ORIGINAL

RETURN TO SECRETARIAT RECORDS

NUCLEAR REGULATORY COMMISSION

IN THE MATTER OF:

PUBLIC MEETING

SECY-78-164 - PLAN FOR RESEARCH TO IMPROVE THE SAFETY OF LIGHT-WATER NUCLEAR POWER PLANTS

Place - Washington, D. C.

Date - Monday, 3 April 1978 **Pages** 1-39

Telephone:
(202) 347-3700

ACE - FEDERAL REPORTERS, INC.

Official Reporters

444 North Capitol Street
Washington, D.C. 20001

NATIONWIDE COVERAGE - DAILY

DISCLAIMER

This is an unofficial transcript of a meeting of the United States Nuclear Regulatory Commission held on April 3, 1978 in the Commission's offices at 1717 H Street, N. W., Washington, D. C. The meeting was open to public attendance and observation. This transcript has not been reviewed, corrected, or edited, and it may contain inaccuracies.

The transcript is intended solely for general informational purposes. As provided by 10 CFR 9.103, it is not part of the formal or informal record of decision of the matters discussed. Expressions of opinion in this transcript do not necessarily reflect final determinations or beliefs. No pleading or other paper may be filed with the Commission in any proceeding as the result of or addressed to any statement or argument contained herein, except as the Commission may authorize.

CR 6938
CRAIG:fr
NR

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

PUBLIC MEETING

SECY-78-164 - PLAN FOR RESEARCH TO IMPROVE THE SAFETY OF LIGHT-WATER NUCLEAR POWER PLANTS

Room 1130
1717 H Street, N. W.
Washington, D.C.

Monday, 3 April 1978

The Commission met, pursuant to notice, at 1:45 p.m.

BEFORE:

DR. JOSEPH M. HENDRIE, Chairman

PETER A. BRADFORD, Commissioner

RICHARD T. KENNEDY, Commissioner

VICTOR GILINSKY, Commissioner

PRESENT:

SAMUEL CHILK, Secretary

H. SHAPAR, Executive Legal Director

J. KELLEY, Acting Legal Counsel

L. GOSSICK

CR 6938
CRAIG: fr
NR

S. HANAUER

S. LEVINE

K. PEDERSON

ALSO PRESENT:

E. CASE

1
CK /fml
CR6938

P R O C E E D I N G S

COMMISSIONER GILINSKY: Why don't you go ahead?

MR. GOSSICK: Fine.

We are hear to present the plan for research to improve the safety of LWRs.

MR. LEVINE: will present the paper.

MR. LEVINE: The paper is Section 78-164.

I have Steve Hanauer, who was a great help in sorting all this matter out and helping us get at the answer. The paper has attached to it the third draft of the report, which is NUREG-0338.

We would like Commission approval of the report prior to submitting it to Congress.

In addition to whatever changes the Commission may think are needed, we have some minor editorial changes in our own mind to make also. Submission of the subject plan is required by the Congress on 4-12, April 12, '78. It is required by our fiscal 1978 authorization act. This act required us to develop a long range plan for the development of new or improved safety systems for nuclear power plants. To prepare the plan we formed a research review group on approved reactor safety.

We held two meetings, one in January and one in February. At the first meeting we presented an outline of the report and discussed the approach to its preparation. At the second meeting the group reviewed the first draft of the report,

fm2

which, although not then complete, contained the same recomendations that are in the third report that is before you.

Could I have slide one, please?

(Slide.)

Slide one indicates the membership of the research review group. We had members of RES, Standards and Licensing.

(Slide.)

The second slide is a list of the consultants to the research group, and it includes a number of viewpoints. It includes utilities, reactor manufacturers, some private consultants and some independent viewpoints, particularly I call to your attention Mr. Breidenbaugh, Mr. Brockett, Dorfan was a member of the APS study group on reactor safety; so was Findleyson and Carl Kouts of our Union of Concerned Scientists, now a private consultant.

So we had a broad spectrum. We try to get as many viewpoints as we could. We had two memebers of DOE, Mr. Brechure and Mr. Kerseski of Department of Energy who were helpful in preparing the plan. We got many useful and objective comments from everyone involved.

All the discussion received from the consultants, as well as those of other people who we canvassed for ideas, are summarized in Appendix C to the report and the disposition of all their comments is indicated.

The NRC Staff also met with a ACRS Subcommittee

fm3

in February, and the full Committee in March. The full Committee reviewed the second draft of the report. The ACRS concurs in the recommended research projects and believes they should be undertaken even though their risk reduction potention is unknown. They believe these studies will serve to -- place the extent and suitability of proper safety improvements. The letter they to us is attached to the reports in Appendix A.

