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NUCLEAR REGULATORY COMMISSION

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

SUBCOMMITTEE ON GENERIC ITEMS

Room 1046
1717 H Street, N.W.
Washington, D.C.

Wednesday, December 8, 1982

The Subcommittee on Generic Items met, pursuant to notice, at 8 o'clock a.m., Myer Bender, Chairman, presiding.

ACRS MEMBERS PRESENT:

MYER BENDER
DAVID OKRENT
JEREMIAH J. RAY
CHESTER P. SIESS
DADE W. MOELLER
PAUL G. SHEWMON

DESIGNATED FEDERAL EMPLOYEE:

SAM DURAISWAMI

ALSO PRESENT:

WARREN MINNERS
MALCOLM ENRST
BILL MILSTEAD
GEORGE SEGE

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P R O C E E D I N G S

MR. BENDER: This meeting will now come to order. This is a meeting of the Advisory Committee on Reactor Safeguards' Subcommittee on the Generic Items.

I am Myer Bender, Subcommittee Chairman. The other ACRS members present are Dr. Okrent, Mr. Ray, Dr. Siess, and Dr. Moeller.

The purpose of this meeting is to discuss a draft report on the Prioritization of Generic Safety Issues that was prepared by the Office of Nuclear Reactor Regulation of the NRC.

This meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act and the Government in the Sunshine Act.

Mr. Sam Duraiswamy is the Designated Federal Employee for the meeting.

The rules for participation in today's meeting have been announced as part of the notice of this meeting previously published in the Federal Register on Friday, November 19, 1982.

A transcript of the meeting is being kept and will be made available as stated in the Federal Register Notice. It is requested that each speaker first identify himself or herself and speak with sufficient clarity and volume so that he or she can be readily

heard.

We have received no written statements from members of the public. We have received no requests for time to make statements from members of the public.

If I could just take a minute or two of the subcommittee's time I would like to refresh the members.

Some time ago, we agreed with the staff to consolidate the generic items list that was developed by the staff with the one which the ACRS had, and that was done with the result that there is now one generic items list that we are all working from.

The staff some time ago suggested that they were developing a basis for evaluating the safety priority of these items, and they have now developed their priority basis and have offered to come in and tell us something about what it is and what conclusions they have drawn from their evaluation.

So if there is no prior discussion, I would like to just call on Mr. Minners to tell us what the staff has done and explain the rationale as he sees it.

MR. MINNERS: All right. My name is Warren Minners from the Office of Nuclear Reactor Regulations.

I am here to talk about the recently completed prioritization studies that the staff has done in an effort to better manage their prioritization of generic

issues and their management of generic issues.

Prioritization is part of a program for managing generic issues. It is not an end in itself. The first step is identification, and we have various systems and programs for identifying issues. It is a job, I think, we do very well.

The next step is prioritization, and the purpose of prioritization is to try to pick out the important issues and then, the next step is to allocate resources to resolving those important issues and not allocating resources to unimportant issues.

Then, of course, there is a resolution process - always a difficult one for us. And then there is review and approval which in my observation has even been more difficult for us. Then, finally, implementation on the plants which is another time-consuming process.

So, prioritization is only really one of the early steps in the program of resolving issues, but an important one so that the resources are assigned efficiently.

Now, this is our schedule as we have and as we intend to go. We have gotten down through the draft report on generic issues. We started out with a suggestion and the action plan to have a way of

resolving issues.

We gave a second paper which outlines the general concept behind it. We have been down to the ACRS talking about the subject. We got a letter from you which said that you join in this program to brief the Commission.

We put out a preliminary report and finally we have put out this NUREG-0933 which is our report of prioritization of generic issues. That is what I am going to discuss today.

We intend to also get public comment. We are going to send out a Federal Register notice. We are now meeting with you. We hope to meet with the full Committee on the 7th.

Ultimately, we are going to submit the report to EDO, brief the Commissioners and finally officially publish it. While this is going on, we intend to begin allocating resources to the issues that have been prioritized as high safety priority ranking. We are not going to wait until we get through the whole process.

If we pick up some more issues, we will assign some more resources to them. If we have made a mistake, we can always change it.

I want to emphasize that this is the very first step and the accuracy needed is a lot less than if

you were going to put requirements on the licensees. So, if you make a mistake it can be corrected.

We also have another task which the EDO has assigned the Safety Program Evaluation Branch to prioritize all of the TMI action plan issues, including those which are not assigned to NRR. We are proceeding with that and expect to have something out by, hopefully, the end of the year and to the EDO in January.

Now, we had a process that we followed in prioritization these issues and the first thing is, we tried to identify all of the issues, and 0933 is mostly a backlog of generic issues that have been around for some time. They are from the old 471371 reports, the A, B, C, D issues. We have ACRS issues mixed in there. We have the ACRS issues that you discussed in a report. We have TMI action plan issues assigned to NRR. But that is mostly a backlog.

Issues keep coming in and we are going to prioritize those, but we really have not gotten to it.

MR. RAY: Question, please.

MR. MINNERS: Yes.

MR. RAY: You are separating the TMI action items into NRR and non-NRR. Will the tracking of those non-NRR be centralized with yours or are there going to be separate reports? Will it be fractionated?

MR. MINNERS: I guess I don't kow the answer to that questinon. I don't think people have thought that far. They are what is called a re-base line action plan and I don't know. I don't think it has been thought out in detail exactly how those are going to be tracked.

MR. RAY: Well, from our viewpoint I would suggest that it would be very convenient to have one report and have it centralized so we know where to go and not have to go in different directions.

MR. SIESS: They are going to regionalize it.

MR. MINNERS: Well, for me personally it is a difficult situation to try to track issues in other offices. We have been doing things. There is an action plan tracking system but that is done by the Office of Research Management and NRR has input to that, and that is the tracking. For the other things, I don't think there is a tracking system.

It is difficult, I have found, for a branch in one office to try to get involved in the management of these things in other offices.

MR. SIESS: Well, is generic items strictly an NRR problem?

MR. MINNERS: My parochial view is that it is done in NRR and we want to solve their problem. That is

what we are working on. I think generic issues are primarily an NRR problem.

MR. SIESS: What I was wondering is, did we ask NRR to come in and talk about generic items, or did we ask the Nuclear Regulatory Commission staff to come in and talk about it?

MR. MINNERS: Well, the history was that it was always NRR that came down and talked to you.

MR. SIESS: Who else was involved?

MR. MINNERS: Well, I&E has bulletins and orders mostly which are generic, and they handle those. Research has their research plan which you use separately. So, that is being looked at.

So, I think when you talk about generic issues it is kind of a special name that NRR has put on its particular issues which tend to be shorter range issues. The big, long-range stuff goes up to Research and we call it research. And the immediate stuff goes over to I&E and we call it bulletins, circulars and information on this issue.

I think they are all being handled by the individual offices in their own way.

MR. SIESS: You mean if an item requires research for resolution it is not on this list we got?

MR. MINNERS: That is not quite true.

MR. SIESS. I hope not.

MR. MINNERS: But there are not too many generic issues which require research. I think kind of by definition a generic issue does not require research. If it requires research, it gets kicked out some place else.

MR. BENDER: That is a strange definition. I think it is not one which we ever concurred in.

MR. MINNERS: I have the items on here.

MR. BENDER: And it is really a little troublesome to hear this kind of story. It suggests that there are three or four regulatory agencies. There is only one. There is only one generic items list and there is only one way of doing priorities for it.

You take the whole list and look at it, and see where all the resources are. I just don't understand the position that says, "Just look at NRR." That is not our job to sort out between NRR and others where the generic items should be assigned, that is NRC staff's job.

MR. MINNERS: I think it is a matter of what labels you are putting on it. Maybe we should have different names for them. When I say a generic issue, I usually mean something that is assigned to NRR. If you have other things -- well, just names, they are called

research projects.

MR. SIESS: That is not a proper distinction. Some generic issues always require for resolution for the staff to reach a position and they can do that without research. Others like 841 were research projects from the beginning.

MR. BENDER: Well, look, I think this is something we need to take up with the EDO and not with you. There is no real point in debating it with you. But it is a little surprising.

But why don't you go ahead, Warren, and tell us about the part that you feel is under your aegis.

MR. MINNERS: I think my boss wants to tell you how he has got it all figured out.

(Laughter.)

MR. ERNST: Let me say a couple of words. There has been a little bit of a parochial effort here starting, I guess, a year or more ago. We were interested in these issues that had been so-called "A through D" items, generic issues; the ACRS generic issues and those TMI action plan items that were assigned to NRR. That was our first effort at trying to prioritize.

The EDO after that time - I guess it was what, last summer or thereabouts - asked NRR to also

prioritize the TMI action plan items that were not the responsibility of NRR. I think Warren will get into it and has briefly covered that already. So, that is the basis for the prioritization effort.

As far as resolution is concerned, we are at the prioritization stage. Once you identify those that you wish to work on there are going to have to be action plans prepared to resolve those, and that might require some effort by Research. But those action plans in some cases don't exist, and we are in the process now of trying to define action plans on those high items that have been identified.

So, I think that is part of the due process of getting them resolved. So, there is coordination.

From the standpoint of tracking, my understanding is that the EDO wants to set up an overall tracking system on all safety generic issues whether they be NRR or Research, or NMSS, or whatever, and have a consolidated tracking system. So, it is not quite as much of a problem, I think, as you might think.

I think it is if not presently well coordinated, I think there are certainly steps being taken to have it better coordinated.

MR. BENDER: Well, I don't want to belabor this point much farther, but sometimes when I read the

remarks by a man named Hart about generic items, I wonder whether he is not hitting the mark.

In fact, we have been waiting a long time to get a prioritized list, and if we are still trying to do it the situation is really in a sad state. I thought that we were here to see how the work program is going to be changed as a result of this analysis that you have developed. We do not have a complete work program.

MR. MINNERS: We have not prioritized the research program, that is about the only thing we have not prioritized.

MR. ERNST: That is true, that will be the EDO or Research effort to really prioritize their programs.

If, however, we had some work that needed to be done by Research to resolve a generic issue, there would be task assignments to Research through a user request mode.

Again, for perspective I would like the subcommittee to understand that what Warren is talking about is the prioritization process.

We will be happy to talk about our other plans and things like that, for example, on the "highs" we have already requested the cognizant branches within NRR to submit - through Mr. Denton - work plans and schedules and so forth for all of the "highs" that have

been identified. These are due in by about the middle of December.

If there is some coordination with Research on an individual item, this will be done.

MR. BENDER: Well, let's go on. Warren, tell us what you want to tell us.

MR. MINNERS: And you will hear what you want to hear.

(Laughter.)

MR. SIESS: Let me say one thing. I do not have any problem with looking at what we have here as prioritization of generic issues in NRR's area. There is a large enough number here to worry about.

But I guess before I get very far past this stage, I would like to see a list of those items that are not included in this prioritization - I do not know whether it is three, or thirty, or three-hundred - just to get some idea as to what fraction of the total we are looking at. Because if this represents half of them, I am not sure how useful it is to anybody.

MR. MINNERS: Half of what?

MR. BENDER: Of the previous list.

MR. SIESS: Whatever list exists in the Nuclear Regulatory Commission.

MR. MINNERS: This is a complete list of

generic issues that exist in the Commission. Now, in the past we have not defined --

MR. SIESS: This is everything, including what you previously said I&E had?

MR. MINNERS: Well, no. If you are talking about generic issues, I&E does not have generic issues, they have bulletins, notices, and circulars. They have a generic aspect to them, but they are really just fine-tuning --

MR. SIESS: Those are generic actions.

MR. MINNERS: Those are generic actions.

MR. SIESS: And Research has a role in the past action plans, et cetera.

MR. MINNERS: That is right.

MR. SIESS: But this, you say, has all the generic issues. This includes everything the ACRS has brought up, they have not been put on some other list.

MR. MINNERS: Everything we had on the list, they are all listed here.

MR. BENDER: Tell us what you want to tell us, and we will try to hear what you are telling us.

(Laughter.)

MR. MINNERS: At least identification is not a problem. When we got the issues, we had hired a contractor to help us with this project. Pacific

Northwest Labs helped us out on many of the issues. So, we would look at the issues and decided whether it was appropriate for us or for the contractor to do the issue.

The decision we made the last time was that there was an issue which was resolved and it was mostly just going through and finding out what the history of it was. There was not any use in sending it to the contractor because we would have had to do this kind of work anyway.

So, the contractor tended to get issues in which there was a technical analysis required, and we tended to get a mixture of either the ones which were just wrapping up the paperwork or in some cases we also did technical analyses.

One of the hardest parts of the job was to define the issue. We did that by going down and talking to the lead branch and anybody else we could find who we thought knew something about it, and that was a difficult process.

The issue that you have just been handed out, C-8, Main Steamline Isolation, is a good demonstration of how hard it is to define the issues. We spent a lot of time on that issue defining what it was. I think the final answer came out significantly different than what the original answer was and the prioritization came out

different because of that.

That was a very time-consuming process and it is an important one because if you don't define carefully what you are prioritizing, you can get an answer that is not correct.

Then we prioritized them according to a methodology which Is am going to try to discuss later on - which was a fairly standardized methodology - so that we kept some kind of comparability between issues because our real purpose is not to define whether the issue is good, bad or indifferent, but how it ranked relative to the other issues.

Then we also had some issues which really were not ameanable to a PRA kind of approach which we used, and we labelled those "Licensing Improvement" for lack of a better name, and "Environmental Issues."

