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Transcript of Proceedings

UNITED STATES OF AMERICA

PRESIDENT'S COMMISSION ON THE ACCIDENT AT THREE MILE ISLAND

DEPOSITION OF: THOMAS M. NOVAK

Bethesda, Maryland

July 30, 1979

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

To: Thomas Novak

From: Richard S. Mallory, OGC RSM

Enclosed is a copy of the transcript of your deposition before the President's Commission on the Accident at Three Mile Island.

Please read through the transcript carefully and correct any errors (other than unimportant punctuation errors) in black pen on this copy. Correct any errors you can identify in the questions, as well as in your answers. This copy will not be retyped, but will be reproduced as you have marked it, so your corrections should be dark and legible.

After you have corrected the transcript, please sign and date the certificate at the end, and type your name under your signature.

You may wish to make a copy of the transcript for yourself before returning the original to me. When you return the transcript, please indicate if you object to making your transcript available to the Commission or to the Commission's investigation of Three Mile Island. Because of Commissioner interest, we would appreciate receiving your corrected copy by c.o.b. Monday, August 13, if possible.

Unless you have an objection, I will send a copy of your signed, corrected transcript to the President's Commission with the request that they substitute it for any uncorrected copies they may have.

If you have any questions or problems, do not hesitate to call me or the attorney who represented you at the deposition.

Enclosure: Transcript

* I have no objection to the release of this transcript to the parties listed in the 4th paragraph

Thomas M Novak

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 punctuation errors.

Date: August 13, 1979

Thomas M. Novak

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UNITED STATES OF AMERICA

PRESIDENT'S COMMISSION ON THE ACCIDENT AT THREE MILE ISLAND

DEPOSITION OF: THOMAS M. NOVAK

Room 1132
New Phillips Building
7920 Norfolk Avenue
Bethesda, Maryland

July 30, 1979
10:55 o'clock a.m.

APPEARANCES:

On Behalf of the Commission:

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EXHIBITS

P R O C E E D I N G S

MR. HELFMAN: Would you please state for the record your full name?

THE WITNESS: Thomas Michael Novak.

MR. HELFMAN: Have you ever had your deposition taken before?

THE WITNESS: No.

MR. HELFMAN: Perhaps I should explain a few of the characteristics of the deposition.

Your testimony that you are giving today is sworn, and as a result will receive the same force and effect as if you had given your testimony in a court of law.

At the conclusion of the deposition, the testimony will be reduced to transcript form by the court reporter, and you will be provided with a copy and afforded an opportunity to make any changes which you deem necessary.

However, you should be aware that we would have the opportunity to comment on any changes that you make and if the changes are substantial, it could reflect adversely on your credibility.

Therefore, it is important to be as accurate as you can, and if you need clarification of a question before you answer, please feel free to ask for clarification.

For the benefit of the court reporter, it is necessary that you give audible responses since it is

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difficult to take down nods of the head or gestures. You should try to allow me to complete a question even if you anticipate where it is going, and I will try to allow you to complete an answer before I ask my next question because it is difficult for her to take down two people talking at the same time.

It is our practice at the conclusion of a deposition to continue it rather than to terminate it in the event there are further questions that we have to ask. We will simply reconvene the deposition.

Do you have any questions about any of that?

THE WITNESS: No.

Whereupon,

THOMAS M. NOVAK

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

DIRECT EXAMINATION

BY MR. HELFMAN:

Q You were asked to bring a resume with you. Did you do so?

A Yes, I have one.

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MR. HELFMAN: We would like to have this marked as the first exhibit to the deposition.

(Novak Exhibit No. 1 was marked for identification.)

BY MR. HELFMAN:

Q Is this resume an accurate representation of your educational and professional and employment background?

A Yes, it is.

Q I suppose the best place to begin is could you give us your title with the NRC and describe very briefly what your obligations and responsibilities are?

A My position is Chief of the Reactor Systems Branch in the Division of Systems Safety.

Inthat position, I am responsible for the review of construction permit applications and operating license applications for light water reactors.

The area of our responsibility focuses on the review of transients and accidents, and for a variety of systems designed to cope with these events--the emergency cooling system, the residual heat removal systems are just examples.

Presently I have also been assigned on an interim task force related to bulletins and orders which was formed following the Three Mile Island 2 Accident.

Q Do you continue to perform your functions as chief of the Reactor Systems Branch, Division of Systems Safety?

A No, I don't. We have, as a consequence of the interim organization, an alternate branch chief is presently performing that duty. His name is Atemis Speis.

Q When you were performing the job of chief of the

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Reactor Systems Branch, what was the organization of your department?

A The organization consisted of two sections, one whose supervisor was Mr. Sandy Israel, and the other section whose supervisor was Mr. Gerry Mazetis.

Their positions were as section leaders. There was no specific differences in specific responsibility differences between sections. They are comparable sections and they are capable of doing tasks without specialty in a sense.

Each section has either 6 or 7 engineers assigned to the section so in total we have about 15 professional people and two secretaries and myself.

Q Could you describe for the record what occurs, for example, with a construction license application? Where does it go? Does it go to you, the team leaders, the engineers?

A The application is first, it is directed to me for assignment; depending on the amount of work in either section, I will make an assignment where I feel that the work can be most easily accomplished.

It is then assigned to, I route it to a section leader with perhaps a suggestion as needed to the engineer who I think might be most suitable for it.

The section leader and myself will discuss that

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assignment. The formality of the construction review, of course, takes several steps. Are you interested in going through those?

Q Right now I am just interested in the flow.

A The material then once it is assigned to a section, the distribution would include then the section leader and myself and a responsible engineer assigned to that review.

Q Then the engineer does the actual review?

A Yes. What will typically happen is the section leader and the engineer will sit down and the section leader will highlight those aspects of the review that he thinks and expects the engineer to focus on.

We have a standard review plan which is our general way of doing the review. We will utilize previous reviews of similar plants to perhaps highlight a specific area where we want to spend more time learning about a particular aspect of the design so they generally will sit down and outline the review for themselves.

The engineer himself will have some ideas of where he thinks he should be spending his time.

We have as a part of our review process identified the periods of time that is available to the engineer, so in effect he is trying to identify those portions of the review that both he and the section leader feel should be covered. On occasions, I will insert what I think are areas

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that should be covered. We may get together and discuss the review.

Q The three of you?

A The three of us; it depends specifically on the plant and any peculiarities of it.

Q When the engineer has completed his review, does it go back to the team leader?

A Yes. Of course, there is several opportunities for discussion. His first work product is a draft set of questions that he works up. There will be a lot of discussion before those have been prepared, but the section leader then concentrates on the review of the first set of questions.

He generally turns them back to the reviewer to reflect the review and they will discuss them. There is usually on occasion a question or two that will come up to me where they can get earlier guidance if they feel I would have some opinion on it. It may help direct it and shorten the review process, but generally I do not see the original first set of questions. ~~There~~ That is something between the engineer doing the review and the section leader.

Q When the section leader is satisfied, does it come back to you?

A Then they are forwarded to me. The concurrence is a little different depending on the stage of questions. This is a prerogative of the division, the assistant director

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of reactor safety. The first round of questions on a plant can be sent out through the branch chief's signature.

Q Your signature?

A Yes, my signature; in effect, I concur. I am the highest level of concurrence, so the section leader then would prepare the formal set of questions let's say, and then I would concur on them and they would be then directed to us, the Division of Project Management. That is not the first time I see them.

What I see for the first time is generally a cleaned up first draft of the questions, and then I will review them, make my comments to the section leader, and the engineer at the sametime. We go over them, and we iron out any differences that I have.

When we agree on them, then they are put back into the formal process of preparing them in final form. They are signed out then by the section leader through me. I concur in them, and then they are directed to our Division of Project Management.

Q Are these questions which are posed to the Division of Project Management?

A They are actually directed then to the applicant. The Division of Project Management acts as a funnel, so to speak. They receive all the questions from all of the technical areas on the staff and they are the contact within

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the staff between the applicant and the staff.

Q Then the applicant I assume has a certain period of time within which to respond?

A Yes. Generally he may take six to eight weeks to respond to the questions.

Q Where do those responses go?

A They are directed back to the project. In other words, the formal chain is from a branch chief in Projects to a licensing manager let's say representing the utility of applicant.

The response, the formal response then is back to the branch chief, and then a distribution of the responses are made to all of the technical divisions so we would then receive our response in terms of amendments to the applications or responses to questions.

Q In the event you discover a transient or an accident which warrants review by other departments within the NRC, in addition to your own, is there some procedure for referring those concerns to other departments? Would you do that through the Division of Project Management?

A We may. There are occasions when in transmitting our questions to the Division of Project Management, they may note some questions and note the relationship those questions have to other branches.

We probably informally have talked to the branches

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involved and mentioned to them that we are making this comment.

We also discuss questions directly with other branches where the technical disciplines require that we better understand the commonality of the concern.

e may agree then that a question which has a specific flavor which may reflect two different disciplines would be generated, but it would come out of just one of the technical disciplines, so there is no specific procedure that is followed.

The standard review plans identify the inter-relationships between branches, but there is no specific form let's say that I would fill out which directs an inquiry or requests an inquiry by another branch, another technical branch.

Q But you can tap the knowledge of the technical expertise of particular branches?

