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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

PUBLIC MEETING

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

SUBCOMMITTEE ON SAFEGUARDS AND SECURITY

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Nuclear Regulatory Commission
Room 1167
1717 H Street, N.W.
Washington, D.C.

Thursday, June 26, 1980

The Subcommittee met, pursuant to notice, at 8:35 a.m.

BEFORE:

MR. J. CARSON MARK, Presiding

DR. CHESTER P. SIESS

DR. STEPHEN LAWROSKI

DR. DADE W. MOELLER

MR. MICHAEL BENDER

ALSO PRESENT:

MR. RICHARD K. MAJOR

PROCEEDINGS

CHAIRMAN MARK: The meeting will come to order.

This is an open meeting of the Advisory Committee on Reactor Safeguards, the Subcommittee for Safeguards and Security.

I am Carson Mark, the Subcommittee chairman. Other ACRS members present today are Dade Moeller, Steve Lawroski, Chester Siess, and possibly Mike Bender will manage to come in a little late.

The purpose of the meeting will be to review the FY 82 budget of the Safeguards Fuel Cycle and Environmental Research Division in the area of safeguards in preparation for the ACRS annual reports to the Commission and to Congress.

In addition, the Subcommittee will be briefed on recently completed studies relating to reactor plant design to reduce vulnerability to sabotage, and code development related to spent fuel storage pool consequence estimates from sabotage.

This meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act and the Sunshine Act. It may be necessary for the Subcommittee to hold one or more closed sessions for the purpose of exploring matters involving proprietary information and possibly some matters involving undisclosed budgets.

Mr. Richard Major on my right is the designated Federal employee for this meeting.

The rules for participation have been announced as part of the notice of this meeting previously published in the Federal Register on June 11, 1980. A transcript of the meeting is being kept, and it is requested that each speaker first identify himself or herself and speak with sufficient clarity and volume that he or she can be readily heard.

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

Do any members of the ACRS who are present have comments to make?

(There was no response.)

You have the agenda. It may be useful to make some shift in that agenda. The discussion of the nuclear fuel cycle adversary consequences will probably require to be closed, which suggests that it perhaps be taken towards the end of the morning session where it could be put together with those comments on the budget, which would best be in closed session, that is, the budget numbers, not the research plans. That would amount to shuffling of one of the items.

In addition, Dr. Heinrich from Savannah River, I believe, will not be here; and Frank Dean from Sandia, who

has been involved in the study, while perhaps not as a special topic, will at least introduce it into the discussion of the Sandia work.

That is all that I have in mind in connection with the agenda, with the exception that we have Carl Michaelson, a former consultant to the Subcommittee here, and although it is not tagged on the program, we hope to discuss at least with the research people or NMSS people the questions of their current view of the problem that Michaelson raised with this subcommittee at its last meeting, plans they may have for addressing that view.

That may perhaps best fit in the discussion connected with the power plant design concepts for sabotage protection. What I just mentioned might perhaps not be improper in an open meeting. If we got to some detail of that, it, too, might have to come back with the part for which we would have to close the meeting. Anything, I guess, which relates to a specific way of doing some damage would best be handled that way.

Unless some of the other subcommittee members have inquiries, we will now proceed with the meeting. I call upon Mr. Arsenault of SAFER to open the meeting, outlining the RES or the NRC staff's plan.

MR. BASSETT: I am Sam Bassett, his deputy, and Frank has asked me to operate in this area of the meeting.

We have with us Jay Durst, who is our A.D. for safeguards and fuel cycle safety, and Jerry Tomlin, who is the branch chief of our safeguards activity.

Jerry will conduct the normal course of the meeting and will introduce the various speakers. He is scheduled to follow Messrs. Varnado and Ericson, and I think we should just go right ahead with that meeting unless there is something that you would like to say.

DR. LAWROSKI: Could I ask a question? Some time ago, I think shortly after we heard from Mr. Michaelson about some of the scenarios, the NMSS people were going to address the question of the consequences of some of those scenarios to be analyzed. Did that ever get done?

SPEAKER: There will be a representative from NMSS here later in the day.

DR. LAWROSKI: All right, I will wait.

MR. BASSETT: Why don't you go ahead.

MR. TOMLIN: I'm Jerry Tomlin, the Branch Chief of the Safeguards Research Branch. I would like to introduce Dave Ericson.

MR. ERICSON: I'm Dave Ericson from Sandia Labs. We would like to take a few moments and highlight some of the high points of this study. I think the Committee was provided copies of it fairly recently. We will comment on some of the key points and then attempt to address any

questions you may have.

The study was a design to look at potential value of plant design and damage control measures for enhancing protection. I should underline also that this study was intended to look at future plants. It was not a retrofit design, but rather what about new design, and then in turn to look at the impact of such measures on plant costs.

The background, of course, is that Sandia has been involved with the reactor safeguard and sabotage question since the early part of the seventies. The Committee itself had raised some questions in that time frame. Subsequent to the original Sandia studies, an industry workshop was convened in which a number of people from industry were cleared and invited to comment on those original Sandia studies.

Out of that workshop came recommendations for additional research, and then in mid calendar 1977, the Office of Reactor Regulations issued a user request to ask that this question be examined.

In looking at the question of sabotage resistance and, indeed, resistance to all problems, a number of design objectives were suggested. We have entitled this "Design Objectives for Risk Reduction," but I will stress and make clear that we are only looking at this from the sabotage or the malevolent act viewpoint, not all aspects of risk

reduction.

A number of ways one might do this would be to simply reduce the number of ways in which the release could be caused. You might do this by simply hardening the equipment or making it less vulnerable into individual pieces, or we might reduce the number of paths, the number of points of entry that an adversary might have.

One might increase the number of individual actions required to complete a sabotage sequence, physically separate equipment, make it more remotely located, increase the number of redundant functions, add to the number of things that would have to be done. Of course, one might try to reduce the probability of a success. Again, this could be done by reducing the vulnerability of a particular piece of equipment or making it more difficult to get at that equipment. Both of these would work in that direction.

Finally, one might reduce the consequences. Given that a sabotage sequence had been completed, we might look at the ways that we could reduce the consequences of such success. This would involve what we have chosen to call damage control, or it could involve accident mitigations of other types.

Now, having done this, of course, then the question is, well, what are your evaluation criteria? Those are the kinds of things you are looking at: what are the

criteria? The value measure then may be sort of abstracted in this fashion. Certainly one value would be if you have reduced the number of Type 1 vital areas.

That is, if you have reduced the number of areas from which a release could be caused, you have gained something. If you have reduced or eliminated targets which were formerely unprotectable in some sense, that would be of value. Certainly increasing the difficulty of movement for an adversary would meet several of those design objectives. Increasing the probability of sequence interruption or increasing the likelihood that you could neutralize an attacker would be of help.

Let me comment here that in our evaluation, we did not look at the question of neutralization. In apply some models that are available, we did not apply any engagement between guard forces or law enforcement agencies and the adversary. We stopped short of that point. And certainly if the design can give you some control of the insider, that would be helpful.

Obviously the impacts are straightforward in some sense. Capital costs and operating costs are a very direct measure of the impact of any system. The effect upon safety, or security requirements interacting with or conflicting with safety requirements. And then finally, what is the effect on operations, either the maintainability

of the equipment, the ease of access to it for maintenance, perhaps the operator attitude, the performance of those people: is it affected by the security you impose?

Before I talk about the study itself, I would like to mention the fact that, recognizing that we needed all the expertise we could bring to bear, we have established what we have chosen to call a Design Study Technical Support Group. We have contacted the vendors, utilities and architect-engineers and solicited their involvement, solicited not on a volunteer basis but we actually put several groups under contract.

The goal was to have these people assist us in reviewing and evaluating the design options and the measures that were developed during the program. They were not under contract to develop these but rather to assist us in reviewing and evaluating.

We also were using them as a way of getting additional data and technical analysis in some instances, and certainly from the utility viewpoint, to give us some advice and some guidance on potential operational impacts.

The participants included all four vendors: Combustion Engineering, Westinghouse, B&W and General Electric; two architect-engineers, a gentleman from Bechtel and one from Sargent & Lundy, both experienced people; and then the four utilities.

From the utilities, from Duke we had a member of the engineering staff; from Commonwealth and Northern States we had two plant superintendents. I might add we must have had good people because since the study began both of these gentlemen have been promoted to corporate headquarters. We also had a security man from Power Authority, State of New York.

CHAIRMAN MARK: Excuse me. Promoted so that they can't help you any more?

MR. ERICSON: No, sir. As a matter of fact, they both have been so very helpful, and indeed, we have had several meetings with this group, one just last week, and they were still participating. So we haven't lost them even though they have assumed additional responsibility.

The two firms at the top are listed a little bit separately. International Energy Associates is a consulting firm here in Washington who assisted us as a subcontractor in laying some of these things out. Nuclear Projects, Inc. is the executive agent between the utility combine and Westinghouse and Bechtel in the construction of the SNUPPS plant.

Their involvement and the reason for their involvement will be immediately obvious when we talk about the plant we chose as a baseline.

Since we were interested in future design, we

thought it was important to start with some current state of the art of design. Looking around, there were a number of potential systems that one might have chosen, the concepts being advanced. We selected SNUPPS for a variety of reasons. It was under construction. There were to be five to six identical units, and not the least of all, yours truly happened to know a few of the troops out there, so that always opens the door a little easier.

We chose SNUPPS to provide us plant layouts, structural ideas and this sort of thing, not to analyze their plant but to provide a baseline. We then looked at this, got the safety descriptions for the key safety systems, then characterized the plant by doing a sabotage fault tree analysis, which we will not discuss in this meeting, using the techniques that have been involved at Sandia to analyze the potential events, and then to convert events which would lead to a release to a vital area analysis, and then to do further analysis by laying out the plant.

So we are all on common ground, let me just throw a block diagram of this plant up. I'm sure most of you are familiar with this. SNUPPS is a four-loop Westinghouse plant laid on a peninsular arrangement with turbine hall to my right, reactor building, fuel building in line. The auxiliary building housing all the bulk of the ESF equipment

is immediately adjacent to the control building, and the emergency diesel is then to the side of that.

I have colored in yellow some areas which house safety and control equipment, which we will discuss further as we talk about the alternatives and some of the things we looked at regarding this plant.

Just as a way of comparing and showing you what happens when we do the analysis, this is that same plant after we have digitized it. This is a computer drawing of the same plant. Now we are inside. We have included inside detail.

These happen to be the RHR heat exchanger compartments, containment penetration rooms. This happens to be ESF switch gear rooms and the diesels if one looks inside the plant, and this is the auxiliary feedwater area. These two little dots are the tanks. This is condensate storage and makeup.

The diamonds are potential areas of concern. When we do the analysis, some of those disappear, but we prepared these just simply based on the drawings, so we put lots of things in to begin with.

In looking at design alternatives, then, we had a number of goals in mind. One was that they ought to be practical alternatives. They ought to be something one can do. A variety of people have talked about these things in a

variety of ways through the years, so the question was have we ever looked at them in a consistent fashion.

So one of our goals was to get it all down in the same format so they could be compared on a relatively equal basis. We selected the designs to be considered. I should comment these were not unique with us. We picked on all the brains and all the prior comments we could to establish the list.

Functions are, of course, we have said, to maintain primary coolant integrity in inventory, make sure the reactor is tripped, and then to remove any shutdown or decay heat.

As a result of all the investigations prior to and including this one, four categories have been established as to the kinds of designs one might use. You could harden critical systems, that is, make them just inherently less vulnerable. You could change the way the plant is laid out, put things in different locations.

You might consider changing systems themselves, actually the way a system is designed, or as always, you might add something additional to the plant. Our goal was to get to the point where we had them documented and developed to the point conceptually where we could do some evaluation of them.

The kinds of things that come out, and these are

only examples, not the full list that we looked at, are: under hardening systems you might look at potential hardening containment, additional protection or hardening of the ultimate heat sinks. You might consider enclosing makeup water tanks.

In layout one might consider additional separation of the containment penetrations, routing any power cables to outlying safety-related buildings underground, well underground to protect them. You might lay out the control room in a different fashion. You might even move some of the emergency cooling system into containment.

Yes?

DR. SIESS: Just what do you mean by hardening?

MR. ERICSON: In the case of structures, more concrete to make them less vulnerable. In this case --

DR. SIESS: To a forcible entry?

MR. ERICSON: To a forcible entry or forcible attack.

DR. SIESS: Multiple doors, special doors, special --

MR. ERICSON: In some cases eliminating doors.

DR. SIESS: You consider that hardening also?

MR. ERICSON: Yes, sir.

DR. SIESS: Making it more difficult to enter.

MR. ERICSON: That's right.

DR. SIESS: Either by forcible means or surreptitiously.

MR. ERICSON: Yes, sir. Now, it turns out that because of the concern about insider questions, hardening may not always get you where you want to be. If you harden the door and then give the man the key, you really haven't bought much.

In terms of system design changes --

DR. SIESS: Two keys helps.

MR. ERICSON: Sir?

DR. SIESS: Two keys might help.

MR. ERICSON: Right.

In design changes, of course we might look at the way some of the low pressure systems are isolated, alternate ways of doing containment. One of the things that was talked about was the ability to run back the turbines and function without off-site power.

The independent safe shutdown could be added, or additional -- one thing that was suggested one time was additional scram systems.

All in all, in this initial list we had 29 different alternatives. Some half of those are listed here.

We have reviewed the list with our comments on them, with our support group, on two separate occasions. And I should point out that we did not ask for a consensus

from that group. We asked for their advice and their counsel, and then we said we will stand up and be counted and take the responsibility for the decisions. Tell us what you think, and we will go from there.

We did not ask them to vote and give us a majority position or anything like that.

We looked at six alternatives. One was hardening of makeup water tanks, which would be a way of hardening, putting some protection around them, and that falls in that first category. The second two, separating penetations or separating redundant trains even further, is plant layout. Hardening the decay heat removal system would be in the fourth category, and the last two would be some system design changes, looking at the low pressure, and also what one might to do a facility to facilitate damage control, to facilitate going in and doing some repair.

We took these alternatives, developed them to the conceptual design state. Then combined them with a physical security system which we believe is consistent with the requirements of 73-55; and came up with three alternative plant configurations.

I should point out that the goal was to keep the physical protection system, that is, the guards, detectors, that sort of thing, as constant as possible from alternative to another. So, changing the way you did the security system didn't unduly influence the results.

I also will say that we did not bring our security plan to the staff and say, "Is this acceptable in today's age?" Based on our own interactions with the staff, we believe they were consistent with the existing requirements.

CHAIRMAN MARK: You mentioned damage control. Damages, for one thing release to the environs of radioactive material; for another, it's put in a plant in a state where it's expensive to clean up or repair.

Are those separable? Do you put more weight on one than the other?

MR. ERICSON: We have attempted to look at damage control, or we're looking at it from the standpoint of what could you do -- if he has damaged certain pieces of the gear, what could you do to get those back on the line to prevent the release, the ultimate releast to the public?

CHAIRMAN MARK: So, it's the release that is over-riding?

MR. ERICSON: That's our concern, yes. That's the thing we want to avoid. Anything we can do up until the time that that happens, we'll consider damage control.

Now, I recognize that damage control immediately evokes various ideas in people's mind. We will talk about some of that.

CHAIRMAN MARK: Well, with TMI sitting there, damage control means something different.

MR. ERICSON: Right.

DR. LAWROSKI: What was the relative emphasis of the insider versus the intruder being the one that arranges the sabotage?

MR. ERICSON: We tried to look at both as equally as we could. Now, admittedly, as we will talk about it, we get into -- one can be done with some neat little models, the other requires a lot of judgment at this point in time. I will discuss that.

First, with simply the hardening make-up water tanks, we looked at three ways to do this. You can put a building around every tank, you can put several tanks in a building, you could put in the ultimate and move buildings into the tanks inside existing buildings.