Licensing improvement has some gray areas in it but they are generally issues which improve the efficiency of the licensing process and update the SRP, or things like that. So, they were really not safety issues in that sense.

That was to serve one of the purposes that this list has, which is to define accurately the total list of generic safety - and I underline "safety" - issues that we think are important to reactors.

The list that has been put out in the past, at least by NRR, had every one it. So, you see a list of a hundred items but half of them may not have been safety issues.

So, the purpose is to get just the safety issues identified.

After we did the prioritization, we circulated the product around for NRR peer review. At least for the issues that are in this version of C933, those have to date only been circulated within NRR for peer review. After we published a report, in fact, we have sent it to the other offices and if they like to make comments on it, we will try to take them into consideration.

And now we are trying to gain ACRS review and your comments and, as I said, we are now beginning to schedule resolution of the high priority issues which have so far been identified by process, and we are going to go out for public comment which includes the industry.

We are not waiting for public comment because that is unnecessary. If public comment shows we have done something wrong, fine, we will correct our course. We will start working on something, drop some issues as indicated; but it is certainly not necessary to wait for public comment to start our resolution.

MR. BENDER: What will you do with public comments when you get them?

MR. MINNERS: We will look at them and, you know, take care of them. You mean, get a formal process, is that what you are looking at?

MR. BENDER: You have got an evaluation basis here. Do you expect to have the public respond to the evaluation basis or to comment in some other context?

MR. MINNERS: No, I think I would like comments both on the methods and on the products. If they have suggestions on the methods which could be improved or changed in some way, we will listen to it. If we think it is a good idea, we will do it; also the same thing on the products. If they have comments on the products, we will do it.

My standing offer has been - which I have been able to do every time - if somebody has a different number than we have put down, to use it.

If the industry says that we have viewed the wrong probability or consequence, or something and they give us a different one, most likely we will use it if they have some reasonable basis for it.

MR. MOELLER: Excuse me, that raises a question in my mind. I was looking at the report and reviewing some of the calculations that were in it. I

fully understand the need to develop a system and I cheer for you, you know, to come up with a good way of prioritizing the issues.

But you are basing essentially your total judgment on the dose. So, I was looking at one area which you would readily recognize that I am probably interested in and that was the air cleaning monitoring and ventilating event.

We are reviewing this month on the SEP issue the Millstone and the Dresden plants. I looked at the operating histories of both of those, and they have had hydrogen explosions. In a hydrogen explosion you might kill three, or four, or five people. I do not believe anyone has been killed to date but you could. They might get, you know, one million rem each.

Where, in your system, are you looking at traumatic injuries and deaths due to mechanistic forces versus just simply dose?

MR. MINNERS: To the public or to workers?

MR. MOELLER: Primarily to the worker because I don't foresee too much that would do it to the public.

MR. MINNERS: I don't think we are at all.

MR. MOELLER: So really nothing in your system addresses either dose to the worker or injury.

MR. MINNERS: Oh, no. You went too far.

MR. MOELLER: I am sorry.

MR. MINNERS: Dose to the worker, yes, we consider and I think it should be considered more than it has in the past.

As far as other injuries to the worker, no. I will put on my lawyer hat. I don't think the Commission is authorized to regulate in that area. So, I guess we shied away from it.

MR. SIESS: Is the distinction between your jurisdiction and OSHA's clear?

MR. MINNERS: Not to me, I hardly know anything about the distinction. We have limited ourselves as to health effects from radiation and not anything else.

MR. SIESS: Even then I wonder, is that outside of OSHA's jurisdiction and in yours?

MR. MINNERS: I think there may be a fuzzy area on radiation health effects on workers between us and OSHA. But I don't know the legalities of it.

MR. MOELLER: Well, in a sense this is a little bit like the question that Mr. Ray raised where he asked, who looks at the total picture within the NRC. And I am sort of saying, who looks at the total picture in terms of all kinds of health effects.

MR. BENDER: Well, without wanting to get into

a long debate about it, I am inclined to agree with Warren's view, namely that the Regulatory Commisson was set up to deal with radiation hazards, and that trying to draw in the industrial saftey problems is an awfully broad area.

I can sympathize with his views.

MR. MOELLER: He has answered my question.

MR. MINNERS: Our process I think, as you realize, is a ratio of the safety benefit to the cost associated with an issue. The safety benefit is just the change in freqwuency of events and a change in consequences.

What we have been basing our decisions on are best estimates of those numbers. We have considered uncertainties, but I think the decisions have been made on the best estimates. We have tried to make best estimates. In some cases the analyses have conservative assumptions because it is just too hard to get a best estimate.

So, we don't restrict ourselves unnecessarily by our attempt to do a best-estimate calculation and none of these calculations are supposed to have any conservatism in them, although they may.

MR. BENDER: Let's look at it the other way. Do they have any realism in it?

(Laughter.)

MR. MINNERS: Some of them do not.

MR. BENDER: OK.

MR. MINNERS: I think the intent is to have realism in it.

MR. BENDER: I understand that, but most of it is speculation when you get right down to it.

MR. MINNERS: Yes, there is a good deal of speculation. But that is countered by the fact, once again, that you are not imposing requirements. You are only trying to assign resources in the best way that you know how. This speculation hopefully is better than the previous speculation.

MR. BENDER: I will accept the point.

MR. OKRENT: Excuse me. I would say in a sense you are dealing with the question of whether or not you are going to impose requirements because on those that you chose not to work on, you have made a decision.

I have a question in that regard. Your decisions may all be the right ones but the information that is given in support of the particular decisions is necessarily brief in your basic report.

I only this morning got hold of a copy of the draft report that is always referred to in the basic

report as the thing that gives the supporting documentation.

MR. MINNERS: That is just PNL's report of their work.

MR. OKRENT: I took a quick look at it and it seems to have one appendix that deals with one issue in very considerable detail, enough in fact that if anyone wanted to look at it hard and see, do I agree or not, it looks to me like he could.

But this is not the case for "umpteen" other ones if I understand correctly what is in this report.

MR. MINNERS: The attempt was to give enough information so you could do that.

MR. OKRENT: Where, in the PNL report or yours?

MR. MINNERS: No, in 0933. We attempted to put enough information in there so that you could independently judge and make your own independent calculations.

In some cases it gets difficult because some of the things are developed from the best fault trees.

MR. OKRENT: Well, I must say in one or two that I looked at hard - meaning I spent ten minutes on each -- well, there were only a couple of pages so you could look at it hard in ten minutes - I found lacking information in what was given. So, I called Sam and

said, "Have you received NUREG-2800 and filed it already," and he said, "No, it looks like they have not gotten it yet."

So, I figured, well, when NUREG-2800 comes up it will define this backup. But as I look at it, it seems to give a lot of backup on one issue but then on the others it just gives methodology.

MR. MINNERS: When the N&L report is finised it will have a write-up similar to the one that you have seen in there, just as an example, of every issue that P&L did. It will be in the same format with the base-case risk and the justification risk, and all the numbers for every case that N&L did.

MR. OKRENT: But with all of the details that are given in the case on diesels, is that what you are saying?

MR. MINNERS: It will be similar to that. The diesel one is done a little more fancy, I think, than the average issue. So, the amount of detail you get will vary.

MR. OKRENT: So, what you are saying, the final report will include a write-up on each issue?

MR. MINNERS: The final P&L report?

MR. OKRENT: Yes.

MR. MINNERS: Yes, sir.

MR. OKRENT: And are you asking us to provide a comment before we have the benefit of this final report in some draft version?

MR. MINNERS: Yes. But I could give you a report if that would help you.

MR. OKRENT: You mean you have the report?

MR. MINNERS: We have a draft report. You have the same draft report.

MR. OKRENT: Do you mean the copy?

MR. MINNERS: Right, Bill, we have a draft report with all the write-ups in it?

MR. MILSTEAD: Bill Milstead, NRC staff.

We have final copies in on the 2800 report and I am told we have six or seven of the final copies on individual reports that will be going into the first supplement.

We have draft copies on all the reports that P&L has done. In-house right now those will be finalized over the next month and-a-half or so. They will be issued periodically as supplements to the report.

MR. OKRENT: I am not sure what you are saying. You are going to give the decision that you have now and at some later time the documentation for them?

MR. MILSTEAD: The report that you are looking

at, the draft report, will be finalized. The intention of that report is to describe the methodology to be used and data base, and to explore in detail three example prioritization analyses.

The prioritization analyses are performed on individual generic issues by the contractor. Each will be documented in a single report for each issue. Periodically, we will issue a supplement to the basic report which has a compilation of the individual reports for generic issues.

MR. MINNERS: Maybe I can help you on that, Dr. Okrent. You are focusing on something which I was told the Committee would focus on and properly should, the individual issues, and whether we have made the right decision on those issues.

I think that we are now at the stage where I would like to get people to comment on whether the methodology is any good. I think that can be done without having all the details.

MR. OKRENT: So, in other words, you are saying today we are not supposed to be offering comments on the results of the prioritization?

MR. MINNERS: If you would like to, but that is not my primary purpose.

MR. SIESS: Mike has some ideas that we are

signing these out.

MR. BENDER: The thought I had, Dave, was simply this: we should hear what the staff wants to say today. The Committee needs to have its own way of assessing these things. We can deal with the methodology or we can decide we do not like the methodology.

I would rather just ask the members to look at each issue individually and come to some judgment for it, if that makes any sense.

MR. OKRENT: Right. Now, I think the two-step approach that you are suggesting is a good way to go. What I was trying to understand first was, is that what the staff was intending?

But also, it seems to me that before the staff asks the ACRS or the public or whoever it is, even concerned scientists, to buy its decisions, the backup on each of the issues should be available for people to evaluate; and this is the point.

What I am interested in, I would like to have seen the backup before I agree or have questions, as the case may be.

MR. BENDER: Could I try this kind of question, Warren, has the work been done and it is just not reported?

MR. MINNERS: Correct.

MR. BENDER: So, if we wanted to get to the point of saying, "Well, we want the backup on Issue X, Y or Z," you would be able to provide it?

MR. MINNERS: We will just go to the Xerox machine and send you some copies.

MR. BENDER: Go ahead.

MR. MINNERS: Let me pick up on Dr. Okrent's point for a moment because I would like to try to make this point.

I think there is a significant difference between making the decision to work on an issue or not to work on an issue, and the decision to issue it as a requirement because once you get the utilities going you can spend millions of dollars and we are talking about hundreds of thousands of dollars.

So, you don't have to buy anything irrevocable. If you find a year from now that you do not like the way we analyzed the issue, you know, you just go back in the record and say, "You did it wrong." Tell us how we did it wrong and we can make it any priority that we think is proper. And vice versa for high priority issues. You can downgrade anything you want to.

After we worked on an issue and you found out

this is not really significant, you can throw it out. You are not, in that sense, buying it.

So, the public and anybody else can make comments. I don't think you would want to agree that you could only get one chance on saying whether an issue was good or bad, and that when the Committee issues a letter and says, "Are you going to work on Issue X, Y, Z," that is the only comment that the Committee is ever going to be allowed to make on that issue. So, these are not irrevocable.

Now, let's try to get on to the methodology. We tried to make best estimates of the safety benefit which consists of first change in the frequency of the event per reactor year. Our technique has been one of several.

In some cases, we tried to do a specific event or fault tree and I think Issue No. 10, which is the neutron detector to break where people develop a specific sequence if I had a break in the tube, what was the probability of having something getting out of containment.

In other instances, we used WASH-1400 as a basis.

MR. DURAISWAMY: You said Item No. 10.

MR. MINNERS: Issue 10.

MR. DURAISWAMY: Issue 10, where?

MR. MINNERS: In 0933.

MR. DURAISWAMY: In this Table 12?

MR. MINNERS: It is not a high priority issue. No, it is in 0933.

MR. DURAISWAMY: Yes, I know; that is what I am talking about.

MR. MINNERS: Table 2, yes.

MR. BENDER: Surveillance and maintenance of TIP isolation.

MR. MINNERS: That is right.

MR. BENDER: Is that the matter?

MR. MINNERS: That is the issue.

MR. BENDER: All right.

MR. MINNERS: I just want to use that as an example where that issue was analyzed by presuming what the sequence was and putting probabilities on failure. The indexing machine was in a certain location and if all valves closed.

Some of the other issues used WASH-1400 as a basis. The Safety Program Evaluation Branch is most familiar with WASH-1400, so we tended to use that. And Issue No. 17, which is a loss of off-site power with a subseqwuent LOCA, that was done using WASH-1400 sequences as a basis and modifying it to try to make an

estimate of what the change in frequency would be if you required some fix.

Now, P&L had the RSSMAP studies of Oconee and Grand Gulf in a cut-set form, and they used those. Most of their, that is all of their issues, are on that basis. They would go into the cut-sets and modify the appropriate parameters and then calculate a base case and adjusted case, core-melt frequency, and do their RSS changes on those bases. Now, getting data for these analyses --

MR. OKRENT: Could I ask a question in that regard?

I see Mr. Ernst is here and he has been one of those who have been urging that people not over abuse what he calls the "bottom line syndrome" meaning, I think, don't take the absolute value of the risk or the likelihood of core melt as a vital part of your decision-making, if I can paraphrase.

MR. MINNERS: I think he says, don't take it as the only part. I think he says it is a vital part in your decision making.