A That's right. As the question develops where it is recognized that it crosses into areas outside of our own specific expertise and for which we do not have, we may have the primary responsibility, they may have secondary review responsibilities in the sense of supporting our effort, we will identify our needs.

In some cases, they may have the primary responsibility and we may note for their information what we know

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about the particular issue.

It is basically done on an informal basis, but there is generally documentation involved with it--not in every case, but in the cases of substances both branches generally will use a memo to identify and to formalize the working relationship, what we have agreed to do on a specific problem.

Q You indicated in your resume in the first paragraph on the first page that your responsibilities include the performance of safety reviews and evaluations of applications for nuclear power plant construction permits and operating licenses.

Once a plant obtains an operating license, does it fall without the jurisdiction of your branch?

A No. There will be exceptions. When an operating license is issued at present, there may be a number of residual issues that will be resolved perhaps prior to the first reviewing of the plant. This may be 18 months after the plant has received an operating license.

In this case, the Division of Project Management in its official transferal of a project, of a completed operating licensed project to the Division of Operating Reactors will in its transmittal letter identify those residual items.

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It will also identify the responsible branches in the

Division of Systems Safety who will follow through on those issues. Generally this will result in a supplement to a safety evaluation that was written as part of the operating license reviews.

Q And your branch then could be involved in the review of an open item in an operating license application even after the operating license had been granted?

A That is correct.--

Q There is another possibility that occurs to my mind where you would become aware, your branch would become aware of a transient or an accident which warrants additional attention, and yet you have the expertise within your branch to analyze it and so you wouldn't be seeking expertise from another branch within the NRC, but might wish to call the matter to the attention of another branch which would have the ability to do something about it.

Have you had the experience of referring a safety concern to another branch or another department in order to alert them to the safety concern rather than to obtain their technical expertise?

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A Yes. Now you have used two terms. You have used safety concern, and then you said transients, so to speak. I would consider safety concern to be the broader. It would include perhaps a new understanding of the transient.

On occasion where under the concept of a safety

concern, we have in the review of an operating license identified some test information that we have required and from it we conclude that that information is of general concern, for example, to operating reactors.

We would transmit that information to the appropriate people in the Division of Operating Reactors. We would communicate with them orally. We would send them a memo if we thought it was necessary. We would talk to them, and we would make sure that they had that understanding.

You have to recognize that we do that when we feel there is a clear relationship between the issue that we are presently working on and a similarity of design in an operating plant.

Q Basically a generic concern?

A Yes.

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Q Who in your branch would be responsible for making the decision concerning whether or not such a concern is to be routed to operating reactors? Would that be you or someone like Gerry Mazetis or Sandy Israel or one of the engineers under them, or is that your responsibility?

A It is not anyone's responsibility. It is everyone's. I think if a recommendation is made, we would expect an engineer to make it, a section leader, if he recognizes it, or myself, so I don't have any final say whether this permit is going there or not.

If someone thinks it has merit, and generally people go alone with them, we would forward it, so there is no formal decision process as to exactly where in the organization that information, to whom it should be provided.

There is generally no hesitation to provide this information to the parties that we think have an interest in it.

Q So an engineer could make a recommendation to handle a matter in this manner?

A Yes, he could; if he felt it should go to another division, as part of generating the concern; he also decides on the distribution. This is part of the formality of preparing the memo is to make up an initial distribution list.

Q Would he be responsible for the distribution of the document or the concern or the memorandum, or does that come back to you, or does it come to the team leader?

A There is really no formality to who is responsible for the distribution. It is a collegial document in a sense. If it was originated by an engineer, he may suggest some people that he thinks should be put on the distribution list. Someone else may add to it.

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Generally as you go up higher in the review process the suggestion to broaden it--in other words, I might suggest someone in research might have an interest in it because of some other information that I have, so generally

what generally happens is the distribution increases as it is considered by higher and higher levels of management. It is very rare that we would decide to take someone off of distribution. That wouldn't be a problem. We don't have a guide necessarily to keep the distribution list to a minimum, although obviously everyone in the building is not interested in it, but we generally try to suggest that it be made available to the people who have an interest, have some background in the subject.

Q Would you have the authority to decline to distribute a concern like this if an engineer had recommended it? Does the decision reside in your hands?

A No. The organization permits that engineer to send that copy to anyone he deems appropriate. He can sign it himself in a sense. He can send a memo, attaching another memo so to speak, and say I thought you would be interested in this.

No one else in my branch did, if that is an example you wish to use.

Q Would that also be true of the team leaders?

A Yes.

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Q Such as Mr. Israel and Mr. Mazetis?

A Yes. They could if they wish send a memo to someone else. Generally, the distribution is intended to give other readers an idea of who has it so if there is some discussion,

if two people on our distribution list find something that they wish to talk about, they know that the other person has the memo and it is a frame of reference.

Q Would there be any advantage to an engineer or to one of the team leaders to obtain your signature on a memo expressing such a concern?

A Yes. There would be an advantage because it represents a higher level of management view on it. For example, if a memo is written by an engineer and it is provided for general distribution as opposed to the same memo being sent either by a section leader or even a branch chief, I think it just naturally suggests a higher level of importance being attached to that memo. It is given a little bit more formality.

It is not normally a practice for an engineer to write memos on his own because there is an opportunity, of course, that there may be disagreement. If he just decides to write a memo, he doesn't discuss it with anyone, there is a chance that his views would not represent those views of the branch, and so we would then have to write a memo which is sent to the same distribution list offering a different viewpoint. It may be a position of the staff that is different, so generally an engineer, if he has a point, he will discuss it first with his own management.

It may be suggested by the section leader that he

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go ahead and prepare a memo for his own signature, making these facts known. It may be that, I don't know if the section leader would concur. It would not necessarily be obvious from the transmittal of the memo itself that there is concurrence by a section leader. He can send it out without it. He may wish to have the concurrence of the section leader, but that wouldn't be obvious then to the reader of the memo, but it would be on file within the branch whether or not there was concurrence. This is at the option of the engineer and the section leader.

Q Let me show you a copy of what has become known as the Novak memorandum which for the record should be noted as an exhibit to the deposition of Sandy Israel.

Down at the bottom in the lefthand corner there is a contact reference.

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What would that indicate to a reader of this memorandum in view of the fact that it bears your signature?

A Generally the contact person is the originator. He authored it, and anyone who has questions related to the memo would be expected to contact him. That is generally the way we use the contact in our branch. A person who drafts the memo is identified as the contact person.

Q Could it be assumed from the fact that Mr. Israel is indicated as the contact, and the memorandum bears your signature, that there was a concurrence between the two

of you as to this memorandum?

A Yes. In this case, I received the memo first in a draft, and if I recall right, I noted something to the extent okay for final, which in effect at least at that level at that time suggested that I supported issuing the memo as is.

I don't recall if I made any changes. If any, it would have been on the editorial. It was then routed back to the secretary for final typing. It was a handwritten first draft, and I think this memo then went to final very soon thereafter it was typed--concurrence or original, initial concurrence by Israel, and then myself.

There is a file copy of the memo which would identify the originator or what you want to call the original contact, and then any higher levels of concurrence. In this case, I think mine was the highest level of concurrence to the memo.

Q There would be a copy of this in the file which would indicate more information than is contained on this copy?

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A Yes, to the extent that the file copy has on the lower portion of the page blocks which are basically initial blocks, the date of the final typing, or let's say when Mr. Israel initialed it, and then I would initial it and sign it at the sametime so I would have initiated it on what

we refer to as the yellow copy of the memorandum, and there should be a copy of that in our file.

Q Would it be possible to obtain a copy of that copy?

A When we have an opportunity for a break, I will locate it.

Q In addition to reviewing the memorandum, prior to initialing your concurrence, did you discuss it with Mr. Israel?

A I don't recall any technical discussions. It may have been, the discussion may have only been to the extent that I read your memo and I initiated it for final typing, but I can't swear to that.

I may have mentioned it just to let him know where the memo was in the review process that I had read it, that I saw no, I had no comment on it other than to go ahead and issue it, and let it become what is now suggested as a review reminder.

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As I recall I did add Mr. Denny Ross to the distribution. He was my immediate supervisor, and in the original draft, I do not know if, I cannot recall if Mr. Israel identified Ross. I think I added Mr. Ross on the distribution, so this was a case where the distribution was in large based on my review of the memo.

There was never any comment about whether the

distribution as finally came out was all that was necessary. We added Mr. Ross and that's all I recall from the discussion.

Q Who is Mr. Ross?

A At the time, Mr. Ross was my immediate supervisor. He was the Assistant Director for Reactor Safety, and the purpose of my adding him to the distribution was to let him know of the area that we intended to investigate as part of this review reminder so that he would have some opportunity to comment on it if he saw fit.

Sometimes there is a question that perhaps the area that you are going into is perhaps not specifically our area of responsibility. Perhaps it should be reviewed by another branch. It is an opportunity for management to note whether the information is going perhaps, the request for information let's say if the review reminder would suggest that is going outside of what we would consider our standard review plan, so he is offered an opportunity more from a management point of view--I didn't expect any technical comment from him. I didn't really expect any comment, and I didn't receive any comment from him, but it was an opportunity for him to put himself into the process if he saw fit.

We weren't going to wait on any concurrence from him.