The second one, which appears on the next figure is

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the most radical departure from the current designs now being considered. That is completely separating the redundant train. Now, rather than having your redundant equipment in adjacent compartments in the auxiliary building, we have separated the redundant trains into two completely separate bulidings, A and B, with emergency diesel with each train associated with it.

In doing this, we wind up adding some equipment. We added an additional turbine driven auxiliary feedwater pump. We added some high pressure injection pumps. So that the normal operating equipment charging this sort of thing now all appears in the auxiliary building as does the controls.

DR. SIESS: Hasn't somebody done that? Isn't there a design -- is that the German design, that has essentially three buildings -- German has four buildings, hasn't it?

MR. ERICSON: That's correct. Some of the Swedish designs are very similar to that. So, again, we have said -- nothing uniquely created out of thin air, we borrowed from wherever we could.

This design, by adding the high pressure injection and taking charging as a normal charging system away, then completely separate safety and charging. The other criteria was that there be no direct access from this safety train to this safety train. In other words, there is no door from building A to building B.

The entrance to both is through the auxiliary building

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through well protected doors. To get to building A, you actually go through a tunnel.

The other alternative that we'll comment on was adding -- we have chosen simply to do this in a separate building -- that's the way to do it. If you were designing a new plant, you might even have the alternate decay heat removal system, or shutdown heat removeal system located within the building contiguous but separate from --

DR. LAWROSKI: How much is in that rectangle?

MR. ERICSON: We have in there a -- this really provides essentially additional transit protection. We have sufficient borated water and charging pumps to make up seal leak -- seal losses, that kind of normal -- that kind of losses and auxiliary feedwater.

DR. SIESS: What about power?

MR. ERICSON: It is completely self-contained. We sized it at about 1700 kilowatt on the diesel, which would provide the auxiliary feed and any other power needed to run this system.

DR. SIESS: Similar to the German system?

MR. ERICSON: Yes.

DR. LAWROSKI: Well, I don't know. How large of a thing?

MR. ERICSON: That is a very strong seismic one, thick walled, vaulted door ability in this particular model.

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It is very similar to the Germans.

Given those designs, what did it buy us? In looking at the value, which is safeguards effectiveness, or increased resistance, what external threat we have the Sandia developed semi-automated facility evaluation techniques which lead to those digital plots, the vital are analysis. In the long run, you also are applying some judgment.

The internal threat, there are a number of models being pursued now. There have been some developed for other aspects of the fuel cycle. There are now some studies looking at applying those to power plants. We did not use those in this study, rather looked at the question and tried to do it from a relatively subjective way.

The impacts we have mentioned before, cost, manpower, operations to meet safety. The cost -- strictly from cost estimates based on the conceptual design, manpower and constraints will, of course, be the result of analysis, looking at what you are adding and where it goes.

Now, we -- in doing this, if one looks at the question: Can you reduce or eliminate vital areas, vital plant areas? In the base-line, as we have analyzed it, there is potentially five. Two of those involve the spent fuel pool in the cask area, the other three are plant areas. One of those, it depends on what kind of capabilities are ascribed to the shutdown panel, whether or not that becomes one; and 37 other areas, as we have

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analyzed the base-line plant.

DR. SIESS: What's the 1 and 2, again?

MR. ERICSON: Type 1 vital area, which would be the single location. Type 2, which you would have to visit two or more locations to cause a release.

Those 42 total plant locations can be put together in 56 different combinations to cause you a problem. Obviously, if all you have done is harden the outside enclosure, you haven't changed whether or not it was an area. So, that stays the same.

In physically separating the buildings, we definitely lose one out of our potential and the safe shutdown -- the alternate shutdown panels are no longer type ones, for sure. We added a couple of type two areas. You also see that now there are many more ways in which those 43 areas may be strung together.

DR. SIESS: That could be, or would have to be?

MR. ERICSON: Could be. Any one of the 291 combinations could cause you a problem. However, it turns out if you look at the converse of that, how many areas must I protect to make very sure they can't cause me a problem? That one reduces it to abut three areas, the type one vital areas and one of the safety buildings, and you've done the job.

A lot of those combinations or sequences involve double compartments. That is, you have to get into both A and B safety trains. So, if I can absolutely keep him out of one

safety building, then he cannot cause any of the sequences.

DR. LAWROSKI: Causing a problem in this case means release?

MR. ERICSON: Release, yes.

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CHAIRMAN MARK: I have a feeling that the last way you stated it was surely basically the important way.

DR. SIESS: The first way you stated it, the higher the number in that last column, the more difficult it is to detect. Yet, you turned it around and make it look the other way.

MR. ERICSON: Let me put the numbers up here. It turns out in the first -- for the base-line plant, there are approximately 17 areas that must be protected. By area, this may be as small as a compartment that's ten feet square.

In the physically separated and protected building, you have fewer, because a lot of those pumps are in a single building that is very massive and has a single point of entry. That's -- for the outsider, that's a very potential gain. For an insider, it may or may not be.

CHAIRMAN MARK: I guess it's fair to say that you have fewer areas which -- had better be protected better.

MR. ERICSON: That's right. In all the things that we have looked at, we did not make significant changes in things like control room. The spent fuel area will frequently show up, however, the cask is a time window thing. It may be there and it may not, if you are looking at --

DR. SIESS: It's still difficult for me to see a big difference between the 56 and 292 in the last column. I wonder if you can just give me an example of the kind of combination that is added when you go to the physically separated and protected systems that gives you back to six.

MR. VARNADO: I can add --

MR. ERICSON: I was going to say, I was going to try to make it simpler.

DR. SIESS: It can be simple, we have time.

(Laughter.)

MR. VARNADO: In the physically separated design, we have added some additional compartmentalization as well. So that when you combine -- you now have the safety trains with somewhat greater degree of compartmentaization.

If I interrupt that train anywhere near, you know, in its course, then I have accomplished my goal. Now, I have the same thing in two different buildings, so it's like a product of those numbers that gives me the number of combinations --

DR. SIESS: In other words, in one building there are six places where I could sabotage it? In this, you got the six places separated?

MR. VARNADO: That's right.

DR. SIESS: It really doesn't complicate the saboteur's job that much.

MR. VARNADO: Well it does in the sense that he has two

totally separate places to go. He has to get into two separate buildings.

DR. SIESS: He had to do that in base-line, didn't he?

MR. ERICSON: No, only had to get in into two separate compartments, which may be adjacent to one another.

For example, the BSF pumps in the design are compartmentalized. They meet all their safety and fire protection criteria, but they're in a row down a corridor with doors on each one. So, he just goes from one to the next.

Here, he has to go out of the building to get into another one.

DR. SIESS: I don't think the last column is that significant.

MR. ERICSON: Let's look at -- I've added the question of how many you must protect.

CHAIRMAN MARK: It is for computer time.

(Laughter.)

MR. ERICSON: It would take him longer to figure it out. In the complement set, or the areas that must be protected, you see it looks like the same, but it turns out that eleven of these then can be in a single building, a single safety train, either the A or B buildings.

So, if you put your protection boundary at that massive boundary, then you are looking at three areas; two type ones and a collection of type two areas that would really have to be

protected.

DR. SIESS: But the last one does almost as well, doesn't it?

MR. ERICSON: Yes, for the transient events, because now you have added additional redundancy for transient events. You can still -- in this last one, in order to be functional, of course though, you must have an intact primary system to be able to supply -- take heat out thorugh the steam generators.

DR. SIESS: In looking at the third and fourth ones, the fouth one is possible for the existing plant, the third one is not.

MR. ERICSON: Absolutely. The third one -- that's -- you're starting from scratch. You can't go back. Let's change it a little.

The base-line plant, as we said, is a very compartmentalized design in accordance with the best existing practice. However, there are multiple ways that you can get to some of those points. For example, as I said, the pump rooms are located off a common corridor which you can get at in a variety of ways.

An operator, in essence, has access to both trains at the same time in that if he's on his rounds, and he's going down the hall.

If one wanted to say, "Let's look at the insider and we'll control him," by administrative controls or work rules. To keep the train separate, you have to do this in very small

compartmental levels.

In the physically separated case, you now have them in separate buildings with single access, even though you've compartmentalized within the train.

They way we have laid it out in this particular concept, the access routes are well-defined. There is one door for normal access. There are emergency escape routes, but they are one-way routes.

We separated all emergency and operating equipment. The operator then would only have access to one train at a time. He would have to come back through A building before he could go over to B building, which might be an opportunity for doing some verification of equipment status.

Then, administrative controls, if you were really considering work rules or that sort of thing, you could do it on two buildings rather than on the whole complex.

Adding the system, adding the base -- taking the base-line or something similar to it and adding the shutdown heat removal system, again, compartmentalization is the same as the base-line plant. You have added the redundancy. That compartment, as we have laid it out here, certainly has well-defined routes. You can build it as a bunker and put a single door or two doors on it, so there is the only way in. Then one could put administrative controls -- heavy controls on the one building, less -- perhaps less severe controls inside.

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DR. SIESS: So having a well-defined route, from this point of view, is totally advantageous. It means you have only to watch that route.

MR. ERICSON: That's right.

DR. SIESS: Or is it, for an outsider, having a well-defined route seems to have an opposite connotation?

MR. ERICSON: It could. On the other hand, for the outsider, if you have walls ten feet thick, you can assume that he's not going to try to come through there. He can try to come through doors.

If you know that's where he's going to come, you can increase the detection surveillance.

DR. SIESS: It's good in all circumstances to have a well-defined and limited scope route.

MR. ERICSON: Yes. It could help you in both cases.

DR. SIESS: All right.

MR. ERICSON: Thirdly, if you are looking at control of insider movement, well-defined routes would be helpful; of not coming through the gate and wandering everywhere.

Of course, nothing is without its cost. We have not, at this point we do not have a complete cost data on the base-line plant. We assumed that if -- for point of argument, if $3/4 billion in '78 dollars is probably more than that now for those base-line plants.

We looked at the SARs and said, "Well, it's going to

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take approximately 60 operators and technicians."

We recognize that plants today have far more men than that on site in a given shift; probably will have in the immediate future. Certainly, these things are kept, the operation safety, maintenance safety, are as far as we know meeting the criteria.

Adding enclosures, in terms of '78 dollars, we estimated would cost another half to a million and a half dollars. It doesn't change your way of doing business at the plant, particularly. It would increase the protection in that package.

In discussion this with the industry people last week, even in terms of 1978 dollars, they said we were probably at least 30 to 50 percent low on that estimate. Since we're comparing all the same, we'll accept that we may be off in absolute value.

In looking at the cost of separating the building, in order to do this, because we didn't have the detailed cost for the existing or the base-line idea, we had the same cost estmator estimate the cost for the auxiliary building, the control building, and the diesel building for the existing facility the same way he did for the new facilities.

In other words, there would be a reasonable cost comparison. Doing that, we wound up with about a $16 million increase; some possible increase in manpower; the rounds will take longer, is simply takes longer to get around that more spread out plant.

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Maintenance may be a little more difficult because of restricted access. Equipment movement would certainly would be a little more of a problem than it is at the existing plants. The additional high pressure system reduces reliance on operating systems.

I think many of the utility people would just love to debate this and say, "Well, if it's operating every day, it's probably more reliable than the one that's sitting in the corner."

So, that trade-off is always possible here. Separate shutdown panels, of course, does have an impact on control life.

DR. SIESS: You're talking about the HPI separate pumps rather than using the charging pumps?

MR. ERICSON: The charging pumps. The possibility of separate shutdown valves or multiple shutdown panels of course gets you back then. We have not looked at the details of the control logic and things that have to be considered there.

From the personnel standpoint, you have two major plan areas that you might impose some rathe strict controls. Such controls, we're contimuall told, will have no impact on the way people think and the way they conduct the day to day activities.

Adding a shutdown heat removal system, we estimated at about $9 million. That's 50 percent low. You're looking at $13 million, perhaps.

Again, you're adding equipment for the possible need

for increased people. This certainly will be additional surveillance test, additional maintenance will have to be done, you have another diesel that will have to be periodically operated.

You do have the additional redundancy available for transients. We believe that you then could wind up with one are of fairly strict access and control. Perhaps, then, that would give you less adverse people reactions to controlling activities.

DR. SIESS: Can you get by with a non-redundant diesel and decay heat removal system?

MR. ERICSON: We have not said this -- we still have all the existing safety. This is a third level redundancy. At this point, we are not calling this a safety point. This is a last-ditch bail-yourself-out sort of thing.

DR. SIESS: If that diesel is its only power supply that came in to connect with other diesels with offsite power, I could see the staff saying, "Single failure criterion."

MR. VARNADO: I guess we felt, for our design purposes, sections of design criteria, we didn't feel that it was necessary to apply the single failure criteria to this ultimate back-up system.

MR. ERICSON: If you get to this point, you have exhausted a lot of other possibilities, before you even turn to this.

DR. SIESS: That is true; but if that's true, then

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this damn well better work. Diesel reliability has not been notably high.

I think the Germans have two diesels. Steve, do you remember?

DR. LAWROSKI: I am not sure.

DR. SIESS: I'm not sure either. But that's not a big deal.

CHAIRMAN MARK: You have mentioned ways in the last two or three vu-graphs in which you might have to add people because they have to walk further or have a few pieces of extra equipment to check on.

If we think of the normal concer about a plant, its safety because of breakdown, because of something or other, that I would judge not really effective by your first three alternatives, but is by this last one; namely, that there there is a feeling you ought to add something, that's possible or is it not, that this hardened decay heat removal system would meet some otherwise normal need other than sabotage?

MR. ERICSON: As a matter of fact, we have concluded that though this looks promising, it ought to be considered what we are looking -- the staff is looking. Sandia is doing some studies on the total question of shutdown -- ultimate shutdown in decay shutdown heat removal by assessing a variety of techniques for doing this.

We said beyond what is now existing, we said that this

ought to be included in that. For sabotage it shows some promise, but that is not the only thing that has --

DR. SIESS: Fire protection. Let's see, at Oconee, they have gone to a shutdown heat removal system for at least two reasons that I recall: fire protection and sabotage.

I think they decided they could not meet either the fire protection or the sabotage criteria with the existing --

They were consulted on this basis.

CHAIRMAN MARK: Am I right that the other changes you discussed scarcely bear on the kinds of considerations which --

MR. ERICSON: Except for the completely separated systems, fire protection could be enhanced.

CHAIRMAN MARK: THe two building proposal does some of that?

DR. SIESS: Fort St. Vrain has a partial isolated decay heat removal system that they put in chiefly for fire protection.

MR. ERICSON: Well, of course, there is always a bottom line, which is what do you think you learned? A number of conclusions that we have drawn at this point: design changes alone do not appear to provide significant additional protection. By that, I mean just simply changing the way you lay out a plant in itself does not materially enhance the protection.

The way we did this for the outside, as I indicated earlier, we did not attempt to model any engagement tactics, this

sort of thing.

We simply looked at it from the standpoint: Can I get to an outside intruder before he gets through the last door?

Therefore, does changing the way I designed and built the plant increase that probability? An insider, of course, it depends on the kinds of access to the outsider.

However, the second point really addresses the point that Dr. Mark raised a minute ago; that design changes, for example -- if you've laid it out so that you have well-defined routes that might facilitate the way you do your physical protection, you could concentrate detectors, you could concentrate surveillance, maybe even provide dedicated response, a variety of ways you might you might do this.

For the PWRs, the hardened decay heat removal systems appear promising, but we'll say more about that under the recommendation.

Through this I stress the design aspects and not so much the damage control We started out looking at the question of advantage control from the more or less classical running repair idea. Somethings been damaged, go fix it, get it back on line or jerryrig it.

In some cases, that could be done. You are also fighting a severe time restraint. You have things on backshift, you have trouble getting people there, that sort of thing.

When we talked with our industry colleagues about this,

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they said, "Hey, have you really looked at what we can do with what's already there? The systems are installed. There are alternate ways to use them."

We have looked at that to some extent. We have some ideas which we think need to be exploerd further. Certainly, as you look at alternate ways of using installed systems, you are not only then looking at potential for encountering sabotage, certainly now one has a potential for looking at accident situations, doing things differently.