MR. OKRENT: Well, let me go on. What P&L did, I think, they frequently used the results of WASH-1400 or some PRA as a very important input into their deciding whether something is or is not a dominant

contributor or whatever.

MR. MINNERS: Yes.

MR. OKRENT: So, I wonder if that approach is completely compatible with the questions I have heard Mr. Ernst express in this room more than once.

MR. MINNERS: I think it is. But you cannot turn off your brain when you do this. I mean, it is a standardized procedure. You have to watch out for standardized procedures, they can trap you. It may not fit the situation that you are looking at.

That is what is hard about doing these. You cannot spend five million years analyzing each one of these issues, that would be ridiculous. So, you only have a limited amount of time and you have to do it with some kind of short-hand techniques. You have to be clever and say, "Gee, this short-hand technique does not fit in this situation, I have to do something else."

That is hard to always recognize. That is why peer review is a necessary and desired part of the process. Hopefully, the things that we miss other people will pick up. It is not infallible. There is no doubt you are going to make mistakes.

MR. BENDER: Well, I think the point can be made in a different way. How much are we depending upon this computation as a basis for judgment?

MR. MINNERS: Quite a bit.

MR. BENDER: Well, if you are depending upon it quite as bit to assign resources, which is really what the issue is on, then how good is the distinction?

MR. MINNERS: It is better than not making a computation. That is what I would assert. It is quite a bit better than not making a computation. That is the point that you hve to keep fixed in mind.

I would agree, this has lots of faults or errors in it, it overlooks things and you can get focused n the bottom line; all that kind of stuff.

But you have to compare this to the process that we did. Before, we had a bunch of people in a smoke-filled room and they stared at the ceiling and came up with an answer. We did a lot of those and they are not very good.

If nothing else, at least when this guy did the computation he did look at his computation and argued with the specifics of this computation. When you just sit somewhere and he describes what his conclusion is based on, you have no way of understanding it or disagreeing with it - except the bottom line.

MR. BENDER: You have more bases for disagreeing with it.

MR. MINNERS: You understand what the bases

are, yes.

MR. SIESS: Let me ask you something. A couple of minutes ago Dave used the words "dominant sequences." But I do not see anything up there that talks about dominant sequences, it only talks about the change in frequency or the change in consequence.

MR. MINNERS: Right.

MR. SIESS: It seems to me, changes would be independent of whether it is a dominant contributor or not.

MR. MINNERS: Well, but the cut sets, I think, in them have only the dominant parameters when you think they are 10 to the minus 9 and 10 to the minus --

MR. SIESS: So, if something is not dominant and not in the cut set, you could not do this?

MR. MINNERS: Not this way. And that may be a problem. The whole issue may be whether something which the Oconee RSSMAP said was not dominant and somebody thinks it is.

MR. SIESS: Well, something that the RSSMAP said was not dominant could be simply because something else is dominant and you fix it, so this would not become dominant.

I do not see how "dominant" should be considered since what is not dominant now might be

dominant after you fix something else.

MR. MINNERS: Well, when we get down to the criteria, you will see that when you get down below sequences which have a core-melt probability of 10 to the minus 5, less than 10 to the minus 5, that it is hard to justify doing anything.

MR. SIESS: So, you have a cut-off point that is sort of safety-goal related.

MR. MINNERS: Yes, sir.

MR. BENDER: Well, let's move along. At 10 o'clock the more important meeting that is supposed to occupy this room will start.

MR. MINNERS: The only thing I want to mention on data, we went to various places. We would go to LERs and try to get data from there, realizing that this may not get all the events. But that is the best we have. We would go to other PRAs and try to get data on system unavailability to failure rates. There was a lot of judgment put into these things.

People, by necessity, in order to make an analysis had to use judgment that was not backed up by a lot of calculations or data.

One of the areas particularly judgment was almost completely in there, and that was human factors. An example is the TMI action plan item 1-A-22, which is

training and qualification of personnel. This was done by going into the Oconee cut-set, modifying the human error parameters in that cut-set by a percentage which a panel of experts thought was the appropriate percentage.

It is a very qualitative judgmental process that we have done on all of the human factors. That seems to be, or that is the only technique, that we thought of for doing that. That is a questionable area.

However, I still think that is a better technique than someone, even a panel, sitting down and making a judgment of whether it is good, bad, or indifferent.

In the human factors areas, I think, the better part of the analyses are cost analyses.

The other part of safety benefit or risk is changing consequences which we took to be man-rem. We did not try to get down to fatalities or anything like that. We decided that man-rem would be the index that we would use.

We used source terms based on the WASH-1400 release categories in most cases. If there was an instance that neceassitated it, we would make a specific estimate of a small release or some unusual event.

The dose to the public was calculated in a standardized way, taking the source term, the WASH-1400

source term, and using the CRAC-2 code, a typical Midwest metereology from the Braidwood site.

We assumed the population density was 340 people per square mile, which is the mean of all the sites in this country. We integrated over a 50-mile radius from the plant that those were the doses and those doses are listed in the table on page 10 of 0933.

We did that because people told us that release categories were not -- we originally had done it in Curies release, but the health effects of Curies are not the same for different categories of isotopes, and you see that. So, you use a different variation in Curies relative to the number of Curies for the different categories and the relative doses from those.

MR. SIESS: Warren, somewhere you factor in number of reactors that will be affected.

MR. MINNERS: Yes, sir.

MR. SIESS: Now, in this dose calculation you used an average number of people per square mile. Suppose you have something that only affects MARC 1 PWRs, would you use that number of rem and would you still use the 340 people per square mile as representing an average for all MARC 1 PWRs?

MR. MINNERS: Well, I think the tendency would be that you use this standardized number. But the

analyst should really ask himself the question, is that a proper number to use for this particular case? A lot of times the answer comes up, "No but it is due Friday."

MR. SIESS: But you would put in the rem for that number of reactors.

MR. MINNERS: Yes, sir.

MR. SIESS: And the fact that they are the older reactors and are likely to be, some of them, in more populated areas, would not matter.

MR. MINNERS: That is up to the analyst's judgment and I don't know the specifics. I cannot think of a specific case. But if it made a difference, the analyst should go back and re-do it, do it properly.

In a lot of cases you might do it the standardized way and if the safety significance comes out to very, very low numbers, they have to be changed by an order of a hundred or a thousand to make any difference. The guy says, "Well, that is close enough."

MR. SIESS: Well, we know that poplation must vary. Well, over a 50-mile radius it probably does not vary too much, does it? A factor of 10, 20 maybe?

MR. MINNERS: Yes, there is a factor of ten, I think, from low to high.

MR. SIESS: The smaller rate is, it could be a heck of a lot more than, it could be a hundred.

MR. MINNERS: I think you get a factor of ten in the population density.

MR. BENDER: Well, you have to look at the uncertainties in the numbers and how they affect the judgment. But can you go on?

MR. MINNERS: Yes.

One thing I want to emphasize is that in most of the issues we assumed that all of the TMI fixes in 0737 were in place, and we did not prioritize the 0737 item. We presumed that that was a given and although we realize that some of these have not been implemented, we presume that they are going to be. So, whatever that results in, that was going to be our base case.

So, that meant that the Oconee and Grand Gulf WASH-1400 were kind of the base case which says that the core-melt frequency is somewhere between 10 to the minus 4 and 10 to the minus 5. We recognize that there are other studies like the precursor study which says it might be 10 to the minus 3, 10 to the minus 4, and that could make a big difference using that number rather than the other.

Now, in cases in which you thought the probability was higher, in fact, we had some issues which were to evaluate just older plants in which we thought the core-melt frequency might be more than 10 to

the minus 3, 10 to the minus 4 range; we used that number rather than the other number.

So, there was a case where the analyst had to make a decision and say, "Hey, does the standardized method fit this particular issue," and if not, change the method.

MR. BENDER: Warren, excuse me. In trying to get this thing on a man-rem basis, some presumptions have to be made about the effectiveness of containments and things of that sort.

MR. MINNERS: Yes.

MR. BENDER: When you do that, how do you make such judgments? Do you say that, "Well, containments always work?"

MR. MINNERS: No, we took the WASH-1400 probabilities of containmen failure.

MR. BENDER: So, if you didn't like those probabilities they were off by a large factors.

MR. MINNERS: Once again, C-8 is that problem. C-8 comes up to a horrendous consequence calculation because it says you get a direct release from the core down the steam lines, release, release at low level so that it does not balloon and float over the population at ground level.

So, there is a case in which we did not use

the WASH-1400 release category for a containment failure mode and that gave you a very different answer.

Once again, a case in which the analyst has to recognize what the significant features of the accident are and account for them properly. It is a difficult thing to do.

MR. MOELLER: On this same line, on methodology - and I don't mean to be getting into details but I think this expresses the question that I have. Looking again at your first item in the NUREG-0933 on air cleaning you give the probability for PWR 1, 2, 3, 4 through 9, accident occurring per reactor year.

Now, in some of those accidents you assume that certain ventilation or air systems fail as part of the sequence of the accident, I am almost certain. And yet, you multiplied all of these probabilities by 10 to the minus third, which was your add-on assumption for the probability of the failure of the air system.

So, you reduced them all by 10 to the 3. Did you look at each sequence to see if the item you were evaluating might be part of that sequence?

MR. MINNERS: No, and that is the difficulty. I mean, how many sequences are there and how long would that take? Tht is always something that slows up the

analyst. As I say, he has got to have a deadline to get them done. If he does what you suggest - which I am not saying is wrong - that is going to take maybe more time than he has.

These things are always a balance. Again, the analyst has to look at it and say, "Hey, I could do a better job if I did more, but do I have time to do it?" That really is going to make a difference to the answer.

He has to make his decisions and he has to make them in a timely way, and they take more time than he thinks it is worthwhile to go into the details.

MR. SIESS: Is improvement in the methodology or improvement in the analysis itself a generic item? It seems to me it has more effect on some of these things than the matter you are investigating.

(Laughter.)

MR. BENDER: Well, let's get through the rset of this.

MR. MINNERS: The other factor that we use is implementation cost, which is defined as the industry cost to design, install the close fix. And here you are with an issue which you just got, you don't know what it is - much less you know what the fix is.

So, there is a lot of guessing as to what would fix some of these issues. So, that is a large

uncertainty.

It also includes the maintenance of this safety improvement throughout the life of the plant, which does not make that much difference.

We get these numbers. In some cases we have studies where people have actually studied what it cost. In the Boran dilution thing we had a contractor who for other purposes had done a study of what it would cost.

There were actual costs out there. Oyster Creek is putting in a new sparger and they told us how much it is going to cost to put in a new sparger. On some of them we just call up the industry and ask them, "What do you think" and they give us their opinion. Sometimes we make our own judgments.

Once again, it is a balance bestween time available and the information available.

MR. SIESS: What is that, $300 a day down time?

MR. MINNERS: We also include any down time.

MR. SIESS: Is that $300, or $300,000?

MR. MINNERS: It is $300,000 a day. We used what we think is a typical average figure for that. It does not make much difference if you change that number a little bit because once you get down time, that tends to dominate and this implementation cost would become a

much smaller fraction.

MR. SIESS: But 300 K a day, that is not the replacement power.

MR. MINNERS: Yes, sir.

MR. SIESS: I was given a figure a lot bigger than that. I call sort of an average size an 800 or 900 megawatt plant. I won't argue this, but it is not 300 K.

MR. MINNERS: Well, we got these numbers out of this report that was done for us by DOE in '81. As you can see, the cost per day varies with what power is replaced; how big the plants are. There is a whole bunch of factors that go in there.

MR. RAY: Do you have a comparable figure from industry?

MR. MINNERS: Sir?

MR. RAY: Do you have a comparable figure from industry?

MR. MINNERS: The shutdown cost?

MR. RAY: On the $300,000 a day. I do not think they would agree to that.

MR. MINNERS: As I said, this is my source of the information, the Department of Energy. We thought that was good enough.

But so what? It does not make any difference.

MR. RAY: It is only a factor of two.

MR. MINNERS: But it would dominate in any case. If you have any significant shutdown because of a fix, that is going to dominate and wipe out the implementation cost, and you cannot afford to.

MR. SIESS: In your previous slide, I think there is an error. The caption at the top says, "Dollars in millions," and then you said the $300 a day is $300,000.

MR. MINNERS: You are right, that is wrong.

MR. MOELLER: Well, on this again about your methodology, you are then accounting for the down time to implement the change.

MR. MINNERS: Yes, sir.

MR. MOELLER: Millstone-1 had an off-gas system explosion in 1977 that caused them to be down for over eleven days. Do you do it both ways or only one way?

MR. MINNERS: I have that in here, and let me show you how we do that.

MR. MOELLER: Thank you.

MR. MINNERS: I have it.

MR. MOELLER: I will wait.

MR. MINNERS: I was looking for it, I don't have it. I will get to it, I know it is in here.

The equasion is fairly simple, it is the

change in risk, total change in risk; it would be change in frequency. We are doing it by dose. We multiply by the remaining life of the plants that are affected, by the number of reactors affected.

Then we do the same thing with the cost which is the industry implementation cost -- installation and maintenance designed for a number of reactors, plus the NRC cost and this is a small number.

So, the number of reactors tends to drop out.

MR. MOELLER: Well, if you are addressing my question, I didn't see the answer.

MR. MINNERS: No, I am not.

MR. MOELLER: Under the cost -- OK.