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Q Is it normal procedure to CC Mr. Ross with memos such as this?

A Well, I make it a procedure. I make it a point to put him on the distribution of anything that I am signing out where I have not perhaps discussed it with him or he has not seen any draft, so he has an opportunity to see it very early in the process.

My recollection is I did not discuss this review reminder with him prior to my signing it, but only provided him a copy of it when it was issued to everyone within the branch.

Q What is a review reminder?

A A review reminder is intended to provide information to all of the engineers in the branch of an area that we wished to follow through on as part of either a CP review or an OL review, so it provides more detail in an area perhaps than what the standard review plan would suggest.

It also may pick up an area that is specifically not detailed in the standard review plan, so the standard review plan may have been a broad definition of that area of review and a review reminder would suggest in more detail the area that should be pursued by the reviewer in the review, so he is in effect directed, although not forcibly directed, but certainly encouraged and expected to follow

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through on that review reminder in the sense that questions dealing with that specific subject would be an outgrowth of his review.

He would look at the review reminder. He would review the design of the plant, and he would generate questions or other inquiries as suggested by the review reminder.

Q The reviewers that you are referring to are the engineers on Mr. Israel's or Mr. Mazetis' staff?

A That is correct.

Q Therefore, the concerns of the memorandum would come into play in the review of construction license applications and operating license applications?

A That is correct.

Q As far as you know, was this memorandum routed to the branch or department that would be concerned with operating reactors that already have their construction permits and their operating license?

A As far as I know, it was not routed to them.

Q Let me read to you and then show you a portion of Chairman Hendrie's identification of what he considered six main factors that caused and increased the severity of the accident at Three Mile Island, and this was part of a statement he gave on April 10th, 1979, and I am referring to Exhibit No. 2 to the Sandy Israel deposition.

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On page 10, the conclusion reads, "The staff has identified six main factors that caused and increased the severity of the accident as follows."

Paragraph 2 reads, "The pressurizer electromatic relief valve which opened during the initial pressure surge failed to close when the pressure decreased below the actuation level. This failure was not recognized and the relief line closed for sometime."

Paragraph 3: "Following rapid depressurization of the pressurizer, the pressurizer level indication may have led to erroneous inferences of high level in the reactor coolant system. The pressurizer level indication apparently led the operators to prematurely terminate high pressure injection flow, even though substantial voids existed in the reactor coolant system"

A Do you have a question?

Q When you are done looking at it.

A I would like to read it.

(The witness read the referenced document.)

THE WITNESS: I have read it.

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BY MR. HELFMAN:

Q Would you agree that those two paragraphs describe two of the main factors in the Three Mile Island transient of March of this year?

A Let me say that these are not necessarily the words

that I would choose to describe the event. In other words, I don't wish to say that--I have a different way I would express it.

In general, I would agree that the failure to recognize that the valve was open was a serious consideration in the overall accident.

I would also agree that the operator, as I understand it, provided makeup sufficient to maintain level that he thought was sufficient to maintain level in the pressurizer, so I would agree with those two statements that they are two important statements.

There are some points in here that I would disagree with in the sense of very technical sense. I am sure that the Chairman was speaking orally. I don't think this was necessarily a prepared statement. There are some technical weaknesses.

For example, the failure was not recognized and the relief line closed for sometime--obviously not closed for sometime is what should have been stated in the record.

Q That is a grammatical confusion?

A Yes. Also there is a statement in here that following rapid depressurization of the pressurizer--I don't know that, I have not studied the plots of the pressurizer pressure to agree that there may have been a very early rapid depressurization, but to say that following rapid

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depressurization of the pressurizer, I might quibble with the term rapid, but that's about it.

Q But generally speakingk you would agree that the failure of the PORV to close and the misleading information provided to the operator as to core coolant level by pressurizer level indication were main factors that caused or increased the severity of the accident?

A Yes, I would agree that they are important. I don't know that they are that separate because as I recall from the accident, once the relief valve was closed, the level dropped very quickly, so in a sense, one led to the other, given the relief valve would have been closed, the operator would have provided for more makeup, but keeping the two separate, in general I would agree that the relief valve being open and the operator, as I understand it from reading some of the material prepared describing the event, maintained makeup primarily as I understand it based on pressurizer water level.

Q In fact, terminated HPI based on pressurizer level indication?

A Yes, I think that is correct.

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Q Allow me to refer you first to paragraph 1 of the Novak memorandum wherein it is stated, "Under upset conditions, such as prolonged relief valve opening and accidents where significant voids are formed in the primary

system, it may be possible to end up with a two-phase mixture in the pressurizer that is not at the highest temperature in the primary system. Under these circumstances, additional loss of primary system inventory or shrinkage in the primary system may not be indicated by pressurizer level. This situation has already occured at Davis-Besse 1 when a relief valve stuck open."

Then paragraph 3: "Although the safety analyses do not require termination of the makeup system, operators would control makeup flow based on the pressurizer level as part of their normal procedures. As a result, under certain conditions where the pressurizer could behave as a manometer, the operator could erroneously shut off makeup flow when significant void occurs elsewhere in the system or loss of inventory is continuing."

Then the last sentence in the final paragraph: For OL reviews, procedures should be reviewed to ensure adequate information before the operator terminates makeup flow."

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My question to you is first what are the negative consequences which you envision from an operator turning off HPI despite the presence of voids in the system, or there is a continuing loss of inventory based on misleading information obtained from pressurizer level indication?

A Excuse me. Can you read back the question?

(The record was read by the reporter.)

THE WITNESS: The negative consequences I will judge to mean the potential for core uncovery and core damage.

If you just had voids in the core, voids in the reactor coolant system, excuse me, and no leak from the reactor coolant system, I can't define any specific problem with cutting back on makeup flow in that situation.

In other words, - the fact that you have voids in the reactor coolant system would not by themselves lead to core damage.

If, however, you did combine now voids present in the core and a continuing loss of inventory where now the inventory being lost is greater than the amount of makeup being added to the system, the potential there is for them, the voids to increase to a point where there would be insufficient water remaining in the reactor cooling system to continue to cool the core in an acceptable way.

This could lead to a core uncovery as referred to in core damage.

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BY MR. HELFMAN:

Q Would this be more likely where the operator completely turns off makeup flow as opposed to intermittently reducing flow, increasing flow, reducing flow?

A Well, the answer is basically just what we call a

mass inventory balance. If you have a certain amount of mass that you are loosing from the reactor coolant system, and then you decide to turn it off, obviously the deficiency is maximized. You are losing the maximum amount. The net amount is maximized.

Let me say, however, if you have periodic adding and cutting back of makeup flow, you would still do the same calculation in effect over some time period, take an inventory so to speak of the amount of mass in the reactor coolant system, so depending on how frequently you restored flow, if you had no flow, it is just a mass balance, but in general it would be better to keep flow on than to take it off.

Q But in any event, this scenario presents the bovious possibility of core uncovery as a consequence, would you agree with that

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A Yes. I would agree that if an operator for some reason did not provide the same amount of mass to the system as was being lost through the system, that the system is capable then of maintaining pressure at some value and what you effectively have is more steam being forward in the reactor coolant system occupying volumes that would normally be occupied by liquid water.

Q Would you agree that the concern in this memorandum that was signed by you and drafted by Sandy Israel concerning

termination of makeup flow on the basis of misleading information from pressurizer level indication is a concern for potential core uncovery? Is that the danger addressed?

A Well, I can say looking back at the memo today, that certainly is the case.

I would point out, though, that I think it is fair, that the remarks shouldn't reflect the thought processes that I went through at the time I initiated the memo. I think that is important.

I did not focus at the time I concurred in the memo on issues such as core uncovery, so at the time that I signed the memo, I was not in my own mind following through on any of the specific scenarios. I basically read the memo for the basic substance of the memo. I found nothing in there which suggested to me a reason that we shouldn't go ahead. I thought we should, and on that basis, I did.

Now to go back and look at the memo and study it today, yes, in looking at it today, the concern that you would have is that if an operator did not maintain proper makeup, and if he did secure makeup, the possibility of core uncovery is a reality.

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Q When you reviewed the memorandum, then you confined yourself to a scenario that is described in the memorandum and did not extrapolate from that?

A I cannot even say that I thought a scenario. I

read it for the purposes of understanding it. I did not study it in the sense to construct the scenario to either agree to disagree that such a scenario was possible.

The purpose of what I did by reading the memo was just to know in effect the thrust of what the memo was trying to pursue. It seemed like an area that merited to me some investigation. As I recall, there was, the investigation was to center on the need for a loop seal which was just a particular bend in the pipe.

I did not see any reason why we shouldn't pursue the need to better understand why these were there, so I would say at this time if that was basically the point, that was all I can recall that I got out of the memo.

I did not particularly spend any time reading the memo at all. I think I may have glanced at it for ten minutes.

Q Would you consider the concerns raised in the memorandum regarding misleading information from the pressurizer level upon which the operator could terminate makeup flow to raise a safety concern?

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A At the time I signed it, no. Let me explain. It is part of our review process, our branch does not review emergency procedures. I don't recall making any mental note of the fact that we were discussing emergency procedures and operator actions, so I guess at the time I signed the

memo I did not see, I did not recognize what the memo was suggesting to the same degree that I see it today.