We have also included in the paper to the Commission the letters from all the consultants, the research reviewers, and their comments are available to you.

(Slide.)

Could I have slide three, please?

Slide three shows the way in which we collects suggestions, the sources from which they were selected. We gave particular weight to those from the ACRS, the NRC Staff and our consultants.

We also considered the other sources of suggestions for improved research, research on improved safety. These several hundred, 200 or so suggestions, were consolidated into 16 research topics that incorporated like kinds of things. They were evaluated against a set of criteria based on the breadth of technical support, the risk reduction potential, the generic applicability to reactors, a large number versus a small number of reactors, the timeliness in which they could be implemented and the cost of implementation.

fm4

As a result of the evaluation five research topics were selected, plus two general studies.

COMMISSIONER GILINSKY: You were presumably looking for things that weren't being examined now?

MR. LEVINE: No. It went beyond that.

If I could have the next slide, it will show that.

Well, if you wait just a minute I will get to that. The one after this.

(Slide.)

Of those 16 research topics, we selected the following five: Alternate containment concepts, alternate decay heat removal concepts, alternate ECC concepts, improved in-plant accident response and advanced seismic design.

For instance, of that list, we are already working, for instance, to some extent on alternate ECCS concepts.

What we are recommending here would be an expanded program in that area.

We are already working,for instance, on improved seismic modeling from a probabilistic viewpoint. This would expand that program and add other things to it such as seismic decoupling. So, there is a mixture of things. There are some things that are currently ongoing in our confirmatory program, and there are some things that are brand new.

(Slide.)

The next graph indicates those which were not selected.

fm5

In fact, the asterisk shows those where work is already going on in our current program. The others are new thoughts. All of these concepts are proposed to be pursued by making studies over the next year to investigate whether, by understanding them more deeply and doing some value impact analyses, one should pick any of these up and pursue them further.

So, none of these 16 topics has been deleted. It is only a question of emphasis.

(Slide.)

Now, we are going into looking at each of the topics recommended for research. The first one is alternate containment concepts. You can see the breadth of support was high. Risk reduction potential is high. Generic applicability spaces from high to low depending upon which concept you are talking about. Some concepts would be applicable to only new reactors. Other concepts can be backfit so that they are more generically applicable. Some would apply only to one kind of reactor and not another kind.

The next slide --

COMMISSIONER KENNEDY: The cost, when you say medium to high, that is the $10- to $50 million a plant range?

MR. LEVINE: No. 10 to 50 is the medium and over 50 is high.

COMMISSIONER KENNEDY: Then, I don't know, what is it? It is somewhere over 10?

MR. LEVINE: Under 10 is small.

COMMISSIONER KENNEDY: When you say it is medium to high --

MR. LEVINE: That means some would be high cost, some of the concepts would be medium.

COMMISSIONER KENNEDY: I understand, thank you.

MR. LEVINE: The two projects we proposed are the vented containment concept, taking two years and about $600,000. This would define conceptual system configurations and filters to determine the feasibility, sizing and cost. What we have in mind is that if you had an accident in which the core were to melt, you would surely, in many accident sequences, rupture the containment because of the pressure genterated within it. If you could vent that pressure -- and then you would get an uncontrolled release of lare amounts of radioactivity. If you were to vent the containment, you would prevent that pressure, high pressure from occurring, but you would be releasing the radioactivity through the vent.

But if you filter it, you can then filter out much of the radioactivity. It turns out if you look at WASH-1400, the bulk of the risk comes from accident sequences where you rupture the containment above ground. If you prevent that from happening, converting an uncontrolled release to a controlled release, you can really reduce the risk significantly. So, we would look at serious configurations of doing that and

fm7

perform value impact analyses on the various options and report that out.

We then look at other concepts, some of which have been studies in a preliminary way and were reported before to the Commission, results of the Sandia study report.

Looking at larger volume, higher pressure capability, et cetera. Improved capability to deal with fuel-water interactions and hydrogen burning.

And on undergrounding, we though we would wait to evalute the results of the California study being done by Aerospace before we decide where to go from here. So, there is money put in there to evaluate that study and decide whether we want to go further than that or not as part of this program.

The next project is alternate decay heat removal concepts.

(Slide.)

Again showing a high breadth of support, high risk reduction potential, and again, medium to high cost, depending on which option you pick.

Also showing some uncertainty in our ability to estimate costs. To estimate applicability. Cost is medium.

end 1

(Slide.)