MR. MINNERS: Then we get a safety priority score which is what we call a safety priority score, value-impact score, which is the change in risk over the change in cost. That is our primary index of prioritization.

So then we try to categorize these by either calling the end result high, medium, low or drop. There are a lot of issues on which we have NUREG reports out or we have proposed rules; we have something like that. We did not go and prioritize them.

So, the work necessary to resolve and improve those issues is basically a value-impact analysis.

Somebody will look at it and say, "Hey, what is the safety benefit and how much would it cost," and make their decision which does in concept the same thing as prioritization does, but hopefully it is going to be a lot more detailed and a better analysis so we are not going to duplicate that.

We just recommend that the Commission go ahead and finish those things up on the same basis and go to a high priority, presumably because the amount of work is small.

Then we have some "high" issues which we are also recommending be scheduled for resolution. We have identified "medium" issues which we are recommending or scheduling for resolution in later years, and we have "low" and "drop" issues which we are now recommending be combined into one group and no further work be done by the Commission.

We do not make them disappear, we keep a record of them so if anybody wants to bring them back up again and can demonstrate that we did the analysis wrong and it is worthwhile, they can be resurrected.

Now, we tried to set up some standard criteria for ranking these issues. We have ten people ranking issues, so we had to have some way of getting people to rank them consistently. We have tried to use a ranking

system which was based on the safety goal guidelines.

This chart, graph, whatever you want to call it, tries to show that. Down here it has plotted the change in risk as as fraction of the safety goals variable guidelines. The break point is ten percent of the safety goal guidelines such as core melt, latent cancers, we transferred into man-rem.

The ten percent is there because we are only looking at one issue. This is the Rank One issue and that kind of says, "Hey, ten issues make a total core melt." A very rough number. We think there are a hundred issues that will make up for the core melt but we took ten and said, anything, any one issue that had a change in risk that was greater than ten percent of the safety goals, we would make that a high priority issue in line with the safety goals.

The other thing on the safety goals is the value-impact score. Once again, this is shown relative to the safety goal benefit-cost guideline of $1,000 per man-rem or, in our units which is the universe, a man-rem per million dollars - one-thousand man-rem per million dollars.

I look at this as saying, anything that comes out on that safety goal line is about medium priority. So, in this area the benefit-cost ratio will change the

priority of the issue. When you get up to high risk, the risk guideline takes over and it will be done irrespective of cost.

Then we said if you get below certain levels of risk it is insignificant. If you have something which is a tenth of a percent or a hundredth of a percent of the safety goal guidelines, 10 to the minus 7 or 10 to the minus 8, 10 to the minus 9 kind of frequencies, it is so insignificant that it is not worth working on it even if it has high value impact. If you make it a dollar's worth of safety you only have to send a dollar, but you are only getting a dollar's worth of safety and it is not worth it.

So, that is our general scheme for prioritizing these issues.

MR. OKRENT: Would you remind me, in looking at the benefits, was there another benefit besides the reduction in man-rem?

MR. MINNERS: Core melt.

MR. OKRENT: No, in other words --

MR. MINNERS: Core melt frequency.

MR. OKRENT: No, but there is --

MR. MINNERS: There is latent cancers. There is a societal --

MR. OKRENT: No, those are the safety goal

guidelines, no, no. But when you try to get a ratio of value impact it says, "Value impact score relevant to safety-goal benefit-cost guideline."

MR. MINNERS: The benefit-cost guideline is $1,000 per man-rem, so a thousand man-rem per million dollars.

MR. OKRENT: So, that is the only benefit that you consider in looking at the possible improvement from some change.

MR. MINNERS: That is the only benefit that we consider in calculating the value-impact score. Let me continue.

MR. MOELLER: Give me a couple of numbers for the ordinate on that. I am confused.

MR. MINNERS: I will. We do have other considerations. Once you get this value-impact score and you look at where those criteria, say, would go, you don't turn off your brain. You have other considerations.

The other things you want to consider in ranking this issue is, was it due to occupational dose? If it saves some public dosage but it really irradiated workers I think you ought to give second thoughts to whether this issue is really worthwhile.

That is on the benefit side. There may be

other benefits that you want to look at and can as long as you state what they are. I cannot think of any example off-hand except occupatioal dose. But if there are other benefits that you want to put in there, they can be put in it.

We are also looking at plant damage and as general ball-park numbers we use $400 million for cleanup and a billion dollars if you have to replace the plant.

MR. OKRENT: A billion?

MR. MINNERS: Yes.

MR. OKRENT: How about --

MR. MINNERS: The present worth.

MR. OKRENT: How about the cost of power that you would have to buy if you lose the availability of the plant?

MR. MINNERS: That is in that billion. It costs you $400 million to clean it up, and if it is so badly messed up you cannot return it, it is a billion dollars to replace the power until you can build another plant.

MR. OKRENT: Let's see, it is $300 million a day which was the figure you are using for --

MR. MINNERS: Pardon, $300,000 a day.

MR. OKRENT: I am sorry, $300,000, yes. That,

if I do my arithmetic right, is three days roughly for a million, or 3,000 days, is that it?

MR. MINNERS: I think ten years comes out here.

MR. OKRENT: Assuming on the order of ten years.

MR. MINNERS: Yes. Is that right, George?

MR. SEGE: Yes. George Sege, NRC staff.

That is a factor of the present worth, a factor of reduction.

MR. OKRENT: I see, all right. Order of magnitude.

MR. SEGE: Yes.

MR. OKRENT: Thank you.

MR. MINNERS: Now, the results are mewntioned in 0933 and the high priority issues that came out of that are included in the package that we gave you, and in the letter sent on 0933 to you we said there were two issues which were still im limbo. One was C-8 which when it was sent down to you was rated low priority.

As I said, we have gone through a whole bunch in looking at that.

MR. SIESS: What does C-8 mean?

MR. MINNERS: C-8 is main steamline isolation valve leakage in BWRs, and have now changed to a high priority.

Item 22, which is Boran dilution, is unchanged; that is still in the drop category.

MR. OKRENT: Could I come back to the previous viewgraph? How do you use these things you label "Other Considerations" in the decision making?

MR. MINNERS: The dose is kind of straight-forward. A lot of times what we have done is just take the same ratio, value-impact ratio but used worker dose rather than public dose and used the same criteria.

MR. BENDER: The same dollars per man-rem?

MR. MINNERS: The same dollars. We have not weighted them differently for workers and the public.

MR. BENDER: That is good.

MR. MINNERS: Then, averted plant damage, we have sometimes factored that in the implementation cost, but that is not a big number. If probabilities are low like 10 to the minus 5 per reactor year, that is only $400.5 million. Now, if you get to 10 to the minus 4, it gets to be $4 million and then you have to consider it.

MR. BENDER: The number you have for replacement, it includes cost of replacement power and cost of replacement plant. It seems terribly low.

MR. MINNERS: I think we have a pretty good

number. It is really not that big a number. If you do not have to do it for ten years there is a big difference. Ten years at 10 percent interst is a lot of money.

MR. BENDER: You do not have to do it for ten years.

MR. MINNERS: Yes. You presume that an accident on the average occurs at mid-point of the life of the reactor, maybe by ten years, I guess; ten or twenty years.

MR. BENDER: A plant's lifetime is 30 years, so, half throught it is fifteen.

MR. MINNERS: Fifteen. So, the standard is fifteen years on the average before you have to spend this money. So, you don't have to have a billion dollars. You have to have a lot less money in your IRA account which is not taxed and goes up very fast.

MR. BENDER: You are using a sinking fund concept.

MR. OKRENT: At what interest rate?

MR. MINNERS: I forget. Do you remember, George?

MR. SEGE: We used a five percent real discount rate.

MR. OKRENT: Five percewnt.

MR. SEGE: Yes.

MR. OKRENT: I saw something from Sandia that said that even a smaller number was applicable without inflation.

MR. MOELLER: Let's see, there is nothing in this that allows for economic effects off-site. Is that correct?

MR. MINNERS: We took the thousand dollars per man-rem as a surrogate for all off-site effects, health effects and property damage effects.

We are only trying to rank issues relatively.

MR. OKRENT: Well, there is an absolute value entering into your judgment, I think.

MR. MINNERS: To a degree.

MR. OKRENT: But you think that the studies indicate that this is a good surrogate, or what?

MR. MINNERS: I have had some people that say no, that it is not for property damage. But I have not been convinced that is the case. The problem comes, it is so variable, I think, and we are trying to do generic issues and have to have a generic number. There are not any two reactors or any two sites that are the same.

So, it is a very difficult thing to do, very hard to do. There is so much difference between an reactor, between a site. But you still have to do it

because it is a generic issue.

MR. BENDER: What else are you going to tell me?

MR. MINNERS: I am going to tell you some numbers, which is what Dr. Moeller was interested in.

MR. SIESS: Excuse me, but could I interject something? This is the wrong time to ask it, but in your categorization list in addition to high, medium, low and drop you have a category called "Licensing Improvement."

MR. MINNERS: Yes, sir.

MR. SIESS: I could not tell whether that was above high or below drop, or just what it meant.

MR. MINNERS: We have to listen to Mr. Bender's comments in that we have been parochial about that and my brain is not prioritizing licensing improvement.

MR. SIESS: Could you simply define a licensiong improvement?

MR. MINNERS: We have a definition for licensing improvement which is not in your version of the 9033 draft but it will be in the final version. It is basically things that improve licensing, update in the SRP.

MR. SIESS: You mean it will not increase

safety and it will not cost anybody anything?

MR. MINNERS: It night cost somebody something.

MR. SIESS: But it will not improve safety.

MR. MINNERS: It won't improve safety. Reporting requirements.

MR. SIESS: Oh, I have a review of some of these specific things and some of them are labeled "Licensing Improvement." We will find in 933 what that means, or will those just be left out of 933?

MR. MINNERS: No, in the table to all generic issues with the safety and environmental licensing, it tells you what they are.

MR. SIESS: The table tells me it is licensing improvement, but is there somewhere I find that issue discussed?

MR. MINNERS: Sometimes, yes; sometimes, no. On the ones that we - the Safety Program Evaluation Branch - defined as licensing improvement we wrote up a little "blurp" which I hope is a rationale that is understandable as to why it is licensing improvement.

We were also given a list in which things were labeled "Licensing Improvement" and we just accepted that list.

So, on those issues you will not find a description which gives the rationale of why it is

licensing improvement. That might be something that we do later in the report because NRR is prioritizomg this issues and I fully expect that some of them are going to come back with the question of: "I don't think this is a licensing improvement" because there is a gray area in what a licensing improvement is.

MR. BENDER: Let's see the numbers.

MR. MINNERS: Here is the previous chart which displays change-in-risk versus value-impact score. This is in man-rem per million dollars, and this is depending on which guidelines you are focusing on, which may be man-rem per reactor, man-rem for all reactors.

MR. BENDER: Is that all affected, or all?

MR. MINNERS: All affected.

MR. BENDER: OK.

MR. MINNERS: Well, all reactors and if it is not affected there is no man-rem change. It is the same thing. You integrate overall the activity.

MR. SIESS: If it is a PWR modification not a BWR, it is all PWR, is it? That is what you meant by all affected.

MR. MINNERS: You would multiply "N".

MR. SIESS: It is the "N".

MR. MINNERS: And then core melts per reactor year and core melts per year. And, as I say, this is

really the safety goal. The 10 to the minus 5 is ten percent, 10 to the minus 4, the safety goal number. Take account that we are dealing with one issue and not the total core melt.

And this is your thousand dollars per man-rem cost-benefit thing from the safety goal. And here is how the things that we have prioritized fall out. Up in this corner, everything costs something. There is not anything that has small costs. Even though it may have small risk, it still costs a lot of money and they all tend to fall back here.

And then, this area over here would say, "Hey, this is an issue that is really going to cost you a lot of bucks to fix." In our generic issue list it did not contain any.

MR. OKRENT: I am trying to understand where on that viewgraph this thing called "Other Considerations," namely averted plant damage, would enter.

MR. MINNERS: Now, you may go back and look at this issue - and I don't know what the issue is particularly - but the actual calculated value-impact score, the risk number, may not be these numbers. The number may have been up here.

I will give you an example I can think of,

siting rule. I believe that came in somewhere up in here, all right? We prioritized it as a medium category because there is no reactor here today so it is not very wise for the Commission to put a high priority on that issue at the expense of things which are medium.

So, on an "Other Considerations" basis we downgraded that from a high priority indicated by the numbers to a medium priority based on our judgment.

MR. SIESS: How can it be high if the end is zero?

MR. MINNERS: We did not say it was zero.

MR. SIESS: You just said they do not have any reactors.

MR. MINNERS: Now, today they do not have any reactors. When the study was done you presumed you were still going to get reactors. We did not think that we wanted to make a policy judgment that there would be no more new reactors from now until the year 3000.

MR. OKRENT: Let's come back to a specific issue like turbine missiles or something. You would presumably do a value-impact score and there it is man-rem in the enumerator and millions of dollars spent to fix it in the denomiator; is that correct?

MR. MINNERS: Right.

MR. OKRENT: Period. And the enumerator is

only man-rem.

MR. MINNERS: For the value-impact score.

MR. OKRENT: So, there is nothing in the enumerator that deals with the averted plant damage.

MR. MINNERS: I am being very precise, of the value impact scores there is nothing in the enumerator.