I wonder if I could have thq eustion re-read and my answer because I think I lost it somewheres along the line.

(The record was read by the reporter.)

THE WITNESS: Okay.

BY MR. HELFNER:

Q Had the final paragraph of Mr. Israel's memorandum caught your attention where he suggests that procedures be reviewed to ensure adequate information before the operator terminates makeup flow, would there have been a way for you to call this to the attention of the people who would be able to review the procedures to ensure that the operator had adequate information before he terminates makeup flow?

A I'm sorry. I am going to have to ask her to read it again.

(The pending question was read by the reporter.)

THE WITNESS: Yes. Let me say that if a need to point this out in the procedure had come to my attention to the point that I wanted to make other people aware of it, at that time I would have discussed it with probably people who review, operating license personnel. Let me explain.

At the time that I wrote the memo, signed the memo, it was my understanding that the only people within the

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staff who reviewed, who had the procedures, were members of the Operating License Branch. It was my understanding that as part of development of their examinations, they would have access to these procedures.

I was not aware, to my knowledge, that Inspection and Enforcement also had reviewed the procedures, but perhaps reviewed them at the site, so my point of contact as best I could recollect of people who would have at least had access to the procedure would have been the Operating License Branch.

It probably would not have ended there since they do not review the technical acceptability of the procedure, but only review it from the point of view of determining what portion of that procedure do they wish to choose to examine the operator on.

BY MR. HELFMAN:

Q For the operator's examination?

A That is correct, so the answer to your question is it would have been possible to follow through, although I do not now know exactly what chain of actions would have had to have been taken.

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My association with people developing reviewing procedures was not, I was not familiar with that at that time.

Q It sounds like to me that there were no formal procedures. Would that be an accurate assessment, and that

you would have had to have found a path?

A I would say that that is generally true. I can recall only one instance where we had an opportunity to discuss even generic procedures. In one case, in reviewing an emergency core coolant system for a class of plants, we were concerned with the operator actions, so we used the procedures as the document from which we could understand exactly what actions he would have to perform.

We were interested then in the number of actions and whether he would have sufficient time to perform those actions. That review culminated in our decision that the operator should have more, should have an automatic backup in the sense that if he failed to perform the action, the action would be done automatically for him, but in general, we did not review procedures, and I would agree with the way you phrased the question.

Q Do you recall if that prior experience involved a B&W plant?

A It did not. It was a Westinghouse standard plant, and as I recall it had the title of RESAR-3.

There was one other occasion that I might add when there was a concern in the last several years about a number of events where the reactors were over-pressurized during startups. People who worked for me informally obtained a copy of a procedure or procedures on how plants

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were started up, so we did, and I think again we may have gone through the Licensing Branch where we asked if they could obtain for us a copy of the procedure, and I think that is the way the engineers obtained it.

Q What was the concern at that time?

A The concern at that time, there was a technical concern that during startups because either of operator inattention or failures of certain equipments, the plant was pressurized--water reactor plants were particularly sensitive to over-pressurization because when the plants were being started up, they would be completely filled with water and unless you were very careful on how you added water and removed water, it was possible there for you to add more water than you were removing, and the plant would very quickly pressurize.

Q Is that the condition of going solid or being solid?

A That is correct.

Q What was the concern, that the pipes could be broken?

A The concern was that if you had a very irradiated vessel, and if it should have a crack or a flaw in it, that there was a suggestion that with the vessel being cold, it was of brittle character, and with high pressures there was a chance that that flaw would grow and rupture the vessel.

Q Do you recall what plant this concern was discussed

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in the context of?

A We discussed, the concern was broadened to include all operating PWR's. As I recall, we may have had the procedure for the Donald C. Cook Plant, and the Indian Point 2 or 3 operating plant.

Q Were any memoranda issued by your branch concerning the danger of going solid when the plant was in this state?

A Yes. Memoranda to the point that Mr. Flugge, who is not now an employee of the staff, noted the concern. He was reviewing licensing event reports which identified these kind of events. He wrote a memo which summarized these events and initiated the actions that followed.

Q Was he an engineer?

A Yes, he was.

Q On whose team was he?

A He worked for Mr. Mazetis.

Q Would it be possible to obtain a copy of Ron Flugge's memorandum?

A Yes.

Q Do you recall in that episode who determined the distribution of the memorandum? Was it Mr. Flugge or Mr. Mazetis or yourself?

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A No. I can't recall who determined it. No. I don't recall who made that distribution.

Q Would there also be a yellow copy of this memorandum

in your file?

A Yes.

Q Could we obtain a copy of that as well?

A Yes.

Q Getting back to the Novak memorandum of January 10th, 1978, with respect to the final paragraph where there is this discussion concerning a concern that procedures be reviewed to ensure adequate information to the operator, is what you are saying that that simply didn't catch your eye?

A It didn't catch my eye, and if I were to probably suggest what we might have done with it, at most it would have been part of an operating license review. We would have pursued whether the procedure for that specific plant, what it would specifically say.

I guess now looking at it, it would only have suggested when we finally got to the point where the review was nearly complete because it is only at that time when the procedures have been prepared, that we would have had an opportunity to review the procedures and to make sure then that there was consistency between the design and the procedures, but that is speculating because we, as I must point out, we don't as a normal part of our review, we have not combined the review of procedures and the design.

When we have obtained procedures, it has only been

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in background to help us have a better understanding of what an operator may or may not do or what he is required to do. It gives us better background to understand potentially a weakness in the design.

Q So is what you are saying that operating procedures and design review were separately reviews basically?

A That is correct.

Q Had such a course of action occurred and had this paragraph caught your eye, would the procedure that you have outlined have confined this concern to evaluation of operator license permits, applications or construction permits?

A If the procedure aspect had really caught my eye, it would have suggested to me a concern to make this note, this information known to the Division of Operating Reactors.

I would have looked probably for some generic way to disseminate this information. I may have tried to talk strictly then to the Operating License Branch people to see if they could have disseminated that information to all operating plants--probably not, but I probably still would have discussed it first with the Operating License Branch people.

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We probably then would have concluded that we would have had to discuss it with the Division of Operating

Reactors.

Q Let me call your attention to the first sentence in the memorandum where the memorandum refers to this problem as being one noted in B&W plants that loop seals in the pressurizer surge lines are used in some plant designs noted in B&W.

Is that a generic reference to the B&W plant design?

A Yes.

Q Did that generic reference catch your eye when you were looking over this memorandum?

A Yes, it probably did. In other words, it at least suggested to me that B&W designs were the only pressurized water reactor designs that had a loop seal.

I probably didn't make much of it because the B&W plant design has a different configuration with regard to, in terms of elevation. It has what we call lower loop designs and raised loop designs, so it would not have surprised me that a comment like a loop seal only occurs on B&W, and I may have associated that with just due to the fact that they have a different elevation arrangement, different than the Westinghouse and combustion plant designs.

Q Of course, at the time of the issuance of this memorandum there were a number of B&W plants that already had their operators license and perhaps had gone commercial.

Would you agree with that?

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A Yes.

Q The procedure that was followed, that is, providing this memorandum to the engineers on the staffs of your two team leaders, would not have brought this memorandum to bear on B&W plants that were already operating reactors and already perhaps operating commercially, is that correct?

A That is correct. The distribution did not account for it. I think I did not recognize it as something that should be discussed at this time with the Division of Operating Reactors.

It probably was because I thought there was some... work yet that we had to do. In other words, we would pursue the review on an operating license review and if information came out of that review which we thought added to our concern let us say, then I think we probably would have brought the Division of Operating Reactors into it.

I would imagine that my thought process was one of well, we still have to do the work. We still have to perform that part of the review that was a reminder to the reviewers to learn more about the purpose of having pressurized loop seals, and if from our review we determined something that we felt had a safety consideration, then we would bring it up to, or inform the Division of Operating Reactors, so I would have to say it must have been my thought at that time when I signed the memo that it was something that should be

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kept within the branch because we were just going out, trying to now learn more about the specific design peculiarity, and if something would come up out of it, then we would have another point in the review process where other people could be brought in to share our information.

Q With respect to the concerns raised regarding inaccurate information concerning core level on the basis of pressurizer level, and the possibility that the operator would terminate makeup flow based on the inaccurate information, what further review did you feel was necessary before this matter was called to the attention of other departments?

A Well, I did not focus on that point, so I don't think that is a fair characterization.

What I would say is as I recall my point was that we were going to investigate why there was reactor coolant loop seals. When we understood why they were there, we would probably then disseminate that information.

We would, if we felt it was certainly a safety concern that was more firm in our minds.

I did not at the time we issued that memo recognize all of the ingredients of the memo to the same level that we can today but it was in my mind something that we were going to review to better understand the basis for a specific design configuration.

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Q Would you agree that the safety concern is rather apparent on the face of this memorandum?

A In today's light, yes, but I do not believe that it would be that apparent at the time that the memo was prepared.

For example, there are 15 engineers in the branch. To my knowledge, no one ever sat down and discussed it with me. Nobody asked me whether or not we should discuss this issue with the Division of Operating Reactors. I assume and I am fairly positive that each of the engineers read the memo. He at least would have read it to make sure he at least understood it.

He may have not done anything with it at that time because he was not reviewing a B&W plant. As I recall, there was only one or two B&W plants at that time being reviewed, so the memo did not ring the bells at the time it was issued that it certainly is suggesting it can ring today.