For example, it might be possible with relatively simple design changes to provide a capability of bringing fire protection water in to the auxiliary feed system. It has been done, I think.

DR. LAWROSKI: What makes that third one not of those under one? It's a structural design change.

MR. ERICSON: Well, it's more than a structural design. I have added a system, too. In one, I have done nothing but change the way I lay them out. I haven't added anything to it.

DR. LAWROSKI: Then it should say layout. Don't say it is a design.

MR. ERICSON: We have wrestled with the right way to say this repeatedly.

DR. LAWROSKI: Well, that first one tends to weigh a very negative feeling. Unless somebody formally exlcudes the third, you could easily have included that one under that.

MR. VARNADO: We do include that one under that.

DR. LAWROSKI: Under the first one?

MR. VARNADO: That's right. The third one goes with the previous two, Steve. If the separate decay heat removal system does provide a means of additional physical protection measures which can increase the overall protection of the plant.

Just adding the hardened decay heat removal system without additional controls, access controls and physical protection measures, really is not going to buy you a great deal.

DR. SIESS: I thought by structural, you meant walls and doors and not pumps, valves, and pipes.

MR. ERICSON: That's correct. There are some suggestions for some things one might do in terms of -- particularly in the insider problem of additional switching, or permissive switching of systems which we did not look at.

Originally this program was intended to take some ideas that looked pretty neat and pursue those with an architectural engineer to a fairly detailed design. We are proposing now that we not do that, but rather to look at a few other things in to about the level of detail we have here. We have put a lot of emphasis, we have got down the road and looked a lot at some PWR alternatives. We need to verify that those kinds of comments apply to the BWR or to assess that they don't, but to make a definite look at that.

Any additional work with decay heat removal as far as additional systems we think ought to be included in the other program, so that sabotage is another thing that's considered along with fire protection, flood, and that sort of thing.

The question of the insider just needs to be addressed further. There's just no question about that. The idea of what an operator might do to counter sabotage or accident needs to be addressed -- pursued further. The ideas we have established have not really been carried to their ultimate. And we really need to go back at this point in time and look at what one might do to existing plants. The last time we met with the industry group, we discussed this quite a bit; several pointed out to us that, "Hey, Dan, let's face it: since March of 1979 we haven't ordered many new plants. And we'd better be looking at what might be done and what could probably be done, if anything, to existing plants." And we discussed this with Mr. Michelson a month or so

ago, and I think he would agree with that last recommendation. We need to go back and look at what might be done.

Obviously, things like adding system come to mind, but we have not analyzed it from that standpoint as to cost. Any of the cost data you see here was strictly new construction, was not retrofit. We never considered retrofit in the cost (WORDS UNINTELLIGIBLE).

That's pretty much a quick and dirty look at this program and where we think we need to go.

DR. SIESS: Is your cost on the hardened decay heat removal system, was as new construction?

MR. ERICSON: As new construction. And those cost figures are construction dollars, do not include cost of money and all that sort of thing. And as I said, the industry people suggested at least 50 percent low even then.

And those were 1978 dollars, so already they're 20 percent low.

DR. SIESS: Now, Oconee is -- are they actually building their dedicated heat removal system at Oconee?

MR. ERICSON: Yes, sir, as far as I know.

DR. SIESS: To serve three plants?

DR. ERICSON: That's for three, yes.

DR. SIESS: Three systems or one?

MR. ERICSON: I think it's a single system that serves all three.

DR. SIESS: What's it cost, do you know?

MR. ERICSON: More than ten million, I believe.

DR. SIESS: That is three plants' worth.

MR. ERICSON: Yeah. But, on the other hand, since it's a single system, you can't divide the cost number by three, either.

DR. SIESS: No, but we've got an awful lot of multiple units.

MR. ERICSON: Right.

DR. SIESS: And on your decay heat removal system, that applies equally to PWRs and BWRs?

MR. ERICSON: That's a question we need to address further. We've done some preliminary looking, but we haven't -- we haven't -- I'm not ready to make that statement.

DR. SIESS: You've mostly looked at PWRs?

MR. ERICSON: Yes, sir.

CHAIRMAN MARK: Is it your impression that things will not really be very different?

MR. ERICSON: That's my impression today.

DR. SIESS: Well, the Germans are using them on BWRs.

MR. ERICSON: My feeling is that we're not going to see a lot of difference.

DR. SIESS: I don't want feelings, though.

And what I didn't hear, or maybe I just missed it, is the -- a distinction, if there is one, between prevention and mitigation. Has that been a way of looking at it here? Or do

you just feel that they --

MR. ERICSON: Well, certainly, the design would -- the designs we looked at were aimed at preventing, yeah. We were looking at the damage control more as the mitigating -- or do something about it given that you've got to.

Design to mitigate -- I guess we haven't really pursued that, if I understand that's the way you're phrasing the question.

DR. SIESS: Yes. It's b[illegible]lly a prevention problem.

DR. LAWROSKI: Do you regard the spent fuel, though, as a, as one of the important areas?

MR. ERICSON: At certain times. Now, that's -- that's a personal prejudice. I think there are some time windows in the spent fuel area in which you are very concerned immediately after discharge. But at long times I think you have --

DR. DIESS: What about radwaste?

DR. LAWROSKI: Well, let me -- may I pursue that a little further? Now, isn't that one from the standpoint of structural design, one that could be altered quite a bit by whether you have the thing below or above grades, or as vulnerability to --

MR. ERICSON: Certainly.

DR. LAWROSKI: -- leaking of water?

MR. ERICSON: If it's below grade it's much more difficult to get the water out. No question about that.

DR. LAWROSKI: Okay. Well, that's --

MR. ERICSON: On the other hand --

DR. LAWROSKI: That would be one, then, that --

MR. ERICSON: On the other hand, it may be much more cost-effective to rely on damage control and provide other ways to put water in. And it's hard for me to envision getting all the water out in very, very short periods of time.

DR. SIESS: Again, it would depend on whether it's built or not.

MR. ERICSON: Yes, most certainly.

DR. SIESS: What about radwaste?

MR. ERICSON: Our criteria was in excess of Part 100. And it's very -- most radwaste you're not going to exceed Part 100 criteria at the boundary.

DR. SIESS: The Part 100 criteria don't really make much sense after Three Mile Island, do they? I mean, we had releases less than Part 20 at Three Mile Island, and it's had a traumatic effect on not only the people but the NRC and the industry. And Part 100 dose limits go along with some source terms and other assumptions; they're not real doses.

MR. VARNADO: No, but Part 100 dose limits are the criteria that are used in identifying vital areas, that NRC uses in identifying vital areas.

DR. SIESS: I know they do. But I don't think it makes any sense.

MR. VARNADO: Well, that's --

(Laughter, several comments at once)

DR. SIESS: The Part 100 dose limits along with reg' guide 1-3 and 1-4 and a few standardized calculations for picking sites is one thing. But Part 100 dose limits as consequences to a population are absurd.

I mean, right now, if somebody sabotaged a radwaste tank and put out even Part 20 limits in a day, as little as Part 20 limits in a day, you know, that's ten times as bad as Three Mile Island.

MR. ARSENAULT: Mr. Chairman, if I may?

CHAIRMAN MARK: Yes, Frank.

MR. ARSENAULT: I think the point here was simply to offer the contractor some --

CHAIRMAN MARK: Can't hear you.

MR. ARSENAULT: -- some criterion on the basis of which he could determine which of these things he was going to consider and which not.

There's a probabilistic distribution associated with any release resulting from a sabotage event. The point here was simply to indicate that we are concerned with sabotage that results in small releases. Part 100 was a convenient benchmark to use.

DR. SIESS: But Part 100 is a big release.

MR. ARSENAULT: Well, it's a --

DR. SIESS: It's a heck of a big release.

MR. ARSENAULT: It's big from -- it's big in connection with, or in comparison to minor accidents and so forth. When you consider sabotage, if you want to go to the smaller events, the possibilities there, I think, the potential there extends the requirements for protection considerably.

DR. SIESS: That's right.

MR. ARSENAULT: And if you -- if you choose to do that, that's one basis for reviewing studies.

This was a benchmark.

DR. SIESS: Well, at some point, I guess, somebody's got to look at the motivation of the saboteur. At one time we used to use embarrassment as a motivation, and I guess that was the case at North Anna, was it? They certainly didn't hurt anybody by putting the caustic on the fuel, but they got a lot of publicity -- not very good publicity. And I could visualize somebody hitting the radwaste tanks at every one of Commonwealth Edison's plants, which wouldn't be major releases but it would shut down all the power in northern Illinois. Which might bother Dr. Lawroski more than it would me. But --

(Laughter)

MR. ARSENAULT: I trapped myself by responding to that. What I actually wanted to mention was going back to the point of mitigation, a point of clarification.

The two places where that word might be applied in this case, we're talking about prevention of a release and we want to

speak of mitigation of the release after the release. But then there's the question of an initiating event and mitigation of the sequence that ultimately would end in a release.

I think the study does deal with that latter type of mitigation -- damage control and various actions to reduce the end effect of a sabotage event. So I wanted to make that clear.

CHAIRMAN MARK: I don't think we can draw a new line other than your Part 100 here today. There is certainly something very much in what Dr. Siess was just saying. But there's also the opposite of that: that if you know that Part 100 is, indeed, an upper limit for the mayhem that might be raised, then you can put it in a separate box as not being like a hydrogen explosion which may or may not happen. If Part 100 is an upper limit, then it puts the question in a lower scale than if you are capable of putting out 10 percent of all the fission products in the air, which some of the scenarios would certainly allow if you didn't guard against it.

I have a question on this. I wonder if it will come up later, from the staff's discussion. How much the work which you have described which has been done has amounted to in the research budget and how much the recommendations that you make would amount in the budget which we will need to be considering in numerical detail.

You, presumably, know what this has meant in fiscal '80 and is down for it in '81. And I don't know, Arsenault or someone

or Durst will tell us later what --

MR. DURST: What you said about making the numbers, these monies are not in the '80 or the '81 budget; these are previous monies. The project was slightly delayed for a variety of reasons, so the monies that were spent were from prior years. And the monies that are remaining are authorities to spend which were carried over from the FY '78 budget, which was the last funding year.

DR. LAWROSKI: Is this all labeled research, then?

MR. DURST: In '78.

DR. SIESS: Is the program on assessment of alternate LWR shutdown heat removal concepts a research program?

MR. VARNADO: Yes, sir, it is.

MR. ERICSON: That would be improved safety program.

DR. SIESS: That's the improved research, that safety program?

MR. VARNADO: Yes.

DR. SIESS: Who's doing that?

MR. VARNADO: We are.

DR. SIESS: You are.

CHAIRMAN MARK: Now, I'm not sure if I followed. Does this mean that in discussing the '82 budget request this item would not need to appear at all?

MR. DURST: That is correct.

CHAIRMAN MARK: Good.

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DR. SIESS: But the shutdown heat --

(Laughter)

But the shutdown heat removal study would?

CHAIRMAN MARKS: But that's not a Safeguards item, however. Not a Safeguards item. That's an improved safety research decision unit.

DR. MOELLER: I found it an interesting discussion, but I am troubled by the bottom line, and that is the conclusions, because I don't understand them. Dr. Lawroski raised a question, and I thought perhaps that would help me but it really didn't. Your conclusions are: number one, that structural design changes alone do not appear to provide significant additional protection; then, number two, design changes -- now I don't know whether those are structural design changes or not -- but you say design changes can facilitate implementation of physical protection. So those, one says they do not alone do much, the second one, I guess, meant to say that in combination with other steps they do.

Could you help me with your conclusions once again?

MR. ERICSON: I think you have addressed it just right, Dr. Moeller.

DR. MOELLER: Okay. In combination, then, with --

MR. ERICSON: That's right.

DR. MOELLER: -- other things.

MR. ERICSON: In assessing the impact of changing the design, the layouts and that sort of thing, we tried to keep the

implementation of physical security -- that is, guards, bells, whistles -- constant. Just changing the way I built the plant didn't change much. However, I recognize that changing the way I build the plant may facilitate, may help me to implement the requirements of 73.55 in a different way. And so I think you have grasped what we were --

DR. SIESS: That goes back to the differences in the completely separated buildings and just the separated compartments.

MR. ERICSON: It just -- it allows you to do some things you might not otherwise do. It allows you perhaps to concentrate some security.

DR. MOELLER: Thank you. That helps me on that one.

The other point I did not understand, which also was -- a question was asked but I didn't follow: in terms of design alternatives, you listed turbine runback and I don't understand what that is in relation to a design alternative.

MR. ERICSON: In addressing the concerns of sabotage, one of the things we normally attribute is that we accept that we will lose off-site power -- the grid is very difficult to protect -- which means you then are forced in-house, into the emergency diesels, in most cases. The question has arisen, well, can you run the turbines back, what it was, can you run the turbines back, the main generating capacity, to a lower level and support your in-house loads just off of that?

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I understand that there are some systems that "can do that." But I don't believe any have ever been demonstrated, as part of a licensing in this country, that they can drop to 15 or 20 percent of load and then continue.

DR. MOELLER: Thank you. That helps.

MR. ERICSON: That was the idea.

DR. MOELLER: Thank you.

DR. SIESS: Does that depend on by-pass capability?

MR. ERICSON: Yeah.

DR. SIESS: They vary tremendously on that.

CHAIRMAN MARK: You say that covers the program as you --

MR. ERICSON: As we wanted to present it this morning, yes, sir. Do you have a question?

(Pause)

CHAIRMAN MARK: Well, when you talk of making it more difficult for outsiders to get in, you're thinking of some number of individuals with wire cutters and scaling ladders and whatever they can carry, maybe more than they can carry. Do you also include in those thoughts the business of coming in with a large transport vehicle?

MR. ERICSON: Yes, I think so. But now --

CHAIRMAN MARK: Forcibly.

MR. ERICSON: -- how far do I pursue this?

CHAIRMAN MARK: Forcibly. Well, I think perhaps that's far enough, if that is included in your list of outside possible

maneuvers. If we wanted to go into detail, we'll probably do so in a closed session sometime. But it would come in the orbit of your interest?

MR. ERICSON: We have discussed this with Mr. Michelson.

CHAIRMAN MARK: Is there more that you'd want to say about that now, Carl, or would we rather go into more deeply at some other time?

MR. MICHELSON: No, I think we'd want to address that another time.

I would like to make one comment on the --

CHAIRMAN MARK: Please do.

MR. MICHELSON: -- presentation. It doesn't always come through real clearly as to what we mean now by additional protection. Additional protection against what? Against the external adversary or the insider?

I think there are probably very effective ways already of improving protection against the external adversary outside of this study entirely. However, I thought the intent was to address specifically the problem of the insider and what could be done in terms of design changes, layout changes, or whatever to enhance protection in that area.

I don't think in the presentation it was ever made very clear to what extent certain of these changes would help against the insider, as opposed to certain others which would probably not be too effective. Maybe they were -- I don't know

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if you want to take the time now, but it never came through to me too clearly -

MR. VARNADO: What the scope --

MR. MICHELSON: -- which changes are working in which area.

MR. VARNADO: Okay. The scope certainly was not limited, as far as our charter, to looking at insider protection, but rather protection against -- as Dave mentioned earlier -- against both insiders and external threats. So --

MR. MICHELSON: Well, but my question is very simple -- to what extent does any of this help the insider problem? And if it doesn't, then what is it for? Since I think there are a lot of very effective ways of taking care of the outsider problem and by means other than rearranging the compartments and whatever. You can go back now to even more enhanced physical protection of the boundary and things of this sort --

MR. VARNADO: Surely.

MR. MICHELSON: -- to lay off against these kinds of things.

DR. SIESS: Moats, walls, and hot oil, yeah.

MR. VARNADO: There are lots of ways of keeping people out. But what do you do about the fellow that's already there?