MR. OKRENT: So, if one decided that even if it caused a core-melt accident, the man-rem off-site would be a hundred and this would lead to a certain dollar value, then, or whatever. You would have nothing in the enumerator that deals with the loss of the plant, the clean-up of the plant and so forth; is that correct?

MR. MINNERS: On that particular number, the value-impact score, what you say is correct. But that does not mean that it will get a ranking based solely on that value-impact score.

MR. OKRENT: Well, but nevertheless, going vertically you only have one thing, you have something called value impact, and value only includes man-rem.

MR. MINNERS: Yes.

MR. OKRENT: I guess at the moment I am having a problem with that because it seems to me there are other real costs.

MR. MINNERS: You are inferring that we are ignoring the averted plant damages.

MR. OKRENT: Well, where does it come in because I do not see it.

MR. MINNERS: It goes into "Other Considerations." I have a value-impact score which is way down here and it says it is low. But, holy cow, this would wreck the plant. That is not worth it. I move it up to high priority on that basis. If the analyst wants to make an explicit calculation, he can do that.

But as I tried to point out, if the probability of the event is in the 10 to the minus 5 range averted plant damages are not a big number, they are half a million dollars. So, if it cost any significant amount of money to make the fix, you know, $10 million is not an unusual number. The averted plant damages are a small thing compared to that.

Now, if the probability is high, if you are getting 10 to the minus 3, yes, then averted plant damages can become significant. He looks at that and makes a decision on that basis.

I do not think that you want to have a prioritization system which automatically includes averted plant damages. You ought to be focusing on safety issues. Then, after you look at the safety issues you can modify your decision based on other

factors.

The primary focus ought to be on safety. If it is an insignificant risk to the public and wrecks the plant, I think the Commission has a hard time getting concerned about it.

MR. OKRENT: Well, let's see, if it a tenth of the minus 4 issue, 10 to the minus 4 per year, that is --

MR. MINNERS: Then averted damage would be about $4 million on our standardized numbers.

MR. OKRENT: Four million.

MR. MINNERS: Four million, and that is significant. So, if you had some kind of a small LOCA which contaminates the containment because it gets outside, then you put that number in and it might make a difference in your answer.

MR. OKRENT: Where does the four million come from at 10 to the minus 4?

MR. MINNERS: One bilion to replace -- let me do it the other way.

Four-hundred million to clean up the mess which you have to do anyway, and if it is so bad that you cannot put your plant back on line it is a billion dollars for replacement power and you get your --

MR. OKRENT: I am trying to, again, just do the arithmetic. At 10 to the minus 3 at a billion

dollars, I get a million. What am I doing wrong?

MR. MINNERS: I don't know. I do not know what you are doing.

(Laughter.)

MR. OKRENT: I am multiplying 10 to the minus 3 times 10 to the 9, and I get 10 to the sixth. And then you would multiply by 40 years or what?

I am just trying to see what you are doing.

MR. MINNERS: Yes, multiply 10 to the minus 5 times 10 to the ninth.

MR. OKRENT: Yes? That does not give four million.

MR. MINNERS: No, it does not, 10 to the minus 5 should give you 400,000.

MR. OKRENT: I am trying to see where you got your four million.

MR. MINNERS: That is times 2 to the minus 4.

MR. SHEWMON: You cannot take any even candidate minus "N" and multiply the two numbers times each other and get four as the number out front. That is where he is hung up.

MR. OKRENT: Also, I cannot even get 10 to sixth at the moment.

MR. SHEWMON: Let us get the little numbers, the orders of magnitude --

(Laughter.)

MR. BENDER: I think we had better move on.

MR. MINNERS: Wait a minute, that is per reactor year, so you have to multiply it by --

MR. OKRENT: That is what I was asking, then you multiply by the number of reactor years involved.

MR. MINNERS: Right.

MR. OKRENT: OK, and that may be where you get your four also, is what you are saying.

MR. MINNERS: Right.

MR. BENDER: Now, what else are you going to tell us?

MR. MOELLER: Well, on your chart here where you have several things you could do, do you only put the dots? For example, you can have man-rem per reactor or man-rem per total all reactors. Do you only put the dot on the chart that is the highest risk or a change in risk; or do you put two dots for each thing?

MR. MINNERS: Well, this is not supposed to be a complete story.

MR. MOELLER: Right.

MR. MINNERS: I think these are mostly man-rem totals.

MR. MOELLER: Because that governed?

MR. MINNERS: In most cases that governed.

MR. MOELLER: But let's say --

MR. MINNERS: Core melt governed, but most of the time it was man-rem governed.

MR. MOELLER: So, you do the calculation both ways and then you take whatever governs.

MR. MINNERS: That is correct.

MR. MOELLER: Thank you.

MR. MINNERS: We would like ACRS's feedback. I personally think the first thing to do is to decide if the methodology is any good at all, which I think it is, and what modifications should be made to it if it is not quite up to par. That is the kind of comments we would like.

We described our methodology in the front part of 0933 and the methodology which is the same basic concept but a little more standardized is described in here in their report - I guess we will leave you a copy of that although that is more technique, I think, than methodology. I think the methodology is described in 0933.

And we would like people to comment, the ACRS in particular, on the acceptability of the application of this methodology, the individual issues, and is the ranking of particular issues correct.

We would like a committee letter if we can get

one in January which I think would probably be limited to methodology.

MR. BENDER: OK.

MR. OKRENT: Could I ask a question in a specific issue because in the end I think before sort of buying a methodology, one wants to see how it looks against some sepcific issue.

MR. MINNERS: I will try to answer your question, but there are over a hundred issues.

MR. OKRENT: Now, turbine missiles is the one.

MR. MINNERS: All right.

MR. OKRENT: We do not have the benefit of the backup review in this area, unfortunately.

MR. MINNERS: I do not think that was done, I do not think there is anything else.

MR. OKRENT: But this is one that says the issue should be dropped for further consideration.

MR. MINNERS: Yes, sir.

MR. OKRENT: And I guess if I were to accept this - and I may very well when I understand more - I may ask myself, why did we bother asking them to change the orientation from tangential to peninsular and so forth, and things of this sort. But in the write-up it gives an estimated --

MR. MINNERS: You have to presume what we are

rating is what the requirements are now and how we could change them. We did not rate what people did in the past.

MR. OKRENT: I understand.

MR. MINNERS: That is based on new plants that are goong to have good orientation, and old plants are going to have what they have.

MR. OKRENT: But if I buy what is here, I am not sure in fact it pays to bother asking for the peninsular orientation. For example, one of the things it says - and just a very short paragraph - is, "A realistic estimate of radioacative release in the environment would not be from a core melt but rather from a gaper leak."

MR. MINNERS: Right.

MR. OKRENT: That is just a statement.

MR. MINNERS: Correct.

MR. OKRENT: It says, "-- 10 to the minus 1 is much too high to assume that a turbine missile destroyed enough safety-related systems to cause a core melt."

Now, that may be so, but where is the technical information that will justify this conclusion?

MR. MINNERS: I doubt that there is anything beyond that.

MR. OKRENT: See, that is part of methodology

to me. In other words, you can say, "Oh, the methodology is OK but this is a narrow application of the methodology," and I guess you said P&L did not do this in detail.

MR. MINNERS: No. We will take all the blame, that is correct. You can find a lot of those instances in which there are assertions and they are not backed up by something. That is a problem of somebody who has to do an analysis in a limited amount of time.

Now, I think to answer some of those questions, it maybe should be done. But the analyst said, "Hey, that is going to take me six months and I don't have it."

MR. SIESS: Which direction did he rate it?

MR. MINNERS: Low.

MR. OKRENT: Drop.

MR. BENDER: Warren, I at least have some sympathy for the view you have expressed.

In this case specifically your judgment might not be any good, but the Delta risk which you are dealing with for the particular improvement which might be involved might be such that it would not be worthwhile arguing with you to try to go back and deal with the whole question of whether we should have had peninsular design or not.

I would probably want a lot more background. But if I am only dealing with the existing plants, what they have, what you can do to those, whether you are right or not may not be very important. I would not mind making some judgments on that basis.

MR. MINNERS: You have to keep in mind --

MR. BENDER: But on this absolute methodology, I personally would want to think a lot about it.

MR. OKRENT: But, Mr. Chairman, there is a statement and apparently there is not going to be a backup to this particular statement which I had assumed in fact there was going to be some appendix that one could look at it and in fact in may buy off that this is correct.

MR. MINNERS: We already have a report which I think is too thick.

MR. BENDER: I am not trying to confuse the issue, Dave.

MR. MINNERS: It is a serious question, Dr. Okrent, and I do not kow how to answer it. It has to be on the judgment of people. I think we have spent a lot of money on prioritized issues and would the money be better doing something else.

MR. SIESS: Well, let's get clear just what you mean by methodology. You mean a lot more than that

equasion you write that comes out with an "S" on one side and a lot of other letters on the other.

You mean the whole involved methodology, including the application of judgment; right?

MR. MINNERS: Yes, sir.

MR. SIESS: It is probably easier to decide on the acceptability of an equasion than on the acceptability of staff's judgment which we always disagree with anyway.

MR. MINNERS: I think what we are asking to say is that allowing judgment as part of the methodology is acceptable, particular applications of judgment on particular issues. I should be arguing at this point, Dr. Okrent's question is a fair one and we ought to discuss whether our judgment on turbine missiles is correct or not.

MR. BENDER: There are several ways to answer your question. We could address it by saying, should you use the methodology at all; should you use the methodology with any qualification - which is more than likely what we will say; and perhaps we may suggest that there may be other criteria as well as the methodology which should be used, which the Commissioners have previously suggested.

I think we will take those matters into

consideration and see whether we can develop a response for you.

MR. MINNERS: We are more limited than you are. I think we are under some constraints that you may not be.

MR. BENDER: There is a separate question of whether the priorities are right. We might address that independently from methodology and I suspect we will.

MR. OKRENT: Is there something in the written material sent from Hanauer to Freilly that would tell me how this thing called "Other Considerations" in your viewgraph No. 10 is actually used?

MR. MINNERS: In the introduction to 0933 there is a little more expanded discussion of what "Other Considerations" are. But there is nothing like an equasion that says how you do it. You will have to go to the particular example to see the various ways that it is used.

MR. OKRENT: That is part of the methodology, though; is it not?

MR. MINNERS: Yes, and an important part. But the focus, we think the focus has been and should be on safety benefits, public dose and implementation cost; that is the prime thing.

Once you have that fixed, then you say, "Hey,

there may be other things I should look at," and those are "Other Considerations" and take whatever weight is appropriate in that particular situation. I do not think there is a generalization for it.

I think one of the reasons we are doing this is because they are parallel to the safety goals and we think that half the parallel to safety goals is being the problem for policy statements of the Commission.

MR. ERNST: Let me take one crack at this "Other Considerations" - and I may be wrong. So, Warren, if I am wrong, correct me.

Diesel genrators, for example, B-56, I think, winds up with using the priority score approach which does not include averted plant damage or replacement power cost, would indicate a medium priority, I believe.

However, if you look at the core-melt reduction it would indicate a high rating. So, I think this issue is rated high.

If one were to consider the averted plant damage benefit it would not change the priority rating much because at $1,000 a man-rem there is already some substantial benefit and it is already rated high anyway because of the core-melt reduction.

So, if one considered averted plant damage, there would be no overall change in the priority rating,

it would still be high. I think it is fair to say that the averted plant damage does not appear in the priority score and the plots that Warren showed. But for informational purposes the information is provided in the write-ups and could influence a decision maker.

MR. MINNERS: You have to have an event with melt core that does not bust the containment for averted plant damage.

MR. OKRENT: Are there any such? Maybe there are not any.

MR. MINNERS: According to WASH-1400 there are not any, which I think is a wrong conclusion.

MR. OKRENT: Well, in WASH-1400 a large fraction of a certain class go downward and lead to a small man-rem.

MR. MINNERS: Yes.

MR. OKRENT: Actually, my own feeling is that that particular class of event - assuming that is what happened - your estimates of the costs are too low. I think the psychological costs would be very large so that the man-rem is not a good measure. I think the cost of clean-up is going to be far larger than what you have shown, even if it is discounted. That is just my own personal guess. I think it is a very difficult problem.

MR. SHEWMON: I would guess the probability of going through the containment, though, is less than what they have estimated.

MR. OKRENT: As a matter of fact, it may not be even crucial whether it goes through the containment. I think the clean-up, if it is out of the vessel, that is the problem.

MR. SHEWMON: It goes out through this little house and has to go through the containment to get into where the reactor is; does it not?

MR. BENDER: I hate to exercise the chairman's prerogative but since another meeting is going to start in 15 minutes, I would like to come to some decision on what to do with the request of the staff.

We have some time set up for the full Committee to hear this?

MR. DURAISWAMI: Yes.

MR. BENDER: How much?

MR. DURAISWAMI: About half an hour on Saturday.

MR. SHEWMON: Prime time. Do you want it A.M. or P.M.?

MR. DURAISWAMI: Saturday at 3:30.

MR. BENDER: There will be a brief time for discussing with the Committee what the alternatives are

that are involved.

My proposal, if it suits the subcommittee to suggest it, is that we take the items that have been identified on the list as generic items and assign the subcommittee members to take a look at, recommend to each subcommittee member or committee member that he get whatever backup is available and make a judgment.

MR. SIESS: With backup from staff or from fellows?

MR. BENDER: I did not understand.

MR. SIESS: With backup from staff or from fellows.