Q Between January 10th, 1978 and March 28th, 1979, was any such review conducted or further exploration of the problem conducted in your branch?

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A It was my understanding--let me say it this way. I would have expected that that further review would have taken place as part of the review of the Midland operating license review. Midland is a B&W plant of similar design to the Three Mile Island plant design, so it would have been

logical for the reviewer of that plant to engage in questions dealing with that subject.

Q Do you know who was assigned to review that plant?

A Mr. Scott Newberry was the assigned reviewer, and he was assigned to Mr. Jerry Mazetis' section.

Q When did this review occur?

A The review has been in process for probably two years. Only recently did I have an opportunity to talk to Mr. Newberry, and he noted for me that when we reviewed, started the review of the Midland application, it was one of the plants that we selected for assistance in review from the EG&G personnel operating the Idaho National Test Laboratory, so they assisted us in preparing some of the questions, in fact preparing most of the questions for our initial round of questions with the applicant.

Q Could you please give me the name again of the laboratory?

A It was the Idaho National Test Laboratory--INEL--Idaho National Engineering Laboratory.

Q Do you know if they dealt specifically with concerns raised in the Novak memorandum of January 10th, 1978?

A I did ask that question more recently, and Mr. Newberry informed me that he looked at their questions and it was not there. It is possible that their questions pre-dated the issuance of the review reminder.

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When we provided information to the people who would be assisting us in our reviews, it is my understanding, although I did not specifically verify it myself, that we gave them copies of all of the standard review plans for which we have primary responsibility, those that we have secondary responsibility.

We would have also given him, them copies of all of the existing review rem ders, so if it was in existence at the time they initiated the review, they would have had the benefit of the review reminder.

Q Would it be possible to obtain a copy of the questions they posed so as to ascertain the date that they posed them?

A Yes.

Q Could you provide that to us?

A Yes.

MR. CHOPKO: Off the record.

(A discussion was held off the record.)

BY MR. HELFMAN:

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Q Do you know if the concerns of the Novak memorandum were addressed in the questions finally submitted to the applicant in the Midland OL review?

In other words, did Mr. Newberry address those concerns that the Idaho National Test Laboratory did not?

A I only recently asked Mr. Newberry and Mr. Mazetis

if they had, if there was a question asked dealing with this issue. As I recall from our conversation, their first impression was yes, they had picked it up. However, they had not been able to locate the question.

In discussing it between themselves, they believe what they now recall is that while it wasn't asked on the first round, they had intended to ask for it during the second round of the questions, so it may have been when they thought they had asked it, that might have been really what the recollection was coming up with.

No, it hadn't been asked yet, but what they probably were going to do was ask it on the second round of questions.

Q Has the second round of questions been completed or is that coming up?

A There have been second rounds of questions completed. I don't know if we specifically issued our final second round questions.

My thought is that when we were probably in the preparation of the second round of questions is when the Three Mile incident occurred, so now there is a question in my mind whether all of our questions got out before the Three Mile incident.

Subsequent to the Three Mile incident, we have had other people assisting us on the staff in performing this

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review, so I am not up to date as to exactly what stage of review the Midland application is at this time.

Q Would it be possible to obtain from you a copy of the second round of questions if they exist or the draft second round questions if they exist?

A Yes.

Q Do you believe that had the significance of the safety concerns been raised in the Novak memorandum of January 10th, 1978 involving misleading information from pressurizer level as to core coolant level and potential operator error based thereon, that this memorandum would have played a significant part in preventing the accident at Three Mile Island in January of this year?

A In my own opinion, no; I think the memoranda would have been judged probably still hypothetical. It was not clearly in my mind a memorandum which had sufficient technical detail to perhaps suggest a change in the design.

I am speculating, but I would guess that it would not have been a clear basis for saying had that information been disseminated, without a doubt it would have precluded the Three Mile Island accident.

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I don't know the answer. My guess is that the memo could have been reviewed and judged to be still hypothetical. There was basis to suggest that the operators had had events similar to this. Acceptable action had been

taken, and it may have been argued that the operators are alert enough to respond properly and that there would be no need for a design change.

Q Your first point was that a memorandum such as this would need a technical workup to really have been useful, is that correct?

A Yes. I think that we would have had to develop a technical basis to support the need for changes in operating plants. We would have done it by the accumulation of additional operating data from which a technical argument would be made to support the need for a change.

For example, when we talked about the pressurized water reactor transient, it was through that kind of an argument that changes in the design of the plant, as well as some of the procedures, occurred. The staff was convinced that these changes were necessary, and on a time basis appropriate for making these changes required that they be made.

I think only after we could have accumulated a technical argument, which would be made of the data from operating plants and a technical evaluation of its significance would changes be suggested.

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Q Had such technical workup been done on this memorandum, do you feel that this memorandum in conjunction with such technical workup could have been a significant

factor in the prevention of TMI 2?

A I would say that what we would have certainly changed would have been operating procedures, so the procedures would have been modified to reflect the concern. To the degree that the modified operating procedures would have prevented the accident, yes, but that still would be a certain degree of speculation on my part.

Q At the end of the first paragraph of the memorandum there is a reference to the Davis-Besse 1 incident where a relief valve stuck open.

Were you familiar with that transient at the time that you reviewed this memorandum?

A I was aware of the transient, yes. We had studied it several months earlier. I did not specifically recall any of the review of that incident when I signed this memorandum.

I knew it existed, and I was satisfied that it was an appropriate reference.

Q At the time that you reviewed this memorandum, were you familiar with the Michelson memorandum produced by Carl Michelson?

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A No, I was not. I did not know of its existence.

Q At the time you reviewed the memorandum, were you aware that this memorandum was inspired by a contact between Sandy Israel and Jesse Ebersole?

A No, I was not.

Q Were you aware that that contact arose out of a discussion by the ACRS concerning the Pebble Springs plant?

A No, but let me point out that I was aware that Sandy Israel and Mr. Ebersole had had some discussions. It was my understanding that these discussions or as I recall now, my impression was that these discussions related to perhaps over-flooding of the steam generators.

Q You weren't aware that their discussions concerned the concerns raised in this memorandum of January 10, '78?

A That is correct.

Q Were you aware of the sequence of events of the Davis-Besse September 24th, 1977 incident when you reviewed the memorandum?

A I was familiar with the Davis-Besse event following the time that events occurred. I did not specifically, again as I said earlier, refresh my memory as to specifically what was the Davis-Besse event when I signed the memorandum.

Q Do you think that you were aware that the Davis-Besse event involved an unexplained closure of a feedwater valve which cut off water to the steam generator which in turn resulted in a rise in reactor core pressure and temperature and as a result the PORV opened and stuck open, that coolant escaped through the open PORV, flowed into the quench tank to such an extent that the ruptured disc on

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the quench tank ruptured and that nevertheless the pressurizer level increased to its maximum? Were you aware of those details?

A I was probably aware of those details shortly after the event. The branch had an opportunity to send people to the site and we did study the event.

When I signed the memo, I probably had a recollection of the Davis-Besse event as an event which had a transient which ended up with a relief valve opening, but most importantly, that the quench tank ruptured and that there was a blowdown into containment.

Q Do you recall the names of the people who were sent to investigate that event from your branch?

A At least Mr. Gerald Mazetis.

Q Had those details slipped from your mind by the time you had reviewed the January 10th, 1978 memorandum?

A Yes, they had.

Q Would it be fair to say that the reference in the January 10th, '78 memorandum of operator error based on misleading information as to core coolant level based on pressurizer level didn't catch your eye?

A That is correct. When I say didn't catch my eye, let me say that if I read it, technically it made sense to me so I wasn't arguing with the technical content of the statement.

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When I say it didn't catch my eye, it didn't suggest to me anything of the significance of the statement as we can now look at.

Going back to the Davis-Besse incident, we concentrated our reviews on, certainly we were interested in what the power operated relief valve, how it performed. We had an intrest because we were generally looking for systems response.

We were interested in the containment behavior, specifically the amount of debris that was formed in the sump, so there were areas of our review that we concentrated on.

My recollection was we in the Systems Branch did not specifically look at the operator actions. It may now in hindsight be a weakness or a specialization by which the Branch did its work that it was not able to really put the operator in the systems review process.

Q Would it be accurate to say that as a result of the review of the Davis-Besse incident, you were not aware of the operator action in that incident?

A No. We probably were aware of it. It was difficult for us to incorporate it in a sense into our review process.

Q I see. That efers to the operator having terminated HPI?

A That is correct.

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Q In the structure of things, is Mr. Denton your superior?

A Mr. Denton is the Director of the Office of Nuclear Reactor Regulation. Under him, he has a number of divisions, one of which is the Division of Systems Safety, whose director is Mr. Roger Mattson.

Under Mr. Roger Mattson is a number of assistant directorships--one, reactor safety.

At the time of the Three Mile incident, Mr. Robert Tedesco was the assistant director. I reported to Mr. Robert Tedesco at the time.

Q Mr. Tedesco I assume was not provided with a copy of the January 10th, 1978 memorandum as a part of distribution?

A That is correct. He may have had it in the file that Mr. Ross turned over to him when Mr. Tedesco assumed responsibility. I have no idea whether or not that indeed occurred.

