our safety review.

Again, there are essentially two hearings, a safety and environmental hearing held together.

The hearings generally begin, as I said, sometime after the issuance of the Safety Evaluation, perhaps after some supplements have been issued as well.- And that process continues for whatever length of time, culminating in an initial decision by the Atomic Safety and Licensing

Board, which is the body conducting the hearing. This initial decision will frequently authorize issuance of a license or a construction permit, as the case may be.

The issuance of that permit will generally be accomplished by the Staff when it, that is the Staff, is satisfied that the open issues are satisfactorily addressed and any requirements of the Board are satisfactorily met, and then the CP or Operating License will be issued.

In the case of a CP, construction then begins.

Q Who actually issues the CP?

A The CP is issued by the Staff. It is generally signed by the Director of Project Management.

Q All right. Now at that point, then, the utility is permitted to go out and begin actual construction on the plant, is that correct?

A That is right.

Q And I presume that that can proceed as slowly or quickly as the utility and its contractors manage to accomplish?

A That is correct.

Q All right. Throughout that construction process, does the Division of Project Management have a role to play once the CP is issued?

A I assume you are talking about the period between the CP issuance and the tendering of the operating license application, is that correct?

Q That is right.

A It has a role to play but a relatively minor role. It is a responsive role in the sense that the applicant is required to notify us of any changes in design criteria, for example, during this period, to which we must respond. That is, we must address these changes and, not having done this myself, I am not absolutely certain of the details of the process. But any such information must be addressed and the Staff much be satisfied with the change.

Q Does the Division of Project Management at that point make any attempt to insure that the utility is complying with the restrictions or the conditions that may have been imposed in connection with the construction permit process?

A That is usually done by I&E, Inspection and Enforcement.

Q I&E takes over that?

A Yes. It is their responsibility, the Inspection and Enforcement Office. And, of course, if they need any support in accomplishing that task, they of course ask us

for it and it would be furnished.

Q Once the construction phase is completed, the utility at that point would tender an application for an operating license?

A Not quite.

And operating license can be tendered at any time. Almost always, of course, the construction phase is not completed at the time of tender.

Q They try to anticipate it?

A Right.

The general time span for our review for an operating license is - - well, it varies from time to time, but 24 to 30 months is the time span which we suggest be allowed between the time of tendering of an operating license application and the expected fuel load date.

The actual time varies, of course, depending on the construction time, the hearing process at the operating license stage, variations in our review generally are anticipated, such as the Three-Mile accident and the effects it has had on other reviews inhouse.

Q So the utility will try to estimate when they are likely to be in a position to load fuel and back from that try to file its application 24 to 30 months prior to

give them the necessary lead time?

A That is correct.

Q Okay. They file an OL application at that point?

A Correct.

Q And what kind of supporting documentation do they submit with the application?

A Similar to the CP, the principal document from a safety standpoint is the SFAR, the final safety report, which is similar to the CP but it contains more detail to the design and the analyses that have been performed and so forth.

The review process is quite similar to the CP review. The principal difference between them is in the hearing process itself where the items addressed at a hearing are only those contentions raised by intervenors rather than a complete examination during the hearing process of the entire application, which is permissible and is usually done during the CP hearing.

Q Something which has come to my attention at several times is, I believe, in connection with these hearings you are now talking about, Mr. Silver, if an intervenor comes in and raises safety issues - -

A Yes.

Q - - that the intervenor feels apply to the particular plant that is proposed for OL, and it is determined that those safety considerations apply really to many many more plants as well, how is that treated at this hearing stage?

A The hearings are plant specific. That is, the hearing deals with one plant only. As a general rule, there have been hearings on generic issues, that is, issues which affect many plants, done in several ways that I have seen, where perhaps one plant is a lead plant for the issue and an issue is thrashed out on that plant with participation by intervenors or groups or individuals, or whoever, and utilities and staff people are involved with other plants as well. The Radon issue, which ^{Perkins}~~per chance~~ was the lead plant, Three-Mile Island was a participant, and this is an example of that.

Generally speaking, however, the hearings are for a specific plant.

Q And, therefore, if an intervenor raises a generic safety issue, is that simply taken due note of and assigned for examination in connection with examinations of other intervenor issues, as they may come up?

A If an issue is raised - - well, as far as the Staff

is concerned, if an issue is raised any place, any time, that applies to other plants, it is considered in whatever might be the appropriate way. In fact, it would be treated as a generic issue and attempted to be resolved generically rather than focusing each time on each plant which, of course, is the efficient way to do it.

Q But in the meantime, this particular OL application in which this generic issue was raised would proceed in due course, is that right?

A Yes.

Q Let me take an easy example, a broad issue: The disposal or storage of radioactive waste, intervenors always seem to want to bring that up in these hearings and if I understand what you are saying, if you are considering licensing a particular plant and an intervenor comes in and wants to raise issues about radioactive waste, where it is going to be stored or handled, et cetera, that would be assigned to a generic list in connection with the treatment and resolution of generic issues and the specific plant would proceed through the licensing process?

A That is correct.

Q Unless it was a lead plant, as you said, for generic issues that comes up on occasion?

A Well, again, the only one that I am aware of is the Radon issue, which is very similar, submissions from Radon from mill tailings during the fuel manufacturing process. It really has nothing to do with the specific plant. All fuel must come from uranium mines somewhere and treated and processed somewhere.

Q Suppose questions were raised about the basic B&W design for a plant? Would that be considered a plant specific objection or would it be, again, a generic issue which would be resolved across the board?

A It could be either..

Q See, this is something that we have been - -

MS. MOE: I am not sure it is totally clear, at least from the two examples you were talking about, whether you have to resolve problems of radioactive waste or Radon before going on with the licensing because, for example, the question of radioactive waste has been whether or not that has been dealt with, has been challenged in court and there has been, you know, so far judicially sanctioned resolution.

It may not be a final resolution of what is going to happen, and that is why it is considered a generic issue, but it is sufficient for purposes of licensing the plant.

MR. KANE: So there hasn't been a final resolution, but there has been a resolution for purposes of proceeding with licensing plants.

MS. MOE: Right. And the Radon example, I don't believe any plants where that has been an issue have received their OL's yet, have they?

THE WITNESS: Three-Mile Island was one.

MS. MOE: All right. But the question of Radon is still being considered at present?

THE WITNESS: Yes. It still is and I suspect will be for some time.

BY MR. KANE:

Q As a matter of fact, there is some 12 or so generic safety issues which have been - - well, the latest NRC publication identifies 12 which are still being worked on.

A Yes. But they are not all in the hearing process. As a matter of fact, I don't think any of them are involved specifically in a hearing process.

Q But they are issues that apply generally to nuclear reactor plants and, therefore, they would not be considered in any specific plant hearings?

A That is correct. But in each case there has to be a finding that the plant is safe for continued operation, even

if this generic issue has not be resolved.

Q So if you can find some temporary or interim way of dealing with the problem until a final resolution can be achieved, is that the procedure?

A Basically, that is it, but "temporary" carries a connotation that is not quite right.

In fact, the plant may very well be able to continue operation for its entire life without a particular issue being resolved, fully resolved.

Q I guess what I wanted to get to, because this terminology has come up again and again, is just how generic does a safety issue have to be in order to be generic? I have heard differing definitions.

I have heard some people say that all it has to do is apply to more than one plant. If it applied to only two plants in the entire country, would it be a generic issue?

A I am not the decision-maker, nor would I be in any case I could think of as to whether an issue should be considered generic or plant specific. But my personal opinion is that if it applied to two plants, it should be treated as plant specific and not be a generic issues.

Q In your experience, have generic issues applied to a large number of plants?

A Yes.

Q So, if I asked you if three was enough - -

A I don't know the magic number.

Q All right. But it is usually a lot of plants?

A It would usually be a class of plants, perhaps all Westinghouse plants or all , or some class or group, something like that.

Q All right.

You said that the OL process is very similar to the CP process in some ways and one of the differences you noted was in connection with the hearings.

Are there any other significant differences between how the OL process and the CP process are carried out?

A As far as the process, not much.

Q There is more focus on detail, of course.

A That is not a difference in process. The process is similar. The nature of the review is different. The focus is on details of design, insofar as we do focus on that, and the focus is on completed analyses rather than analyses which have been started but not completed, as might be the case in the CP review or perhaps had not been started at that time.

Q Is there any look at that point during the OL

process at problems that may have arisen during the construction phase, environmental factors that may have come to the attention of the utility that had not been previously recognized problems that have arisen in terms of the actual construction itself, stress weaknesses, things of that nature that may have come up?

A You mean that - - I am trying to understand your question. I don't think I do.

First, again, as a licensing project manager, a safety project manager, I don't have anything directly to do with the environmental matters. But any new information on any subject which has become available during this interim should be - - well, it is required to be discussed in the OL application, and would be reviewed at that time.

Q All right. You say the OL process then takes about 24 to 30 months?

A Yes.

Q Are there any other significant differences between the content of the process and what goes on at the CP stage?

Well, is there another SER that is issued?

A Yes. There is an SER issued at the end of the operating license review which is the same process-wise, again,

is similar to the earlier CP review.

Clearly, though, issues cannot be left for some future time generally in the OL review. They should be resolved during the review.

They are left sometimes as licensed conditions to be resolved at some, or to be implemented perhaps at some usually near future time.

Q Has it become more and more common practice in recent years for open items to be attached and noted in connection with the issuance of the OL? What I have in mind is, for example, I have seen some of the conditions that were outstanding at the time of TMI 2 and I forget how many, but it is some 13 or 15 items maybe.

Is that a usual situation these days?

A I don't think it is unusual. Obviously, I have not read all operating licenses issued in the last few years and I don't know what is in them, but my impression is that there have been operating licenses with fewer conditions and probably some with more conditions. I don't think this is an unusual number of conditions.

Q So it is usual or frequent to have some open items still extant at the time that the OL is issued?

A Yes, it is usual.

Q Again, when the OL is issued, who issues that?

A It is signed by the Director of Project Management.

Q What role does a Project Manager plan after the OL is issued?

A There is a period of time, again, I will speak generally, there is a period of time between the issuance of a license and transfer of the project to the Division of Operating Reactors.

This time span varies depending on many factors. During that period, the licensing project manager continues to be responsible for the plant. That responsibility would include assuring satisfaction of license conditions, writing amendments to the license to document removal or satisfaction of these conditions, maintaining contact generally with the utility to assure that it would be aware of what is happening in the start-up procedures that are ongoing after issuance of the license.

Q Would the project manager, during this phase, before being transferred to DOR, keep a close tab on safety problems as they arise?

A Yes. I would say so.

Q How would the project manager go about doing that?

A Through personal contact, through personal contact

that is with the utility and I&E, Inspection and Enforcement, which is frequent especially during the early phase of start-up.

Q When you say personal contact, do you mean going out to the site or - -

A Going out to the site, but generally telephone contact which would be frequently daily, even several times a day, you know, when the situation demands it.

Q So you would be talking on the phone with the utility. Would you also be talking on the phone with I&E?

A Yes. Also, of course, formal notification of events is made. LER's, that is, Licensee Event Reports are published, are submitted by the applicant. Again, the regulations define the conditions under which this must be submitted.

Q Would the project manager make it a practice of reviewing these LER's that come in for which he is responsible during this period of time?

A They are in fact distributed to the project manager, among many other people of course, and I can only speak from personal experience, but I read them all and make a judgment as to whether some further effort on the part of the Staff is appropriate. The responsibility lies with I&E. Normally, they are responsible for resolving

any problems identified in LER's.

Q But as project manager you would try to play a role in that process, I take it?

A Yes.

Q If you, for example, received an LER in a facility for which you were responsible, you read it and you identified the safety problem about which something should be done, would you check with I&E to see if they were doing anything on it?

A Yes.

Q And if you had any feeling that I&E was not taking the correct steps, would you try to give your input as to what should be done instead?

A Yes.

Q And you would make some independent determination as to whether or not you thought what was being done was adequate?

A Yes.

Q All right. Would you then follow-up to see to it that in fact the licensee, the utility was carrying out the appropriate steps that had been determined by I&E and by you, for example?

A No. Again, officially it is I&E.

MR. KANE: Off the record.

(Short recess taken.)

MR. KANE: On the record.

BY MR. KANE:

Q Before going off the record we were talking about the time before the transfer of the project to DOR and after OL issuance, and we were talking about examination of the LER's and follow-up action that may be taken based on that.

A Right.