The first project we would consider, an add-on decay heat removal system over and above those already installed in reactors. The purpose being to improve the overall reliability of decay heat removal. A two-year task, taking $600,000. I note energy only because we would want an individual design done that we could then assess.

We have talked to DOE and DOE is agreeable to performing a detailed design of an add-on system to meet requirements that we would specify. Then, we would evaluate the reliability achievable on such a system.

We would consider things such as independence of equipment, redundancy, separation or bunkering, trying to improve operational reliability. Develop performance and safety design for such a system, if implemented.

We would request DOE to develop the design, as I pointed out, and perform a quantitative alloy impact analysis. There have been other suggestions in this area that have been suggested to improve the capability to remove decay heat. One is to not shut the reactor down. That is, to make it operational after a turbine trip by bypassing steam flow to the condensor, and leave the reactor in an operating condition.

Other suggestions are to improve backup feed water system, to look at passive decay heat removal systems and

diverse heat sinks such as deep wells. All those would be looked at to see what options for improvement might be taken.

(Slide.)

The next topic is alternate ECC concepts. This has a high breadth of support. It was assessed as being of medium risk reduction potential because the core melts, accidents due to failure of emergency core cooling system, do not dominate the risks by a large factor.

There are still other accident sequences where you would get core melts and you would not change the overall probability of core melts very much by improving ECCS systems. Generic applicability is medium. That is because we don't know to what extent we can backfit. Cost of implementation could be low to medium.

(Slide.)

COMMISSIONER GILINSKY: Let me ask you, do you have some notions as to what some of these systems would look like?

MR. LEVINE: Yes, that is right here, in fact.

COMMISSIONER GILINSKY: I see.

MR. LEVINE: We are estimating several aspects of this task. We have to modify our computer codes to be able to handle alternate injection points and other kinds of things ad indicated in the second list. We perform a variety of system performance calculations with modified codes which

would be quite expensive, and look, include such things as alternate locations of fluid injection. Devices to divert or restrict fluide flow.

For instance, you could put check valves in so that all your cold-leg breaks became hot-leg breaks, which are much easier to handle. One would have to look at that; increased volume or pressure of available fluid, to get it in earlier. And other configurations that people might suggest.

We would accelerate the conversion of semiscale and current planned semiscale UHI tests so we can get those over with and get on to our alternate ECCS program. We always plan on semiscale. That would take a year and require $2 million. Again, we would perform preliminary valuey impact evaluations to pick those that would be or look most desirable to do further work on.

(Slide.)

Improved in-plant accident response. This is of great interest because we are concerned about two things about operators. One, when an accident happens, we are concerned about their ability to diagnose correctly what is happening so they can take the correct action.

We also know that they may have, in WASH 1400, operator errors in testing and maintainence, and elsewhere make significant contributions to accident risks. So it was felt that this should be studied. Had high breadth of

support, risk reduction potential, high to medium. Applicability is high, and cost would be low.

(Slide.)

This slide shows some details. A study of current research on improving operator information assimilation under reactor accident conditions. This would be an analysis of what is available to the reactor operator, what is he supposed to do with that information in the event of an accident, and what is the likelihood that he will be able to do the right -- diagnose it correctly.

That would lead into the next study which is to look at automatic monitoring and diagnostic systems, for instance, using a computer to help the operator diagnose and decide on proper courses of action.

COMMISSIONER GILINSKY: What about the qualification of operators?

MR. LEVINE: That is also part of this. That is an abbreviated slide. We would look at improved use of simulators for operator training. Try to see what is involved in getting a higher quality operator in the plant. We would be looking at operating an emergency procedures for accident response.

Again in WASH 1400, we found that some of these procedures are not very well written. We found, however, that the plant operators knew about that and had, in fact,

adjusted this in their own mind to correct courses of action.

We looked at the man-machine interface, the information presentation pattern recognition, control of design, et cetera. We would also look at a very difficult task called human initiation of accidents by erroneous action as opposed to deliberate actions.

This is very difficult to do, but we would start trying to develop techniques for looking at that, and seeing if such things would contribute to accident risks and what might be done about them.

(Slide.)

Advanced seismic design has medium breadth of support. Risk reduction potential is high to medium. Again, depending upon potential success of any of these things I will discuss in a few minutes.

The generic applicability would generally be low because it would probably apply only to new plants. It may, in fact, apply only to new plants in certain areas. Cost of implementation would be medium to high.

(Slide.)

We were to review the candidate concepts that were proposed by a number of people. These include increased energy absorption capability, component isolation, foundation isolation, and flotation in the fluid-filled basin. The last

three, isolation and basin concepts, really can be determined to fit the category of attenuating the impace of the seismic forces on the plant by floating it in a pond. Decoupling is the answer.