Q When did Mr. Ross turn over responsibility to Mr. Tedesco, if you can recall? Is that shortly after the memorandum was issued?

A No. I don't recall the specific date.

Q Would it have been sometime in 1978?

A Yes.

Q What time would this have been?

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A Well, if Mr. Ross maintained any files, it might have been filed under information related to the Reactor Systems Branch.

Q But not applicable to a specific OL review?

A No. I would have guessed he would have had it under a file which would have been a file to show the areas of review of various branches.

Q Did the Pebble Springs plant come before your branch for review?

A Yes, as a construction permit application.

Q When was that approximately, if you can recall?

A 1977; it had a delayed review because of the potential--off the record.

(A discussion was held off the record, and the witness' response was read back.)

THE WITNESS: For volcanic eruptions in the vicinity of the plant site.

BY MR. HELFMAN:

Q Has that plant received an operating license to date?

A No, it has not.

Q Did it go through an operating licensing review stage through your branch?

A No, it has not.

Q Are you familiar with the questions that are

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propounded by the ACRS regarding plant applications?

A I am familiar with those questions that the ACRS develops in the area that I have technical cognizance over, yes.

Q Do those questions get routed through your branch either to or on the way back, with answers, from the licensee?

A Well, ACRS questions can take a variety of paths. Usually the questions come to us from the staff members. They may be questions that a specific committee man has wished to be asked, and we then endeavor to answer it, or we will let it be known to the applicant that this is a question that we have been asked to answer and suggest that he prepare an answer either as an amendment or perhaps at a meeting.

Yes, we generally. I would say we always receive the responses to any questions by the applicant. If they are formalized and if they are at a meeting today, it is part of the record, so it is available to us.

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Q Did your branch receive the questions that were propounded by the ACRS regarding the Pebble Springs application?

A Those questions are a little, they were a little unique. They were very detailed, as I recall, and my recollection is that through the Division of Project Management or something these questions were provided to the applicant, something in the sense of can you have these

answers to these questions in time for the next subcommittee meeting or something.

As I recall, the staff was just more or less a middleman in getting the questions to the applicant. They were prepared by somebody on the staff of the ACRS, and they were given to us probably through the Division of Project Management--some of the people on our staff, in fact. I think I recall that we had some very limited discussions with regard to the scope of the questions.

It is my recollection that these questions went well beyond what we would traditionally call the bounds of our review either in suggesting more failures than what we would traditionally look at, and asking for consequences, but it was of that nature.

Q Do you recall who discussed the scope of the questions? Was that you and some other people on your staff?

A As I recall it, I did have discussions either with Mr. Israel or Mr. Mazetis. I don't recall which person I had that with.

Q Was it one or the other rather than both?

A It could have been both.

Q These questions were routed from the ACRS eventually to your branch and then your branch simply passed them to the applicant without further analysis or review of the questions?

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A No. Let me see if I can help. It is my recollection that the questions were given to the appropriate branch in the Division of Project Management. They probably gave us a copy of the questions at the sametime that they gave a copy of the questions to the applicant, so that was the way I think we became aware of the questions.

We probably got them through the Division of Project Management, but they were responsible for seeing that these questions were provided to the applicant.

Q Then your branch did not act as a conduit?

A That is my recollection. No, we did not.

Q What if anything was done by your branch with respect to the questions?

A We certainly read the responses. We were interested in the responses to the questions. We did not, as a formal review, review the adequacy, so the questions were basically developed by the ACRS. We reviewed the responses basically for information and to strengthen our own review of the particular concerns suggested by the questions.

Q Do you have any recollection of the content of question No. 6, which was proposed by Mr. Ebersole?

A No, I do not.

Q Do you recall if any of the questions raised specifically the concerns which are addressed in the January 10th, 1978 memorandum signed by you?

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A No, I do not.

Q Is there some documentation concerning your branch's consideration of the Pebble Springs questions that we might be able to see--memoranda, evaluations?

A Let me see if I understand. What you are asking me is after we had received the responses from the applicant, did we write anything which described any comments related to those responses?

My recollection is we did not, but I will look and if there is anything available, I will make it available to you.

Q Is it normal procedure for you to receive the questions propounded by the ACRS and the responses propounded by the applicant?

A Yes. We generally work a little more in the line--I would suggest that this was a little different. Generally what happens is we are a stronger, we may play a stronger role in the questions.

In this case--by that let me clarify what I mean by stronger. We would get a certain question from ACRS. We may read it, discuss it, and then prepare questions and then ask them of the applicant, so we may do that kind of work on behalf of the staff.

Then the question comes back. We review it. We would discuss the response with the ACRS and the applicant.

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In this case, the questions had, to my nature were already, you might say had been prepared. They were areas, as I recall, that we would not normally ask because in the sense they would be, you might suggest a violation of what we would consider to be our standard review practices. They would be outside of what we might call design basis events.

Q Your area of specialization?

A Not so much the area of specialization--as something beyond what we require for licensing; for example, if we require that an accident be reviewed assuming a single failure, we would not necessarily then ask for accidents that would require two or three single failures to track that scenario, so in that sense the questions were dealing with perhaps scenarios less likely than what the staff would suggest is an adequate basis for licensing.

Q So in that circumstance, your staff really did nothing with these questions?

A That is correct, in the sense that we neither included them in our own safety evaluation--we were knowledgeable that the questions were asked. We were knowledgeable that I don't know if all of the questions could be answered in enough detail to say that all you wanted to know, the applicant was able to provide you with.

It was my understanding and recollection that the

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applicant provided a surprisingly comprehensive answer; that might have been because of his need to try to be as responsive as he could to the committee such that they could complete their review and the process of the construction permit could be brought to a close.

Q Was your branch responsible for transmitting the responses to the ACRS?

A Not to my knowledge.

Q Do you recall or do you know if the applicant responded to each of the questions that was propounded?

A As I said, he may not have answered all of the questions completely. Some of his answers may have been we have not studied that specific scenario, but he answered the questions.

Also it was my recollection in discussings with people in our branch that we were surprised at the depth to which he was able to respond to those questions in a relatively short period of time.

Q Were you aware of any transients occurring at plants outside of the United States that might have involved a PORV failure.

A I was not at the time, let's say up until the time of the Three Mile Island accident.

Recently we have been made aware of a plant transient similar in some respects to the Three Mile accident

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in that there was a system transient which resulted in the PORV valve remaining open, one of two valves remaining or , and may have been open for a period of 20 minutes after which the operator secured the valve.

Q Was that a Westinghouse plant?

A It was my understanding that this is a Westinghouse designed plant.

Q Located in Europe?

A Yes.

Q Do you recall if you personally did any work on the Three Mile Island 2 construction permit or operator license application?

Q At the time that Three Mile Island 2 application was submitted for a construction permit, I was working in what is now called the Division of Project Management. Mr. Ross was what we at that time called the, he was the project manager for that branch.

I don't recall any specific portions of the review that I undertook myself, but I do think that we had discussions in the area of thermal hydraulics with regard to Three Mile Island.

I may be recalling Three Mile Island Unit 1. There is that possibility, but I don't recall any specific reviews that I conducted myself of either Three Mile Island 1 or 2.

Q Would it surprise you to learn that you are listed

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on the docket for Three Mile Island 2 for approximately 400 hours, if I recall correctly, of time?

A This is prior to the Three Mile Island incident?

Q I am trying to find out the dates.

A Your question is with regard to the operating license or the construction permit?

Q I'm not sure. I can represent to you that your name appears on the Three Mile Island 2 docket.

A That could be the case because if you go back in time to the Three Mile Island docket, it includes the construction permit for Three Mile Island 1, operating license for Three Mile Island 1, construction permit for Three Mile Island 2, and the operating license for Three Mile Island 2.

As I recall, I did not perform any engineering reviews of Three Mile Island 2. I had already taken on my present position. There were periods of time during which I did perform engineering reviews and it is very possible that one of the plants I could have reviewed in let's say the review of the emergency core coolant systems or core thermal hydraulics could have been either of the Three Mile Island ones.

Q Could you provide us with any documents which would indicate what dates you worked on Three Mile Island and what you did in that regard?

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A I don't know how I could do that. I could see if that information is available. I am very skeptical that I could obtain it without a very tedious review.

Q Can you suggest where we might find such information?

A I would suggest that the Accounting Department may be of some help.

Q Okay. You mentioned earlier that due to specialization or compartmentalization, certain types of review fell outside of your function, and I think we were discussing this in the context of the route that you might follow to bring the concerns of the January 10th, '78 memorandum to the attention of other departments within the NRC.

Is it your feeling that such compartmentalization or specialization in the NRC was an organizational defect of some sort prior to TMI 2?

A Certainly I think a certain amount of compartmentalization or specialization is necessary. Nuclear power plant design envelopes a wide range of specialization, so I would support specialization as a necessary part of a well-functioning regulatory organization as far as nuclear power plant reviews are concerned.

My point is that if there was an error, it was the failure to recognize the relationships between the procedures, the emergency operating procedures that would

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be followed as a consequence of an accident.

We were aware of the procedures, but we did not as part of our review of a system design or a system evaluation combine the operator's activity with what he would do following procedures, not to say that we didn't know that he had procedures. Our reviews did consider how soon an operator might have to take an action, and we would certainly consider that.