MR. ERICSON: Well, I think what we said there, too, is that plant design per se is not the answer. It may facilitate the way you administratively do the job, but we're right back to

your comment -- there are other things you would have to do to do it.

MR. MICHELSON: Yes, and -- but to what extent do what you propose here even help? That never came through clearly to me.

DR. SIESS: I thought they made a point that with the separated safeguards buildings or with the dedicated heat removal system this did provide additional protection against insiders.

MR. MICHELSON: Well, I'm not sure.

MR. VARNADO: It would allow you to implement controls which could provide additional protection against the insider.

MR. MICHELSON: Well, my problem is then with the conclusion. Number one, structural design changes alone do not appear to provide significant additional protection against insiders.

DR. SIESS: Well, they didn't consider those structural design changes, because that was multiple systems.

MR. VARNADO: Well, without additional access control measures, then those design changes didn't -- if I -- if I have two completely separate trains but everyone has access to both those trains, then I have gained, you know, I really haven't gained anything.

MR. MICHELSON: You obviously have gained nothing. But I thought that you had made statements that when you separated you applied equal control to each side. Now, would the control

apply to each side?

MR. VARNADO: The control, you settle the control, essentially --

DR. SIESS: The conclusion is not well stated.

MR. VARNADO: What's the control as applied in the existing plant? The operator or the -- the loading operator has access to all trains -- to both trains in the plant.

MR. MICHELSON: But if I separate the two trains and I make them control separately train A and train B -- which I thought that's what you meant by structural design change -- pull the two apart and put them in two compartments and control each, now you ought to, kind of, intuitively, sort of, double the protection even against the insider, maybe.

DR. SIESS: Well, you have to look at the first --

MR. MICHELSON: That's Section 1, design structural changes -- and it does not provide additional protection.

DR. LAWROSKI: It's a very narrow --

CHAIRMAN MARK: By themselves do not, is what they mean.

DR. LAWROSKI: Well, it's a very narrow definition of "structural," too, that's used in there.

DR. SIESS: It means layout changes by themselves will not do it. But they will, together with other -- they will make other controls work better.

MR. MICHELSON: I think it was a good study, it's a good start. But it didn't come through clearly just how it addressed

-- to what extent it would address and help the insider problem.

The one other comment I wanted to make is the problem which I did discuss with Sandia a little bit. And that is, when one attempts to go to compartmentalization one has to be very careful about problems if, say, a pipe breaks. As you start to go to small compartments and confine high-energy lines or even water system lines within compartments and put bunkered doors on, or whatever the physical protection, the first thing you know, a pipe break will blow walls apart and create other kinds of problems, if one isn't careful.

And I don't know, I think you said you would go back and take a little look at that.

MR. VARNADO: We are.

MR. MICHELSON: Because if you provide venting, then how do you keep the fellow from going through the venting access to get into the area? And it's a little sticky.

DR. SIESS: The one thing that comes through to me is that complete separation by trains, which is, presumably, possible only with new designs, is clearly better than trying to compartmentalize every pump and valve. And if you're talking about an existing design, the dedicated system, which essentially a separation with a new train, has the same advantages.

MR. MICHELSON: Well, Dr. Siess, one other comment in that regard. I think that there is a very positive contribution to physical separation here by going to -- you know, physical

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separation for security may also enhance physical protection against pipe breaks or local fires and this sort of thing, which might be well worth the investment alone.

DR. SIESS: Well, I think that's one of their points. Because fire protection is an obvious one. And we've seen two older plants that have gone to dedicated systems simply because they could not meet the fire protection criteria by anything they could do to the plant, that is, Oconee and Fort St. Vrain; I don't know how many others.

DR. LAWROSKI: But I'm not sure that, although you said that equal attention is given to the insider as well the outsider, I have a feeling, though, that it's the outsider really that is addressed more here in some of the conclusions. I can't -- and I -- one more thing -- I'm not -- I -- for example, in looking at a conclusion, I can look at it two ways, that first one: that alone -- design changes alone do not appear to provide significant additional protection -- now, is that on the basis that I already have a highly invulnerable plant or not? Because I once heard, in the earlier days of these studies, and particularly from the first report, the unclassified one, "Gee, these things are pretty invulnerable, fellows." I'm not sure, and I'm not sure that that was so then, and after TMI-2 I am even less sure that that statement held.

DR. SIESS: I'm not sure --

DR. LAWROSKI: But we heard it often, though. And I

don't know. You know, including people who advised the utilities that that was the case.

DR. SIESS: I'm not sure whether I'm disagreeing or not. But recalling the ACRS concern that -- as addressed in one of our generic items, I would say this has been quite responsive, because that concern was in the form of a question, as what changes in plant design and layout can be made to reduce the probability of successful sabotage. And as that developed in the committee, I don't think there was a strong distinction made between the insider and the outsider. We heard stories on the outsider; we heard stories on the insider. And the basic question was what can you do in the design of the plant, as opposed to simply personnel control, et cetera, that could reduce the probability of successful sabotage. And I think this has addressed that. And I think it's come up with some interesting answers -- or, at least, directions, anyway.

DR. LAWROSKI: Directions maybe, but not answers.

DR. SIESS: Well, I don't think they've got all the answers.

DR. LAWROSKI: I agree with you.

DR. SIESS: But I think it's clear from this that separation by trains, or separation by systems, has a significant advantage. Separation by compartments, simply putting a lot of locked doors in there, probably is not going to help you very much. It could louse everything up.

CHAIRMAN MARK: Frank?

MR. ARSENAULT: Yes, Mr. Chairman. Like a lot of other things in the area of safeguards, as soon as you push on it a little bit it starts getting complex. But what does the word "insider" mean? Does it mean anyone who gets inside the plant gate, including the Coke machine repairman? Does it mean an employee? Does it mean the president of the company?

In trying to address this question, we found a good working definition of the "insider" to be anyone who is authorized to be in the location where he exists.

DR. SIESS: That's good.

MR. ARSENAULT: And so, therefore, an employee who may have access to all of the plant including one of the redundant systems but not have access to the second redundant system is an outsider for purposes of protecting the second system.

It's a working definition which seems to have some application in this case.

DR. SIESS: He has to have access. He doesn't have to be smart.

DR. MOELLER: But it helps.

DR. SIESS: As Carl Michelson postulated, the dumb insider in cooperation with a smart outsider could do quite a bit of damage if he can get to things. And he doesn't have to get to them simultaneously within the same day. I mean, if you have auxiliary operator A assigned to train A and auxiliary

operator B assigned to train B and they trade off at weekly intervals or monthly intervals, I'm not sure there are not some scenarios that couldn't be worked out on that basis.

DR. LAWROSKI: Did the TMI-2 event, or accident, alter any of this as you were proceeding with the job?

MR. ERICSON: Not directly, no, sir. Certainly, it certainly emphasizes, I think, our last recommendation that we made. We were looking at future design. Clearly, we need to go back now, we -- or, at least, "we" in the collective sense, I think, we need to look at the system, at, directly at those questions. No question about that.

MR. MICHELSON: May I make one other comment relative to this study but a little afield? We are beginning to see that so-called non-safety-related equipment somehow at some point can have a significant impact on the ability to safely shut down equipment. I'm kind of wondering as a general question now to what extent people are going back and looking at the possibilities of utilizing non-safety-related equipment, maybe in conjunction with only single train safety-related sabotage, other combinations, to see what kind of scenarios can be developed about considering the access to even both trains particularly.

The non-safety equipment has, some of it has --

DR. SIESS: I think that's a case where prevention versus mitigation comes out a little more clearly, since the non-safety-related equipment can initiate an event and you've got

other things that normally would mitigate.

MR. MICHELSON: Unfortunately, the information normally available to the operator during the mitigation would be lost by the loss of the non-safety-related equipment, which greatly complicates his ability to maneuver.

CHAIRMAN MARK: Then you make everything automatic, Carl.

MR. MICHELSON: Well, that's another issue.

(Laughter)

But it's something, I think, that one might want to (WORDS UNINTELLIGIBLE).

DR. SIESS: All you have to do then is sabotage the computer.

CHAIRMAN MARK: Dedicate and shutdown computer?

DR. SIESS: Like air traffic control or early warning?

CHAIRMAN MAPK: But I think that has brought in sight the sabotage protection studies, and holding back on the thing which is presently listed as item -- from SAI. It would be appropriate for something, at least, a half an hour's discussion, which is not going to complete it, of item III in this agenda, of the FY '82 research program, if that's agreeable to Tomlin.

MR. TOMLIN: I am Jerry Tomlin, the branch chief for Safeguards Research. I want to talk a little bit about our plans for FY 82.

Our program is broken into three areas, which you can see there: physical protection, material control and accounting, threat and strategy. I want to talk briefly about what our objectives are in each of these areas.

MR. MARK: Could I ask if threat and strategy is identical with what a year ago was referred to as alternative strategies?

MR. TOMLIN: Yes, very similar.

The regulatory objective for physical protection is to assure that the licensee provides adequate protection against malevolent actions directed towards sabotage or theft of special nuclear material.

The means to achieve the regulatory objective is the sort of stepping-off place for our research program. The selection of appropriate performance criteria, many of which you have heard discussed this morning already, and the evaluation of safeguards against these criteria.

Our research objective then is to support the regulatory objective by the development and application of physical protection, criteria selection aids, effectiveness evaluation aids and other studies.

In like manner, the material control and accounting

area, the research, the regulatory objective, to assure the licensee provides adequate protection against changes of special nuclear material location, quantity or composition which could contribute to theft or sabotage.

In like manner, the means to achieve that objective are selection of appropriate performance criteria and then evaluation of safeguards against those criteria.

The research objective which follows is to support the regulatory objective by the development of material control and accounting, criteria selection aids, effectiveness evaluation aids and other studies.

Threat and strategy research, the regulatory objective, to ensure that NRC bases its regulatory activities and operational responsibilities on the best available information concerning threats and consequences of successful adversary action.

The means to achieve this objective are to do threat studies, consequence studies and incident response studies.

The research objective, which we have developed, is to support the regulatory objective again by the development of better understanding of threats, consequences of theft or sabotage, and incident response.

Taking these three areas which we have just discussed, I would like to run down very quickly what we have planned for the future. You can see on the top our FY 80 budget, what we

are spending in FY 80.

MR. MARK: Could I ask, going back to your previous things -- incident response, which you mention only in the third group --

MR. TOMLIN: Yes.

MR. MARK: -- I had thought there had been a great deal of incident response studies under physical protection and transportation of SNM, which c[illegible]s under the first two groups.

MR. TOMLIN: There have been. It is just a matter of how we categorize them here. There have been a great deal of studies done under physical protection which I will show you as we go forward.

MR. MARK: It would be expected that those would continue?

MR. TOMLIN: That is right.

MR. ARSENAULT: Jerry, isn't it true that this refers primarily to nonlicensee response? It is the same problem?

MR. TOMLIN: That is right.

MR. ARSENAULT: Nonlicensee response is distinct from the licensee's immediate response --

Under the category of threat and strategy the incident response category refers to the nonlicensee actions, right?

MR. MARK: Nonlicensee actions? Like local law enforcement?

MR. TOMLIN: Local law enforcement, FBI.

MR. MARK: Classified or nonclassified transportation routes?

MR. ARSENAULT: That is right.

MR. MARK: Excuse me.

MR. TOMLIN: Okay. What I would like to do is -- well, when we go over the dollar -- -- we indicated the level of spending in each of those four years, what we are spending in FY 80 in total for that area, the area of physical protection, for what we plan to spend in FY 81, what we are requesting in FY 82 and FY 83.

Then I would like to go down through a listing of the projects that are covered in this area. The first project is the large Sandia project, which you have heard in some detail last year. I gave you a detailed briefing on that project. It is an ongoing project since about 1976 and will be continuing development of the technology base for fixed site physical protection.

The second project is a very similar project for transportation, physical protection. That project will be winding down in the next year, probably in 1981. You heard a briefing on that also last year about the same time.

The third project, inspection methods, is a project

that was begun last year. We are doing it at the request of I&E, basically developing improved and new inspection modules to help the field inspector in the area of physical protection as he goes around inspecting primarily reactors.

The fourth project, safeguards for proliferation resistant fuel cycles, is also a new project we are doing, just getting started, looking at possible new impacts on safeguards from some of the cycles that were recommended by NASAP (?).

The last project on this sheet and the first project on the next sheet are related.

MR. LAWROSKI: In what connection are you looking at those?

MR. TOMLIN: Well, it is a very low level funding project in which we are primarily responding to a congressional mandate, which we were asked to write a report, an annual report on these things.

MR. SIESS: Which item are you talking about?

MR. TOMLIN: Proliferation resistant fuel cycles, right.

MR. MARK: It has escaped me, there were some high class proliferation resistant cycles that everybody is about to use or something?

MR. TOMLIN: Yes.

MR. MARK: I thought it concluded there really wasn't anything you could do.

MR. DURST: I think what you have said is indeed what we think is to pave this project support, NMSS, who was required by congressional action to make continuing surveys and semiannual reports to the Congress on their evaluations and the -- -- recommendations impact.

This project supports that NMSS planned effort.

MR. LAWROSKI: Is that what it consists of and limited to that?

MR. DURST: That is correct.

MR. LAWROSKI: Okay. That is why it is small?

MR. DURST: It is very small.

MR. TOMLIN: Yes, it is very small.

MR. DURST: I believe it is in the nature of $100,000?

MR. TOMLIN: Yes, or 150, and it should be finished before 1982. In fact, if we are just talking about 1982, it wouldn't even appear on this list.

This top project here is a project we are doing. This particular one will be out on RFP. We are evaluating bids on it right now. It is done in conjunction with the previous project, the last project on the previous slide. It is to look at vulnerability of spent fuel shipping casks. We are actually doing some experiments in impacting these casks with shake charges to see what the source terms that might result from that.

MR. SIESS: What does secondary mean there?

MR. TOMLIN: Secondary would be a radiation leak from a secondary location, not the prime location where the shake charge hit it. There are internal pressures in the casks that are sometimes secondary areas for release.

MR. SIESS: Where does the primary come in, somewhere else?

MR. TOMLIN: The primary is the location where the cask is hit by the explosive charge, by the --

MR. SIESS: Yes, but this says you are doing source term characterizations and secondary violations. Are you doing something on primary violations?

MR. TOMLIN: Yes, that is the first one. Shipping cask sabotage source term assessment. There are two projects. That one is currently being done at Battelle.

We are talking about the last project on the first slide --

MR. SIESS: Yes.

MR. TOMLIN: -- and the first project on the second slide.

MR. SIESS: I guess I don't understand why they are separated. If I knock a hole in a cask with a shake charge and I get out 50,000 curies, am I worried about 500 curies coming out of another hole?

MR. DURST: I think I can answer your question. This

is a much studied problem by Bill McGee in research at Sandia, and as a result of those studies there was a ranking made of what were apparently developed with probable vulnerabilities of central casks.

They are both vulnerable to a shake charge penetration. There is relative ignorance about what impacts upon source term rejection from the assault that would occur. The project was designed which is being executed by Battelle Laboratories, and there is an engineering project which in effect may penetrate and stale fuel which is penetrative within a hot cell, and will come up with data which will at least give some -- -- information on the type of releases which the shake part penetration would make.

MR. SIESS: That is the first one.

MR. DURST: That is the first one. The second most probable method of attack, one which would be more simply executed and one which would demand much less fuel, the adversary, is in effect a massive blast attack or perhaps a more sizeable saucer attack or even a fairly massive shake charge attack.

This would create the primary release exits by the rupturing of some secondary parts of the cask, because of pressure set up within the cask and it would blow off.

MR. SIESS: And as you would destroy the cooling system or something of that sort but not breach the cask?

MR. DURST: That is right. Yes, but in those which have such a cooling system, that would be the cooling system, would be part of the dynamism of the --

MR. SIESS: The second part is where you don't breach the cask due to the --

MR. DURST: The second part is you don't necessarily have to breach the cask. You might, but that is not as important as the fact that what physical action the explosive attack makes upon the cask's ability to stay together and not have a secondary rupture.