MR. BENDER: Yes, separately. I suggest that maybe we get one of our fellows to take a look at the methodology and help us assess its value, and just discuss it in the subcommittee meeting.

Warren wants a letter in January. We will try, but we do not promise anything because it does not seem to me that whether it is January or February is all that magic. You can set it out whether you have our commentary or not.

MR. MINNERS: Don't take this as any kind of a threat.

MR. BENDER: I wouldn't think so.

(Laughter.)

MR. MINNERS: But the staff thinks it is prudent to go ahead and allocate resources based on what we have done so far.

MR. BENDER: That is not a problem.

MR. MINNERS: Well, OK, that is not an irrevocable decision. So, not having the ACRS letter at the right time is not fatal.

MR. BENDER: You have to realize, you have been allocating resources for the last three years.

MR. MINNERS: We are not allocating resources.

MR. SIESS: The number of high items we disagree with and would like you to submit less of the number of low and drop that we disagree with.

MR. MINNERS: Well, we can give you a quota of disagreement if you would like of one or two.

MR. SIESS: Weighted.

(Laughter.)

MR. BENDER: Are there any other points? Dade, do you have anything else?

MR. MOELLER: Well, the usual question. Is the staf pretty unanimous in the ratings?

(Laughter.)

MR. MINNERS: Our process was to take our evaluation or our write-up and send it around to NRR, to the assigned branch and copies to every division. We

asked them to give us their comments.

The rules were that we would try to get consensus, and in 95 percent of the cases or 99 percent of the cases we did.

In the other cases in which we could not get consensus we said, "We are rating it, not you. But we will write down what your comment is." So, if there is a difference of opinion it is written down in the thing.

MR. BENDER: Well, we will look at that report.

Sam, based on my delegation of authority, has made some arbitrary assignmewnts. If the members do not like the assignments, I wish you would get back to Sam and suggest to him what else you might do.

MR. OKRENT: Do we have that thing?

MR. BENDER: He has passed them out.

You will hear from us as to what we are going to do in January. We may not get you a letter but I do not see it is all that magic.

MR. MINNERS: Well, if we are really off course, I guess we need some redirection. If we need minor adjustments --

MR. BENDER: You are not that far off course. Even if we do not like the method, just a quick look says you are working on a large fraction of important things - if you are really working on them.

If there are no other comments, I suggest we adjourn this meeting and let the more important one proceed.

(Whereupon, at 9:50 a.m. the subcommittee adjourned, to reconvene subject to the call of the chair.)

NUCLEAR REGULATORY COMMISSION

This is to certify that the attached proceedings before the

_____

in the matter of: ACRS/Subcommittee on Generic Items

Date of Proceeding: December 8, 1982

Docket Number: _____

Place of Proceeding: Washington, D. C.

were held as herein appears, and that this is the original transcript thereof for the file of the Commission.

M. E. Hansen

Official Reporter (Typed)

M. E. Hansen

Official Reporter (Signature)

PRIORITIZATION OF GENERIC SAFETY ISSUES

PROGRAM FOR MANAGEMENT OF GENERIC ISSUES

1. IDENTIFICATION
2. PRIORITIZATION
3. ALLOCATION OF NRC RESOURCES
4. RESOLUTION
5. REVIEW AND APPROVAL
6. IMPLEMENTATION

SCHEDULE FOR PRIORITIZATION OF NRR GENERIC ISSUES

1. TMI ACTION PLAN ITEM III.E.2 (5-80)
2. SECY-81-513 (8-81)
3. ACRS LETTER ACCEPTING STAFF'S LIST (3-17-81)
4. ACRS BRIEFING ON SECY-81-513 (12-81)
5. PRELIMINARY REPORT (3-26-82)
6. COMMISSION BRIEFING (4-13-82)
7. DRAFT REPORT ON NRR ISSUES, NUREG-0933 (9-30-82)
8. FEDERAL REGISTER NOTICE FOR PUBLIC COMMENT (12-15-82)
9. MEET WITH ACRS (1-7-83)
10. SUBMIT REPORT TO EDO (1-21-83)
11. MEET WITH COMMISSIONERS (2-21-83)
12. PUBLISH NUREG-0933 (3-21-83)
13. PRIORITIZATION OF NEW GENERIC ISSUES IDENTIFIED BY ALL OFFICES

PRIORITIZATION OF NON-NRR TMI ACTION PLAN ITEMS

- SUBMIT REPORT TO EDO (1-15-82)

PROCESS

1. IDENTIFY ALL ISSUES
   - SOURCES – NRR, ACRS, AEOD, OIE
2. ASSIGN ISSUES
   - SPEB
   - CONTRACTOR ASSISTANCE FROM PNL (NUREG/CR-2800)
3. DEFINE ISSUES BY CONSULTING WITH LEAD NRR ORGANIZATIONS
4. PRIORITIZE SAFETY ISSUES USING DEFINED METHODOLOGY
5. IDENTIFY NON-SAFETY ISSUES FOR SEPARATE PRIORITIZATION
   - LICENSING IMPROVEMENT
   - ENVIRONMENTAL
6. CIRCULATE PRODUCT FOR NRR PEER-REVIEW
7. ACRS REVIEW
8. SCHEDULE RESOLUTION OF HIGH PRIORITY ISSUES IDENTIFIED BY PROCESS
9. PUBLIC COMMENT

SAFETY BENEFIT

1. CHANGE IN FREQUENCY, F (EVENTS/RY)
   - SPECIFIC EVENT/FAULT TREE
   - WASH-1400 (SPEB)
   - OCONEE 3 AND GRAND GULF 1 RSSMAP (PNL)
   - DATA – LERs, PRAs, JUDGMENT (HUMAN FACTORS)

2. CHANGE IN CONSEQUENCE, D (MAN-REM/EVENT)
   - SOURCE TERM: SPECIFIC ESTIMATE, WASH-1400 RELEASE CATEGORIES
   - DOSE: CRAC 2 – TYPICAL METEOROLOGY (BRAIDWOOD), MEAN POPULATION DENSITY (340 PEOPLE/SQ. ML.), 50-MILE RADIUS

IMPLEMENTATION COST, C ($MILLION)

1. INDUSTRY COST
   - DESIGN, INSTALLATION, MAINTENANCE:
     - STUDIES
     - ACTUAL
     - INDUSTRY ESTIMATE
     - NRC ESTIMATE
   - DOWNTIME
     - $300/DAY

2. NRC COST
   - RESOLVE, IMPLEMENT, MONITOR

CHANGE IN RISK

$$\Delta R = (\Delta F)(\Delta D)(L)(N)$$

WHERE
- ΔF = FREQUENCY
- ΔD = DOSE
- L = REMAINING LIFE
- N = NUMBER OF REACTORS

COST

$$C = C_I N + C_R$$

WHERE
- C_I = INDUSTRY IMPLEMENTATION COST
- N = NUMBER OF REACTORS
- C_R = NRC COST

SAFETY PRIORITY SCORE

$$S = \frac{\Delta R}{C}$$

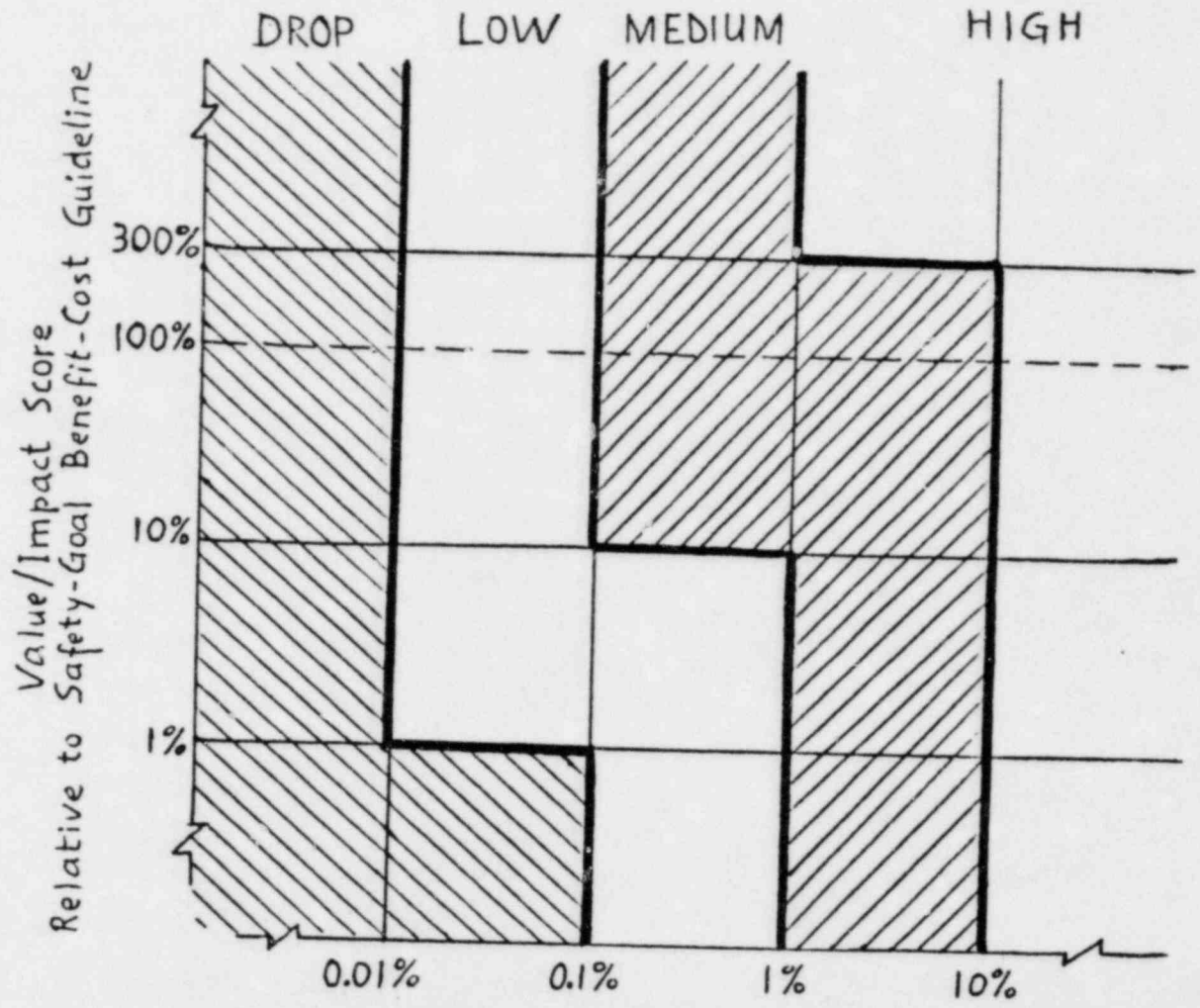
SAFETY PRIORITY RANKINGS OF GENERIC ISSUES

1. NEARLY RESOLVED } SCHEDULE RESOLUTION
   HIGH }

2. MEDIUM - SCHEDULE FOR FUTURE YEARS

3. LOW } NO FURTHER WORK
   DROP }

POTENTIAL GENERIC ISSUES
SAFETY PRIORITY RANKING CRITERIA



GS
12/3/82

OTHER CONSIDERATIONS

1. OCCUPATIONAL DOSE

2. AVERTED PLANT DAMAGE
   - CLEANUP – $400 MILLION
   - REPLACEMENT – $1,000 MILLION

RESULTS

1. HIGH PRIORITY (EXHIBIT A)
   - C-8 CHANGED TO HIGH
   - 22 UNCHANGED
2. TABLE II OF NUREG-0933
3. ACRS ISSUES (EXHIBIT B)