We were careful not to accept designs and scenarios for which operator actions were suggested to be required very early after an accident occurred, so from the point of our review, we would look at the design to see that the operator had sufficient time to take an action.

What I mean now--but we did not scrutinize the procedure to see that all of the implications of what the operator could or could not do as part of the accident scenario, so from that point of view, I would sense a need to tie those together.

Q Two questions occur as a result of your comment. First is would you agree that the B&W OTSG design put far greater demand on the operator in a time sense than either the Westinghouse design or the combustion engineering design?

A Well, if I take away the Three Mile Island 2 accident and everything we have most recently reviewed in terms of short times to drying out steam generators and so forth,

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the answer to your question would be no because our rules that we have adopted in terms of required operator actions in the event of an accident are the same for Westinghouse plants or combustion plants or a General Electric Plant or a B&W plant, that being no operator action is required let's say any sooner than 10 minutes, regardless of the accident, so the operator response time is no shorter to these classical accidents that we have reviewed.

Q When you indicate that the operator has no required procedure to follow for 10 minutes, is that post-TMI or pre-TMI?

A this is pre-TMI. This says if there is an accident that occurs, any action that is required to mitigate that system, that accident must be performed automatically, that the operator does not have to take an action before 10 minutes, so there was no action required by an emergency procedure as far as I know.

We would not have approved the design had we known that there was an action required other than verification, which means you look but you don't have to perform an action. You don't have to turn on a pump or secure a valve or start a diesel or something of that nature, so none of these actions are required any sooner than 10 minutes, and this is pre-TMI.

Q In the TMI 2 scenario, the operator, is it accurate

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to state that the operator on the basis of indicators took action?

A Let me point out one thing and let me first clarify an earlier statement.

Generally, there is never a requirement for an operator to take an action before 10 minutes. On certain plants for an interim period of time we have given credit for an operator taking an action let's say in 5 minutes. Under those conditions,we call him a dedicated operator in the sense that given there is a response, his first and only action is to perform that function, so for a period of time until,well, obviously until the plant is modified, we have permitted an action by an operator in less than 10 minutes; but traditionally our design requirements are that there is no operator action before 10 minutes.

What might suggest something earlier is that after the plant has been built and the plant is operating, something is learned of the plant that wasn't originally known and until certain changes can be made to the plant, as in that sense instead of shutting down the plant until the changes can be made, the staff has on occasion determined that a dedicated operator is an acceptable interim response to the concern.

Now maybe we ought to go back to your second question. I wanted to clarify that point.

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Q Let me follow that for a moment. This type of a change and the use of an interim operator would result from the recognition of a generick problem, would that be accurate?

A It could be generic, or it may be plant specific.

Q My second question concerned what you have described as a lack of integrating operator procedures in design review.

What do you feel that is the result of? Is there some lack of overview in the organization, some structural or organizational problem that keeps these concerns and reviews unto themselves?

A Yes, there must be that. The organization certainly has to set certain charters for itself, and there is in the development of a structure of an organization certain responsibilities that are identified.

I would say certainly a very unintentional oversight was the need to give the procedures a closer technical review.

They were reviewed. They have been reviewed but continue to be reviewed by the Office of Inspection and Enforcement, and I would not want to put myself as a person who understands to what depth the Office of Inspection and Enforcement reviews them.

I do know that, and certainly it can vary depending on the people doing the reviews, but it is my understanding

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that the Office of Inspection performs a review in the sense that it ensures that all of the necessary procedures are indeed in existence and it may perform a review which checks to see that, for example, the designations given to certain equipment are indeed correct, for example, that valve designations are proper, but it is my understanding that the suitability of that procedure in the terms of is it the right kind of a procedure to respond to that accident was not specifically under the charter of the Inspection and Enforcement.

Similarly, it was not under the charter of the Office of Operator Licensing Branch. They were familiar with the procedures only to the point that they knew that the procedure was one that could be physically carried out by an operator, and also whether it served as a base from which they could construct various tests to determine if the operator was indeed familiar with the procedure.

Q Are there some changes proposed in the organization of the NRC to ensure that issues such as you have mentioned concerning operator procedures don't fall between the cracks?

A It is my understanding that as part of the long-term recommendations of the lessons learned task force, that they will be looking at those areas where the staff should provide higher, put higher emphasis in their reviews and certainly I think it is relatively knowledgeable to many

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people that I am fairly confident that this will be one of their recommendations.

Q But they will recommend that certain issues be emphasized or that there will be structural changes in the organization in order to ensure that certain issues are covered?

A I think I would expect them to identify the need to ensure that these kind of reviews take place.

Whether our management decides that okay, we agree with the need for those changes and we must make the necessary changes within the present structure of the organization or whether some changes to this structure would have to be made would have to be decided at a later time.

Q Your description of the operator procedures leads me to the conclusion that they don't allow for much discretion on the part of the operator, that an event occurs and he follows the steps of a fairly rigid procedure.

Would that be accurate?

A I am not familiar with all that an operator does in the sense that the procedure just defines what the operator has to do. It doesn't suggest what he can't do or what he might also be able to do, so if there is a weakness that we have become more aware of following the Three Mile Island accident, it is that the operator perhaps responded and did more than what he specifically was required to do for the

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event.

It is my understanding the operator is not restricted to only those actions required by the emergency operating procedure, my point being that we only give him credit for performing only those actions dictated by the emergency operating procedure, and in that sense we review it to see that it is well ordered and that the operator has enough information to perform those actions when required.

MR. HELFMAN: Let's go off the record for a minute.

(A brief recess was taken.)

BY MR. HELFMAN:

Q With respect to the procedures which the operators are required to follow in the event of a transient, is the intention to eliminate the need for the operator to exercise discretion or make analysis of the transient at the time he is supposed to be performing his manipulations?

A In general, yes; it is my understanding that an operator is trained to recognize certain observable symptoms. In other words, if you have an event, there is information displayed in the control room which he is trained to recognize, so this is committed to memory. If these lights go on in a sense, he recognizes this.

He then is trained to take certain immediate actions which may only be verification, and if indeed we had a reactor trip, he verifies that the rods have all bottomed,

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for example, and then he is required then to follow a procedure in terms of performing any subsequent actions, so he doesn't really do any diagnosis other than what he is trained to diagnose and so he is only expected to diagnose a certain variety of events from which he can determine what specific procedure he should follow.

Q Such as a procedure which would require him to check his pressurizer level in order to determine core coolant level?

A That I don't know that that would be the case. I would say that if he has a procedure, if he has diagnosed that he has had a loss of coolant accident, he then follows the specific procedure for a loss of coolant accident, and he follows all aspects of that procedure. That is what he is trained to do, and if the procedure itself would say maintain makeup water or HPI water to that determined for the pressurizer water level, then he would follow it only because he has been trained to do it and that is the accepted response, so he is not making a decision in that sense.

Q Let me give you a hypothetical. Let's assume that the operator had been trained that pressurizer level indication and pressure indication rose and fell in tandem, and he observes that pressurizer level indication is increasing whereas pressure is decreasing, and he has not

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been provided with a specific procedure to cover such an event, what then does the operator do in light of the philosophy that the procedures are set out,he is not required to analyze the transient, he looks for indications and reacts?

A The operator, and here we may be using the term plural because it is most likely that there would be two operators in the room, a senior reactor operator and a reactor operator, the senior reactor operator would then have to make a decision if he sees an event that is different than an event that he has been trained to respond to, to take what he considers to be a safe course of action.

Q Is this contingency provided for, or is this just a necessary observation?

A I would consider it to be, it is an observation. What I am saying is we don't, as far as I know, expect him to have to analyze and respond to events that he has not been previously trained to. We don't teach them in that sense by saying we are only going to teach you as much, only a certain level of accidents, and now we are going to spring some new ones on you and expect you to decipher these new ones correctly and take proper action, so the answer to your question would be no.

It would just occur because we didn't recognize it to be an event that could occur different than what he

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has been trained to respond to.

Q The operators then are not trained to handle situations that are not specifically dealt with in their procedures?

A That is my understanding.

Q Are you aware of what the educational level is of operators?

A It is my understanding that they generally all have a high school, at least a high school education. They will take a certain number of courses that may be considered to be college level courses to give them a better understanding of basic nuclear engineering principles.

Q Did your branch have any responsibility for control room design in reviewing operator license applications?

Not a major design; as I noted earlier in our discussion, there was one time when we did look at the number of actions that would have to be taken and the ability of the operator to move from one location to another to see that he could do it in the timeframe necessary, but that would have to be in my mind a very secondary review. It is not primary to our review.

Q Would you have reviewed such things as the locations of indicators?

A No.

Q For example, the location of the quench tank

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indicators on the bank of the control panel at TMI 2?

A No, we would not have done that as part of our review.

Q Is there any branch within the NRC that reviews control room design?

A Yes. That branch is the Instrumentation and Control Systems Branch, and it would be my judgment that they perform the majority of the review of control room layout. Well, of the review that is performed by the staff, I would suggest that they are the primary reviewer.

Q But you don't know the extent of the review that is performed?

A That is correct.

Q Would your branch be responsible for reviewing the adequacy of indirect indications of plant condition such as the indirect position indicator on the PORV?

A No.

Q Is the review that your branch performs at the construction permit stage or at the operator license application stage confined to safety-related items?