MR. SIESS: I understand.

MR. LAWROSKI: What kind of studies are these -- experimental, analytical or --

MR. DURST: The one at Battelle is extremely experimental. It involves a fairly difficult engineering to permit actual stealing of the radiated material, the spent fuel pens, they are in a hot cell and do not blow the hot cell apart at the same time. That one is going on right now.

The secondary one is just the study for final word on the response to request for bids, and I am not privy to the three or four that have been offered as the final for the competition because they still have not been decided.

MR. TOMLIN: Okay, the next project is explosive attack on spent fuel pools. It is a new project that we are hoping to get started in 1981. In fact, the next ones on the list

are, beginning with explosive attack on spent fuel pools on down, are all new projects that would be started in 1981 -- well, the next three would be starts in 1981 -- explosive attack on spent fuel pools, spectrum of graded safeguards, and power reactor safety/safeguards interface, which is the discussion we have just had.

Those would be planned for an '81 start. The next three we are talking about an '82 start for those projects.

The second subject, the second supplement of our total program, material control and accounting: in FY 80 we are currently spending at the level of a million dollars. The plan for '81 is 1.4. The requested level for '82 is 2.4 and for '83, 2.5.

The first project is the large project at Lawrence Livermore Lab that you were again briefed on last year about this same time. We gave a detailed briefing on their development.

That project is planned to continue.

The second project, the material holdup studies, is a new project which we have not yet initiated, but we are in the final stages of developing the final statements of work and working, that is a project that was requested by the Office of Standards Development.

The third project, strategic analysis for safeguards system, is a new project planned to start in '81. It is looking

at basically the interrelationship of physical security and material control and accounting, and it will be answering some fairly specific questions.

The last project is a request that we have just recently received from the Office of Standards Development in which there is a program at National Bureau of Standards which is being phased down at the end of this year. This is one of the developments in that program at National Bureau of Standards that looks very promising. And the Office of Standards Development would like to continue funding that project.

We are in the process now of considering getting that funding and --

MR. SIESS: Who is funding it now?

MR. TOMLIN: It is being funded by the Office of Standards Development at National Bureau of Standards.

MR. SIESS: As effect of the systems program?

MR. DURST: No, not this specific project.

MR. TOMLIN: Not this specific project. This is an outgrowth of the project at National Bureau of Standards.

MR. SIESS: Okay.

MR. MARK: You say that is very promising. What does it seem to promise -- that you can do by a different means what you can already do or what?

MR. DURST: I think you are familiar with the program

of about five years, jointly with NRC, which the National Bureau of Standards executed. It was quite a sizeable program which went about a million and a half dollars a year.

It was a continuous program which took essentially a series of projects, four or five, in the areas of measurement, and pursued those projects under National Bureau of Standards supervision to create improved measurement standards for the nuclear industry.

That program is not to be funded in FY 81 by either DOE or the National Bureau of Standards. Now I can't be -- DOE may. I don't think DOE intends to make its contribution to the joint program. I know that the NRC does not.

The Office of Standards which was in effect the project monitor and in effect the NRC manager of the previous joint program has asked that this element which was proposed as a part of the much larger program if the NBS program had continued, be undertaken within our own research money. In effect, it is one part of a larger program which is about to die or has died, which the Office of Standards thinks has unique merit and wants it to be --

MR. LAWROSKI: What are the unique merits? You haven't answered Dr. Mark's question. What are the unique merits of this measurement scheme?

MR. DURST: I have not seen, nor has the office seen,

the technical details that would say what the unique merits are. This is a request from Standards to us stating that they want some research in this area, and they are going to define their needs and give the request to us.

MR. MARK: I can understand that it is new and different to use resonant neutron radiography. If you can already measure the U-235 without doing that, then you can meet the safeguards objective with existing equipment. Maybe you can't.

So I was really asking what capabilities, what new capabilities are opened up by doing this rather fancy and advanced type of neutron radiography.

MR. TOMLIN: Dr. Mark, I think --

MR. MARK: Is this the NBA way of --

MR. TOMLIN: Dr. Bob Shepherd, who is the, will be the project manager for that, maybe he can answer your question.

MR. SHEPHERD: It is the feeling of Standards, the Standards Bureau, the Office of Standards Development, NRC and Bureau of Standards, that this technique may prove to be a calibrate of reference -- -- technique that will calibrate the measurement of U-235 across the industry.

I am not sure, but it seems to be promising in terms of reference calibrating techniques.

MR. MARK: I am not fully clear yet. If we don't yet

measure 235 well, then I can't think of quantities we could measure, and I rather think that previous measurements of 235 as done by NBS and as put out in the standards, with a given counter operating in a given way and a given sample at this following spot, you can compare the number of grams 235 you have got in this box with the standard number, which is 107 that is in that box, and that that technique has been used for something, and improved I am sure, for something like three decades.

But this would replace it? I think it might warrant study to see if it could duplicate the results, but I can't see why it would be likely to give us more accurate measurements of the 235 atoms.

Frank, are you familiar with this?

MR. ARSENAULT: I am not intimately familiar with the project. I do know that the Office of Standards Development is seeking wherever possible to provide secondary references that can be used within the industry.

MR. MARK: If there is an easier way to use this in the field, that of course would have a very important aspect.

MR. SHEPHERD: That is the aspect that they will be looking at, being able to use it in the field -- see, the whole point is that the standards or the measurements must be referenceable back to NBS.

MR. MARK: Absolutely.

MR. SHEPHERD: Okay. And in doing that they see this as a tool whereby initially the Bureau of Standards will be the laboratory that does the reference measurements.

Okay, but then the technique hopefully will be moved from the Bureau of Standards into the field.

MR. MARK: Clearly that is what really matters, and if it is easier to use or calibrate across a wider range of compounds or something, then it has possible value.

I am still a little bit --

MR. DURST: I thought we had enough of those --

MR. MARK: I thought that the effort put on measuring 235 should have wound up that subject pretty well.

I am a little bit concerned with what wasn't an answer to my question, Jay; namely, that you stopped the development of standards even while they go on looking at proliferation resistant fuel cycles, for which standards obviously don't exist.

MR. DURST: The NRC has stopped its money in that joint project, that is correct. FY 80 was the last year in which funding for that joint project was in our NRC funding.

MR. MARK: And are we in the position that we have cross-reference standards for places like Barnwell or wherever else?

MR. ARSENAULT: It might be worth a few comments. First of all, the National Bureau of Standards, the AEC I think

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it was originally, I have subsequently heard, and the regulatory staff and subsequently the NRC. I have mentioned those to give you an idea of how far back it goes.

We viewed the question of what program should be instituted at NBS to support the industry in its nuclear materials measurements.

The conclusions of a working group were that the NBS should establish a program of technology development, measurement technology development, reference standard production, and workshops to transfer into the industry the capability of doing calibrations of secondary references that would allow their measurements to be traceable to National Bureau of Standards measurements.

Such a program was developed by the National Bureau of Standards and proposed through their budgetary procedures to the OMB, supported by -- I am not sure if it was DOE or ERDA at that time, and the NRC.

OMB in what appeared to be a fitful attempt, fitful last attempt, to maintain the concept of lead agency, suggested that the program was a good one and provided the people at NBS but not the funds, suggesting that they get the funds from NRC.

We had not funded for the program but were able by stretching out and decreasing the level of effort in other programs to fund that program to the tune of -- I have forgotten

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whether it was $1 million or $1.4 million -- during the first year.

MR. MARK: That is about 1979 or something?

MR. ARSENAULT: Yes, about, or 1978.

MR. MARK: 1978 perhaps.

MR. ARSENAULT: This was done by the Office of Research merely because we happened to have the largest available pool of funds, not necessarily because people thought it was research. They did not.

The second year it was taken over by the Office of Standards Development and funded. Their interest waned. They have decreased their funding two years running and have terminated, as I understand, terminated the program.

It is my understanding that this particular project is seen by the Office of Standards Development to be one that offers promise for providing secondary standards that will allow industry to trace their measurements to the National Bureau of Standards.

I personally have not evaluated it. We haven't looked into it deeply. It is a program that if I understand correctly will start in 1982. We have had lots of time to review it in detail before we in fact issue the funds.

So that is where it stands right now.

MR. LAWROSKI: Has a group of analytical experts looked at this?

MR. ARSENAULT: Well, as I have indicated, what we are doing at the present time is responding to the Office of Standards Development's perception of a need and a value in pursuing this project. One can only assume that in their management of the NBS contract, both their staff and the NBS have made this determination on the basis of some analysis.

We have not yet gotten into the act, as it were. We are in a responding mode at this time. We will of course be doing our own independent assessment of the value of this project. We are in fact monitoring for it.

MR. SIESS: Is it possible that they have simply run out of technical assistance money and would like for Research to fund it?

MR. ARSENAULT: Well, it is always possible, but this is, as I understand it at this time, more by way of a developmental project, and I would think it falls within the definition of research as used in the NRC.

MR. SIESS: And the other program didn't?

MR. ARSENAULT: No. The other program was really a service program, one of actually making available reference standards of conducting workshops for industry, of developing measurement capabilities at NBS which would then be transferred to industry.

It was much more an industrial support program, which was the basis for my feeling that the NRC should not be funding

it to begin with. But by squeezing it into a hole, the Office of Standards Development thought it to be much more responsive to their own direct needs. And it was in my view a legitimate if somewhat strained technical assistance program.

MR. MARK: I see, this isn't really a research program, I admit. I am not sure it is industrial support. It is industrial support or was originally. It now has other aspects, however. It comes up in a way which whether it is research or not must be a rather central concern to NMSS, whether or not the people who handle, receive, ship, and check inventories of this raw material are in a good shape for all mixtures of all compounds that appear normally, like this is carbide, this is oxide, so you get a different signal this time, and so on.

Are we all through with what is needed for secondary standard comparisons? Paul Baker?

MR. BAKER: I am not aware, I will put it this way, I am not aware of NMSS having reviewed this particular one at all.

MR. MARK: Well, how do you -- NMSS must be concerned whenever MUF is waved around. And the only way you know whether there is any MUF or not is whether this measurement and that measurement are properly cross-calibrated and the difference has any meaning.

MR. BAKER: That is correct.

MR. MARK: And one was made in San Diego and the other was made in Pennsylvania by students of a different school.

(Laughter.)

MR. LAWROSKI: That is only a part of it though.

MR. MARK: Oh, I know, it is just the most easy to describe.

MR. LAWROSKI: Because this will measure for you, what, presumably some concentration or something like it. Now you have to multiply it by something that probably has an uncertainty; namely, whether it is volume or weight, because you have a very poor representation of sample to get a product that then represents something that gets involved with MUF.

Are we keeping apace in the degree of accuracy which we measure U-235 with the way we can measure the material in storage in whatever form, waste or what else, the volume or mass of it and homogeneity?

MR. DURST: I can give a partial answer to that, although --

MR. LAWROSKI: As you know, we can measure the hell out of accuracy to a fair you well and maybe not be much better off when it really comes to the industrial problem.

MR. ARSENAULT: One of the advantages of what are loosely categorized as nondestructive techniques, such as neutron resonance --

MR. LAWROSKI: Well, I asked earlier whether there was

an NBA and I didn't -- nobody --

MR. ARSENAULT: I guess I didn't hear the question, but both neutron transmission, neutron resonance spectroscopy measurement techniques are -- I will use the word "inherently" nondestructive, except that I may be contradicted.

And one of the major difficulties in nuclear materials measurement in the nuclear industry right now is measurement of scrap in various containment. I believe that it is foreseen that this would have its principal advantage in that area.

MR. LAWROSKI: Well, that is what I wanted to hear, but whether that is a unique capability, that this offers prospects of that, or whether that is just a guess on your part now.

MR. ARSENAULT: Well, I know that the application to scrap measurement is foreseen. Whether or not that is the principal motivation behind this development I don't know.

MR. LAWROSKI: Los Alamos is you know, they are keeping it --

MR. ARSENAULT: Also, I think that I would not refer to this technique as a unique measurement capability because there are other approaches to the problem of measuring.

MR. LAWROSKI: Granted.

MR. ARSENAULT: I have already indicated that we are at this time somewhat in a responsive mode to those who we

presume have studied the thing adequately.

We of course will perform our own evaluation before we contract for this effort. But unless some of the staff is able to address this more fully than I, I have to admit to no definite knowledge.

MR. MARK: Questions of this sort certainly come up in things like the Livermore program. They have got to measure the atoms both at this end and that end of the pipe, and concentration is changed between the two ends and things like that. I don't know how much of that program, which is largely analytical, really relates to checking how good the measurements inherently are.

MR. ARSENAULT: The technique, as with neutron transmission techniques, and x-ray and gamma ray absorption techniques, offers promise for both nondestructive and in-line measurements.

Now I know that that promise is there. Whether that is the motivation for the development of this I do not know. I would point out --

MR. MARK: I guess I was speaking not so much of the resonance radiography as of the solid, solidity of our position in general.

MR. ARSENAULT: I was about to point out that contrary to my own inclinations as a matter of fact, the ACRS recommended last year that we direct more attention to the improvement of

materials measurement capability accounting systems.

MR. MARK: I am not sure we knew enough to know that we had to do that, but we felt that it was basic to the whole attempt to keep control.

I wanted to ask, I think we have done what we can with that at the moment, as you say, it is going to be considered further, the neutron resonance techniques --

MR. ARSENAULT: Yes.

MR. MARK: -- are still to be talked through.

Material holdup studies. I think I can understand where that comes in. I saw a reference somewhere in your plans to considering designs to do something about holdup, and I thought that sounded her strange. Why is it not that you are just interested in the holdup that is there instead of how you could change it. If you knew what is there, you don't care whether it is half as much or twice as much.

MR. TOMLIN: I am not sure what you are referring to. We are primarily interested in the latter of those two.

MR. MARK: There was something written about the program which sounded as if you were going to work hard to reduce the holdup, or improve the holdup scene in some way, and it wasn't clear why there was much of a need for that.

There may be a lot of need to know how much is in that drain.

MR. LAWROSKI: Well, what is this study of material

holdup? Is it -- what do you mean by what you are going to support?

MR. SHEPHERD: Mr. Chairman, what we have in mind here is the matter of Dr. Mark said, and that is we are going to be able to determine holdup in areas of the plant such as elbows, T's, joints of this nature, and if we can calibrate and come up with a predictive model that will characterize the holdup along the process in those areas, then we think that we are a long ways ahead in terms of trying to estimate what our holdup is from just an inventory.

MR. LAWROSKI: Gee, but that is so design specific that --

MR. SHEPHERD: No, we feel that an elbow, a T, or traps of this nature, may not be specific; we feel that those are generic to all plants. That is what we feel. And we are going to utilize if we can the new process plutonium line that is starting up at Rocky Flats to look at the clear solution now that is going through, starting in July, cold solution, and the hydrogen, and compare those analyses with the hot solution that will be running through a little later on.

Hopefully, that will be the start of our material holdup study.

MR. LAWROSKI: Well, but see, in one case I can arrange to have the elbow, so that there is -- connection so that there is a smooth transition through the thing; in others

I can arrange it so that it isn't that. And that is what I mean by site -- the design specific, you know. It will be influenced by how fast the flow is past the darn thing and so on.

MR. SHEPHERD: There is a lot of parameters of interest -- the whole range of temperature --

MR. LAWROSKI: (interrupting) I don't see how the dickens you are going to get something out of a particular study.

MR. SHEPHERD: I guess the whole idea is that we are not clear at this point what the outcome of this study is going to bring, but we do know at this point that material holdup is one of the classical hiding places for material unaccounted for, and we use that as a basis for trying to address that issue and then look at the whole of what comes out of the study.

MR. MARK: Well, I can see a great interest of getting in the position of knowing what the holdup is and being able to allow for it. I am a little less clear, when I read in -- I think it must be RES', this program description -- the requirements for new or retrofitted fuel cycle facilities, driven apparently by holdup studies. That could only be to change the holdup rather than to -- if you knew it you don't need to change it.