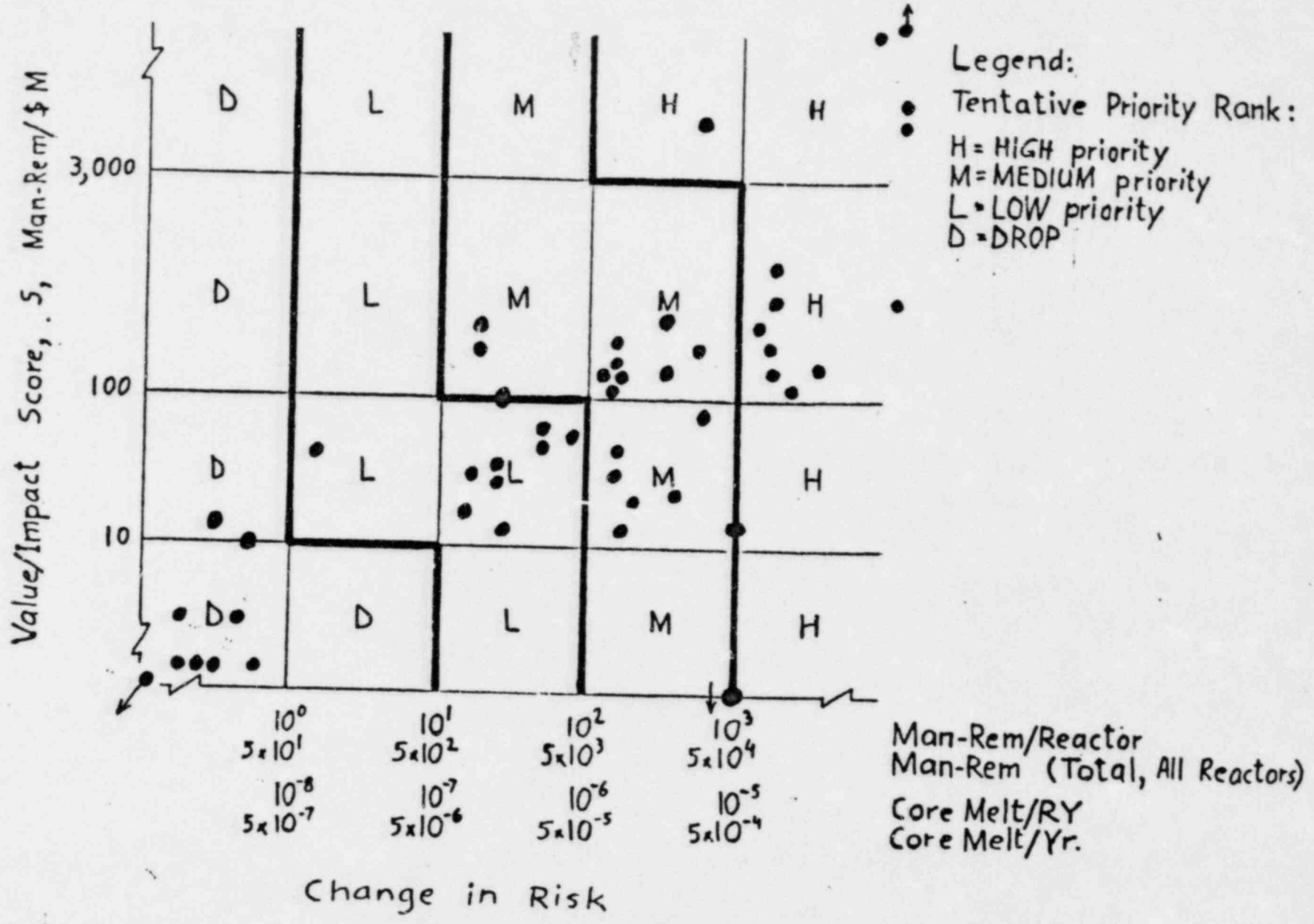


Figure 1 — Priority Ranking

GS 12/3/82

ACRS FEEDBACK

1. ACCEPTABILITY OF METHODOLOGY
2. ACCEPTABILITY OF APPLICATION OF METHODOLOGY TO INDIVIDUAL ISSUES
3. COMMITTEE LETTER

EXHIBIT A

HIGH SAFETY PRIORITY ISSUES(16)

	ISSUE	ΣRISK REDUCTION (MAN-REM)	Σ COST ($MILLION)	S (MAN-REM/$M)
23.	REACTOR COOLANT PUMP SEAL FAILURES	173,400	594	292
29.	BOLTING DEGRADATION OR FAILURE IN NUCLEAR POWER PLANTS	450,000	8.6	53,000
A-30.	ADEQUACY OF SAFETY-RELATED DC POWER SUPPLIES	530,000	15	36,000
B-6.	LOADS, LOAD COMBINATIONS, STRESS LIMITS	48,000	-149	-330
B-10.	BEHAVIOR OF BWR MARK III CONTAINMENTS	1,300,000	39	33,000
B-56.	DIESEL RELIABILITY	65,000	47	1,380
C-8	MAIN STEAM LINE LEAKAGE CONTROL SYSTEMS	218,000	16	13,500
I.A.2.2	TRAINING AND QUALIFICATIONS OF OPERATIONS PERSONNEL	122,400	691	524
I.C.1(4)	CONFIRMATORY ANALYSES OF SELECTED TRANSIENTS	105,000	64	1,650
II.B.6	RISK REDUCTION FOR OPERATING REATORS AT SITES WITH HIGH POP. DENSITIES	40,500	4	10,000

RCE/12-3-82

EXHIBIT A (cont.)

	ISSUE	ΣRISK REDUCTION (MAN-REM)	Σ COST ($ MILLION)	S (MAN-REM/$ M)
II.C.2	CONTINUATION OF INTERIM RELIABILITY EVALUATION PROGRAM	79,000	83	950
II.C.3	SYSTEMS INTERACTION	7,000	7.3	954
II.C.4	RELIABILITY ENGINEERING	267,000	559	478
II.E.4.3	INTEGRITY CHECK	35,000	160	220
III.D.3.1	RADIATION PROTECTION PLANS	640,000	341	1,880
IV.E.5	ASSESS CURRENTLY OPERATING REACTORS	80,000	74	1,000

EXHIBIT B

CONCISE LIST OF ALL ACRS ISSUES

ACRS NO.	NRR NO.	SAFETY PRIORITY
1 - 52	RESOLVED PER ACRS REPORT NO.7 (3-21-79)	NRR AGREES WITH ACRS THAT ISSUES ARE RESOLVED
53	A-37	DROP.
54	C-10	LICENSING IMPROVEMENT.
55	A-11	USI(HIGH).
56	-	COVERED IN II.F.1
57	B-73	COVERED IN C-12(RESOLVED)
58	C-13	COVERED IN A-17 (USI)
	A-9	USI(HIGH).
	A-30	HIGH.
	A-35	RESOLVED.
	B-56	HIGH
	B-57	COVERED IN A-44 (USI)
	A-17	USI(HIGH).
59	B-22	LICENSING IMPROVEMENT.
	B-52	COVERED IN A-2(USI).
60	B-68	DROP.
61	D-1	DROP.
62	D-2	LICENSING IMPROVEMENT.
63	B-54	MEDIUM.

RCE/12-3-82

EXHIBIT B (cont.)

ACRS NO.	NRR NO.	SAFETY PRIORITY
64	A-3	USI (HIGH).
	A-4	USI (HIGH).
	A-5	USI (HIGH).
65	-	COVERED IN SEP.
66	A-19	LICENSING IMPROVEMENT.
67	A-39	USI (HIGH).
	B-10	HIGH.
68	A-42	USI (HIGH)
69	B-8	DROP.
70	A-29	MEDIUM.
71	A-15	RESOLVED.
72	B-64	RESOLVED.
73	A-2	USI (HIGH).
74	A-1	USI (HIGH).
75	A-6	USI (HIGH).
	A-7	USI (HIGH).
76	C-1	RESOLVED.
77	A-40	USI (HIGH).
-	1	DROP.
-	2	MEDIUM.
-	3	RESOLVED. RCE/12-3-81

EXHIBIT B (cont.)

ACRS NO.	NRR NO.	SAFETY PRIORITY
-	4	RESOLVED.
-	5	COVERED IN I.F.1.
-	6	RESOLVED.
-	7	DROP
-	8	COVERED IN I.C.1.
-	9	COVERED IN II.K.3.
-	13	DROP.
-	29	HIGH.
-	A-21	LOW.
-	A-22	DROP.

WMilstead 12/6/82

ITEM C-8 MAIN STEAM LINE LEAKAGE CONTROL SYSTEMS

DESCRIPTION

Historical Background

Dose calculations by AAB in 1975 indicated that operation of the main steamline isolation valve leakage control system (MSIVLCS) required for some BWRs may result in higher offsite accident doses than if the system is not used and the integrity of the steamlines and condenser is maintained. The dose calculations performed by AAB at that time, assuming nonoperation of the MSIVLCS, took credit for cold trapping of iodine and volatiles in the steamlines and condenser. In addition, long holdup times and release either through stack filters via the Waste Gas Treatment System or leakage from the steam system was assumed. Leakage from the main steam condenser system would be small because normal operation requires that leakage be maintained at a low level. Integrity of these systems is not assured during earthquakes since they are not designed for the SSE. However, the probability of failure of both the fuel and these systems due to earthquake is small. By contrast, the MSIVLCS draws a negative pressure downstream of the MSIVs to collect leakage past the valve seats and processes the collected leakage through a safety grade filtration system for release to the environment. Relatively little cold trapping or holdup time occurs when the MSIV leakage control system is used. Therefore, the calculated doses for releases through the MSIVLCS are greater than the calculated doses

for releases through the steam system unless the integrity of the steam system is lost. Item C-8 was initiated to investigate whether the MSIV leakage control system currently recommended in Regulatory Guide 1.96[21] is desirable. Since its inception, Item C-8 has been categorized as of little or no significance to plant risk (i.e., Category C). Little or no staff effort has thus been devoted to the issue. In the meantime, new concerns have arisen because operational experience has indicated a relatively high MSIVLCS failure rate and a variety of failure modes at some BWR plants, and resulted in the initiation of New Generic Issue 16 (Section 1 of this report). Recent data[A] on the magnitude and frequency of MSIV leakage at BWR plants has renewed concerns for the viability of the design of the MSIVLCS. In addition, the question of backfitting MSIVLCs to BWRs that do not have the systems has been raised.[219] The prioritization of NUREG-0471[3] Item C-8 incorporates all of the concerns outlined above.

Safety Significance

Calculations by AAB in 1975 for accidents with a TID source indicated a potential increase in offsite releases of iodine by two to three orders of magnitude for proper operation of a MSIVLCS when compared to the calculations of releases assuming the steam system is intact and MSIV leakage is eventually released through the condenser. Therefore, use of the MSIVLCSs prescribed by Regulatory Guide 1.96[21] could increase the overall risk to the public. Additionally, the above calculations performed by AAB assumed a relatively low rate of MSIV leakage. Recent data[A] collected by OIE has revealed a high frequency of measured MSIV leakage at some operating

plants which may be in excess of the Technical Specification limit of 11.5 SCFH by more than two orders of magnitude. Leakage of this magnitude is beyond the design capacity of most MSIVLCS's and as a result the public risk associated with excessive MSIV leakage may be higher than previously assumed.

Possible Solutions

(A) Plants now having MSIVLCSs would provide procedures and train their operating staff to use the more efficient steam and waste gas treatment system, if available, as the first option following a major accident. The MSIVLCS would be treated as a backup system to be used only if the normal treatment system is not available.

(B) Install MSIVLCSs at all the "grandfathered" BWRs and train and equip the operating staff to treat the MSIVLCS as a backup system as in (A) above.

(C) "Fix" MSIV leakage characteristics and continue to use the MSIVLC at those plants which have or will have them as the first choice of treatment for MSIV leakage following a major accident.

(D "Fix" MSIV leakage and use the MSIVLCS as a back up system at these plants which have or will have them, as in (A) above.

(E) "Fix" MSIV leakage, install MSIVLCSs at all grandfathered BWRs and train and equip the operating staff to treat the MSIVLCS as a back up system as in (A) above.

(F) Disable all MSIVLCSs and accept MSIV leakage at its current magnitude and frequency.

PRIORITY DETERMINATION

Major Assumpation

In the analysis of this issue the following major assumptions were made:

(a) frequency of core melt event in BWR=3.8 x 10^{-5}/RY. (Grand Gulf PRA) Appx B NUREG/CR-2800[B]

(b) failure probability of MSIVLCS (i.e., will not function properly when needed = 5 x 10^{-2}/demand when MSIV leakage is less than 100 SCFH and 1.0 when MSIV leakage is greater than 100 SCFH.

(c) system failure probability of steam and waste gas treatment system = 5 x 10^{-2}/demand (i.e., the steam and waste gas treatment system will not be available if desired to prevent direct leakage to the environment). Unavailability of the nonseismic portions of the steam and waste gas treatment system due to seismic events is assumed to be covered by 5 x 10^{-2}/demand failure probability.

(d) The steam and waste gas treatment system is not available for use for 26% of the core melt scenarios. (Examination of the Grand Gulf PRA indicates that 26% of the core melt scenarios were either initiated or exacerbated by the loss of offsite power, which is required to operate the condenser and waste gas treatment system).

(e) if neither the MSIVLCS or the steam and waste gas treatment are available MSIV leakage is released directly to the environment.

(The potential to contain MSIV leakage in the steam line until the steam and WGTS are available for treatment is not considered)

(g) of the 50 expected BWR plants, 25 have or will have MSIVLCSs and 25 do not have an MSIVLCS and will not provide one unless required to do so.

(h) all plants in the population have an average remaining life of 30 years

(i) the partitioning efficiency ofthe MSIVLCs is 99% (i.e., reduces releases by a factor of 100)

(j) the partitioning efficiency for the steam and waste gas treatment system is 99.9% (i.e., reduces releases by a factor of 1000)

(k) maximum MSIV leakage was assumed to be about 3000 SCFH based on the maximum reported MSIV leakage observed at Browns Ferry Units 1, 2, and 3 (IE Bulletin No. 82-23)[220]

(l) the probability of an individual MSIV to close is 10^{-3}/ demand and the probability of MSIV isolation demand (I&C) failure is 5 x 10-^{5}/demand. (WASH-1400)[16]

(m) Average MSIV leakage and the frequency of occurance per test were as indicated by the following table. This table was derived from the data provided in a memorandum from OIE[A] which discussed the results of an industry survey of BWR MSIV leak rate tests. The derivation of this table is discussed later under the frequency/ consequence estimate.