Q I think you indicated to me that the project manager plays a pretty active role in that regard, during the time that he still has responsibility for the project, in terms of reviewing the LER's, in determining whether there are problems. If there are problems, to follow-up to see what I&E intends to do about it. Give his own input as to what he thinks should be done about it and then, thereafter, to generally see to it that the utility is following-up to take the steps that is necessary or deemed necessary by the NRC.

A That last step is generally done by I&E. Most LER's are not of a nature where NRR action would be necessary or appropriate. I would say the very vast

majority are and should be handled by I&E who, of course, has the responsibility and technical capability and should do this.

Q You have been a Senior Project Manager since October of 1973?

A No.

Q All right. Then I am misreading your - -

A That is not quite right.

Q I am misreading the first paragraph on Exhibit No. 1.

A I guess it says that. That is not quite right.

I came here in October of '73 at which time I was a project manager. Again, it is a matter of a grade. I was a GS-14, which by definition is a project manager.

A year or so later, I was promoted to a 15, which is tied with senior project manager.

Q All right. So you have been - -

A So it is not exactly right in that respect. I had not noticed that before.

Q You have been engaged in project management at the NRC since October '73?

A That is correct. And there is no essential difference between the functioning of a project manager versus a senior project manager.

Q Over that period of time, from October '73 to the present date, how many LER's do you think you have read? Thousands?

A No. I would not guess thousands. Hundreds, I suppose, if I had to guess.

Q Have you ever seen a LER that did not have the language in it, "The health and safety of the public was not affected?"

A There are a couple of negatives there. You are saying that you think that most LER's have that statement?

Q I have read a few. I have certainly not read anywhere near as many as you, but the ones I have read all seem to have that language in them and I am just curious if you have seen one that did not have that language in it.

Is that something you have seen a lot?

A I have seen it a lot. I can't say I did not see any that don't have it.

Q Would you consider it unusual if you saw one that did not have that language in it?

A Well, most of them do it. I guess it would be unusual that some of them don't. But, again, most of them are quite minor.

Q Have you ever seen an LER that had that language

in it where it turned out in fact that the public health and safety was affected by the event described in the LER?

A No. I can't say that I have seen that situation.

Q Have you ever seen an LER that did pose a safety problem?

A Yes. I have, yes.

Q And have you ever seen LER's that required some follow-up to correct the problem that was set forth in the LER, that is, a safety problem?

A Let me try and make something a little bit clear.

The only plant I have taken through ^{license} issuance is Three-Mile Island. Most of the LER's I have read were those out of Three-Mile Island. I am talking of Unit 2 at Three-Mile Island.

I have seen other LER's, for example, on Unit 1 on Three-Mile, or other plants, but generally only specific ones on other plants where they are of interest to some class of plants.

Q But you have seen LER's that identified a safety problem which required some type of follow-up action?

A I thought they did or might, yes. Some, yes.

Q All right. Let me jump back for a minute to some of the general questions I was asking as to how the CP and

OL process works. You were talking about the FSAR and how that is reviewed by the Division of Project Management.

Does the project manager also take a look at the contractor's detailed engineering drawings?

A Let me clarify something. The Division of Project Management does not review the FSAR. They are responsible for the managing of the review. The details of the review, most of the details of the review are actually accomplished by other groups outside of DPM.

Q What other groups?

A Branches in what is now DSS, the Division of System Safety, and DSE, site evaluation, and other - - well, there are other branches within DPM that do reviews, detail reviews, quality assurance, safety guards, and I guess right now that is probably all of it.

Q Under those circumstances, I guess the project manager is fulfilling a function of coordination?

A Coordination, management and so forth. There are some portions of the FSAR that are reviewed directly by the project manager that are relatively minor.

Q Who would look at the contractor's detailed engineering drawings?

A The detailed engineering drawings - - there are many

kinds of detailed engineering drawings, but generally they are not submitted for review. There are some detailed drawings that might be considered detailed drawings in the FSAR, for example, P&IDs, process and instrument diagrams, which are drawings which show the basic piping and instrumentation and control of various systems. They are in the FSAR, at least those that are reported are.

Some electrical schematics are in the FSAR and lay-out drawings and things of that kind. But the actual drawings needed by the construction people to build the plant generally are not submitted.

Now, we have in recent years required submittal of many kinds of detailed electrical drawings for review or to at least spot check and they have been submitted separate from the FSAR.

Q Would the electrical drawings for the control room circuitry be submitted?

A Schematic drawings, yes. Yes. Frequently.

Q All right. And is that at the CP stage or the - -

A At the OL stage. Those drawings don't exist generally at the CP stage. The detail design has not yet been done.

Q What about failure modes and effects analyses? Are

they submitted for review?

A They are not generally submitted for review, would be my answer to that. In response to questions, there are requirements by the Staff.

Q But otherwise, they are not automatically submitted by the applicant?

A That is correct.

Q If they are requested by the Staff, at what stage would they be requested usually?

A During the OL review usually and any step along that process.

Q Under what circumstances would the Staff ask to see the failure modes and effects analyses?

A I can only answer that generally.

Q Okay.

A Where there is a feeling such that the failures might in some way affect the health and safety of the public. That is a very general answer.

Q That is good. I understand that. That is good because I understand very little about the process and the general stuff is a little easier to grasp for me.

How would it come about that the Staff would have some doubt on those points? Is that from reviewing other

documents where the Staff would think that there is a possibility that there is some problem and therefore want to see the failure modes and effects analyses?

A Yes. I would say that is the most likely way for it to come about.

Q Would the Staff get that kind of concern out of a review of the PSAR or the FSAR where that kind of thing would be generated usually?

A Yes. It could be, yes. I don't know how many times we have asked for this sort of thing either, but probably not very many.

Q That was the next question. In your personal experience, have you ever had to ask to see the failure modes and effects analyses?

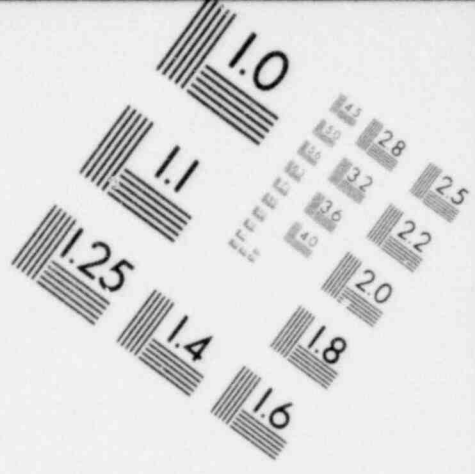
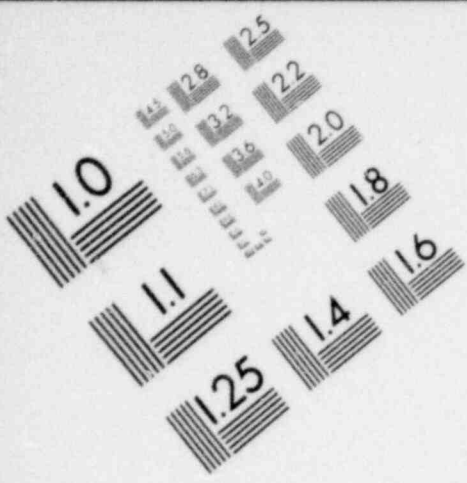
A I don't recall.

Q All right.

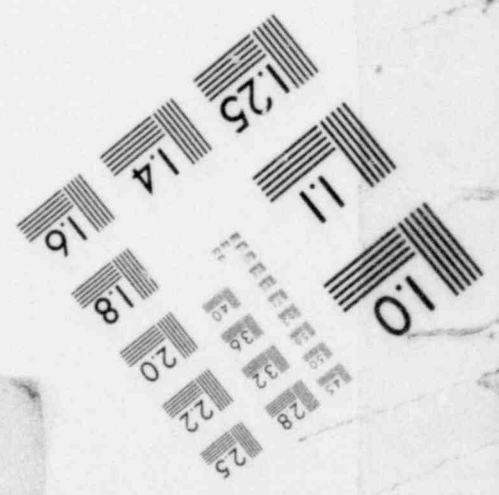
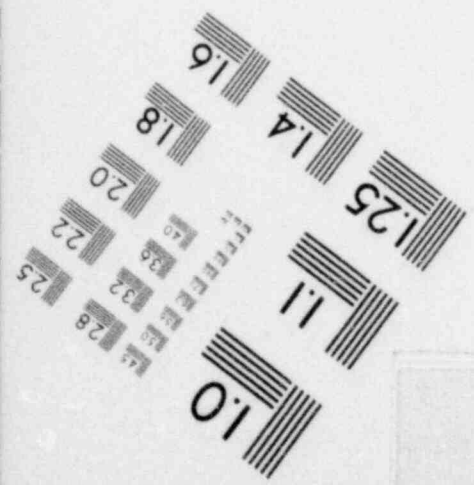
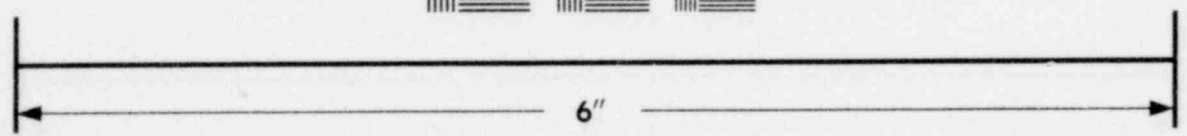
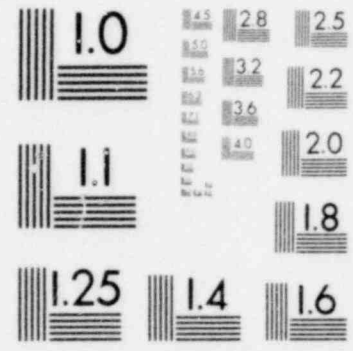
A On the plants for which I have been responsible, I don't recall.

Q Let me ask you about this point. How many plants have you been responsible for since you have been with the NRC?

A Well, let me try to name them. Plants for which I have had responsibility at one time or another. Do you



**IMAGE EVALUATION
TEST TARGET (MT-3)**



want names?

Q Just numbers.

A Seven or eight, I would say.

Q All right. In connection with any of those, do you recall whether or not you have had to ask to see the failure modes and effects analyses?

A I don't think we have asked for them, no.

Q Is it your impression that that is not a very usual course?

A Yes. That is my impression.

Q What about contractor's performance specifications? Are they customarily examined at any point in the process?

A I am not sure I know what you mean by performance specifications.

Q I guess I mean, you know, specifications relating to exactly how different tasks are going to be accomplished and by what deadline and with the use of what subcontractors and with the use of what materials, the gameplan for the actual construction.

A Your terminology is - - you have got a lot of things jammed in there.

We are aware of a construction schedule generally, not in great detail but of course the schedule does exist on

the site and is frequently reviewed by I&E.

We are aware of which principal contractors are doing what in general terms. Obviously, we know who the architect engineer is and what his general scope is and we know who the NSSS supplier is and their scope.

We know who the construction manager is, you know, things like that.

Q Is there anything submitted for review, however, in the way of documentation which would constitute performance specifications as such? I don't mean a little here and there, but a unified single package.

A Which defines the exact responsibilities of each of the contractors and subcontractors?

Q Yes. And what they propose to do and when they will accomplish this?

A No.

MR. KANE: Let's go off the record for a moment.

(Session off the record.)

MR. KANE: Back on the record.

BY MR. KANE:

Q Mr. Silver, I am informed by Mr. Bland, my technical advisor here, that one of the things that we wanted to focus on in connection with performance specifications would be

whatever documentation is provided to lay out what a piece of equipment must accomplish, for example, pumps, and the gallons of water per minute that they can move, something like that, the capabilities of the equipment.

A All right. Now let me understand what the question is, though. You defined what you are talking about, but what are you asking me?

Q Whether or not that type of information is presented in connection with the OL or CP process to be reviewed and evaluated by the NRC?

A Much of that information is presented in the FSAR, generally for safety related equipment, and for some non-safety related equipment as well.

Such things as pump flow, pump curves, that is head versus flow curves which define what the pump will pump against what pressure, and materials or at least major materials of construction for some safety related equipment, not all.

That kind of major requirement is frequently or is usually identified in the FSAR. It is certainly not a complete - - it is not anything that could be used by the engineer or whoever to go out and buy the pump. It is the very beginnings of what is required in a specification,

a purchase specification, for example, but it defines for us what we need to know about the capability of that pump.

Q Is there any other source besides the FSAR in which that is presented to the NRC or is that pretty much it?

A To my knowledge, no. That is it.

Q All right.

A Of course, there may be information in response to questions and things of that kind which become part of the FSAR.

Q Does the FSAR also address process specifications, how they are going to carry these things out, how they are going to do welding, to what specifications?