SPEAKER (ARSENAULT ?): That is not the purpose of the

study, however, Dr. Mark. The purpose is to try to get a handle on the vertical factors --

MR. MARK: That I can see a great use for.

MR. LAWROSKI: Provided you would get.

MR. MARK: Of course the need for --

SPEAKER: There is every possibility that we can cover all parameters at the site; some knowledge is better than none.

MR. MARK: It will have to be plant specific ultimately. Good design may be of some use too.

SPEAKER: We may come up with a practice.

MR. MARK: It will be different if it is at Savannah River or if it is built on top of a mountain in Denver.

MR. LAWROSKI: It is different whether it is sized for 3 percent to 35 or whether it sized for -- --

MR. MOELLER: I assume he is nearing the end, but on the previous slide he has the project on explosive attack on spent fuel pools, and I have asked it before, and apparently the answer didn't satisfy me, but it seems to me that the nature of this problem is directly proportional to the amount of spent fuel in the pools at the operating reactors.

So my question is who within NRC looks at this problem in conjunction with away-from-reactor storage, and my point being that if we had more rapid movement in developing away-from-reactor storage for spent fuel then the degree of the

problem at the individual plants, operating plants, would be reduced.

SPEAKER: Yes. It might be increased at the away-from-reactor storage.

MR. BASSETT: I believe that my presentation is going to deal with that.

MR. MOELLER: Thank you.

SPEAKER: In that connection, Dr. Moeller, Bill Hawes is here, and in regard to the previous attacks on casks, I think he can give us some clarification on this secondary emission.

MR. MOELLER: Right, and that would be involved also?

SPEAKER: Yes. The question was raised though as to the differentiation between primary and secondary releases by attack on shipping casks --

MR. MOELLER: You are talking about the distinction between the two projects?

MR. HAWES: Yes, the first part of the test has to do releases through the -- essentially considered the hole created by the explosive. Take, for example, a shape charge (inaudible) according to a cask.

A secondary violation has to do with things like to form the cask with a high -- -- a platter charge or breaching charge, the possibility of blowing off the (inaudible)

The reason why we separate it is because from a reference basis (inaudible) selected, it turned out to be a very nice point to separate. In other words, one thing we have ongoing details looking at direct integration, which involves the shape charge, the -- -- tank weapon, and the second study which will be going on very shortly is to cover major breaching charges and power charges which based on some experimental work at Sandia appear to lead us to believe that -- -- to secondary violations if there are violations at all.

MR. MARK: Mr. Tomlin, does that cover the points you had?

MR. TOMLIN: I have one more slide.

MR. MARK: Yes.

MR. TOMLIN: Funding here is relatively small compared to the other two. You can see the levels there. Communicate threat assessments and ongoing --

MR. SIESS: Large increases though?

MR. TOMLIN: I am sorry?

MR. SIESS: Percentagewise they are large increases?

MR. TOMLIN: Right.

(Laughter.)

Maybe we know what we are doing in here, maybe we don't. Either reason would apply, I guess.

Communicate threat assessments is an ongoing project. It is a cooperative project between ourselves and DOE and NMSS

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is also involved in sponsoring this. We are working also with the FBI. It is being done at Lawrence Livermore, and Livermore has several subcontractors on it.

The consequence estimation probably really shouldn't be in this slide. It is the project that you are going to hear discussed very shortly. There is really no money in it other than some money that, small amount of money that we supplied this year to finish the project. So it really shouldn't be in that list because it shows nothing for 81 or 82 in that funding.

The last three are new projects: the safeguards emergency communications project is a project that we envision would begin in FY 81. That is basically a safeguards piggyback on the nuclear data link.

The last two projects are projects that would be initiated in FY 82.

MR. SIESS: What is the research component of the last one, or those two, I guess both?

MR. TOMLIN: The last two?

MR. SIESS: They look like interesting projects, but I am trying to categorize them as research.

MR. TOMLIN: Okay. The safeguards post-incident project is one at which we would look at events that happen subsequent to a successful sabotage.

MR. SIESS: Have happened or postulated?

MR. TOMLIN: Postulated. We don't really have any "have happens." They are postulated events. Then we can relate those back into our development of safeguards. How would these events relate to safeguards development, things that you might do to prevent them.

The safeguards incident evaluation is really looking at incidents that have happened, if we can learn from those, such as the Three Mile Island incident. How are safeguards impacted by that incident?

I think there is probably a good bit we can learn from a study of that, since we have a large number of people on site. Safeguards have to be impacted by that large number of people.

A number of the licensees are reporting that they have large numbers of people on site right now. So that is the idea behind both projects.

MR. SIESS: Now the incident in the second one is not necessarily a safeguards incident. It is some incident at a plant like Three Mile Island.

MR. TOMLIN: Right.

MR. SIESS: Is that true also of the other one?

MR. TOMLIN: The other one would be more of a safeguards.

MR. SIESS: Okay, the postulated would come before the safeguards in that?

MR. TOMLIN: Right.

MR. SIESS: Okay.

MR. MARK: Is there some interlap between the last one on this slide and the middle one on the -- well, power reactor safety, safeguards interface, which is a program -- --

MR. TOMLIN: No, the safety, safeguards interface is following the line of questions we had with Dr. Michelson directly. The relationship of safeguards features in plants and how they impact on safety.

MR. SIESS: Plus or minus?

MR. TOMLIN: Either way.

MR. MARK: I think that was the point that was mentioned by this group a year ago as having a real need to see clearly through, and I guess the kind of thing which has been variously mentioned is going to be the main topic of that safety, safeguards interface which will be presumably a continuation of Sandia work on the --

MR. TOMLIN: Yes, that is the most logical place, right. We are just initiating that project. In fact, we are in the process right now of developing the statement of work for the project.

We have had some inquiries from NRR on the project. They have been quite interested in it. We have discussed it with NMSS and met with a varying degree of response there. Bob Burnett was at least in favor of our developing a statement of

work so that is kind of where we are right now, developing that statement of work.

MR. MARK: I was hoping it would sometime come into the picture when you have each piece of equipment in its own unassailable box and safeguards has been totally looked after, that one may go back and ask whether you can still run the plant.

(Laughter.)

MR. MARK: Safely, huh?

MR. SIESS: If you can't run it, it is safe.

MR. MARK: If that comes to the end of yours, I think it would be time for a break, and we would follow with some remarks, I think perhaps Baker is not necessarily closed, and then closed.

(A brief recess was taken.)

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AFTERNOON SESSION

(1:35 p.m.)

MR. MARK: Let's start with item 5 on the agenda, current status of the rules and guides.

MR. ALLEN: Okay, thank you. My name is Tom Allen. I am a section chief in the Regulatory Improvements Branch in NMSS.

What I am going to do today is to follow up on some discussions that took place at the subcommittee's February 21st meeting when the issue of regulatory guidance came up and there was at that time some apparent misunderstanding as to what guides were in effect now, what types of guidance materials were being used by the staff and by the industry in carrying out 7355, which is the safeguards regulation for power reactors.

I am going to recap briefly what we in regulatory improvements see will be happening in the immediate future with respect to changes in reactor safeguards regulations.

There is right now a revision of 7355 in the mill that has to do with vital area access. That rule change which basically enforces the need to have access to vital areas in a stricter fashion than has been done in the past, has gone out for public comment, and the comments are in now, and the staff is evaluating them.

By November 1st of this year the Commission wishes

that a replacement or some other measures to handle the issue of pat-down searches at power reactors will have been put into place, and the staff is now working on alternatives to handle that in the short-term.

MR. MARK: Could I ask with respect to the thing that is up for comment on this access to sensitive areas? Is there a proposal embedded in that which is the favored proposal, or are just options offered?

MR. ALLEN: No. It is a regulation which requires a more stringent control --

MR. MARK: Yes.

MR. ALLEN: -- already accessed, and it is done in such a way to limit the number of people who can enter a particular vital area within a facility. The past experience has been that by opening up the procedures for listing the people who can enter vital areas you end up with a very large list.

The goal of this particular modification was to reduce the size of the list to only those with true need.

MR. MARK: But it does not require that they have had a clearance investigation?

MR. ALLEN: No.

MR. MARK: Nor that there be buddies?

MR. ALLEN: No. We will touch on some developments that are coming up in the clearance area a little bit later on.

MR. MARK: And there is an objection to pat-down searches conducted on ladies by gentlemen? Vice versa?

MR. ALLEN: I think there is a general objection to it, as an infringement on personal privacy and so forth, and that is one of the concerns the Commission has had and one of the things that we are trying to address in coming up with a viable alternative to that.

As I mentioned, that we are required to have something done by November 1st of this year.

MR. EVANS: You might also mention, Ton, that from a security point of view there is some question as to whether your pat-down searches will advise you very much.

MR. ALLEN: Sure.

MR. EVANS: And that is one of the things that we are looking at, is the lack of effectiveness of that and whether there aren't more effective measures that can be taken.

MR. MARK: The airports almost do a pat-down search.

MR. EVANS: Only if they have gotten an indication from detection equipment, such as a metal detector, in that particular case.

SPEAKER: That is in this country. Get out of this country and -- --

(Simultaneous conversation.)

MR. ALLEN: In other areas we have now underway in

draft form changes to Appendix B of Part 73, which would have the effect of creating a regulatory base to allow us, or through the licensees, to more closely verify the applications submitted by prospective guard force personnel. That is now underway and is a Standards Development and NMSS co-effort.

MR. SIESS: Have you got an idea now as to how good guard forces are? Has it changed in, say the last year or so?

MR. ALLEN: I would say that with the advent of the Appendix B criteria that there is probably an improvement in the overall level of guard forces, yes, sir.

MR. SIESS: Do you know how many plants run their own guard force and how many contract it out?

MR. ALLEN: I don't have those figures available to me right now. I would guess maybe 50-50, Dave, would you say, proprietary?

MR. MATTHEWS: I can't say. The Office of -- Enforcement representative here might be able to answer that. They monitor those things.

MR. SIESS: Have you gotten a feel for which is better?

MR. MATTHEWS: I think you would probably find a variability among guard forces regardless of whether they are proprietary or nonproprietary that would be of the same order of magnitude.

In other words, there are some very good proprietary forces and some very questionable in terms of their turnover

rate and efficiency, in those terms questionable guard forces on a comparative basis, that are proprietary, and in the same vein contract guard forces vary over the -- -- as well.

Appendix B is basically a group of criteria in training requirements that are in the process of being implemented. There has been some attempt to standardize at least the qualifications of the guards and their training.

The licensees were required to submit plans, and those plans are all in for the operating reactors at this point in time which basically outline each of the major functional areas that a guard is expected to perform in. And then a person assigned in that functional area must be shown to have met a certain amount of qualifications, a certain number of qualifications, and must also have been shown to have been trained specifically for those duties.

Now that is a long process to make, with respect to turnover in existing guard forces (inaudible) on the force now and get them into duties that they are qualified for as opposed to having general duties. We expect that whole process to take maybe two years before there will finally be a complete implementation of what was intended in that part of the regulation.

MR. SIESS: Are there any initial qualifications for guards, or is it all in terms of training?

MR. MATTHEWS: No, there are initial qualifications.

They reside primarily in the area of physical qualifications.

MR. SIESS: Not mental or --

MR. MATTHEWS: There are no exclusive mental qualifications per se, except that the licensee must ensure that the guard before he is put on duty is subjected to psychological evaluation by a licensed psychologist or trained physician.

Whether that indicates any great predictive capabilities on mental stability I don't think it claims. But of course, as you might imagine, that really limits as to what we can do in that regard.

MR. ALLEN: Okay, if we can I will go ahead and proceed. What we are trying to do here is to describe some envisioned amendments to 7355, and we are going to discuss this within the context of what guidance is now and will be provided to the licensees and to the staff to help with the implementation of these things. We see beyond the verification of guard force applicant data that the insider protection problem has emerged here in the regulatory area, and over the next couple of years we see possibilities in that area of preemployment screening.

As a matter of fact on Tuesday the Commission gave the go-ahead to further examine that area, particularly for power reactors, and they have already decided to go ahead with a rule in the fuel cycle area on that.

Also, behavioral observation after the fact, after the

employment has taken place, the use of work rules, which is a new technology that we are examining now on functional zoning, area zoning of the facility, perhaps built along the lines of the safety trains in the case of the power reactor we are examining right now.

We have a study going on in that area.

Compartmentalization shows up as a potential technique, if it can be handled simply enough to accommodate normal activities. As you have seen, there are studies going on now that will feed into the regulatory process in that area, and we remain open to other techniques that may come along that will help us with the insider problem.

We see that there will be changes in the immediate future.

The core of the issue that we hope to touch on here is some of the problems we have in regulatory guidance, and that is the documents that are available to the licensees and to the staff in order to help them implement the requirements.

We will see here that much of the technical guidance that is now in place for power reactors specifically is obsolete based on the fact that 7355 was issued in February of 1977.

We will also see that many technical topics are not now addressed and that the guidance materials that are there now to a large extent do not address themselves to continuing

compliance in dealing with procedural matters rather than with capital expenditure types of equipment and so forth.

Moving on to the next slide, we are going to elaborate a little bit on the obsolescence of some of the materials. This is a sampling of some of the reg guides that are now available for licensees to use in the reactor area. And you can see that there is a problem with obsolescence in their dates as opposed to the date of 7355.

You will notice a couple of guides there that have been revised for the purpose of the fuel cycle facility upgrade rule, but which have not been rescreened to provid applicability to power reactors specifically.

MR. SIESS: The five reg guides are what category?

MR. ALLEN: That is plant protection, I think is the category that they fall into, plant and facility protection.

On the next slide we have listed some topics that just some of them, of a list of topics that are not now adequately addressed in guidance. You can see the vital area access requirements are not sufficiently addressed now, and it is somewhat understandable in that new requirements are coming down the pike and it is difficult for these guidance documents to anticipate the regulatory changes before they take place.

The same is true of preemployment screening, or the clearance issue, which is now coming into focus for us. The

work rule, compartmentalization, also emergency power systems for security equipment in particular. And I might mention, a standard format and content guide. That is the mechanism we use to tell licensees what to submit in their security plans. We have a draft document that has been used in the past by NRR but has never achieved formal status, and that document would naturally have to be updated to accommodate changes in the rules, and that hasn't happened yet.

MR. EVANS: Tom, you might mention that part of the reason for this review is as previously discussed, transfer of the responsibility to safeguards from NRR to NMSS. This has led us to do a fairly detailed review of what was in existence and what we felt needed to be done in order to assure adequate safeguards in the future.

I believe that the question was asked, that they do have the technical lead in this area, and this really is an example of some of the technical things that we are looking at now that we have that lead in NMSS.

MR. ALLEN: That is true.

MR. SIESS: What comes under the heading of compartmentalization techniques, with emphasis on the techniques?

MR. ALLEN: That may be a poor choice of words. It is addressing ways in which compartmentalization could be carried out and expressed in the form of guidance material, and I guess it would describe -- the descriptions that would be

offered there would concern themselves with the types of areas that could be compartmentalized and also address perhaps the barrier types.

MR. SIESS: Well, the basic approach would be first to develop criteria?

MR. ALLEN: That is correct.

MR. SIESS: And then second, as designs are developed to develop some basis for saying these solutions are acceptable. And that used to be what reg guides did.

MR. ALLEN: That is still the case.

MR. SIESS: And do the criteria exist or does that --

MR. EVANS: There is a contract that is being let for this beginning of Fiscal Year 81 that is tackling that exact problem. The first task in it is to define those criteria, which once the criteria is defined we will be able to move forward as you say into the specific regulatory guidance on alternatives to be used.

MR. SIESS: Now in connection with that first item, what Mr. Michelson said this morning I think is very appropriate. I think there has been a tendency to define vital areas as those related to systems related to safety, or safety-related systems or systems important to safety. There is various language in the general design criteria.

Some of the things that are coming out of the post-Three Mile Island studies suggest that there may be a gradation

of safety-related systems. Now whether that means there is a gradation of vital areas I don't know.