The first item, increased energy absorption capability, may very well be a high payoff area. There are standard -- there are techniques that have been used in other applications where, instead of designing the plant to meet total allowable stresses, one, in fact, allows the plant to deform slightly for the very large earthquakes.

The small amount of deformation, far before the point of failure, would allow you to absorb significant amounts of energy. This is not now permitted in design, and exploration of this looks like a potentially high payoff area. In fact, if that were to pan out, you would find existing plants could probably take significantly more seismic impact than they are currently stated to by current design procedures.

CHAIRMAN HENDRIE: That is not a matter of putting equipment into plants, but rather improving the --

MR. LEVINE: Analytical capability.

CHAIRMAN HENDRIE: Analytical capability?

MR. LEVINE: Yes.

MR. HANAUER: And verifying it.

MR. LEVINE: You would have to do some tests to

sjc

verify it.

CR6938
CK3
kdsl

COMMISSIONER BRADFORD: What would it mean to say existing plant could take more?

MR. LEVINE: It is a matter of definition only. You are allowed to take a certain stress for a given seismic load. If you get a slightly higher seismic load, it doesn't mean the plant fails. It is now considered to be unacceptable, if you have a seismic load higher, that would give you stresses higher than the code allows.

On the other hand, if you change the definition to say instead of keeping the response of the components and structures within elastic limits so that they would undergo no permanent deformation, if you allowed them to deform slightly, you could tolerate much higher earthquakes without having accidents.

COMMISSIONER BRADFORD: As to plants in place, that wouldn't make any practical difference in the way you operate them in the future, would it? Or would it?

MR. LEVINE: It might happen that in a reassessment of the seismic loading capability by ourselves, the USGS would say that plant should really have been designed for an earthquake of .3g instead of .25g. Then all you would have to do is reanalyze the plant and say it still meets .3g, even though it was designed for .25.

COMMISSIONER BRADFORD: So in some situations where you might otherwise have to shut a plant down, you

kds2

would keep it open?

MR. LEVINE: That is a sort of simplistic way of looking at it. There is much more involved in it actually. You could -- you really have to think about earthquakes as being a continuous spectrum of magnitudes in which we select some number as a design basis.

One should really evaluate the plants against this continuous spectrum as a function of probability, and see if they can survive that on a risk assessment basis.

We are doing modeling in our current confirmatory program in that direction. This would be a very useful concept.

COMMISSIONER GILINSKY: You are saying if they include analysis of deformation, you may discover you can live with earthquakes that are bigger than you thought you could handle?

MR. LEVINE: Exactly. That is precisely right. In fact, this whole concept was proposed by Newmark when we first started into the seismic area. For one reason or another, it was never fully implemented.

I am not sure what all the reasons were. I guess people didn't feel they wanted to get involved in the plastic design area. We have learned a lot more about that now. It becomes technically feasible to do that.

COMMISSIONER GILINSKY: You are saying if you get

comfortable with this area you may in fact allow plants be designed to take this into account?

MR. LEVINE: Yes. For instance, in many areas you say you will not get failure until there is 20 percent strain. You might allow one percent strain. One percent strain in fact absorbs a tremendous amount of energy. You could tolerate higher increase without having accidents.

COMMISSIONER GILINSKY: What happens after it is gone plastic, though? You may have to replace a lot of equipment.

MR. LEVINE: Yes, but that is a problem, except the probability of earthquakes is low enough that one might be able to tolerate that.

COMMISSIONER GILINSKY: All right.

MR. LEVINE: Next slide.

(Slide.)

This is a task to improve methodology for evaluating research topics. We keep talking cavalierly about performing value impact analyses that will try to give a quantitative assessment of risk reduction potential, costs and applicability, and the like.

We sort of have done it judgmentally and qualitatively in preparing this report; but you need a much finer tool than we have so far at hand to distinguish between a lot of alternates.

kds4

So we wanted to undertake what I regard to be a very important task, to develop a good way of doing value impact analyses. That is what this task is all about.

I foresee it going on for several years, with the first year starting at $1/2 million. We will probably have to do it again and again, maybe two or three times, because it wouldn't be easy; and I am sure a lot of people will pick at it -- sort of like WASH-1400, where a lot of people picked at it. But if we are going to use it, we have to resolve it.

COMMISSIONER GILINSKY: You are talking about a study which is almost as large as WASH-1400?

MR. LEVINE: No, no. This is much smaller. It really is. It will be sort of based on a difference in risk concept as opposed to an absolute determination of risk. That is, we will, say, use WASH-1400 as a definition of what exists now, and look at the differences from that.