A Yes. In some cases it does that.

Q Would there be anything else presented to the NRC besides the FSAR that would address those types of considerations?

A No, not generally.

Q How about testing specifications, how they propose to go about testing the work to determine if it was done to the proper standards? Is that in the FSAR?

A In some cases, yes. Again, there are all kinds of tests and performance tests, actual system tests or hydrostatic pressure tests, or tests to see that a piece

of equipment does in fact produce the pump, for example, does produce the flow that they had specified. We have asked for test reports, things like that, which would not normally appear in the FSAR but are submitted and have been submitted upon request by the Staff.

Q Again, that would be a matter that would come up upon request of the Staff rather than an ordinary customary submission by the applicant?

A That is correct. These things generally - - well, almost always exist, that is, the applicant or whoever is doing the work ^{for} him needs to know that the equipment is in fact or will in fact do what it is supposed to do.

But that information is not generally submitted as part of the FSAR.

Q Does the FSAR address inspection specifications at all that are proposed by the contractor, how they go about inspecting the work once it has been accomplished?

A Again, in many place, but certainly it would not constitute the entire set of inspection requirements.

Q And, again, would any other documentation be customarily submitted to the NRC in that regard or would that - -

A No. Only on request in specific cases.

Q And at those kinds of requests would come up if the Staff can ascertain that there is some potential problem relating to safety?

A That is correct. Some of this - - well, of course, I&E, again, has the opportunity and the responsibility to look at much of this material in the field.

Q As it is being carried out?

A As it is being done, that is correct.

Q In that period, from OL issuance and prior to the transfer of the project to DOR, how often does I&E go out and do on-site inspections? Is it a continuous process?

A Well, again, that varies. At some plants we have resident inspectors. The guy is there essentially 100 percent of the time. It is supported frequently by other specialists from I&E.

In many older plants, we have not had resident inspectors, but during this period - - I would say since it is a period of heavy involvement by I&E, the presence of an inspector would probably approach 100 percent - - less than that, of course, but, you know, very heavy involvement during this period.

Q Has it been your experience that there would usually be one inspector who is out there on a pretty regular

basis?

A Well, they have a construction inspector. That is not the title, okay? I don't know the man's title. There is a principal inspector and a construction inspector, at least two people who follow this during the construction phase, supported by specialists in welding or in other areas as necessary.

During the start-up phase, which begins probably say a year before licensing, where systems are starting to be completed and turned over to the operating staff, the responsibility for inspection starts to shift within I&E to their - - I don't know again the title, but to the start-up inspector. So it is another group of people who are responsible for operation of the plant and they start picking it up during the period that the systems are turned over to the plant operation's people. And their concern is the function of the plant and its various systems as opposed to the construction.

Q If I understand what you are saying, that within I&E at any given time there is someone who is principally responsible for that plant in terms of the inspection and enforcement function during this period between issuance and transfer to DOR?

A Well, that would be in all cases the operations inspector at that time.

Q So there isn't a constant turn over?

A Well, there may be a turn-over, of course, but responsibility wise it is a single group and generally, of course, a single man. I am sure they attempt to maintain continuity.

Q So as Project Manager during this interim period, after OL and before transfer to DOR, on any given day or week you would usually know which individual you could call in I&E to find out what the status is from I&E's point of view on that plant?

A That is correct.

Q Are maintenance plans covered at all in the FSAR?

A The maintenance plans?

Q As proposed by the contractor for purposes of the utility.

A I guess I really can't answer that. The tech specs of course cover the surveillance requirement of the Staff with regard to equipment and systems, as far as surveillance testing and what have you.

Q What about ordinary maintenance, how it is to be performed on various items and how often and under what

circumstances?

A I would say no, not as far as ordinary preventative maintenance type things, oil changes, for example. No. And I don't think that would be in the - - that would not be in the FSAR or in any document.

Q Right. And would that usually be addressed during the licensing process at any point by the NRC, that is, evaluated to determine the accuracy?

A No, I think no. Again, other than the requirements we have for assuring the operability of the equipment and systems for safety which, again, is covered in the tech specs.

The applicant does submit a proposed tech spec in Chapter 16 of the FSAR which would contain their proposal for such surveillance. And to that extent, yes, it is in the FSAR.

Q All right. Is there any consideration in the FSAR of generic equipment problem reports, that is, prior problems that have existed with the particular kind of equipment that is being proposed to be used at the plant?

A I don't know that I can answer that specifically.

Q Well, let me give you an example. The PORV has come up, of course, quite a bit. Prior to March 28, 1979,

when the B&W plant was proposed for construction, at some point I presume the NRC would be notified in some fashion that it was proposed that the design would include a pilot operated relief valve in some fashion.

Is there any submission of information relating to prior problems with that PROV?

A No.

Q Would that generally be the situation with regard to all items of equipment that are proposed to be used in the plant? Is there any history of use and problems that is provided by the applicant as - -

A The applicant, of course - - let me go back to the previous question.

The PORV has not been considered a safety related item. It in fact is not given credit in any way in the safety analyses.

For equipment, however, that is relied upon in safety analyses, while the applicant does not, that I have seen, does not submit a history of problems with similar kinds of equipment in other plants, certainly this has been taken into account in the design.

I say "certainly," you know, I can't state that I know this as a fact. But I feel confident that that is the

case.

Q Well, the next question is going to be, why do you feel that would certainly be the situation?

A Well, I was educated as an engineer and I have worked as an engineer all my life and engineers get paid to do just exactly that.

Q So that the AE has done his job in connection with the utility, things have been considered?

A Yes. Now, certainly within the last month or year, it could not have been factored into the design, and people unfortunately do not always do their job perfectly. So there very well may be cases where such things were not considered.

But by and large, I am confident that they are considered and, of course, we are aware of the problems and do raise questions of problems and do raise questions about things of that kind.

Q Is there a regular procedure whereby the DPM is informed of the history of specific items that are safety related which are included regularly in CP or OL applications?

A Procedure?

Q In other words, if a new fellow comes into - - off the record.

(Discussion off the record.)

MR. KANE: Back on the record.

BY MR. KANE:

Q What I am trying to get to is how persons involved in project licensing are made aware of the history of problems that may have occurred concerning safety related equipment.

If a fellow comes into DPM and he is a new person and he hasn't had a lot of experience on the job, working for the NRC and someone hasn't picked it up that way and he is called upon to be involved in the licensing of a project, how would he determine whether or not certain safety related equipment, which is included in the license application, has or has not had a history of problems relating to safety?

A Keep in mind, of course, that the review is not carried out by one group or individual, the project manager, but rather the principal detail work and review is carried out by the response review branch, who is aware of continuing problems and let's call them generic problems, and would factor the group's knowledge of these problems and the status of the resolution of the problems into the review.

The project manager is also aware of these things, based on a variety of documents which generally are circulated.

Now, I can't say that any of this constitutes a formal procedure. I simply don't know. But there are a variety of documents that are distributed widely to reviewers and to project managers informing them, discussing the problems, minutes of meetings on general problems.

Q If I understand everything you have been saying, Mr. Silver, there is no formal process or requirement that the applicant submit a history or information relating to the history of safety related equipment that he proposes to include in his application, is that correct?

A To my knowledge, there is no such requirement, that is right.

Q And is there any usual practice that is followed where the applicant would submit such information or is that simply on a basis that the Staff might request it on occasion?

A Well, I would say that the Staff - - no, there is no usual process, again, but the Staff would certainly request this not on occasion but regularly, if it were in fact a problem that needed attention.

Q Is there any kind of open forum or open meetings that are held during the licensing process where reviewers that are working on the projects can present their findings on the project to other reviewers and/or to management at the NRC?

A I am trying to think how to answer this best.

There are a variety of forms in which this can be done. Project managers will frequently have project meetings. I don't know if "frequently" is the right word, but occasionally they have project meetings involving the reviewers on a particular project during which the projects may be discussed and such things can come to light.

The review, of course, in each particular branch is done generally by an individual or perhaps two or three individuals and the submittal of all such review information, questions, SER inputs and what have you, almost always, or I guess I can say always are through the section leader, through the branch chief and frequently through the assistant director in the line organization of the review organization.

So that there is, I would say, always two and usually three levels of review of the reviewer's work before it gets down formally to project management.

Now, informally, of course, there is continuing discussions between the project manager and each of the reviewers in his area. There are continuing formal and informal meetings between the project manager, or let's say the Staff including the project manager and appropriate reviewers and their management, and the applicant and his contractors.

There are continuing telephone discussions, primarily between the project manager and the applicant and his contractors and the reviewers where appropriate during the review process.

There is a wealth of opportunity to make one's feeling's known formally and informally on any matter that comes up in the review.

Q Is there any kind of practice of having like a bull session where, you know, a bunch of project managers get around the table and just throw out their concerns with their projects and concerns that they think might be applicable to other projects as well in particular?

A Sure. There are individual branch staff meetings perhaps once a week or every two weeks, you know, depending on the situation, the purpose of which is to discuss administrative matters and other kinds of formal business,

but also to discuss technical matters of these kinds.

Presumably, there are similar meetings in each review branch.

There are meetings, periodic meetings, less frequent I guess, of all the project managers to get together and discuss technical and nontechnical matters.

There is almost always a post ACRS meeting within Project Management to discuss matters which have been discussed at the most recent ACRS meeting which leads to all kinds of discussions, almost always technical.

Q I think that answers my question.

If the utility wants to make significant changes or modifications in its design at any point during the licensing process, does it have to go back to the NRC to obtain some type of evaluation or approval of that?

A It depends on the nature of the change, of course. If it affects the FSAR, it must be submitted as an amendment to the FSAR and it would be reviewed as part of the FSAR. Yes.

Q If it does not affect the FSAR, is there any requirement that it be submitted to the NRC for approval or evaluation?

A I can't specifically remember what the regulations

require, but basically I guess affecting the FSAR is probably broader than any of the other regulatory requirements.

If there is any change - - I would say this, that the regulations in one place or another require any changes in the safety system or in a safety related system to be reported to the Commission and for review and evaluation. This is normally done.

I mean, there are many changes of one kind or another during the design of a plant.

Q Would that wind up in the form of a supplement to the FSAR?

A Amendment rather than a supplement.

Q All right. A supplement.

A Again, the usual practice that I have seen would be when the applicant identifies that he needs or wants to make a change, he would carry this design of this change through to some point where he has something to talk about and would generally present this to the Staff at a meeting rather than wait until he had it finished enough to a point where the FSAR could be amended and discuss it with the Staff at a formal meeting but on kind of an informal basis, feel out the Staff, as it were.

We would respond at the meeting where possible, or later, if some more thinking or analysis had to be done.

Q All right.

A And the thing would progress through the normal process, review process.

Q In connection with that review then of a proposed change or modification in safety systems or safety related systems, would the NRC in any fashion usually evaluate detailed engineer's drawings?

A It has been done. I don't know if "usually" is the right word or not. Depending on the situation and the degree of - -

Q Is there a requirement that the licensee or the utility submit detailed engineering drawings in connection with a request for approval of a change?

A No. The level of detail would be commensurate with the level of detail already in the FSAR.

Q Would that be the same situation with regard to a submission of failure modes and effects analyses?

A Where they exist, yes.

Q And would that be the same situation with regard to changes to technical specifications that would have to

be made based upon that change in the design?

A Well, technical specifications don't exist until the license is issued.

Q I see.

Let's take the situation where the OL has been issued but before it is transferred to DOR.

A Yes. I see. Now, let me understand your question. My answer may be different during that period after the license was issued.

Q The OL has been issued and there has been no transfer to DOR. At that point the utility wants to make certain changes either in its safety systems or safety related systems and it is requesting approval by the NRC of that.

Does it have to, at that point, submit proposed changes to the technical specifications?

A If there are changes necessary in the ech specs, yes. There is no legal requirement, as I understand it, that the FSAR be maintained once the license is issued, maintained up to date. It usually is because I think it is convenient for everybody involved to do that. But I don't think it is a requirement of the law or a regulation.

I am not a lawyer, so I don't know if that is

100 percent true. That is my understanding, though.

Q Well, I don't know either.

A All right. The way that this would be done normally is in the form of a tech spec change request by the applicant or the licensee.

Let us say the design has changed in such a way that the tech spec has to be changed. I think I said before the only way to change a tech spec is by amending the license to make the change.

The applicant would request the tech spec change and submit supporting documentation which in this case would include a description of the design change, his evaluation of the effect on safety and any other information that he feels to be appropriate.

This would be reviewed by the Staff, perhaps questions asked or official information requested, and an amendment to the license prepared, which includes the safety evaluation of the amendment which obviously includes the change.