A Primarily, yes, but in the review of certain transients, we do consider what we consider to be the non-safety or control system impact might be on that specific transient, so we primarily review the transient from the point of view that if there is an effect that the control

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system may have to further degrade the system to make the transient more limiting, then we consider it in the sense that if the control system, if that was the normal function, we would consider it.

We don't review the control systems or non-safety grade systems in terms of determining whether any credit can be given to these systems. In general, any mitigation is only permitted by safety-related equipment.

Q When you refer to mitigation, you are concerned with mitigation of what?

A A transient, an expected event or even a serious accident would only be mitigated by equipment designed for mitigation of those specific kinds of events.

Q As you indicated at the outset, the focus of your review was on transients and accidents and the systems designed to cope with such events.

A That is correct.

Q So primarily you are concerned with safety-related items?

A That is correct.

Q Do you know if there is a branch within the NRC that is concerned primarily with reviewing non-safety related items?

A No. The basic point of our review is that we try to go at the review where you postulate an event which includes

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in a sense the failure of non-safety related equipment. Therefore, the event is not reduced in severity because you have given credit for non-safety grade equipment continuing to perform a function.

In terms of developing a serious event, we assume that non-safety grade equipment does not function to minimize the seriousness of the vent, and then on the recovery side we do not give credit for non-safety grade equipment, helping to mitigate the equipment.

Q Is there a performance in the transient review, however?

A Well, we have thought that it was because we generally don't give credit for non-safety grade equipment. We have in our review of certain boiling water reactors recently, we have determined that certain credit has been given to non-safety grade equipment to perform a function that at least the designer feels is a normal function, and then these transients are not serious accidents. They are transients for which the criteria is there being no fuel damage as a consequence of that event.

I would have to say that the staff has been learning more and more in the last two years about the importance of non-safety grade equipment in the consequence of transients and accidents.

Q Let's move on to the subject that we were talking

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about earlier about compartmentalization in the NRC and you indicated that there may be some changes proposed to eliminate some of the drawbacks of such an organizational structure.

What types of changes organizationally could be made to mitigate the compartmentalization that you have noted?

A Let me say this. The term compartmentalization assumes that we all work in boxes and we don't talk to each other.

That is not true. What I am suggesting is that from the review of the Three Mile Island accident and everything else that we are learning, it would suggest to me the need to, for example, integrate the review of the procedures along with the design of the plant. to recognize that the operator is going to play an important role in how a specific scenario evolves, and so from that point of view, I am saying that probably what recommendations would come, or at least it is my opinion that there is a need to consider putting together in a closer way than it presently exists the need to study the operator response to events and the equipment that is designed to mitigate these events, and our understanding of how these events would occur.

You would probably still have specializations in the sense that you would have, for example, a set of people who are concentrating let's say on understanding all

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about loss of coolant accidents which includes how operators are trained to respond to loss of coolant accidents, how the procedures are developed, what equipment is necessary, but that does not mean that you need the same people reviewing some other transient.

It could be another group of people reviewing another transient, but reviewing it in the same breath, so there would still be specializations, but it may be specializations of the kind you talked about.

We may have a group that specializes in reviewing all aspects of a loss of coolant accident, and another group that maybe specializes in accidents which perhaps are all secondary side induced transients in pressurized water reactors. That is an example.

Q These overviews, would they be envisioned as coordinating the efforts of more specialized or more compartmentalized groups, or do they provide an overview or what?

A It would be my opinion that this group would have the primary responsibility for the complete review. It would reduce the necessity to go outside of a branch, so to speak, so in my mind, a branch that has responsibility for the complete review of a loss of coolant accident would include understanding the training that the operator is given, understand the procedures that are developed, understand

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the design and that would be in the sense of an inclusive portion of how an accident may develop.

Q Are there people on the staff that already have this more general or broader view of interrelationship between design and procedures and so forth?

A Well, I would have to admit since the TMI 2 accident, and I think a lot of people have broadened their understanding of the relationship between procedures and the design, the importance I think has become clearly obviously.

Q Do you envision any structural changes in the organization to ensure that this review on a broader basis is conducted as a matter of routine?

A If the organization as it is presently constructed can't provide that function, then it would be obvious that it would be modified.

I think if it is a question of giving a specific branch a new charter, assigning a different set of people now to that branch to perform that charter, then indeed it has been accomplished within the same basic structure so you move people around and you modify the charter. That is one way of achieving it.

It may be necessary to restructure the organization because it is just more efficient to do it that way. That is also a possibility.

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Q I have two final questions, and one is do you see any safety related concerns about locating two reactors at the same site?

A No. Let me point out that has always been part of our review when we do look at dual sites where necessary. We see complete separation, so the fact that there are two units on the same site and the relationship between them has been part of the normal review process, basically that an event to one unit shouldn't have a feedback effect from another unit, and/or call upon or need systems from another unit. They basically are reviewed as two separate units in the areas that I am responsible for.

Q Were TMI 1 and TMI 2 connected in such a way that TMI 1 was needed to help bring TMI 2 to a cold shutdown or to maintain it in that condition?

A It is my understanding that there was some use of Three Mile Island 1's chemistry lab and so forth because of the activity level let's say in the Unit 2 lab, but as far as the systems that were used, to my knowledge there was no TMI 1 systems.

They may have, for example, used some of the storage facilities at TMI 1. Those are areas that I am not specifically a specialist in.

Q Let me ask you if you recall receiving from Mr. Harley Silver, project manager at TMI 1, a document

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concerning an April 23rd, 1978 transient at TMI 2, the details of which involved five safety grade valves failing to close with a loss of pressurizer level indication on the low side?

A May I see the document? Yes, I recall this document. It is my recollection that Mr. Silver and I had a discussion about the event, and I asked him if he couldn't provide me with a document.

As I recall, I thought the document I was going to get, expecting to see was something prepared by the Office of Inspection and Enforcement.

The document you show me is one that was prepared by the Metropolitan Edison Company. It doesn't make any difference, but we had a discussion. He did send me the document that you now have shown me, and I see on the cover of it a notation that I did make to Mr. Israel.

I forwarded it to him for information, and having, time permitting someone in his section look into this document for what we could learn about the event.

Q Do you know if there were any such followup and this was done?

A I do not know. I do not recall ever specifically having any discussions with Mr. Israel about anything we may have learned from the review of the document.

Q Do you recall whether you saw the LER that was

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prepared on this transient?

A I do not recall.

Q Do you recall whether this document which comes from Met Ed suggested a review of plant operating procedures?

A I do not recall. I do recall not spending much time looking at the document. The substance of my recollection deals with the conversation I had with Mr. Silver and his description of the event suggested an interest to me and I asked him if he could obtain a copy for me. He did that, and when I had an opportunity to look at the magnitude of the report, the size of the report, I did not want to take any time to look at it myself, and I assigned it to Mr. Sandy Israel. I gave it to him, routed it to him, and suggested that he might want to have someone look at it for inflow.

This to me then suggested that if he could assign someone to it, we ought to at sometime review it to see what we could learn from the event.

Q As far as you know, nothing subsequent to your assigning this to or sending it to Mr. Israel for his information was done by way of review?

A As far as I know, I have had no discussions related to him, with him on it until very recently when this document was shown to me earlier in the last day or two.

I did ask him if he had seen it or recalled it, and he had no knowledge of recollection, but outside of that

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few minute discussion, there was nothing that I can recall in terms of discussion related to that document.

Q That was post-TMI 2?

A That was post-TMI 2.

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

(A discussion was held off the record.)

MR. HELFMAN: Let's mark this package of material which consists of a memo route slip on the top from Harley Silver, refers to a conversation of, it looks like 7/5/78, as the notation from Mr. Novak to Sandy, and this is Sandy Israel?

THE WITNESS: Yes.

MR. HELFMAN: "Please have someone glance at for info," and it is followed by 33 pages of material relating to a trip, ES incident of 4/23/78 at the TMI 2.

(Novak Exhibit No. 2 was marked for identification.)

MR. HELFMAN: With respect to the documents that have been requested during the course of the deposition, counsel have agreed that the documents will be provided covered by a letter from the NRC and that the cover letter and the documents may jointly be referred to as Exhibit 3 to this deposition.

MR. CHOPKO: We so stipulate.

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(Novak Exhibit No. 3 was marked for identification.)

MR. HELFMAN: As we stated at the beginning of the deposition, it is our practice to adjourn the deposition rather than terminate it in the event we have further questions for you, and so at this time, unless Mr. Chopko has further questions--

MR. CHOPKO: No questions.

MR. HELFMAN: The deposition will be adjourned. Thank you.

(Whereupon, at 1:47 p.m., the deposition of Mr. Novak was adjourned.)

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REPORTER'S CERTIFICATE

DOCKET NUMBER:

CASE TITLE: DEPOSITION OF THOMAS M. NOVAK

HEARING DATE: July 30, 1979

LOCATION: Bethesda, Maryland

I hereby certify that the proceedings and evidence herein are contained fully and accurately in the notes taken by me at the hearing in the above case before the

PRESIDENT'S COMMISSION ON THE ACCIDENT AT THREE MILE ISLAND

and that this is a true and correct transcript of the same.

Date: July 31, 1979

Kathy S. Boyd
Official Reporter

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