Now that is too simple a statement. We really look at the engineering insights we derive from WASH-1400, which we think are much more precise than the overall answer in WASH-1400. Then we look at differences in these engineering insights and quantify them.

I think we can do that with a precision that will be acceptable to a great many people; and the research reviewers endorsed this, so did ACRS.

kds5

MR. PEDERSON: How does this work here relate? I know the ACRS in their letter said they thought it would be very difficult to get this down to a really useful level without dealing with the basic question of how safe is safe enough.

MR. LEVINE: No, they didn't say. It seems evident that at some point --

MR. PEDERSON: It says it seems evident it will be extremely difficult to provide a suitable methodology without at some point addressing the question of how safe is safe enough.

MR. LEVINE: Yes. I think that means the following: Let's say we go through this round of topics. We do the five research topics we picked, and we decide to implement those; and as a result of looking at the other sixteen, we picked five or ten more. Where do you stop? is their question.

Their question is not that you can't develop a value impact analysis on a relative basis. It is how do you determine where to stop? In other words, how safe is safe enough? In other words, you can go on forever and find more improvements.

MR. PEDERSON: I agree. What I am asking, is this a step in helping you --

MR. LEVINE: No. No. We have as part of our

kds6

confirmatory program a program to start research in the area of how safe is safe enough. We are just beginning to do that.

(Slide.)

The next slide just lists the other 16 topics, and says we are going to study those and find out -- not the other 16, the other 11; 16 minus the 5.

We are going to look at all of these and decide whether there is anything further worth doing --

COMMISSIONER GILINSKY: These are the ones you rejected?

MR. LEVINE: Yes. We are going to look at these 11 in some detail. With a finer value impact tool available, we may pick up some of those.

(Slide.)

COMMISSIONER GILINSKY: They could come out as well as those you accepted.

MR. LEVINE: In what sense? The funding?

COMMISSIONER GILINSKY: Funding.

MR. LEVINE: No, the funding is less. That is for 11, not one at a time.

(Slide.)

The next viewgraph shows you overall funding, as a matter of fact. It shows you the five we selected, A through E, and the time scale. Then it shows the improved methodology and scoping studies, adding to a total of

kds7

$13.4 million. We will need additional staff.

COMMISSIONER GILINSKY: Let me ask: you seem to think the alternate containment concepts are promising.

MR. LEVINE: I would say in my mind this is the most promising of all, yes.

COMMISSIONER GILINSKY: Now the alternate ECCS concepts --

MR. LEVINE: Are less promising in my book.

COMMISSIONER GILINSKY: But you get almost four times as much money.

MR. LEVINE: Let me talk about that a little bit.

COMMISSIONER GILINSKY: Certain thresholds that you have to go over. Unfortunately, ECCS has a high threshold.

MR. LEVINE: That's correct; but it is also more than that. People really want us to develop some systems where the analysis will be much simpler and less open to question; that is, the complexity of the physical processes will become simpler and more -- the analysis will be more believable. That is what we are going to try to do here, mostly, and try to look at injecting the lower plenum and other places to see if you can avoid things like bypass and the like; That is what the principal effort will be devoted to here.

MR. HANAUER: Here's another point: Several

hundred million dollars have already been spent in ECCS research; and to make a significant improvement in that is going to take a different order of effort than on some of these others.

MR. LEVINE: Next slide.

(Slide.)

These are the recommendations in the paper. We would like your approval to send the plan to Congress. We have proposed, if you wish, that perhaps $1 million could be reprogrammed in '78 to get an earlier start on this, and that you authorize the Comptroller to seek a Fiscal '79 budget amendment for the proposed program.

There is a letter attached to the paper for reporting forward the report to Congress. We would like your approval.

e-3

COMMISSIONER GILINSKY: Could you go back to the earlier slide?

MR. LEVINE: Yes. Go back one, please. 13.

(Slide.)

COMMISSIONER GILINSKY: In some sense you are saying that it is worth spending $4 million on ECC rather than, say, spending more money at this point on containment concepts. Or do you feel compelled to have some number of alternatives here?

MR. LEVINE: Let me put it this way. There is a long history of suggestions for work on improved safety research, for improved safety and research, that come from the ACRS from the APS Study Group on Light Water Safety and from other sources, from the NRC Staff and from our consultants.

If you examine that long list, these first five emerge as things that look interesting enough to do and have some risk reduction potential.

I guess Item E looks more like a perception -- not E. C looks more like a preception in risk reduction than real, but that may be worth it, too.