So that once the amendment is issued, defining the changed tech spec, it also contains an evaluation of the entire change, design change in this case, including the requested tech spec change.

Q All right. Aside from technical specifications, I asked you before in connection generally with the SFAR review and the general licensing review about performance process test specifications and inspection specifications. The terminology may be different from the way I am using it and the way you understand it, but I think you understood what I was talking about before.

As to those kinds of matters, do they regularly have to be submitted to the NRC for evaluation in connection with a request for a change in the safety system or safety related systems?

A Well, again, the tech specs do require surveillance of certain equipment at certain times or certain periods, requires operability, which is defined in the tech specs of those systems and equipment, and any change in those things is in fact a change in the tech specs and must be accomplished via an amendment and evaluated.

Q And that would be covered by what you just described related to the tech specs?

A Yes.

Q Aside from the tech specs, would there be anything regularly done or required in that regard? I take it that many of the things that you say are in part covered

by the tech specs?

A That is correct.

Q And I think I understand the process that you have explained there, but what I am trying to - -

A Things that are not covered is what you are getting at?

Q Yes. That is right.

Again, my only question is is that regularly submitted or is it the kind of thing if the Staff perceives a problem and requests it of the applicant.

A The applicant or licensee is free to make changes that are not covered by the tech spec without NRR approval. Now, again, I&E is in this act, for example. Okay?

We do not review the detailed operated procedures except in particular circumstances. I&E does to whatever extent. They would review changes in procedures and accept or reject or discuss with the applicant these changes.

Q That would not be a function of the project manager as such?

A No. No. Again, basically, things that are not part of our review in the first place are not part of our review when they are changed.

MS. MOE: I just want to add one thing, and see if what my understanding of what you said is true, if they also do not involve a nonreviewed safety question, right?

THE WITNESS: Yes. Right. There may be an entire new issue raised by a proposed change.

MS. MOE: I want to make that clear.

THE WITNESS: That is quite right.

BY MR. KANE:

Q What about required changes in maintenance plans or quality assurance programs that might be triggered by this change in design safety systems or safety related systems? Would that be submitted to the NRC regularly?

A Maintenance plans, no.

Q Would that be submitted to the NRC regularly in connection with a request for approval of design changes?

A Yes. Certainly the change in the QA program would be part of the submittal.

Whether the maintenance program would be I guess depends on the particular circumstances. I don't know that I can answer that generally. But certainly if there is a change in the QA program, which has been approved as an integral part of the review, it would have to be part of the request and would be reviewed as part of the or during

the approval or review.

Q To the extent that the QA program had been reviewed in the initial licensing process, any changes to it necessitated by changes in design would also be reviewed?

A Correct.

Q You state on your resume here that we have marked as Exhibit No. 1, that you have been assigned to Three Mile Island Unit 2 since May of 1975.

What was the status of that unit in the licensing process at the time you took over in May of '75?

A It was part way through the Q-2 process, second round questions.

Q So you then carried it through the second round questions?

A Yes. To be a little more specific, some significant fraction, more or less half, I don't now remember the numbers, of the round 2 questions had been asked, some fraction of the responses had already been received and some fraction of those had already been reviewed and so forth.

Additional round 2 questions were asked and additional responses received and an additional review made after I was assigned to the project.

Q Were there any unusual problems that came to your

attention in connection with the second round questions?

A No. There is always something different on any case, but I couldn't characterize it as unusual.

Q Were there any generic safety issues that were raised in connection with that portion of the Q-2?

A New generic issues?

Q Yes.

A No, I don't think so. Well, perhaps one item, maybe steam generated ^{or} tube problems.

There had been steam generated ^{or} tube problems on other PWRs, mostly Westinghouse and some combustion problems.

Up until that time, at the time of the Three Mile Island review, there had been no steam generated ^{or} tube problems on B&W plants. Some did start to crop up on Okinee and other B&W plants late in the Three Mile 2 review, different kinds of tube problems.

These were considered in the review of Three Mile Island and in fact Three Mile Island was participating in a test program sponsored, I guess, by B&W to try to identify the cause of the problems and potential solutions.

Q Were there any questions raised at that time in the process of the second round questions relating to the

basic B&W design safety issues?

A Basic design? No. That is a very general question. I think, obviously, you are aiming at something. Why don't we get there.

Q All right. I have a few things in mind but, frankly, one of the purposes here today is to find out more than just some of the things I have in mind.

So what I am asking you is whether or not there were any significant generic safety issues that were raised concerning the B&W design that you can recall in connection with the second round questions on the TMJ-2?

We are talking specifically about the B&W scope of supply.

A Well, okay. The steam generator tubes could certainly be one of those.

Q What were the problems with the steam generator tubes?

A As far as B&W was concerned?

Q Yes.

A Okonee developed some perforations, ~~whole~~^s in some tubes which had to be plugged^d in the steam generators.

Again, this is not unusual. It has happened in other PWRs to a far greater extent in fact than on B&W

plants and they just started some few instances on the Okonee plants.

The tentative conclusion at the time was that they were caused by mechanical vibration flow induced vibration in the steam generator.

Q There was some thought then that that problem might apply across the board?

A That is right. It might be a generic problem. And, in fact, since Three Mile 2 was approaching start-up at the time, it was felt that it would be a good plant to examine to try to identify if there is a problem and, if so, what the problem is and how to fix it.

Q What was the result of that examination?

A Three Mile did an EDDY current examination of every steam generator tube on one of the generators. I don't know if it was A or B, which was the first time that has ever been done. Generally it is done on a sample basis.

They examined 100 percent of the tubes as base line, a pre operation base line, identified some tubes where the wall thickness was diminished and in fact plugged some small number of tubes before ever running the thing.

They instrumented tubes which they felt were -- if

vibration were the problem - - were likely to vibrate so that they could judge that they were in fact vibrating and how much and how badly and they also fitted some tubes with stiffeners to minimize the effects of vibration and instrumented those as well.

This was done, again, on an experimental basis and had nothing to do specifically with the Three Mill tube, but rather it was dealt perhaps with the B&W plants generally.

Q Was the determination made that that would be an adequate solution?

A No. This was an investigatory program, not a solution. Again, there was one solution that was thought would do the job and it was implemented but, again, it was instrumented to determine whether it was doing the job.

Q Was the determination made that it was doing the job?

A No. There was no determination ultimately made. The program, as I recall it, was to look at the thing at the first shut down, the first scheduled ^{refueling} ~~review~~ look at the physical tubes, do a re-examination, another EDDY current examination to see what had happened to the tubes to determine now what the problem was and did the implemented

effects in fact do something to help it.

Obviously, this was never carried out.

Q Were there any other generic safety issues raised concerning B&W plants in this portion of the TMI-2 licensing process, and let me take that from the time you took over in '75 until the time the OL was issued for TIM-2 in February of 1978.

A There were questions raised on generic - - there were questions raised on NPSH for various pumps, for example.

Q What is NPSH?

A Net positive suction head for pumps which are in the B&W scope supply. At least, I think they are. The containment ^{spray} ~~supply~~ pumps and the low pressure injection pumps.

It is hard to say whether these are generic questions. You always worry about NPSH because it is frequently fairly marginal in these plants. It depends upon the extent on the particular plant installation and this equipment furnished by B&W, but NPSH is largely the function of layout which is not the responsibility of - -

Q All right. Any other questions.

A I can't think of any, no.

Q Was there any consideration in this period from

when you took over in May of '75 until February of '78 about safety questions raised by the containment isolation actuation procedure for TMI-2, that is, that it was actuated upon for PSI in the containment building rather than some other criteria?

A I believe it was discussed.

Q Were you involved in those discussions?

A No.

Q Well, since you were project manager from that point on, how did it come about?

A Well, I don't specifically remember that it did come up, you know. I can't remember discussions, specifically, but I - -

Q Had that decision been made before your involvement?

A I would have to say yes, but I don't know that for a fact.

Q I think you mentioned the name before, but who was your predecessor at TMI-2?

A Beverly Washburn.

Q Is this a man or woman?

A That is a "Mr."

Q Is he still with the NRC?

A Ho. He is with DOE right now, as I understand it.

Q Do you know what branch within DOE or what he does at DOE?

A No. He is involved in some way with nuclear power, but I don't know what the connection is. We could get in touch with him.

Q In any event, coming aboard as of part way through the second round questions there certainly had been some extensive evaluation done on the TMI-2 application before your time and, undoubtedly, this question of had been evaluation at some point from the time you came - - well, at the time you came aboard, were you aware of any problems related to containment isolation actuation at TMI-2, that is, remaining questions about why it should be triggered to PSI in the containment building as opposed to anything else?

And let me say in that context that I have been informed previously by other persons at the NRC that the standard review plan requires actuation based on any two of three criteria, diverse actuation and at TMI-2, of course, that particular philosophy was not followed.

A That is correct. The design of Three Mile, of course, predates the standard review plan. I, again, do not specifically remember a discussion which said we should require them to add another diverse signal.

Q Is that a safety related matter?

A Yes. There are plants, of course, of the same general vintage as Three Mile which also have a single containment isolation actuation signal.

But, again, I don't recall a conversation or a meeting or a discussion which said specifically we should leave it as it is and not require anything more.

The SER specifically identifies what actuation containment isolation, but it does not discuss whether there should be diverse signal or not. . It simply identifies what is and the fact that it is acceptable.

Q Why was a diverse signal not required for TMI for containment isolation?

A May I look at the SER to see what words we said?

Q Certainly.

A The words in the SER are, "We have reviewed the containment isolation system and we conclude that it conforms with the intent of the requirements of general design criteria 54, 55, 56 and 57 in Regulatory Guide 1.11 and therefore is acceptable."

Q Where is the reference?

A It is Section 624 of the original SER on page 6-5.

Q What is the date of that SER?

A September of '76.

Q That is informative, but it really does not answer my question.

A Yes. Try your question again.

Q Why was TMI-2's containment isolation actuation not tied to diverse signals, and I take it that determination would have been made after the time you came aboard, since the SER is dated in September '76 and you came on board in May of '75.

A Well, that may be the case. The awareness of the Staff that it was the one signal and not diverse signals presumably predated my coming aboard, so - - and it may well be, I don't know, but it may well be that a decision was made prior to that, to September, as it was.

Q Are diverse signals safer?

A I would say yes.

Q The three signals that I recall being spelled out in the Standard Review Plan are PSI in the containment building, radiation and actuation of the HPI, high pressure injection.

Of the three, which is the safest single signal to use for containment isolation, leaving all considerations

aside except safety?

A If we use one, I would say containment pressure would be the one to use. In fact, I don't know of any plant that does not have containment pressure as one of the signals.

Q Which of the three actuation signals would be the one which would minimize, to the greatest extent possible, spurious containment isolation, unnecessary containment isolation from the point of safety?

A Minimize spurious actuations - - probably containment pressure.

Q So that is the one that would reduce to the greatest extent possible the number of incidents of containment isolation?

A Of spurious, unnecessary isolation, yes.

Q Which is the one that would give you the most spurious isolation?

A I don't know that I can answer that, but there are occasional safety injections in every plant, inadvertent, if you will, safety injections which probably would not have required containment isolation from a safety standpoint.

For example, there were several safety injections at Three Mile Island 2 prior to the accident and, you know,

had containment isolation been tied up with that signal, it would have isolated it and unnecessarily so.

Radiation devices, you know, there was never any significant radiation in the containment prior to the accident, but radiation instrumentation is frequently very sensitive.

Q And could trip it?

A It could have tripped it by itself at any time.

Q Let me see if I understand, because I am not sure that I do.

If you have a situation where you are likely to get the most incidence of containment isolation by, for example, HPI actuation, and you are likely to get the least amount of containment isolation incidence from use of PSI in the containment building, from the point of view purely of safety, with no other consideration being taken into regard, just safety, isn't it better to have more containment isolation incidence than fewer ones?

In other words, if you have got a system which is likely to trip and isolate more often, from strictly the point of view of safety, isn't that safer than one that won't trip or isolate on a less frequent basis?

A Not necessarily. I don't think the answer can

be answered definitely yes or no.

Q I had a feeling that was too simple.

A Well, isolating spuriously, without radiation containment, is meaningless. It performs no safety function.

Q Correct.

A Even if you do have some radiation of containment failure to isolate, it does not necessarily mean that any radiation is released into the environment.

Q For example, if we take TMI-2, because that is what my education has been in in that regard, there was no containment isolation for quite sometime. In the meantime, there were some releases of radioactivity into the environment.

Presumably, those releases could have been prevented by triggering containment isolation at some earlier period in the accident, at least in part.