I find it difficult to grade vital areas, but it may extend the vital area concept quite a bit.

MR. EVANS: From a safeguards point of view that may also be the case. Right now there is a very large effort going on to look at all the existing sites that Mr. Matthews might can address some detail. But one of the things that we are finding is that in some areas it takes people having access to several vital areas to be able to sabotage the facility to get a release, whereas in other cases only one, and therefore, you would have a gradation from safeguards point of view as well.

MR. ALLEN: I think that the bottomline of what we are characterizing here is that there are some problems in providing a comprehensive set of regulatory guidance in the reactor area, and a similar situation existed in the fuel cycle area with the promulgation of the physical protection upgrade rule about two years ago.

What we will do here is to look at how a similar situation was handled in that case, and it turns out that what we have done is to compile a package of guidance for fuel cycle facilities into an upgrade rule guidance compendium. And it is clear that a similar type of effort might be worthwhile in the reactor area.

I would mention that prior to the transfer of safeguards functions from NRR over to NMSS Mr. Denton requested that a similar package to the upgrade rule guidance compendium be put together specifically for that purpose, to provide better adequate guidance in the reactor area.

The upgrade rule guidance compendium as we show here contained, or does contain a set of newly developed technical guides. You can see that the topics that are addressed there are more germane to the theft situation which exists at fuel cycle facilities.

Also within the upgrade rule guidance compendium there were implementation documents that were used specifically for allowing licensees to go through an orderly design process in meeting that new upgrade rule.

There were documents that explicitly laid out the staff's intent in certain parts of the regulation. There was also a standard format and content guide included in that package to help with the development of security plans.

I have got a couple of these volumes here today. You can see that they are quite voluminous. And I would note in the last bullet there that we included a bibliography of non-NRC technical guidance, which has been included in this package in microfiche form, which had about 200 other technical, referenceable technical documents to help the licensees through that better protection upgrade rule implementation.

MR. SIESS: I didn't get those last words.

MR. ALLEN: Okay. As an additional aid to the fuel cycle industry in implementing the physical protection upgrade rule this package was put together. And we included a set of non-NRC generated technical documents that were referenced within the rest of the material. They included some mil spec materials where they were applicable, some DOE handbooks on entry control, that sort of thing that were included in here, that were of value and could be referenced elsewhere as vital documents to help the licensees through that process.

MR. SIESS: Does that include, consistent with endorsement by NRC? If an applicant says I am going to do what one of these things says --

MR. ALLEN: No. In the beginning of that particular bibliography section there was a caveat, and then there is a caveat that explains that while much of that technical information is of value that some of it would not be applicable and would not necessarily correspond to NRC's policy.

A good example of this, I think, is in some of the specifications that are included in there on locks, they happen to be military specifications, there is a requirement that keys be stamped "U. S. Government," that sort of thing, are clearly nonapplicable.

Elsewhere within the document we make numerous references to portions of the data base that is included in that

bibliography that are referenceable and are considered acceptable by the staff.

So we did do a culling job on that.

MR. EVANS: In addition, I might add that we established a group that was available to the licensees, that if they had any question about whether one of these technical specifications was irrelevant to the upgrade rule they could call and we could give them the answer.

MR. ALLEN: So what we have is a situation where for a relatively small number of facilities a rather exhaustive job was done in providing regulatory guidance, that being the fuel cycle area. And what we see is that in the power reactor area we can pick up quite a bit from that original process because there are some applicable portions of that work and add to that those aspects of power reactor physical security guidance that are now lacking and provide a similar set of guidance materials for the power reactor licensees.

What we have on this slide is a listing of some of the technical guides that we would envision would have to be developed in order to do an adequate job of that. These guides would be developed in a cooperative NMSS and SD project.

You can see that the areas that we have regulatory changes coming up in and in areas where we have inadequate existing guidance are the ones that are going to get the most intensive coverage here.

You also see that a standard format and content guide in the implementation area and what we call an intent and scope guide, which is a way that we package up statements of staff intent for individual regulatory provisions would also be included.

Within the NMSS funding that would be dedicated to this, we plan now to spend about 140 K in FY 81 and 200 K in FY 82. These monies would be used in addition to SD monies that would be dedicated to this. I think that in a previous presentation we saw about a 100 K of their money will be going into this area.

MR. SIESS: These monies are included in that list we had earlier?

MR. ALLEN: These are --

SPEAKER: Yes.

MR. ALLEN: They are for NMSS. Yes, they are.

The schedule that we anticipate now, given the regulatory changes that are coming up in our manpower is that we would be able to start on this in October of this year, start to get early guidance materials by the first couple of months of Calendar Year '81, and these guidance pieces, documents and so forth would continue to be produced through mid-1982.

That pretty much concludes what we have.

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MR. SIESS: I have got a question. I am not quite sure it goes here, but since Carl Michelson is back and you at with NMSS?

MR. ALLEN: That is right.

MR. SIESS: As far as power reactors go, I think we have had only one proven identified case of successful sabotage, and that was the fuel elements at North Anna?

SPEAKER: Ferry.

MR. SIESS: Ferry. Okay, right company, wrong plant.

As I read licensee event reports, every once in a while I spot one that says the cause was undetermined. It was a valve left open and nobody could find any record that there was any reason to open or close that valve or that anybody was working in the neighborhood and so forth.

Does anybody in the organization, including Carl's group, look at some of those things and do a little detective work to see if there might have been a clumsy attempt at sabotage or just plain vandalism or whatever it might be?

I would say I see one of those on an average of -- I don't see all the LER's and I guess I see one about once a month. But you could put a question on it. Is this done deliberately?

MR. ALLEN: And I was prepared to discuss that in light of current events. There is a current events briefing scheduled for later in the day.

MR. EVANS: The one other point that might be left here is that in terms of the guard screening area, the Commission has, as of day before yesterday, ordered us to develop a rule along the lines of ANSI 1817 for both screening and behavioral observation of guards at power reactors. In addition, though, we have been asked to do a quick fix to take care of the problem that developed at TMI, where we had a newspaper reporter who ended up on the guard force, and we're working that now. That means that, in effect, we'll have a quick-fix type of rule for the power reactors in that kind of area as well as a long-term solution, which means you'll probably find this guidance stage again over both the quick-fix side and the longer term.

DR. SIESS: Well, I've seen a lot about the guards, and I guess all about their training and weapons, et cetera. But what I have heard that bothers me most is that in some instances, I don't know how many, guards are essentially paid the minimum wage or a little bit above it, and I don't know how much access they have to the plant, but I guess if I were looking for somebody in a plant to subvert they'd be the first ones I'd look to.

MR. EVANS: One of the reasons for the strengthened vital area access rule is exactly that. In the past there has been a tendency at some of the sites to include almost all

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employees to have access to almost all areas. And with this new rule we will be able to change that.

DR. SIESS: The guards don't necessarily run the plant, like that guy at Three Mile Island did.

MR. MATTHEWS: They don't necessarily, but there are some instances where they may. Many utilities look upon restrictions on guard access in differing ways, as you might expect.

DR. SIESS: But, see, if I could subvert a guard, then I could get somebody else in there. If he just was somebody controlling access.

MR. MATTHEWS: That's right. It's a big problem.

What we have asked is that licensees ensure that the guards are capable of gaining access to vital areas under emergency conditions or in response to a Safeguards incident or alarm.

DR. SIESS: You're missing -- the point of my question is, guards are low-paid people: has anybody looked at the possibility that an outsider individual or group gets to the guard and through the guard gets to the plant?

MR. MATTHEWS: That is an assumed portion of the so-called design basis threat, against which we ensure that the security plans have provisions to --

DR. SIESS: If I can subvert one guard, I probably can subvert three just about as easily.

MR. EVANS: Well, of course, one of the things that may happen in addition to them having to just subvert the guards to get the access is they may have to have somebody with them. One of the things we're looking at is whether you need to have, say, a two-man rule to make sure that someone is always observing someone else. So then they'd have to have a conspiracy that gets fairly large.

DR. SIESS: Well, the two-man rule is good, but who enforces the two-man rule? Who sees that there are two men?

MR. EVANS: Anybody that would be at the facility. That's one of the things where you want to have an education program of your entire employee force.

DR. SIESS: You see, if he can -- if he could keep tracing this back up to where you only have to get to one or two people to subvert everything below them, then the system isn't any better than who controls them.

MR. EVANS: Well, we've got to make sure that it can't get down to just one or two people. And that's one of the things, that's one of the reasons we're going through this exercise, is because we have that very concern.

DR. SIESS: You know, on the insider threat, I was thinking about Three Mile Island, and just as an example, not a hypothesis because there's no evidence to support this whatsoever, but let's assume that the people in the control room did what they did with malevolent intent -- which would be a good, one,

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you know, it's probably a better explanation of it than anything else I can think of right now, because I find it difficult to understand why they did the things and all the inquiries have found it difficult to understand why they did some things. But let's assume that they did it with malevolent intent. There was no harm to the public. Are there other things they could have done with malevolent intent that could have led to harm to the public? And how could they have been prevented?

See, the control room is a vital area.

MR. EVANS: It is.

DR. SIESS: And control room operators are subjected to a heck of a lot more screening.

MR. EVANS: Mm hm. And a lot more training. And I assume the answer to that --

DR. SIESS: I think the number of people involved here eventually would have been so many that the hypothesis would begin to get absurd. But I don't think there's anything that could have prevented a couple of more mistakes or actions from having let a lot of stuff out of containment.

I don't know whether you can open a purge valve or not under the circumstances anywhere manually, I mean, from the control room. But there are a lot of scenarios you can kick around. And you've got history behind some of them.

CHAIRMAN MARK: Okay.

DR. SIESS: Sorry for the digression.

CHAIRMAN MARK: You're referring to the fuel cycle guide, which has been in place, I guess, for something like two years?

MR. ALLEN: The drafts of the fuel cycle guide were provided to the industry last March. And the final versions will be, printed versions will be, to them within the next couple of weeks.

CHAIRMAN MARK: So it isn't absolutely formally in place, although it's effectively in place?

MR. ALLEN: It is effectively in place.

MR. EVANS: It is being used by them, but it has not been officially published as a final document.

CHAIRMAN MARK: And has it been found appropriate to keep revising it right up to the present time in some details?

MR. EVANS: Not only that. We've now scheduled that it will be revised on an annual basis, so that there will be a periodic revision.

CHAIRMAN MARK: All right. So looking towards that for the formulation of what you have ahead of you later in the year, you'll be looking at a quite current document --

MR. EVANS: Yes, sir.

CHAIRMAN MARK: -- and changes in one would imply the question, at least, of changes in the others?

MR. EVANS: Yes, sir.

CHAIRMAN MARK: Now, when you say "guidance needs," I

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seem to see close to a dozen little buttons --

MR. ALLEN: Yes, sir.

CHAIRMAN MARK: -- bullets here. Does that mean a dozen books the size of one of those?

MR. ALLEN: No. This document --

CHAIRMAN MARK: Good.

MR. EVANS: No, they're all included within.

MR. ALLEN: This document contains everything that was packaged together for the fuel cycle area, and it included about 20 or so NRC documents of the magnitude of the ones you see listed there. So you're talking about --

CHAIRMAN MARK: So what you'll be talking of is a package of about that sort?

MR. ALLEN: When you take the newly developed reactor materials and augment them with some of the applicable materials from here, it may be this size, but the magnitude of the effort would be considerably less than this, because of the fact that there are applicable materials from here that can be used in the reactor side, too.

DR. SIESS: Who's supposed to read those?

MR. ALLEN: The licensees read them with a considerable amount of interest and use them, particularly in the fuel cycle area.

MR. EVANS: It's not page for page, and we don't want to give you that impression.

O-7

DR. SIESS: No.

MR. EVANS: If they've got a particular problem, all of this is referenced to specific components.

DR. SIESS: Licensing project managers? Reviewers?

MR. ALLEN: Yes. The person at the licensee's facility who is responsible for implementing the NRC's regulation. And in the case of the fuel cycle area you're talking of the upgrade rule, or 7320.45 and -46.

DR. SIESS: For power reactors who reviews the security? NMSS men?

MR. ALLEN: Yes.

DR. SIESS: It's sent over by the licensee project manager to NRR?

MR. ALLEN: Right.

MR. EVANS: Right.

DR. SIESS: And NMSS reviews it?

MR. MATTHEWS: That goes to the licensing branches in NMSS.

MR. EVANS: And then after we make our determination it goes back to the project manager at the end of the line.

MR. MATTHEWS: Much in the way that people in the AEC days, those would be the type of review that operated with regard to the licensing project managers. We make the final determination on the acceptability and they basically implement it in terms of the paper.

JO-8

DR. SIESS: Except it goes out of one office.

MR. MATTHEWS: Right. They like to maintain total control of the license from that standpoint.

CHAIRMAN MARK: In the past it has been said by research that in the preparation of these guides there were certain studies had to be conducted by them and that they took some part in helping the implementation and experience of the application of the new rule before it was finally put in the hands of I&E, or that research programs were called on in that respect. Does this -- pardon?

MR. MATTHEWS: No, I'm sorry.

CHAIRMAN MARK: I'm wondering if implied here with the imminence of the guide package you're speaking of that sort of requirement of research will have been terminated or is within sight of being finished.

MR. EVANS: There's an example that we could cite right now where research is supporting us in looking at what the effectiveness of some of the alternatives are to pat-down searches, for example. And doing that it actually -- are you all familiar with the "mate" process that was done by SAI? It allows us to do a computer sort of diversion path analysis at fuel cycle facilities. That has been modified to allow us to take a look at what paths there would be for sabotage of a reactor and what kinds of safeguards, procedures, and components could be put along those paths and which would be the most effective as

an alternative, say, to pat-down search. Research is supporting that, doing that work for us.

MR. ALLEN: And that work is being done in a time frame that will feed into this short-term development, that particularly one is going to be done by before November.

And I'd say that in general we try to use research products a lot in our thinking for regulatory changes.

MR. EVANS: Basically, they -- we try to use them to develop a technical basis for which we can then determine the -- utilize it as a basis for determining the safeguards level of performance that ought to be achieved.

I think a very good example of this is the sabotage of spent fuel casks research that you had mentioned to you earlier today, where they're actually testing a mock miniature cask and seeing how much release we can get when we subject it to explosives. Once that release is determined, we will know what level of safeguards should be put on spent fuel shipments. As you know, we issued an interim rule putting a level of safeguards on them that was really just a best guess. We don't have a good technical basis for what the right level is, and research is developing that technical basis for us. And that's how we try to use them in the regulatory process.

CHAIRMAN MARK: But in the physical security of plants, power plants in particular, there would not be a large number of projects --

MR. EVANS: No, sir.

CHAIRMAN MARK: -- still having to be entered, anyway, well, on comparing infrared with other kinds of interceptors, for example?

MR. EVANS: Not in terms of any near-term regulatory process.

CHAIRMAN MARK: True, that can happen.

MR. EVANS: I would never want to preempt them from saying that maybe DOD had come up with some new way of doing that kind of interception; we might want to look at it for applicability to reactors and we might ask them to go ahead and do that. But in the near-term the answer to your question is no.

CHAIRMAN MARK: With respect to the '82 budget there aren't new items that have to be thought of of this sort?

MR. EVANS: Not that I'm aware of.

MR. DURST: I'd like to, before I respond to that, preparing to respond to that -- the example that they cited previously about equipments and technical capability, you gave the specific example of infrared, all such preliminary researches almost by gentlemen's agreement go to the DOE bailiwick and they have funds greater than our much more limited monies to evaluate equipment.