Perhaps we can convince people that we can design a system whose functional capabilities by analysis are clearly demonstrable, we might be further ahead than we would otherwise be.

Again, as I said before, I think Item A is my highest priority item by a significant margin over and above

any of the others in terms of actual risk reduction achievable.

CHAIRMAN HENDRIE: You have somewhat the same situation with regard to E. A fair chunk of dollars which is required as a sort of threshold to make it, make a dent on the problem.

Now, in fact, in E, what you are working on in terms of the analysis methods, won't make any difference in the real situation in real plants that exist. They have a certain seismic resistance which is there now. No matter how you analyze it, it is going to be the same.

COMMISSIONER GILINSKY: But you might feel better about it.

CHAIRMAN HENDRIE: But if you are under-analyzing, as you say, you may feel badly about a situation in which you have every right to feel good if you were capable of a better analysis.

But it is a complex area and would take a lot of work to make a dent on it. And research's guess is that that will run $3.5-odd million to make a dent, and even -- they think it reasonable to propose it, even though you can make a bigger dent in other areas with less money.

COMMISSIONER BRADFORD: So what is the interrelationship between these projects and the listening process? That is, as you do work on alternate containment concepts, how does that tie into ongoing plant design and

licensing?

MR. LEVINE: That is address in the report and I should have mentioned it. This is the question of how do you implement the results of research. It depends on what you find.

COMMISSIONER BRADFORD: Okay. Some kinds of research, I can grasp that more easily than others.

MR. LEVINE: Let's take Item A, and our value impact analysis turns out to be favorable, and there is significant risk reduction potential at not too much cost, it is a generically applicable backfitable item.

I would think, then, that we would send this over to the licensing and standards people, and they would examine the matter as a matter of implementation.

Should it be implemented or not?

There would have to be regulations made. Safety guides, perhaps. There might have to be a hearing, a rulemaking hearing, et cetera. Then a decision would be made whether to implement it or not.

The implementation would be a set of regulatory requirements and/or guides which the industry would then have to meet. And the industry would propose designs which would then be reviewed in the regulatory process to see that they meet the regulatory requirements.

COMMISSIONER BRADFORD: Those designs would be what,

they would be more complete forms --

MR. LEVINE: Detailed physical designs to meet the requirements, regulatory requirements that would be stated quite much more generally than you do in design.

COMMISSIONER BRADFORD: Wouldn't the requirements themselves necessarily flow from some fairly good idea --

MR. LEVINE: From a conceptual design, but not a detailed design, yes. One has to think about two subjects here. One is how reliable is the system, and the other is will a system of the following general nature perform the function you want it to perform.

The latter question can be settled by a conceptual design with enough demonstration and data to show that if it operates it will in fact perform the function you want with a high confidence level.

On the other hand, if you look at the alternate decay heat removal where you are really interested in improving the reliability of deay heat removal, there you need a detailed system design in order to have reliability.

That is the difference between the two.

COMMISSIONER BRADFORD: So on the second one, in fact you would actually have to do the detailed design?

MR. LEVINE: We would ask someone else to do the design because we would not want to review our own design. Then we would evaluate that design and that would be then a

demonstration of feasibility of what is achievable by this concept.

Then we could again write performance requirements which could then be met by the industry in whatever way they cared to meet them.

So difference is one between operability and functional capability.

MR. HANAUER: Consider thevented containment, for example. At the moment we have a concept that you can say in a few paragraphs. The study would put some flesh and bones on that and would decide that certain -- the vented containment would do certain things for you. One would then say if this were all accepted, we want new plants, let's suppose, to have containments that will do this, this, and this. That will, upon the occurrence of an overpressure, not break, but will vent the gases through filters. And an appropriate design basis is so and so much gas with so and so much radioactivity. And we would have some kind of conceptual study that would show that was the right sort of thing.

Then somebody would have to make a design, so much concrete, so much steel, so big a round, such and such pipes, such and such valves, such and such filters. And then come in and they would have an analysis that, indeed, this collection of expensive hardware would handle so much gas with so much radioactivity in it and so on.

COMMISSIONER BRADFORD: How long of a process are we talking about from the time that you conclude that the concept is workable, does it then have to go out for comment before it can become a requirement?

MR. LEVINE: Several years, one to three years before it could be implemented as a regulatory requirement and some years for the industry to put it in.

If it were applicable only to new plants, it would then have a new plant delay time on top of it. If it is back-fittable, it would be still several years to get it in a plant.

COMMISSIONER BRADFORD: In pursuing a project like that, are you saying that there is doubt that existing containments would work under pressures that they are likely to encounter?