A In part. I think that is right.

Some of the early thoughts about how, you know, the source of the releases have been subsequently changed, where it was originally thought that the containment sump pump backed out a lot of water, which it had, but subsequently it was felt that this was not the source of

most of the release.

Q It was the let down system?

A That is correct.

Q If containment isolation had been triggered prior to those emission or leaks from the let down system, would those leaks have been prevented?

A Probably so. On the other hand, we can discuss the other side of the question.

Isolation, if nothing else had been done, would have tripped the cooling pumps so that they would not have been available to continue cooling the core. Of course, they were tripped on and off by the operators anyway, but had the containment isolated immediately, the cooling pumps would have tripped immediately and perhaps more damage would have been done.

Q On the third hand, there is such a thing as the selected isolation system 2 phase.

A That is correct and many plants do this and, in fact, it is one of the requirements or recommendations in the Lessons Learned Task Force ~~Rule 57a~~ ^{NUREG-0578}, that the isolation be examined in terms of essential or nonessential systems and those essential systems, presumably those will permit the cooling pumps to operate, and not be tripped, on a

Phase A isolation but rather on a Phase B.

Q Are there plants of the same vintage as TMI-2 in which diverse actuation of containment isolation has been implemented and required by the NRC?

A I suspect so, but I don't know this for a fact.

Q Are there plants of the same vintage as TMI-2 in which two-phase containment isolation has been implemented?

A Let me just check something for a minute.

MR. KANE: Off the record.

(Discussion off the record.)

MR. KANE: On the record.

BY MR. KANE:

Q Containment isolation is what we have been discussing, Mr. Silver, and I guess the question is I wanted to ask to your recollection and understanding why was it not required that TMI-2 have diverse actuation of containment isolation?

A I cannot answer that. I don't know why it was not required. The vintage of the plant, again, the time of its design, was such that that requirement did not exist at the time and it was not felt necessary to impose the new requirement on this plant.

Q All right. I think you said you did suspect that

there probably were other plants in the same vintage in which diverse actuation was in fact utilized?

A Yes.

Q And I guess the question I want to ask is how can that situation come about that some have it and some don't have it, even if they are the same age?

A There are some others of the same general vintage that do have diverse actuation. How can it come about? Probably because one utility elected to do it and another did not.

Q And the NRC?

A The requirements of the NRC with respect to that were such that it was not required.

Q Speaking with twenty-twenty hindsight on the basis of safety, should diverse actuation containment isolation have been required at TMI-2?

A On the basis of twenty-twenty hindsight, the plant -- yes. The releases to the atmosphere would have been less severe had diverse either high pressure injection or radiation signal isolated containment, yes, been used.

But, again, whether or not that would have created an overall safer situation is not clear. There is not an obvious answer to that.

Q All right. It wouldn't have hurt, in any event?

A I don't know that.

Q Do you have any reason to think it would have?

A Well, again, you know, it depends on how far you carry it. If there were diverse signals and if appropriate essential and nonessential two-phase isolation would have been incorporated, it probably would have been safer.

If that two-phase isolation had not been incorporated but simply another diverse isolation signal, there might well have been less life or it might have caused more damage.

Q That was my next question.

Are there plants of the same vintage as TMI-2 in which two-phase containment isolation has been utilized?

A Yes.

Q Do you know how many plants there are that fall into that category?

A No, I don't know how many. I know of one.

Q Which one is that?

A The Sequoia.

Q That is a Westinghouse plant?

A Yes. TBA has the utility. And it does have diverse actuation and it does have two-phase isolation. The

CP was granted something like 6 to 9 months after Three Mile.

Q After Three Mile's CP?

A Yes.

Q Do you know when that plant got its OL?

A It has not yet got an OL.

Q I see. All right. That then clearly indicates that the option or the alternative of double phase containment isolation actuation was known to the NRC and to the industry in '75 and '76, is that right?

A That is correct. It was known for sure.

Q And the next question is obvious: Why was it not required at TMI-2 that they have two-phase containment isolation?

A I don't know, is the answer. I personally would have to give that answer.

Q All right. And, again, speaking with twenty-twenty hindsight, based on what you now know from the TMI-2 accident, would TMI-2 have been a safer plant with double phase containment isolation?

A Probably so.

Q Was there any consideration in this period from May of '75 when you came aboard on TMI-2 until initial

issuance of the OL in February of '78 to the fact that the B&W design and particularly the ~~once~~^{ce} through steam generator created a dangerously short period of response time for operators under certain transients?

A I think it was known that the response times were quicker. Whether they were felt to be dangerously quicker or dangerously short, I can't say. I think the answer on its face is they were not felt to be dangerously short.

Q You were the project manager. You did not feel it was dangerously short?

A No.

Q Was there awareness at the time of just how much shorter on a comparative time the loss of feed water was between the ~~116~~^{once through steam} generator used and the recirculation steam generator used by Westinghouse?

A I did not know the numbers. Other people who have responsibility for reviewing analyses and so forth presumably did, but I don't know that for a fact.

Q Was that comparison between the ~~ones~~^{ce} through steam generator and the recirculation generator brought to your attention through this period of May '75 and February '78?

A Not that I recall.

Q Do you know what that comparison is today in a loss of feed water transient?

A Well, I have a general idea, the time to boil kind of thing. One minute versus several minutes or perhaps even up to half an hour for some plants. I have not seen an actual side-by-side analysis or comparison, if there is such a thing, for an identical transient or initiating events.

Q Does a comparison of as little as 2 minutes versus as much as 30 minutes with the recirculation steam generator sound right?

A I have heard the numbers. I don't know the correct ones.

Q Speaking as a layman, that strikes me as a substantial difference in the amount of time for boil out and therefore the amount of time for operative corrective action.

What was the B&W philosophy in connection with TMI-2 with a substantially shorter amount of time before boiling?

A The analysis does not consider total loss of generator feed water but rather loss of main feed, as I recall it, loss of main feed with a single failure which would cause loss of one train of auxiliary feed water. And

given that, I don't think there is a serious problem.

Q All right. Do you think today that there is a serious problem? See, we have been focusing in the past. The NRC seems to draw a big distinction between pre TMI and post TMI.

A We are certainly considering the question of - - "we." Let me define that. The Lessons Learned Task Force, of which I happen to be a member, and presumably other people in the Staff are considering whether single failure is an appropriate design criteria.

I think that decision is a long way from being made. Three Mile has certainly raised the question very clearly and the question of if you decide that single failure does not go far enough, how far do you go. What do you do is something that is being thought about very hard, I am quite sure.

Q That is another question. Was there any consideration of that question, that is, the validity of single failure analysis to begin with in connection with TMI-2 during this period of May of '75 when you began until February of '78, when the OL was issued?

A Single failure was the law of the land, so to speak, and I guess it is no more than a guess that individual

people have considered that single failure may not be the best way to go.

As I understand in the past it took quite a while to establish single failure as a design criteria because of disagreements and so forth. I don't know any of this from personal knowledge.

Q Was there any consideration in this period from May of '75 until February of '78 when the OL was issued for TMI-2 of the validity or the adequacy of the B&W philosophy to run back rapidly from a scram without things of that nature? I understand that is B&W.

A To run back rapidly?

Q To recover quickly from a scram. To be able to bring the applicant back to normal operating condition.

A There was no - - As far as the Three Mile review was concerned, I don't remember that that philosophy was discussed specifically.

Q Let me come back to May of '75, when you came aboard. At that point, you have been assigned TMI-2 as Project Manager. I assume one of the first things you want to do is learn something about the plant.

How often did you visit the site between May of '75 and February of '78?

A Half a dozen times, perhaps. That is a guess.

Q Did you go out there soon after you were assigned the plant for responsibility, within a few months?

A Yes. I think I did. I was just trying to remember which was the first trip or when it was. It was quite soon after that.

Q How often were you on the telephone from that period from May of '75 to February of '78?

A To the site specifically?

Q Yes.

A Tell me the time period you are asking me about again.

Q From May of '75 until February of '78, how often were you on the telephone talking to someone at the site at TMI-2?

A In the beginning of that period, rarely. And I will explain that in a moment. At the end of the period, very frequently. Several times a day, perhaps. I would guess even on an average of twice a day as an average.

Q Why were you rarely on the phone at the beginning of the time period?

A During the actual licensing review, prior to the start-up phase, the people responsible for the review on the

applicant side was the GPU Service Corporation, which is in ~~Parsippany~~ ^{Parsippany}, New Jersey. And during the entire licensing process, they had the prime responsibility for the licensing of the plant for the utility.

This started to change when - -and this was the decided responsibility shift, this was not an accident or anything - - it started to change to Metropolitan Edison, the operating utility, as construction progressed to the point where systems were completed and turned over to the operating people for shakedown tests and that kind of thing.

So that there was a gradual turn over from GPU to Met Ed.

Q And as a result - -

A - - which was a natural and common kind of arrangement.

Q And so, therefore, as the process progressed, you would be talking more on the phone directly to the site because they would have more involvement in that?

A All right. Right.

Again, I must answer your question specifically. There is another location that is involved and that is the Met Ed Headquarters in Redding, which was also involved. So

many of my later conversations were with people at MetEd Headquarters and the site, rather than entirely the site.

Q But at least in the early periods, in the early portion of this period of May '75 to February of '78, if you wanted information about what was going on in the site that you wanted to get over the telephone, GUP Service Corporation in New Jersey would be the people that you would call?

A Yes, generally. I am not saying there were none, understand.

Q Sure.

A I did speak on occasion with the construction people and I guess there were GUP employees as well at the site. But that was relatively infrequent.

Q Who was your primary contact at the site?

A During which phase?

Q The early phase?

A Bill Gunn was the construction manager. That is, I am not sure if that is his actual title.

Q He was the on-site construction manager?

A Right.

Q And as time went on, who was your primary contact?

A At the site as opposed to Redding, is that right?

Q Yes.

A I spoke to Jack Herbein and Gary Miller frequently and several others of the people there. Again, Herbein, was in effect the plant manager at this time. Miller was the unit superintendent.

Q How often were you in contact with I&E people assigned to be doing in section out at the site during this period from May of '75 to February of '78?

A Again, that was not a constant thing. That is, the number of contacts per week, say, was not constant. It varied some. During the early part perhaps twice a week, as a guess.

Later, during the start-up phase, perhaps an average of once a day or some number in that range. It was quite frequent.

Q During this period of time from May of '75 to February of '78, did you regularly review correspondence between the NRC and the plant, correspondence between I&E and the plant? When I say the "plant" I guess I mean the utility.

A Between I&E and the utility. Is that your question?

Q Yes.

A Yes. The inspection reports, I&E inspection reports, I guess, are addressed to the plant, I believe. Maybe not. I don't recall. Yes, I guess they are.

There was certainly no indication of deficiencies addressed to the plant and I get copies of all those. Responses to those are addressed to I&E by MetEd and I get copies of those. At least I read them.

Q Was there much of that kind of correspondence prior to OL issuance for TMI-2?

A A lot of inspection, yes. Increasing numbers, as you get closer and closer.

Q Was there a significant number of safety problems prior to OL issuance to TMI-2 coming up in that correspondence?

A I would say no.

Q The operating license was issued in February of 1978. At that point, what role were you playing? You were, I guess, pretty heavily involved with start-up testing procedures and the results of that at that point?

A No. We do not - - well, we do review start-up test procedures. That is correct.

I would not say that I personally was heavily involved with that. I certainly kept tabs on what was happening at the site, what the status was, what special problems

there were.

Obviously, there are always a string of construction problems, things that need to be found, things that need to be corrected, errors found, omissions, things that are uncovered during tests and so on. I don't recall anything abnormal.

Q During the last three months before the Operating License was issued in February of '78 for TMI-2, what were you called upon to do in connection with TMI-2?

A All right. We had a hearing on going during that period, as I recall it. I know we had a hearing. It is just that, you know, the exact dates I am not quite certain of. But I am reasonably certain it was during that three month period. We were preparing - -

Q By the way, that was the OL hearing?

A The OL hearing, yes. And this went on for covering a time span of many months, not continuous, obviously.

So I was attending hearings, preparing for hearings, writing or preparing supplements. The second supplement, in fact, is dated February 1978, closing out open issues which, of course, is part of that supplement.

Q I am sorry. What is the date?

A February of 1978.

Q All right.

A Writing, preparing the license itself, deciding which items it was necessary to make license conditions, reviewing information from I&E as to the construction status and their list of open items, items that were not purely construction items which I had no direct involvement in, trying to resolve those as well.

It is in fact a very busy time.