TABLE 1

CURRENT		AFTER "FIX"	
MEAN MSIV LEAK RATE - SCFH	RELATIVE FREQUENCY	MEAN MSIV LEAK RATE - SCFH	RELATIVE FREQUENCY
11.5	0.58	11.5	0.69
55.0	0.17	55.0	0.20
1500.0	0.25	500.0	0.11

Frequency/Consequence Estimate

Since none of the BWR core melt release categories assume immediate direct environmental releases which bypass the containment wet well and suppression pool and in some instances other containment or auxilary systems which would mitigate releases, it was felt that basing C-8 consequences on the consequences derived for BWR Category 1 through 4 releases was not appropriate. The Accident Evaluation Branch (AEB) therefore provided the results of consequence analyses of core melt accidents with large MSIV leakage.[C] Analyses were performed with the CRAC I code. For these consequence estimates, the population and meterology of the Perry site were used, along with some characteristics of the Browns Ferry steam lines. The Perry site has an average population density within the 50 mile radius of the plant of about 320 persons per square mile as opposed to the assumption of a uniformly distributed population with a density of 340 persons per square mile used in other generic issue risk estimates. The analyses are, thus, for a hybrid BWR plant of a 3834 MWt. power level.

A direct release consequence analysis was performed to simulate an accident sequence in which releases occur immediately downstream of the first non-seismic Category 1 component (turbine stop valve) in the main steam

Line. WASH-1400 BWR-2 release category fission product source terms were assumed. A two-hour delay prior to initiation of fission product release from the core and a 0.27-hour delay in the main steam lines was used. A nominal low-energy ground level release to atmosphere at the turbine stop valve was assumed. MSIV leakage was assumed to be about 3000 SCFH. Computed peak consequences were 9.6×10^7 person-rem and 2.2×10^3 early fatalities within 50 miles of the site.

An industry survey of MSIV performance was performed for the years 1979 through 1981. The results of this survey[A] and additional information provided by the author of the referenced report were utilized to develop the MSIV leakage rates and frequencies indicated in Table 1. MSIV leakage was demonstrated, by testing, which varied from less than the Technical Specification Limit of 11.5 SCFH to as great as about 3500 SCFH. Since most MSIVLCSs are designed to accommodate a maximum leakage of about 100 SCFH, the leakage data was divided into three groups, i.e., leakage less than or equal to 11.5 SCFH, leakage between 11.5 SCFH and 100 SCFH, and leakage greater than 100 SCFH. The frequency (percentage) of all tests with measured leakage within the three groups was determined from the data. For the first two groups MSIV leakage of 11.5 SCFH was assumed for those valves which "passed" the leak test, and a median leakage of 55 SCFH was assumed for those valves which fall into the group with leakage greater than the technical specification limit but not greater than 100 SCFH. For the third group a weighted average was determined.

Examination of the data revealed that, of MSIVs provided by three different manufacturers, one particular type of valve dominated the extreme leakage

incidents. About 60% of the MSIVs in service are provided by this manufacturer. One licensee has embarked upon an improvement program for his MSIVs, which are of this particular type. The improvements planned for these valves will result in the valve being similar in design and operation to the valves of the other two manufacturers. We therefore assumed that if MSIV leakage improvements are made that all valves would be expected to have MSIV leakage characteristics and a frequency distribution the same as that indicated by the 1979-1981 data for the other two manufactures valves. The results are depicted as "current" and "after fix" in Table 1.

Consequences of a direct release of 11.5 SCFH, 55 SCFH, 500 SCFH and 1500 SCFH MSIV leakage were determined by ratioing the consequence calculated by the Accident Evaluation Branch for the direct release of a 3000 SCFH leak to the above leakages. The risk analysis also considered the low probability event of a core melt accident in which one or more main steam lines are not isolated. For this case a direct release consequence of 100 times the consequence calculated by AEB for a 3000 SCFH leak was assumed.

A simplified event tree was developed using the aforestated assumptions and consequence estimates. The event tree included the probability of core melt accidents, the probabilities of various levels of MSIV leakage, the probability of failure of MSIVLCS and Steam and Waste Gas Treatment System. The redundant series configuration of MSIV was also considered in the event trees. The simplified event tree was utilized to determine the probability of core melt releases, for a spectrum of MSIV leakage rates, to the

environment, directly, through the MSIVLCS and through the Condenser and WGTS.

A specific consequence was determined for each event tree path by ratioing the consequence of the 3000 SCFH direct release determined by the AEB to the specific MSIV leakage assumed for that path. When releases were found to occur through either the MSIV LCS or the steam & WGTS the consequence was reduced by the appropriate assumed portioning factor.

The probabilities for the specific paths through the event tree were multiplied by the consequence in man-rem for that specific path and the products summed to determine the total risk for the event tree. The probabilities and consequences for the basic event tree were adjusted as necessary to determine the total plant risk for operation of BWR plants as they now exist and for the total plant risk following each of the possible solutions. The analysis reveals that BWR plant risk is dominated by those event tree paths in which high (greater than 100 SCFH) MSIV leakage is assumed.

It should be noted that the simplified event tree does not account for "cascading" leakage in a main steam line which has two MSIVs in series. This would represent a leakage reduction. In addition, for those scenarios in which a loss-of-offsite-power (26% of all core melt accidents) is assumed to occur, MSIV leakage was assumed to be directly released to the environment if the leakage was greater than 100 SCFH (the MSIVLCS design capacity). In

reality, there is, in all likelihood, a rather large probability that the leakage could be contained within the steam line until such time that off-site power is recovered and treatment is again possible through the condenser and waste gas treatment system.

The risk associated with large MSIV leakage was determined for seven cases: The cases and the calculated risk for each case are provided as follows:

CASE 1 - Those plants which have or will have MSIVLCSs (25 plants) are assumed to treat them as a safety system and thus will operate the MSIVLCS in preference to the normal treatment systems in response to a major event. We have assumed that this represents the current state of operating plants and have thus adopted Case 1 as the base case. The total risk calculated for Case 1 is 2.45×10^5 man-rem.

CASE 2 Those plants which have or will have MSIVLCSs (25 plants) treat the MSIVLCS as a backup system to the steam and waste gas treatment system and thus only fall back on MSIVLCS in event the normal treatment system is not available following a major event. The total calculated risk for this case is 2.44×10^5.

CASE 3 All plants (50) have a MSIVLCS and treat them as backup systems to the normal treatment system. The total risk for this case is 2.23×10^5.

CASE 4 - MSIV leakage is "fixed" and those plants which have or will have MSIVLCSs (25 plants) continue to regard them as a safety system and thus will operate the MSIVLCS in preference to the normal treatment systems in response to a major event. The total risk for this case is 4.37×10^4 man-rem.

CASE 5 - MSIV leakage is "fixed" and those plants which have or will have MSIVLCSs (25 plants) treat the MSIVLCS as a back up system to the steam and waste gas treatment system and thus will only fall back on the MSIVLCS in the event the normal treatment system is not available following a major event. The total risk for this case is 4.32×10^4 man-rem.

CASE 6 - MSIV leakage is "fixed" and all plants (50) have a MSIVLCS and treat them as back up to the normal treatment system. The total risk for this case is 2.68×10^4 man-rem.

CASE 7 - All plants which now have or will have a MSIVLCS disable the MSIVLCS. Current MSIV leakage is accepted. Following a major event MSIV leakage would be treated only with the normal steam and waste gas treatment system when available. The total risk for this case is 2.6×10^5 man-rem.

Applying these risk estimates to the possible solutions:

(A) Plants which have a MSIVLCS would be required to develop procedures and train their operators to use the more efficient steam and waste gas treatment systems, if available, as the first option following a major event.

The risk reduction afforded by this solution can be determined by subtracting the total risk of CASE 2 from the total risk of the base case (CASE 1) and is (2.45×10^5 - 2.44×10^5) man-rem = 1000 man-rem.

(B) Install MSIVLCSs at all BWR plants which are now "grandfathered" and provide procedures and operator training to treat the MSIVLCS as a backup system to the normal treatment system as in (A) above. The potential risk reduction for this solution is the difference between Case 1 and Case 3 and is (2.45×10^5 - 2.23×10^5) man-rem = 2.2×10^4 man-rem.

(C) "Fix" MSIV leakage and continue to use the MSIVLCS at those plants which have or will have them as the first choice of treatment for MSIV leakage following an accident. The potential risk reduciton for this solution is the difference between Case 1 and Case 4 and is (2.45×10^5 - 4.37×10^4) man-rem = 2.01×10^5 man-rem.

(D) "Fix" MSIV leakage and use the MSIVLCS as a back up system at those plants which have or will have them as in (A) above. The potential risk reduction for this solution is the difference between Case 1 and Case 5 and is (2.45×10^5 - 4.32×10^4) man-rem = 2.02×10^5 - 4.32×10^4) man-rem = 2.02×10^5 man-rem.

(E) "Fix" MSIV leakage, install MSIVLCSs at all grandfathered BWRs and train and equip the operating staff to treat the MSIVLCS as a back up system as in (B) above. The potential risk reduction for this solution is the difference between Case 1 and Case 6 and is (2.45×10^5 - 2.68×10^4) man-rem = 2.18×10^5 man-rem.

(F) Disable the MSIVLCS at all plants which now have or will have them. The potential risk reduction for this solution is the difference between Case 1 and Case 7 and a reduction in risk of (2.45×10^5 - 2.64×10^5) man-rem or -1.9×10^4 man-rem, a risk increase.

Cost Estimate

NRC Cost: We estimated that a total of 5 man-years of professional staff and consultant efforts will be required to perform accident analysis of various options, perform the necessary trade-off studies, develop and justify recommended new requirements, review and approve the requirements, and implement the requirements. At a cost of $100,000/professional staff-year we determined the NRC cost to complete this issue to be $500,000.

Industry Cost:

Solution A - Training and procedures for using normal treatment system first:

(a)	Develop procedure	$50,000/plant
(b)	Control room display	25,000/plant
(c)	Operator training	60,000/plant
		$135,000/plant

Therefore, the total industry cost is (135,000)(25) = $3.38M.

Solution B - Install MSIVLCS at all plants - procedures and training for use as backup.

(a)	Training & Procedures	$135,000/plant
(b)	Procure, Install & Maintain MSIVLCS	
	Procure & Install	$500,000/plant
	Maintain, Surveillance (10 man wks/yr x $2000/mwk x 30 yrs)	$600,000/plant
		$1,100,000/plant

Total Industry Cost =

(50)($.135M) + 25($1.1M) = $34.25M

Solution C - "Fix" MSIV leakage & use MSIVLCS at those plants which have or will have them as first choice.

(a)	Value Modifications*	$350,000/plant
(b)	Licensing submittal & review	$150,000/plant
		$500,000/plant

60% of all MSIVs would be modified

Total Industry Cost = (.6)(50)($0.5M) = $15.0 M

*Licensee estimate

Solution D - "Fix" MSIV leakage & use MSIV LCS of those plants which have or will have them as back up system.

Total Industry Cost = Cost of Solution A + Cost of Solution C

= $3.38 M + $15.0 M = $18.38M

Solution E - "Fix" MSIV leakage, backfit MSIVLCS to grandfathered plants & use as backup system.

Total Industry Cost = Cost of Solution B + Cost of Solution D

= $34.25 M + $15.0 M

= $49.25 M

Solution F - Disable MSIVLCSs at all plants which have them.

(a)	Disable MSIVLCS=1 man-week	$2000/plant
(b)	Maintenance and Surveillance of MSIVLCS - Discontinue	-$600,000/plant
		-$598,000/plant

Therefore, the total cost saving is (-$598,000)(25) = -$14.95M

Value/Impact Assessment

Solution A $S = \$ \frac{1000 \text{ man-rem}}{\$(0.5 + 3.38)M} = 260 \frac{\text{man-rem}}{\$M}$

Solution B $S = \$ \frac{2.2 \times 10^4 \text{ man-rem}}{(0.5 + 34.25)M} = 560 \frac{\text{man-rem}}{\$M}$

Solution C $S = \$ \frac{2.01 \times 10^5 \text{ man-rem}}{(0.5 + 15.0)M} = 13{,}000 \frac{\text{man-rem}}{\$M}$

Solution D $S = \$ \frac{2.02 \times 10^5 \text{ man-rem}}{(0.5 + 18.38)M} = 10{,}700 \frac{\text{man-rem}}{\$M}$

Solution E $S = \$ \frac{2.18 \times 10^5 \text{ man-rem}}{(0.5 + 49.25)M} = 4{,}400 \frac{\text{man-rem}}{\$M}$

Solution F $S = \$ \frac{-1.9 \times 10^4}{\$[0.5 + (-14.95)]M} = 1{,}300 \frac{\text{man-rem}^{**}}{\$M}$

**This is not a desirable solution since it represents a large increase in public risk for a relatively small cost savings.

Other Considerations

The resolution or non-resolution of this issue would not affect core-melt frequency for BWR plants.

CONCLUSION

Issue C-8 should be treated as a HIGH priority issue. The issue should be redefined to stress the magnitude and consequences of MSIV leakage and the representativeness of the current testing methods. Leakage control systems should be evaluated only as one of the possible means for controlling MSIV leakage.

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21. Regulatory Guide 1.96, "Design of Main Steam Isolation Valve Leakage Control Systems for Boiling Water Reactor Nuclear Power Plants," U.S. Nuclear Regulatory Commission, June 1976.

219. Memorandum for S. Hanauer from R. Mattson, "Request for Prioritization of BWR Main Steam Line Isolation Valve Leakage as a Generic Issue," July 30, 1982.

220. IE Bulletin No. 82-23, "Main Steam Isolation Valve (MSIV) Leakage," U.S. Nuclear Regulatory Commission, July 16, 1982.

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C. Memorandum for W. Minners from L. Hulman, "Consequence Analyses for BWR Main Steam System Leakage Pathway Generic Issue Evaluation", December , 1982.