MR. LEVINE: The current --

COMMISSIONER BRADFORD: That they might encounter in unlikely circumstances.

MR. LEVINE: Current containments meet current regulatory requirements. Current requirements do not consider accidents in which the core melts. If the core were to melt, all of the containments now proposed for reactors would fail in one way or another. The worst mode of failure in terms of, well one the worst modes of failure, in terms of consequences to the public is this overpressure rupture.

So, clearly, if one can prevent that overpressure rupture, or reduce its likelihood is what you are talking about, and prevent the uncontrolled release of radioactivity, you would be further ahead.

COMMISSIONER GILINSKY: And you feel $1.1 million does justice to that category?

MR. LEVINE: I think so, yes. There's been significant work done in this area already. We would have to polish it up.

CHAIRMAN HENDRIE: Let me ask a related but slightly different question. Never mind whether $1.1 is okay for item A,

ej

and 3.9 is right for item C. Is 13.4 about right for the group, recognizing that we might, down the line, very well might want to shovel some funds back and forth. Maybe C would turn out ultimately to be 2.7 and A 1.6.

MR. LEVINE: The estimates is quite inexact. I would say it is plus or minus $3 million but it is about right for the group.

COMMISSIONER KENNEDY: I notice in the report on page 1-5, it talks about 3 types of research. Research for improved safety, confirmatory research and developmental research. I just want to be sure that we understand the limits of our statute. I would like to have it confirmed, in fact, the original distinction of confirmatory research has been extended to permit this kind of research.

MR. LEVINE: That is what I believe.

COMMISSIONER KENNEDY: I understand that. What I am trying to do is get a clear and unquestioned confirmation of this. I guess we will get some when we submit it to the Congress for their approval. But, on the other hand, I think --

CHAIRMAN HENDRIE: That's a good test.

COMMISSIONER KENNEDY: That's the ultimate test. But I think we have an obligation to consider the statute ourselves before we submit something to the Congress. And I guess I would like to hear from our respective legal experts.

MR. KELLEY: On the face of it, we saw no legal objection to this. If you want us to take another look at it, we will be happy to do that and get back to you quickly.

COMMISSIONER KENNEDY: What does no legal objection mean in this case?

MR. KELLEY: It means it looks okay to us.

COMMISSIONER KENNEDY: Does it look okay to you?

MR. SHAPAR: It looks okay to me. I think it's well within our statutory authority. I would be happy to take another look --

COMMISSIONER KENNEDY: No, I am -- I just want to be sure that, within the statutory authority as it was originally conveyed, that is, when the original concepts of confirmatory research were enunciated, or only because of the language of the authorization act.

MR. SHAPAR: As you may recall, the language of the original act on this is amorphous. You won't find the term confirmatory research in that statute as such. You will find it developed in the legislative history where the precise dimensions of the word was a very difficult task to determine.

Looking at both -- that we have full legislative authority now, I have very little question.

COMMISSIONER KENNEDY: Then there is one other question. On the assumption that it is perfectly reasonable certainly from a legal point of view to go forward with this,

what assurances can we give the Congress, what assurances indeed can we have for ourselves at this point that we are not in some sense duplicating work that is being done by DOE? Or, indeed, doing work which properly ought to be done by DOE within the limits of its own statute?

MR. LEVINE: Well, there is no question about duplication. We have met extensively with DOE. They are not planning any work like this. About their statute, I guess I am the wrong person to interpret that.

COMMISSIONER KENNEDY: No, my question is, is it something that ought to be done by DOE, are we doing it simply because they didn't? Or is it something that properly ought to be done by us, really, and wasn't conceived of as something DOE would in the formal course of business be doing?

COMMISSIONER GILINSKY: What if one of these things turns out to be promising, some alternate ECCS concept and you think it ought to be tested out on some substantial scale. What would end up doing that, have we thought about that?

MR. LEVINE: Yes. I have. First, let me answer the first part of the question. I think the kind of work we have proposed here is more properly done by us as we have suggested because we are the ones who can best determine the risk reduction potential as well as the overall value. In regard to the latter, I think there are 2 courses available; one you suggest, ECCS, for instance, one could, depending upon what

one comes up with, perhaps do it on one of our existing facilities by modification. If one wants some more substantial demonstration on a real plant, it would be very hard to get even if you installed the system because you would not want to undergo a LOCA in a real plant.

So, I think more likely, you would try to do it on one of our facilities like semiscale, or perhaps even LOFT at some later time. LOFT has so many capabilities for alternate ECCS concepts to be applied to it.