Q At the end of that process, coming right up to I think it was February 8, 1978, the issuance of the OL, or something close to that, are you required at some point to sign off to indicate that you are satisfied as project manager that this project is prepared and ready for issuance of OL?

A Absolutely. My concurrence is necessary in the license signature chain. I prepared the license package and did in fact concur in each of the pieces of paper involved.

Q As to open items that are noted at that time, as you sign off at OL issuance, are you called upon to make some determination that they are going to be resolved in an expeditious fashion? I am informed, and unfortunately I

don't have it, that there is a list of open items related to TMI-2 at the time the OL was issued for TMI-2. I believe it is 14 or 15 items.

And I think you have testified that that is not that unusual and that that happens frequently with regard to OL's that are issued for plants.

What I am asking is, in terms of your signing off that this plant is now ready for OL issuance, are you called upon to make some assurance that those open items are going to be resolved in some satisfactory fashion?

A A license condition requires that they be resolved at sometime in the future.

Q What I am going to ask is the basis for that requirement being implemented.

Are you called upon to evaluate the ability, the incentive, the determination of the utility to in fact do that?

A Most of the conditions in the license are tied to proceeding to subsequent operating modes that provides adequate incentive to the utility. In fact, the schedule for those things was discussed between ourselves, myself included, and the utility to verify the feasibility so that it was not a unilateral schedule on my part but rather a discussion

and an agreement with the applicant - - they know they have to do this and, yes, they believe they can do it by that time. And a decision by myself and other Staff members is made that in fact such and so an item had to be done by that time from a safety standpoint to permit proceeding to the next operating mode.

Q All right. So the OL was then issued in February of '78.

Now, if I understood something which was discussed in the interview we previously had with you, Mr. Silver, sometime after OL issuance it is contemplated that you will be relieved of the burden of the project and it will be transferred to DOR. Is that correct?

A That is correct.

Q However, that did not occur in the case of TMI-2?

A That is correct.

Q And if I understood the interview we had with you, that that has not occurred even to this day, is that correct?

A That is right. There is on my desk a letter transferring it to DOR. It has been agreed. Of course, it is proforma now.

Q How did it come about that after the OL was issued for TMI-2, the project was not transferred to DOR?

A Okay. As I think I have told you earlier, a transfer package was prepared, if I remember, in September of '78 to start the process of transferring the plant.

We, that is Bob Reed, the DOR Branch Chief, into whose branch the plant would go, Jerry Swetzwig, the prospective DOR Manager and myself had a meeting to discuss this transfer package at which time we discussed the package item by item and they indicated a number of questions, comments, suggestions and what have you that they felt should be incorporated before transfer.

As I recall it, the reason it was not transferred had nothing in any way - - it is not my recollection but it is fact - - had nothing in anyway to do with the status of the plant or the status of the open items, but rather ^y business on my part, on other matters, and an inability to fully resolve the items under discussion between DOR and myself and DPM.

In addition, the plant did have other problems and it was down for some significant length of time replacing steam safety valves and so on, which I think you are aware of.

It was, I would have to say, simply a matter of priorities on my time and in retrospect I guess I did not make the correct choice, but so be it.

Q Well, there was a reluctance then on the part of DOR to accept responsibility on the plant until such time as some of these open items were resolved?

A No. I don't think that is quite right, although, it may be correct in some aspect. But, basically, it was a more detailed nature than that.

The transfer package defines who is going to be responsible for review of a particular item, who was going to retain management responsibility, that is project management responsibility for it and so forth and they quarreled with some of my -- again, I prepared the draft package and decided what I thought would be an equitable distribution of work. They did not entirely agree with this equitable distribution and suggested that it be changed.

And I think they had questions I remember in some cases items of clarity and so on.

I don't think there was any - - in fact, many of the items that could not be resolved were by license condition to be fully resolved at the first refueling, which

would have been some 18 months after February. So there was no way that they were going to get a totally clean package.

Q All right. Now, you mentioned several times that you came aboard TMI-2 in May of 1975 and I think you mentioned in connection with our discussion of generic safety issues that came up in the TMI-2 licensing process that there was a situation that came up from the Okonee plant relating to steam generated ^{or} ~~ed~~ tubes.

Did you generally make an effort from May of 1975 on to inform yourself about transients at other B&W plants that might bear upon safety questions relating upon TMI-2?

A I became aware, of course, of some of the more significant transients, for example, the Davis-Besse transient.

Q Did you become aware in that period of time of the transient that occurred at Okonee on June 13, 1975?

A I don't recall that one.

Q It is described in the special report that it was a transient that occurred on June 13, 1975 in which the pilot operated relief valve opened but failed to close. The HPI system was actuated and the pressurizer level rose rapidly.

Are you familiar with that transient?

A No, sir.

Q You are not familiar with it as of today other than what I have just told you?

A No. I think - - no. I guess I would have to say I am not.

Q Then let me ask you whether or not you were familiar with that during the time you were involved with the TMI-2 licensing process from May of '75 to February of '78?

A No. I was not.

Q All right. There was a transient which occurred at TMI-2 on - - before we come to that, let me ask you about the Davis-Besse transient. It occurred on September 24, 1977, in which the PORV stuck open, the pressure rose rapidly and the operator took action based on that to terminate or throttle back the high pressure injection which had come on.

Prior to March 28, 1978, were you aware of that transient?

A Yes.

Q When did you first become aware of that transient?

A Shortly - - some significant length of time prior to the Three Mile accident. I can't remember the exact time.

Q Can we reference it in terms of the transient? Did you become aware of it soon after the transient? September 24, 1973 was the date of the transient.

A Probably shortly after that, yes.

Q How would you have become aware of that transient?

A Discussions with - - initially through discussions with other project managers, including the Davis-Besse project manager.

Q Kind of a bull session type of thing?

A Well, an initial awareness, yes.

Q Was there anything about that transient which was of interest to you in connection with TMI-2?

A Well, it was a transient in a B&W plant which did not directly cause any serious safety problem even though it was, again, in retrospect, a precursor or an obvious precursor of the Three Mile incident.

Q Did you identify any safety concerns at the time you learned of this transient which needed to be addressed in connection with B&W plants?

A Did I identify any? No, I did not.

Q Did you inform yourself at all as to what corrective action was taken at Davis-Besse with regard to that September 24 '77 transient?

A Not specifically, no.

Q That answer suggests that generally you did.

A I was aware of what was going on. I was certainly aware that the appropriate review groups in this organization were aware specifically of a transient and its problems and the potential problems and that they were doing their thing in understanding it and resolving it.

Q Are you aware of any instrumentation changes that were made at Davis-Besse in response to that September 24, 1977 transient?

A No, I am not.

Q At the time you heard of this transient, did you recognize that it had features which were common to all B&W plants which needed to be addressed in some fashion on generic cases?

A Yes.

Q What were those things?

A Again, the basic design of the system involved in the transient, as you said, were essentially the same as most B&W plants.

Q Did you feel that this transient raised any safety issues which were applicable to more than just Davis-Besse, particularly applicable to other B&W plants?

A I was aware that it was applicable to other plants. Whether it raised the safety issues that required action to resolve it, I guess I can't say I was aware of that, no.

Q Have you ever reviewed data from Davis-Besse concerning that September 24, 1977 transient that related to reactor coolant system performance and/or pressurizer performance?

A I have seen plotted curves of the transient. I would say that is the extent of my review of the aspects of the transient that relate to your question.

Q Did you see those plotted curves before March 28, 1979?

A Yes.

Q Did you see them at the time you learned about the Davis-Besse transient?

A Close to that time, yes.

Q And having gone through that review, as far as you were concerned at this time there were no generic safety issues raised by that transient which required resolution at more than just the Davis-Besse plant, is that right?

A The review groups in this organization who are responsible for the systems involved in that transient were

aware of it and were reviewing it. I had confidence in the fact that they would do what had to be done.

Q All right. Let me see if I can rephrase the question.

As far as you were concerned, when you learned of what occurred at Davis-Besse on September 24, 1977, was this a plant specific problem only?

A No.

Q At the time you learned of what occurred at Davis-Besse on September 24, 1977, did you think that this transient posed potential safety problems for TMI-2 as another B&W plant, and the plant for which you were responsible at the time?

A No. I guess I did not think it posed safety problems.

Q And just so I can be clear, did you make any attempt to find out specifically what was done at Davis-Besse to resolve any problem created by that September 24, 1977 transient?

A No, I did not.

Q All right.

There was a transient which occurred at Three Mile Island 2 on March 29, 1978, approximately almost to the day

one year before the accident that has caused the creation of this investigation.

And that particular transient, again, involved the PORV sticking open. And also that transient would have occurred during a time when you still had responsibility for the plant, approximately a little over a month after the OL was issued for TMI-2.

Did you have any familiarity with that transient?

A I recall it, yes.

Q Do you recall that the PORV stuck open?

A Not specifically. But I recall there was such an event.

Q Again, it is described in the Nureg Report 80560.

Do you recall that that situation arrived at the time when there was no indicator at the control panel on TMI-2 to indicate the position of the PORV, I mean no indicator at all?

A Yes.

Q Do you recall that action was then taken to remedy that situation?

A Yes.

Q What was that action?

A To add an indicator which was done in a way that

perhaps was not the most effective way.

Q Was a command signal indicator signal installed at that time?

A Yes.

Q As I understand it, a command signal indicator indicate that an electronic command has been sent to a ~~solenoid~~^{Solenoid} to activate the valve.

A Yes.

Q It does not indicate what in fact the valve has done in response to the command. Is that right?

A That is correct.

Q Was there any consideration at this time of installing instead some type of indicator that would indicate the actual position of the valve?

A I can't answer that. I don't know.

Q Well, as far as you were concerned?

A As far as I was concerned, I am not aware of any.

Q Did you give any thought at this time to the necessity to use an actual position indicator rather than a command signal indicator?

A No, I did not.

Q Did you concur in the determination that a command signal indicator was sufficient to remedy the problem?

A No. I did not.

Q You did not concur?

A I did not concur in any resolution. I am not saying I would not have concurred. I just simply did not. I^t_A was within the perview of I&E to resolve this problem.

Q And, again, because the PORV was not a safety related item - -

A That is correct.

Q - - you would not have direct contact with it?

A That is correct.

Q All right. But you had kept yourself generally informed about the situation?

A Yes.

Q And you did not see any problem with it at that time?

A No. Not at ^{that} ~~this~~ time.

Q Is it also true that at the time this problem - - well, let me ask you this:

Do you recall why the PORV stuck open on that occasion at TMI-2 on March 29, 1978?

A You mean the actual mechanical reason?

Q Yes.

A No, I do not.

Q Do you recall that there was a failure of a bus which caused that PORV to stick open?

A Now that you mention it, yes. I don't remember the details of the incident.

Q Until I became involved in this investigation, I thought a bus was something you took to work in the morning.

Could you explain what that failure of the bus was that caused the PORV to stick open?

A No, I can't. I can't describe it to you.

Q Let me see if I can, in my stumbling nontechnical language, relate what I understand to be the situation and perhaps you can tell me if I am wrong.

If I understand the situation correctly, as of March 29, 1978, the arrangement for the operation of the PORV at TMI-2 was that as long as there was current in the bus the PORV would remain closed under normal operating conditions without being changed.

If there was a loss of power in the bus, if the current failed, the PORV would then stick open or fail open.

Does that sound correct?

A It sounds vaguely familiar. I can't say that it is correct.

Q Okay. There is nothing that strikes you from your engineering background as being out ragedously improbable about that explanation?

A No.

Q All right. That strikes me, again, as a dangerous situation in that if power fails it will fail open rather than failing closed, the PORV itself, just as a layman.

Why was the circuitry set up that way?

A I cannot - - I don't know.

Q The transient itself is described in the Tedesco Report and it is indicated that it stuck open because there was a failure in the bus, the current failed.

It is my understanding that the corrective action was to change the circuitry such that it would take an introduction of current into the bus in order to cause the PORV to open and that without current in the bus the PORV would remain closed.

Does that sound right? In other words, this was to remedy the problem.

A Necessary but not a sufficient situation to cause the valve to open. That is, current in the bus alone would not open a valve. Is that what you are saying, without an additional signal to ^{the solenoid.} ~~cellanoids~~?

Q Yes. In other words, it is my understand^{ing} they reversed it.

A Okay.

Q Before, it took current in the bus to keep it closed. Without current it would open.

A All right.

Q They reversed it such that it would take current in the bus to keep it open and that without current in the bus it would stay closed.

A Okay.

Q And that in connection with that, they also installed a command signal indicator.

A All right.

Q Does that generally sound right to you?

A Yes, it does.

Q All right. It also occurs to me that it must have been known at that time that the POPV's were being used at other B&W plants and in fact at many other pressurized water reactors. Is that correct or a fair assumption?

A All of them, I think, yes.

Q Do you know whether or not this type of circuitry that I have just described as having been used up to March 29, 1978 at TMI-2 was also being used at other B&W

plants in connection with PORV's?

A No, I don't know.

Q If that is in fact the situation today, does that create a safety problem - - loss of power it will fail open?A

A Okay. You are going back to the original circuitry. I would suggest that probably it ought to be changed, correct.

Q Are you aware of any attempt that has been made to do that?

A No, I am not.

Q I am not certain it is, but it is something that has come up.

Are you aware as to whether or not there is any kind of indicator at all for the position of the PORV on TMI-1, that is, an indicator in the control?

A No, I am not aware of it.

Q Are you aware as to whether or not there is any kind of indicator at all at Davis-Besse 1 to indicate the position of the PORV and when I say "any indicator at all," I mean command signal actual position or anything else?

A I don't know.

Q All right. To your knowledge, has this question of indicators or the position of the PORV and circuitry

controlling the operation of the PORV been addressed on any generic basis?

A It is an item in the Lessons Learned Task Force recommendations that valve position indicators be added for the PORV's and the pressurized safety valves as well, as - direct position indicators.

Q All right. At the time of this transient on March 29, 1978, was there any determination made by the NRC, to your knowledge, as to whether or not this constituted a generic problem among B&W plants?

A I have not heard of it. I am not aware of it.

Q Let me show you a document which is really three separate documents stapled together but which has come to our attention in the course of this investigation.

They are, I believe, arranged in inverse chronological order or reverse chronological order. The bottom document is entitled, "Action Item Contro. Form," and I believe this relates to the transient we have been discussing.

The second from the bottom document is dated March 31, 1978. It is a memorandum from Mr. Sternberg who is the Acting Chief Reactor Projects Section No. 1, which is some branch within the NRC and it is a memorandum for

Mr. Seyfrit, A/D Technical Programs, Headquarters.

The last document, which is the first page of this collection of three, is dated May 3, 1978. It is from Mr. Seyfrit, again, to Mr. Brunner, the Chief Reactor Operations and Nuclear Support Branch, Region 1.

Let me ask you if you have seen any of those three documents before?

A The answer to your question is no, I have not seen these before today.

Q Before today?

A That is correct.

Q All right. Let me refer you to the statement which is made on the document, which is on the top document dated May 3, 1978 in which Mr. Seyfrit apparently makes the statement to Mr. Brunner that, "We conclude that additional review is not warranted."

Based on what you know today, is additional review as to these kinds of matters relating to PORV's warranted?

A Again, this is not a simple question. You know, we have before us the fact of the Three Mile accident of which this, you know, PORV failure was an integral part.

It is probably the case that if any of the other failures had not happened, the accident at Three Mile would

have been relatively inconsequential.

To say that this thing in itself is significant is easy to do. To say that it is insignificant is difficult to do.

In fact, as I mentioned, the Lessons Learned Task Force is now requiring or recommending requiring direct position indicators on these valves and presumably, although it is not specifically called out circuitry, it requires the thing to function properly in a safe direction.

On this basis, I would say this thing should be re-examined, yes.

Q All right. Fine.

A It is not a black and white situation.

Q Sure. It is just that the original determination that an additional review is not warranted, it is now obviously not being followed and some additional review is being done in connection with the Lessons Learned Task Force, if nothing else.

A That is correct.

Q Why was the command signal indicator chosen rather than an actual position indicator as the solution to this problem in '78?

A I can't answer that out of any actual knowledge I

know I have. I would assume because in a plant that was essentially an operating plant, it is a simple way to implement.

Q Well, in fact, the Lessons Learned Task Force in the interim report that has been put out now has recognized the fact that to use an actual position indicator with the PORV will probably require a redesign of the PORV. Is that correct?

A It may. It depends on the amount of PORV, the specific PORV that is used in the plant.

Q So to the extent - - well, given the situation you had in 1978, it was certainly easier to use the command signal indicator than change the circuitry, is that right?

A That is right.

Q Let me also draw your attention to the statement that appears in paragraph 3 on the second of these three documents we have here which is dated March 31, 1978. And this is a memorandum from Mr. Sternberg to Mr. Seyfrit in which in paragraph 3 it is stated, "It is requested that the adequacy of the design approach i.e., valve failing open on loss of control power, be reviewed on an expedited basis for B&W facilities in general and Three Mile Island in particular."

Was that review of the adequacy of the design approach performed?

A I don't know. These, again, are memos entirely within I&E and presumably the review was done or not done within I&E.

Q And you were not informed of this at the time you were involved as the Project Manager?

A That is correct.

Q In March of 1978?

A Yes.

Q Is this the kind of information you would have liked to have had as the project manager for this facility in March of 1978?

A Well, again, the decision as to whether to involve NRR is one that rests with I&E. If they feel they have the capability to do a particular thing, as apparently they did here, as apparently they felt here, they would not involve us.

Q And they wouldn't inform you even though you were the project manager?

A I was not informed of this particular thing. You know, depending on the people involved, and I was not informed of this particular one, but depending on the

people involved there, I maybe informed of some others.

I was not aware of the details of this review.

Q Well, again, generally speaking, if a transient occurs at a plant for which you are the project manager and that transient requires corrective action in the way of changing the control board, adding instrumentation and changing some of the electrical circuitry or the way at least it performs, isn't that the kind of thing that as project manager you would like to have simply so you can keep up on your project?

A Perhaps like to have. Again, this is not a safety related piece of equipment nor is it given credit in anyway in the safety analyses.

Many instruments on the board we are not aware of or have not reviewed and the fact that one is added is not necessarily a matter for concern.

Q What is the general definition of what is a safety related piece of equipment?

A It is a judgmental thing, by and large. The regulations discuss systems important to safety. Safety related involves systems which can ^affect the release of ~~adequate~~ ^{radio} activity into the environment or can threaten the reactor or the integrity of the reactor coolant system.

Q Someone we previously spoke to at the NRC, it may have been Dr. Mat^rson, made reference to the fact that safety related equipment essentially, in one sense at least, relates to those items which constitute the primary or the boundary of the primary coolant system.

A Yes. That is essentially what I said.

Q Maybe I don't understand how the primary coolant system is constructed, but I have seen some diagrams and it appears to indicate that the PORV is part of that boundary.

A It is. It being opened constitutes a whole in the reactor coolant system. That is quite right.

Q Doesn't that make the PORV safety related?

A Well, in terms of that definition, yes, but it has not been considered a safety related item in that it is not necessary. Its function is not necessary to mitigate the consequences of an accident or has not been deemed to be necessary.

MR. KANE: All right. Can we have that marked as Exhibit 2, please.

(Exhibit No. 2, marked for identification.)

BY MR. KANE:

Q We have also been informed that on April 12, 1978, there was an order for a modification of the license for TMI-2 in connection with a computer code error and the order said there was a break in the pipe which was only 4.8 inches in diameter in combination with a loss of offside ^t power? pipes which could lead to overheating of the core.

The NRC at this time approved a procedure whereby 8 large valves would be manually operated within a specific time limit of 650 seconds and it limited the reactor power level to 2,568 megawatts thermal.

Does that ring a bell?

A Yes, sir.

Q Did you at that time consider that to be an adequate solution for that problem?

A Yes.

Q Was there any determination made as to whether or not this situation might be of generic concern for all B&W plants?

A It was in fact considered on all B&W plants.

Q Was any corrective action taken on other B&W plants?

A Similar action to this.

Q All right. Was it your determination at the time that calling upon the operators to manipulate any large valves in the period of 650 seconds was an appropriate response to the problem?

A Yes. There is in fact the safety evaluation which is part of the order which discusses this very thing.

Q Okay. I am not aware of that prior to today. There is a safety evaluation that has been done on this problem?

A It is discussed in the order itself.

Q I see. Could we possibly obtain a copy of that? Do you know how to lay your hands on that?

A I think I have one right here, somewhere. In fact, it has been transmitted to the President's Commission.

Q Okay. That has been happening to us a lot.

A I am sure.

Q Mr. Silver, you have graciously arranged to provide us with a copy of the order and safety evaluation which was done in connection with this event which came up on April 12, 1978 concerning the computer code error and problems with that.

Was that addressed on a generic base as to all B&W plants?

A Yes, it was.

Q Was some type of advisory put out as to all B&W licenses?

A Orders were issued to all B&W plants.

Q There was another transient which occurred at TMI-2 on April 23, 1978 in which five of the safety valves failed to close properly for about four minutes. The reactor tripped due to a noise spike on a power range detector. There was a rapid depressurization in one of the steam generators which initiated this problem. The pressurizer volume dropped below the minimum level range, one minute after the reactor tripped and it was restored again after about two minutes.

Do you recall that particular transient?

A I do. I would like to comment, just to clarify a point. It was the main steam safety valves that failed.

Q Mainsteam safety valves?

A And not any other safety valves.

Q All right. I want to show you what I believe to be a copy of the LER which was prepared on that event. It is a four page document....

The top document is a letter of July 24, 1978 from Mr. Herbein of MetEd to Mr. Grier of I&E, Region 1 in King of Prussia, Pennsylvania.

Attached to that letter is a document entitled, "Special Report Concerning The TMI-2 ECCS Actuation of 4-23-78."

I want to ask you if you have seen this document before?

A I have seen it, yes, sir.

Q Have you reviewed that document, read what is in there?

A Yes.

Q All right. The document does describe the performance of the pressurizer level in the circumstances of this transient and it also refers to proposed corrective acts, including changing plant operating procedures to reflect experience gained as a result of the transient.

Do you know what changes were made to the plant operating procedures to reflect the experience obtained from that transient?

A No, I do not.

Q Do you know if any instructions were issued to the operators at TMI-2 concerning the fact that under that type of transient it is a mistake to rely upon pressurizing levels to assess the state of inventory in the core?

A No, I do not.

Q I believe we discussed in the interview we previously had with you, Mr. Silver, the general situation of operators' understanding prior to March 28, 1979 as to the significance of pressurizer levels. And I believe you express^{ed} to us your understanding that pressurizer level was a primary parameter upon which operators relied to assess the state of inventory in the core during normal operating conditions.

Is that right?

A That is correct.

Q Given that understanding and given the pressurizer level aberration which occurred during that transient, was there any consideration of the necessity to advise operators that under the circumstances of these kinds of transients they should not look to pressurizer levels to determine the state of inventory in the core?

A Consideration by whom?

Q By the NRC?

A I am not aware of any.

Q All right. Let me have that LER marked as Exhibit No. 3 to this deposition, if I may.

(Exhibit No. 3, marked for identification.)

BY MR. KANE:

Q Did you want to examine this more?

A It has been a few weeks since I last saw it. I was just refreshing my memory.

Q Again, as Project Manager for this particular facility, would you have any interest in what operating procedures might have been changed in order to take corrective action in response to this transient?

A Interest, yes. Again, I would like to state that we do not and have not reviewed operating procedures on this plant or any other plant, except in unusual circumstances.

Again, since we didn't review the original procedures, the thought of reviewing the change^d procedure would not necessarily be obvious.

I also would like to say, as I have indicated in other connections, that the responsibility for reviewing situations of this kind rests with I&E and, as I recall it, I had specific telephone conversations with the inspector on this particular item, inquiring as to whether he felt we, NRR, should participate in this review of this incident and there was no affirmative response to that.

Q Was there a negative response to that?

A Basically, yes. Again, I would have some trouble recalling exactly what was said. I am sure I can't but,

basically the response was negative.

Q Who was the I&E inspector you spoke to?

A Don Haverkamp. That is to the best of my recollection. There were a number of people involved in this, I believe.

I did, nevertheless, obtain the utilitie's internal report on this incident upon which this thing is based, upon which the information in the LER is based, and transmitted that to the reactor systems branch in NRR asking if they felt if any further action was necessary. And I received my transmittal back without any indication that such action was necessary.

Q Who did you direct that transmittal to?

A Tom Novak.

Q I take it, then, from the fact that you took some action on this transient that you did think there might be some reason why you should get involved in this?

A That is correct.

Q What was your feeling in this regard?

A Well, it was an incident which caused considerable damage to begin with. It was another safety injection, of which there had been several, and it seemed to me it was a more involved transient involving possible safety

questions that we should examine, or at least raising the question as to whether we should examine them further.

Q Were you dissuaded from those feelings by the responses that you received from Mr. Haverkamp and Mr. Novak?