MR. SHAPAR: There is a thread of legislative history here, that Congress did not intend for us to duplicate major ERDA facilities, whatever that may be.

MR. LEVINE: I think that meant not to build our own laboratories. That's been the way we have --

COMMISSIONER BRADFORD: You have talked a little about priorities among the items there. How does this program interrelate with the ongoing reactor safety research and are these dollars competitive also with whatever research may be entailed in the generic issues resolutions?

MR. LEVINE: I don't see any overlap with generic issues. As I pointed out before,. some of these concepts are partly being done already in our existing program. The most obvious one is alternate ECCS where we have already done some work and are defining some more.

This is Item C. This is an attempt to expand that and look at it in a deeper way more quickly.

COMMISSIONER BRADFORD: I guess I haven't made my question very clear. I am not talking so much about overlap. When you look at that particular $14.9 million and decide that you are going to get more of a payoff on that money in those projects, are you saying that relative to all the other areas in which we might be spending research money?

MR. LEVINE; I am not sure I understand the question. Let me take two examples. This is about the only way I can think about it. One of the research topics that we have not suggested for pursuit is called non-destructive examination of the steel in the primary coolant system. There we already have a very large program going, because it is needed to confirm the adequacy of the construction of plants so that you are sure the plant is well built. At the same time, if you ar sure the plant is better built than you otherwise were, without this, you have a safer plant.

So that is a kind of a program that is half in conformatory and half in approved. We just left it in confirmatory where it belongs, or where we have it.

These things are mostly other things that we would not be doing. The bulk of our program, however, relates to confirming the adequacy of existing designs. The bulk of the money we are spending in emergency core cooling, for instance, and code development, relates to confirming the adequacy of existing designs of emergfency core cooling systems.

They will not give you safe reactors. It is a confirmatory program. It is reducing the uncertainties and the understanding of the safety of excisting reactors, that is what the bulk of our program is.

MR. GOSSICK: Let me ask if Commmissioner Bradford's question is like this: assume next year you have got the program started, and you have got it funded. The following year you are, you know, told to keep an absolutely tight budget, and you are faced with either not funding this or knocking out some of your current program.

How do you decide which you do, what is the priority between the two. Is that kind of what you are --

COMMISSIONER BRADFORD: Let me put it another way. Supposing it goes before the Congress and some Congressman looks at Joe and says, "You have got, what is it, a hundred and however many unresolved generic issues, you have resolved

five of them this year, at that rate you will resolve the last one a long time from now. At that rate why aren't you spending that $14 million in that area?"

COMMISSIONER GILINSKY: Let Joe answer it.

(Laughter.)

MR. LEVINE: Well, you know, we already have a posture that the reactors we are licensing are safe enough with those generic issues outstanding, otherwise we wouldn't have licensed the reactors.

MR. CASE: For some length of time, not forever.

MR. GOSSICK: This does raise the more general questions about what is the priority of the program vis-a-vis some of the other things we are trying to do and for which we are having to go back for funds for. I think that is a fair question the Commission has to focus on, decide whether or not we go ahead and try to get this thing started at the expense of something else, strictly on no new money or no new program.

COMMISSIONER KENNEDY: I guess that is the question I would like to focus on. In particular, I would like to focu on the manpower requirements. It seems to me if you put $1 million, it is proposed that we might think now in terms of reprogramming to the amount of $100 for the rest of the year, if we do, we are going to have to put some kind of manpower on it to make that useful.

My question is, should we do this before we get a clear indication from the Congress that, in fact, they are going to provide additional funds? If we do, then we have already established a higher priority for this program than for some other programs which will have to suffer the loss of this manpower.

MR. LEVINE: I agree with you completely. In fact, that was my perception, tht we would not start anything this year, unless there was a reprogramminmg approved for '79.

COMMISSIONER GILINSKY: Well, we will have to take a look at it very carefully. So we have got your proposal. We will take a look at it.

MR. LEVINE: I have only one reminder, sir. It has to get down to the Congress by the 12th of April.

COMMISSIONER GILINSKY: Duly noted. Thank you.

CHAIRMAN HENDRIE: I might say I thought it was a pretty decent report. I have been avoiding Commission papers for some weeks now. I found that a very pleasant period. This was the first one that I dove back into, in spite of its volume, and I found it an excellent paper.

MR. LEVINE: Thank you.

CHAIRMAN HENDRIE: You are to be commended on it, and the group that worked on it is to be commended in it.

COMMISSIONER GILINSKY: Yes, I think that's right. Thank you.

Why don't we take a three-minute break. Then we will start up again.

(Whereupon, at 2:40 p.m., the hearing was adjourned.)