A I don't think I was dissuaded from my feeling by any discussion with Haverkamp, only from the thought that we, NRR, should get involved.

Although, as I said, I did inquire of our technical people as to whether or not we should and their decision apparently was not to get involved.

Q Did you feel at that time that you should pursue your feeling further and raise it in other ways or - -

A No. I did not feel that way at that time.

Q Well, if I understand what you are saying, then, you simply felt that once you were informed by Mr. Novak he didn't see any necessity for NRR to get involved, you didn't feel it should be pushed any further by you?

A That is correct.

Q Just so I can be clear, the way in which you notified Mr. Novak was this specific transmittal, a written document of some kind?

A It was a buck slip kind of thing.

Q You attached it to the LER itself?

A No, to the MetEd report. I don't remember if the LER was part of this or not.

Q I don't think I have seen the MetEd report on this matter. That is not part of the - -

A It is a rather thick order, an inch thick document.

Q It is not an LER?

A No. There was an internal report, if I remember correctly, and it was addressed from somebody at MetEd to somebody else at MetEd and I at this moment can't recall how I happened to get it either, unless I asked for it and they would have forwarded it to me.

Q And you attached a buck slip to the front and directed it to Mr. Novak?

A Yes.

Q And indicated on the buck slip, "What do you think of this," or something like that?

A Yes. "Should we do anything more," words to that effect.

Q And that went to Mr. Novak as far as you know?

A Yes.

Q And it was returned to you, then?

A Yes.

Q And was there anything on the front from Mr. Novak?

A As I remember, he gave it to one of his section leaders to look at, who wrote another buck thing on the same piece of paper.

Q That is, Mr. Novak gave it to one of his section leaders?

A Yes. I think it was Sandy Israel.

Q All right. And then did it come back to you?

A Yes.

Q Was there anything on the front from Sandy Israel?

A Not that I can remember. It was - - yes. It was one of those - - I don't recall a specific comment that, "No, we need not worry about this," or "Yes, we should." But clearly my conclusion of what had happened was that the answer was no, we need not worry about it.

Q If there was nothing written on the front other than your note to them, how did you even know it had been evaluated? Unless there was something on the front, how could you have the impression the answer was no?

A I don't recall at this moment. Presumably, I spoke to Novak or Israel, but I don't specifically recall at this moment.

Q Do you still have that document with the buck slip?

A Probably.

Q I don't want you to do that immediately, but if you can do it, search it out and try and send us a copy of it.

A Again, I have the feeling that I have sent it down to the President's Commission, but I realize it could be in other places down there and I don't absolutely remember that I did that.

The reason for that is I have had requests for similar information from the President's Commission and every congressional committee and there are some internal groups as well. So that I can't keep these things separate in my mind.

Q I don't recall seeing it offhand. If you do determine you have sent it to us, word to that effect would be fine. Otherwise, if you do locate it and can provide us with a copy, we would certainly appreciate it.

A I will find it and get it to you or tell you that I have already.

Q There was another transient that occurred at TMI-2 on November 7, 1978 in which there was a reactor trip due to a feedwater pump trip due to decreased reactor coolant system volume, depressurizer levels, again,

decreased below zero, although, later calculations indicated that the pressurizer was not emptied during the transient.

Do you recall that?

A Yes, I do.

Q And I have here what I believe is the LER relating to that transient. Again, it has a cover letter on it from Mr. Herbein of MetEd to Mr. Grier of Region 1 of the NRC in King of Prussia, Pennsylvania and it has a number of pages attached to it, including a document entitled, "Special Report Concerning the TMI-2 ECCS Actuation of November 7, 1978."

Let me ask you if you have ever seen that document before?

A Yes, I am sure I have.

Q Did you review it at the time you saw it?

A There maybe individual pieces of paper that I have not seen before but, basically, I have seen the LER and the report.

Q When you reviewed this, did you realize that it involved the situation of the pressurizer level indication decreasing below zero, that is, going off scale low?

A I did.

Q And, again, you would have had some recognition of the fact that operators generally were looking to levels in the pressurizer to assess the state of inventory in the core under normal operating conditions?

A That is correct.

Q Did you consider this particular transient to be of great significance?

A No. I did not.

Q Did you feel that any corrective action at all should have been taken in response to this transient?

A As I recall it, no, I did not at the time.

Q Did you feel that any kind of advisory instructions of any kind should be put out to operators in light of the circumstances of this transient?

A I didn't feel that way and I might point out it is not within the scope of my responsibility to advise operators of things to be concerned with.

But I don't recall that I felt that way.

MR. KANE: Let's have this document marked as Exhibit No. 4 to this deposition.

(Exhibit No. 4, marked for identification.)

BY MR. KANE:

Q Something that has come up several times in the course of this investigation, Mr. Silver, relating to pressurizer level, particularly loss in pressurizer level at the high end of the scale, which occurred on TMI-2, March 28, 1979, and that is this concern by operators with "going solid."

Why is there an operator concern with going solid, as far as you understand it?

A The possibility of increases of over pressurizing the reactor coolant system.

Q And why is that a source of concern?

A There is a possibility of damage to the reactor coolant system, the vessel or piping or something, due to such over pressurization, particularly if the temperature due to some event, transient, the temperature of the vessel is reduced below some value related to the pressure.

Q That is the situation where you could actually have a brittleness in the pressure vessel and might even fracture the pressure vessel?

A Ultimately, that is what could happen, yes, sir.

Q Under normal operating conditions, you would not have the temperatures extant at that point that would raise that possibility. Is that right?

A That is correct. It would be warm enough so that this is not a problem.

Q Under normal operating conditions, then, what is the worse case that can occur as a result of going solid?

A Popping of the pressurizer safety valves, which is not in itself a dangerous situation.

Q There was a problem that came up after March 28, 1979 in connection with or actually on March 28, 1979, in connection with the deployment of hydrogen recombiners at TMI-2.

As I understand it, on March 28, 1979, when the accident began at 4:00 a.m., and when the hydrogen problem first became known, the hydrogen recombiners were not physically hooked up such that they could be activated by a simple control mechanism.

A That is correct.

Q Is that correct?

A Yes.

Q And as I understand it also, by the time it became evident that the hydrogen combiner should be employed for safety purposes, the presence of adequate shielding became a problem. There was not adequate sheilding to deploy

those recombiners at that time and more shielding had to be brought in on-site in order to accomplish that.

A That is correct.

Q How did it come about that there was not adequate shielding on-site at that time in order to deploy the recombiners?

A The radiation levels that actually existed inside the containment, which would be drawn into the recombiners, was higher than the design basis, the radiation level which was used for the design of the systems energy for the recombiners.

Q Who prepared those design computations as an initial matter?

A The applicant and the Staff, I guess.

Q Is it fair to say, Mr. Silver, that it was not anticipated until the time of the Three Mile accident that there would be such a high level of radiation present at the time recombiners would be needed, that more adequate shielding was not anticipated as necessary?

A That is correct.

Q The question I had before we took that small break was who initially prepared those design computations. You said it was the licensee?

A I am not sure. It would be both the licensee and the people on the Staff, yes, who would have, I think, performed an independent evaluation.

Q Would B&W have participated in that process?

A Probably, as support to the applicant. Perhaps not directly.

Q Is my understanding correct that under the applicable NRC regulatory guides, recombiners for hydrogen are considered operable even though they are not physically hooked up?

A Maybe operable.. The key to that response is the hydrogen design basis that is used presumes a much lower ~~metal-water~~ ^{metal-water} ~~metal-water~~ reaction in the vessels than actually took place at Three Mile Island, which would indicate that the time at which the recombiner would become necessary is in the order of many days, 20 to 30 days after a design basis accident. So that there is more than enough time to move a recombiner into position and hook it up and also more than enough time for radiation levels to decay considerably so that given the actual accident, it is doubtful to me that a recombiner would have done anything to relieve the hydrogen situation, ^{that} ~~that~~ actually existed at the Three Mile Island accident.

Q But in any event, at the time of the accident, they did not have adequate shielding to deploy the recombiners?

A That is correct.

Q All right. You discussed several aspects of the steam generator. I think you made reference to steam generator number 2 at TMI-2.

Is there anything that now makes you think that that steam generator leaked during or after the TMI-2 accident?

A I do know there were during the various start-up tests that we did have trouble with whichever steam generator it was that had the instrumentation that I mentioned earlier, that that generator did leak apparently through the instrumentation fitting penetration into the steam generator.

Whether this one leaked at this point or whether there was a leaky tube or tubes at the time of the accident, I don't know.

Q All right.

At anytime during the licensing process for TMI-2, was there any consideration given to the fact that instrumentation for the power plant was not geared to

accident conditions? Specifically, what I have in mind, are thermacouple readings in which the computer program for the read out of thermacouple readings only went as high as 700 degrees and under those circumstances, as I understand it, for quite some period all they got was question marks when it came to temperature readings.

A Was consideration given to this?

Q During the licensing process?

A This question falls within the scope of consideration of Reg Guide 1.97 which has to do with instrumentation following the course of an accident, the implementation of which has not been defined nor have many of the requirements been defined and, as a result, plants have not been required to include instrumentation which will function much beyond the design range of normal operation.

In fact, the computer itself is not considered safety related equipment. So that we did not impose on Three Mile, nor has it been imposed on any other plant to date, to my knowledge, the requirement for instruments to have a range beyond the normal operating range.

Q On the other hand, isn't it a safety question as to whether or not during an accident in which you are getting ^{ex}~~ob~~cessive heating in the core, that you want to

have a good reading on just how high those temperatures are going?

A It would have been helpful, yes.

Q Are you familiar with the fact that about seven and one-half hours into the accident at TMI-2 there was a decision made by the licensee to attempt to rapidly depressurize the system in order to go on decay heat removal?

A Yes.

Q And given the temperature readings that are now known to have occurred in the core during that period of time, was that an appropriate thing for the licensee to attempt to do? Specifically, I have in mind - -

A Given what we now know?

Q Yes. Specifically, what I have in mind is the fact that it has now become reasonably clear that there were temperatures achieved in excess of 2,000 degree Fahrenheit in the core.

A Okay. Again, we are into twenty-twenty hindsight.

Q Yes, we are.

A Probably it was not appropriate, that is correct.

Q As I understand it, the problem at that time was that they could not get an accurate reading on temperatures

in the core or at least one they felt they could trust. In part, the reason for that was the fact that all they got was question marks from the computer once the temperature exceeded 700 degrees. Is that your understanding?

A Yes.

Q I am also informed that when the question marks started coming out someone from the NRC or from MetEd, I am not sure which, contacted B&W and asked them what the question marks meant in connection with computer readings on the thermacouples and they were told that that means that the thermocouple readings have gone off-scale high or they have gone off-scale low or the thermacouples are not functioning properly.

Have you heard that?

A No, not specifically, but certainly I would give the same answer know what I know about the system, yes.

Q Was any consideration given during the licensing process for TMI-2 to any safety issues that might be posed by having a sump pump in the containment building which was automatically activated under certain circumstances?

A No special consideration. We were aware that the sump pump was there and what its normal function was. It

was there to pump out water which had leaked into it.

Q Was any consideration given to the fact that the automatic feature of that sump pump might result in a situation where radioactive coolant was removed from the containment building under circumstances which would not be desirable from a safety point of view?

A No. No consideration was given to that that I am aware of.

Q Have you ever heard of a design review tool called sneak circuit analysis?

A No.

Q Since March 28, 1979, have you had any significant change in your duties at the NRC?

A Yes.

Q What has that change been?

A A number of changes. I have not been reassigned in any way except to participate in the Lessons Learned Task Force. As a result of that, and the time that would have to be spent with various investigatory agencies, it became obvious that I would not be able to handle some of the case load that I had and I have turned over the most active of my other cases to another project manager which as far as I am concerned, and I believe this to be true, is

— simply a matter of involvement with various aspects of the Three Mile accident and the Lessons Learned Task Force.

Q Has there been any change in your official job description since March 28, 1979?

A Not that I am aware of.

MR.KANE: That is all the questions that I have, Mr. Silver. I certainly have appreciated your cooperation and time.

I should say that since this is an ongoing investigation, it may be necessary to bring you back at some point in the future for a further deposition session. I can definitely say that we will make every effort to avoid having to do that. But there may be facts we will uncover that will make that necessary.

For that reason, I would like to, unless Ms. Moe has any questions, I would like to adjourn the deposition at this time with the thought that it may be necessary to bring you back sometime in the future.

MS. MOE: I have no questions at this time.

MR. KANE: Thank you.

(Whereupon, at 1:35 p.m., the deposition of HARLEY SILVER was adjourned.)

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