The second question, the one you just asked, I'll let Gerry Tomlin comment on. I would make the general comment that, as he stated, the aggregation of suggested projects for FY '82

has various ranges of realism. Some of them our people downstairs want very much. Bud Evans just gave an example. You will notice now in the '82 program the results of the cask penetration research, which are, you know, a very basic part of (WORDS UNINTELLIGIBLE). There are in there some others that, you know, are just started or are just about to begin, and, you know, the personality that they develop and the utility of the results will be somewhat dependent upon what the contractors turn out. There are, finally, some things in there that right now are just best guesses. We're talking now about a project which will really get (WORD UNINTELLIGIBLE) formulation about the (WORD UNINTELLIGIBLE) level. And it is, indeed, probable when we bring you a list back next year that one or two of them will fall by the wayside, either because it wasn't a good idea or, secondly, because some other new ideas were generated, either by NMSS or us, that seem more reasonable competitors for the number of dollars we have.

CHAIRMAN MARK: I'm thinking that a year ago, or perhaps a year and a half ago, I'm looking forward, there was a fairly large block of stuff which was in progress which was, in fact, associated with the implementation or finalization of the upgrade rules; and that has been, to a considerable extent, worked through. I'm not going to object if a year from now someone says they've had a better idea and similar work is called for.

MR. EVANS: As of now I think you're right, that the

basis in this particular area is pretty much established; there is some work still going on. And once we do have that basis, then the answer is no, there won't be a large number of projects.

CHAIRMAN MARK: Well, you don't now foresee a large number.

MR. EVANS: We don't. That's right. It's a bit of both.

CHAIRMAN MARK: Anything else, Chet?

DR. SIESS: No.

(Pause)

CHAIRMAN MARK: I think that for the whole of items VI and VII, which are the last two that we have not gotten to, we will have to close the meeting. Unless there are things overlooked that we should discuss.

What are the grounds?

(Pause)

The thing which I guess doesn't belong in a closed session: there is under consideration the question should we, shouldn't we, meaning NRC, or NMSS, publish the planned routes for shipments of NMS material. Or spent fuel. Possibly damaging material. We're not -- I guess SNM is mostly DOE.

MR. EVANS: Well, we have some SNM, but there's never been any question, to my knowledge, raised about releasing the security information related to routes of SNM.

CHAIRMAN MARK: They are not made available?

MR. EVANS: So -- they are not made available and we have not been asked to make them available. And, in fact, there is legislation that is about to come out of Congress and go to the President for signature that will give us specific authority to keep from making them available. So that is not a problem.

DR. SIESS: But I think it's just the opposite on spent fuel, isn't it?

MR. EVANS: Yes, sir.

DR. SIESS: Isn't there a bill in Congress to --

MR. EVANS: Yeah, the bill in Congress specifically exempts spent fuel from the point of view of the route and the quantities of shipments, only those two things. Now, I --

DR. SIESS: And there's nothing, nothing that says that shippers of toxic chemicals or flammable materials have to publish their routes and schedules.

MR. EVANS: That is a very true point.

DR. SIESS: I cross the railroad twice a day, and I wished I knew their schedule.

MR. EVANS: And it sticks in the craw of a lot of people that that is the case. But we're dealing with emotions here, I think, more than anything else.

CHAIRMAN MARK: Now let me clear -- you are going to be asked to publish these schedules?

MR. EVANS: No, sir, that's --

CHAIRMAN MARK: Or legislated that you should? Or

what?

MR. EVANS: What we are, what it appears we will be required to do by legislation is to publish the approved spent fuel routes and the quantities of shipments -- not the schedules -- to the public in general.

DR. SIESS: Does the legislation require that you, it says you cannot keep it from the public?

MR. EVANS: Those two things.

DR. SIESS: But does it say you must publish it?

MR. EVANS: It says we must publish it, yes, sir.

DR. SIESS: I didn't see that.

MR. EVANS: Now --

CHAIRMAN MARK: Wait a minute. What is must you publish? When we ship through from this plant to that we will use Highway 13 -- that gets published?

MR. EVANS: We either publish beforehand or on FOIA given out for request. I mean, you have to give it out.

CHAIRMAN MARK: If something is leaving at five tomorrow afternoon, on a route that is known --

DR. SIESS: Well, they don't have to fill an FOIA request unless it's two weeks. So --

MR. EVANS: We have -- that's right. And we don't learn about the time that it's going until seven days beforehand.

CHAIRMAN MARK: Okay. So the exact timing of a shipment --

JO-15

MR. EVANS: Is not.

CHAIRMAN MARK: -- is not involved here. But the fact that you will be using either Highway 13 or, on rainy days, 17, that kind of thing would be?

MR. EVANS: Yes.

CHAIRMAN MARK: But you're not tied down to say we will always use just this set of roads?

MR. EVANS: No. We are tied down to say that only a certain set of roads have been approved.

CHAIRMAN MARK: But you can approve alternate routes.

MR. EVANS: And there might be three alternative routes.

DR. SIESS: Including secondary routes.

MR. EVANS: Whatever routes that --

DR. SIESS: Actually, the secondary roads, the ones closest to the point of origin and point of destination, are pretty much fixed anyway, I guess.

MR. EVANS: There are usually more than one alternative set of secondary roads that will get you to an interstate.

CHAIRMAN MARK: Right. From Green County you could have gone either upriver or down.

DR. SIESS: That extends the saboteur.

CHAIRMAN MARK: Except that going down you would have hit a railroad overpass the truck wouldn't go through. So you didn't have to publish it.

JO-16

(Laughter)

MR. EVANS: Now I would like to add a caveat. There's an additional section in this rule that relates not to the release of this information to the public but, rather, to the release of this information to governors' offices. Now, as it relates to the --

DR. SIESS: Do you make a real distinction?

MR. EVANS: Yes, sir, because the legislation says that the material we give to the governors goes beyond the routes and the numbers of shipments but goes to schedules and security and so on. However, it also says that the governors' offices must protect it as security information if we ask them to.

DR. SIESS: But if they're going to use it for any purpose they can't really protect it that well; they'll have to notify a lot of people.

MR. EVANS: What they do usually -- and we have worked with the states in this in the past -- is they put out on their police channel, so it stays within the enforcement.

DR. SIESS: Which any scanner can pick up.

CHAIRMAN MARK: The Harrisburg reporters are listening on that.

MR. EVANS: Well, as I understand it, it's a teletype.

CHAIRMAN MARK: Oh.

MR. EVANS: Not a radio.

CHAIRMAN MARK: Not a CB.

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DR. SIESS: But still, something is hardly secret after it gets past one person.

MR. EVANS: That's right. It's a matter of how much do you limit the circle.

DR. SIESS: And it's a question of timing.

MR. EVANS: Yes, sir.

MR. MATTHEWS: The intent was to keep it in official channels, at any rate, with regard to the mandatory release.

DR. SIESS: But wouldn't normal practice notify local police of potential shipments that are subject to possible sabotage?

MR. MATTHEWS: No, we've never notified --

DR. SIESS: You don't, you've never relied on local police protection?

MR. MATTHEWS: We do in advance approval of routes, we do often check with the local police to make sure that some route is okay from a construction point of view, from the point of view of safety, bridges will hold the quantity of the shipments, and that kind of thing. In terms of telling them the specific time the routes coming through, we have not done that in the past. We have, instead, notified the state police.

DR. SIESS: Okay. The state police. And on SNM do you rely on local or state law enforcement officials at all?

MR. MATTHEWS: Yes, definitely. SNM transport licensees are required to make contact, not necessarily at the time of each

shipment, but prior some time to making a shipment they are required to ensure that they have a point of telephonic contact with law enforcement agencies every 50 miles along the road. They basically have had to have done, how would you say, liaison with those local law enforcement agencies.

Now, we did that liaison, meaning the NRC did that, from an operational standpoint initially with many of the SNM routes. Okay, they are expected to maintain those contacts and ensure the accuracy, let's say, of the numbers of contacts.

So there has been prior contact, but there wouldn't necessarily be calls to down the road saying now we are starting.

DR. SIESS: Well, now, in terms of, say, a spent fuel shipment, notification of local authorities could have two purposes. One would be for assistance in case of an attack. Or the other would simply be for assistance in the case of an accident. Or on an attack -- the consequences of an attack, not preventing one but --

MR. MATTHEWS: Mm hm. Mitigation.

DR. SIESS: -- mitigation of consequences. Is it clear which is which? Do the state officials have any idea of how they intend to use this information?

MR. EVANS: Some states have planned it better than others. I participated in a meeting with the New York State officials in Albany, where they had in attendance both the state police and the emergency planning offices. And they made a

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determination that the state police would be our point of contact and that the state police would give that portion of the information that was needed by the emergency planners to be prepared to help mitigate the circumstances, would give those to the emergency planning office.

Now, other states have not yet had the interest in spent fuel shipments, because they haven't had them like we had in New York with Chalk River Run, and therefore they are not as far along in their planning along those lines. And I'm not sure, but I wouldn't say that all 50 states understand that distinction. But I think the ones that the shipments are presently going through have a pretty good handle on it.

DR. SIESS: Now, for SNM you depend on DOE, essentially, for protection, don't you?

MR. EVANS: No, sir. We have private shipments.

DR. SIESS: But I mean --

MR. MATTHEWS: The majority of SNM moving in the country would be --

DR. SIESS: DOE protects its own. They don't really depend on local --

MR. MATTHEWS: That's right.

CHAIRMAN MARK: Do you and DOE follow the same rules in respect to what we're talking of?

MR. MATTHEWS: There's a general consistency.

MR. EVANS: They are comparable and compatible Not

identical but equivalent levels of protection.

CHAIRMAN MARK: Well, if by fiat they were made identical, it wouldn't impose much change in what you do?

MR. EVANS: No, the only major difference is that DOE has developed a communications system which we -- our licensees -- they don't want to give our licensees access to. But our inspectors will be equipped with that and they will follow the shipments. So I think we come pretty close.

CHAIRMAN MARK: Are there, from your point of view, large concerns over the legislation that's likely to go ahead?

MR. EVANS: We would have preferred it to have not required as much release as it did, but we don't think that it is such a significant impact on security that we can't live with it. We will be giving up some amount of assurance by giving out this information, but we feel we can live with it.

DR. SIESS: My first impression was one of dismay; and then as I got to thinking about it, I suspect that a real good saboteur or -teurs would not gain an awful more that way than they could gain in other ways. I think they probably would have sources of information and would have researched the thing thoroughly.

If somebody just wants to go out and put a blockade across the highway and lie down in the middle of the pavement, that, of course, makes it easier for them to do it. But that's not a threat. That's --

JO-21

MR. MATTHEWS: Harassment.

MR. EVANS: Well, but it really is a matter of subjective judgment as to how much assurance of security you give up by publishing this information. And as I say, I think everybody would agree that you give up some amount. But I also think that most of us in the security world would say that it's not so great an amount that we can't live with it.

For example, we do not recommend to the Commission that they ask the President to veto the legislation based on that.

CHAIRMAN MARK: You gain something, I suppose, in that the local authorities will have a slightly easier access to stuff that you might on occasion want them to have. They will have it all the time, but once in a while you might be glad that they had it.

MR. MATTHEWS: We felt that the licensees could carry out that communication without any deterrence.

DR. SIESS: Once you start shipping spent fuel again, which we're not doing right now very much, except for a little transfer, there's going to be a -- well, a shipment a week, or two a week, going out of some of these plants.

MR. EVANS: We estimate between 300 and 500 shipments a year.

DR. SIESS: Well, I was saying of a given plant, to get rid of the stuff they've got in there.

MR. EVANS: Right. Some more than that.

DR. SIESS: It's going to be going out very frequently.

MR. EVANS: One might go every day or twice a day.

DR. SIESS: And three months of observation and I can establish the patterns.

MR. EVANS: Sure. That's true.

DR. SIESS: And I don't have to get it from the --

MR. EVANS: And in that particular case, unless they use alternative routes, which they could, then in that particular case you don't gain much from the security of the route. On the other hand, if you have a shipment like --

DR. SIESS: If there's any pattern to the alternative routes they haven't gained. But if they do it randomly that's all right.

CHAIRMAN MARK: A year or two ago there were large questions up in the air as to whether you'd have to ship the stuff from Long Island by sea to Japan or some place else. What is the status, generally speaking, of getting stuff away from Long Island to where you might need to have it go?

MR. EVANS: I'm not totally familiar with it. Do you know how that --

CHAIRMAN MARK: Well, if -- it was purely out of idle curiosity. It's not quite relevant to this discussion, I know.

MR. EVANS: I believe that Brookhaven has decided that they can live with that problem until DOT comes out with its hazardous materials act, which will preempt local rules in the

area of spent fuel shipments, in which case that problem will go away. The schedule for that is within the next year.

CHAIRMAN MARK: And you'd be equally affected by that?

MR. EVANS: We will be affected in that they reference our rules, and if a locality goes beyond our rules then their laws could be challenged in court and would probably be struck down based on federal preemption.

CHAIRMAN MARK: Anything else on that?

Well, I think, then, what we do have is these next items. We'll declare a five-minute break and resume in closed session from then until the finish of the meeting.

NUCLEAR REGULATORY COMMISSION

This is to certify that the attached proceedings before the

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in the matter of: ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
SUBCOMMITTEE ON SAFEGUARDS AND SECURITY
Date of Proceeding: June 26, 1980

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.

Suzanne Babineau

Official Reporter (Typed)

Suzanne Babineau

Official Reporter (Signature)

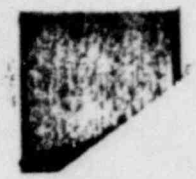
Tape 1

NUCLEAR POWER PLANT DESIGN CONCEPTS FOR SABOTAGE PROTECTION

DAVID M. ERICSON, JR.
G. BRUCE VARNADO
SANDIA NATIONAL LABORATORIES

OBJECTIVES

- ESTIMATE THE POTENTIAL VALUE OF PLANT DESIGN AND DAMAGE CONTROL MEASURES IN PROVIDING PROTECTION AGAINST SABOTAGE AT LWR PLANTS
- ESTABLISH THE IMPACT OF SUCH MEASURES ON PLANT COSTS, OPERATIONS, AND SAFETY



DESIGN OBJECTIVES FOR RISK REDUCTION

- DECREASE THE NUMBER OF SEQUENCES WHICH COULD CAUSE RELEASE
- INCREASE THE NUMBER OF INDIVIDUAL ACTIONS REQUIRED TO COMPLETE A SABOTAGE SEQUENCE
- REDUCE THE PROBABILITY OF SUCCESS IN SABOTAGE SEQUENCES
- REDUCE THE CONSEQUENCES OF COMPLETED SABOTAGE SEQUENCES

EVALUATION CRITERIA

- VALUE MEASURES

  REDUCTION IN NUMBER OF TYPE 1 VITAL AREAS

  REDUCTION IN NUMBER OF UNPROTECTABLE TARGETS

  INCREASE DIFFICULTY OF MOVEMENT FOR ADVERSARY

  PROBABILITY OF SEQUENCE INTERRUPTION/NEUTRALIZATION

  CONTROL OF INSIDER ACTIVITIES

- IMPACT MEASURES

  INCREMENTAL CHANGES IN COSTS (CAPITAL AND OPERATING)

  EFFECT ON SAFETY

  EFFECTS ON OPERATIONS

    OPERATOR ATTITUDE/PERFORMANCE

    MAINTAINABILITY

DESIGN STUDY TECHNICAL SUPPORT GROUP

- REACTOR VENDORS, UTILITIES AND ARCHITECT-ENGINEERS
- REVIEW AND EVALUATE DESIGN OPTIONS AND DAMAGE CONTROL MEASURES
- PROVIDE DATA AND TECHNICAL ANALYSIS
- PROVIDE ADVICE ON OPERATIONAL IMPACTS

TECHNICAL SUPPORT GROUP PARTICIPANTS

INTERNATIONAL ENERGY ASSOCIATES, LTD

NUCLEAR PROJECTS, INC.

COMBUSTION-ENGINEERING
GENERAL ELECTRIC
WESTINGHOUSE
BABCOCK AND WILCOX

BECHTEL
SARGENT & LUNDY

DUKE POWER CO.
COMMONWEALTH-EDISON
NORTHERN STATES POWER*
POWER AUTHORITY STATE OF NEW YORK*

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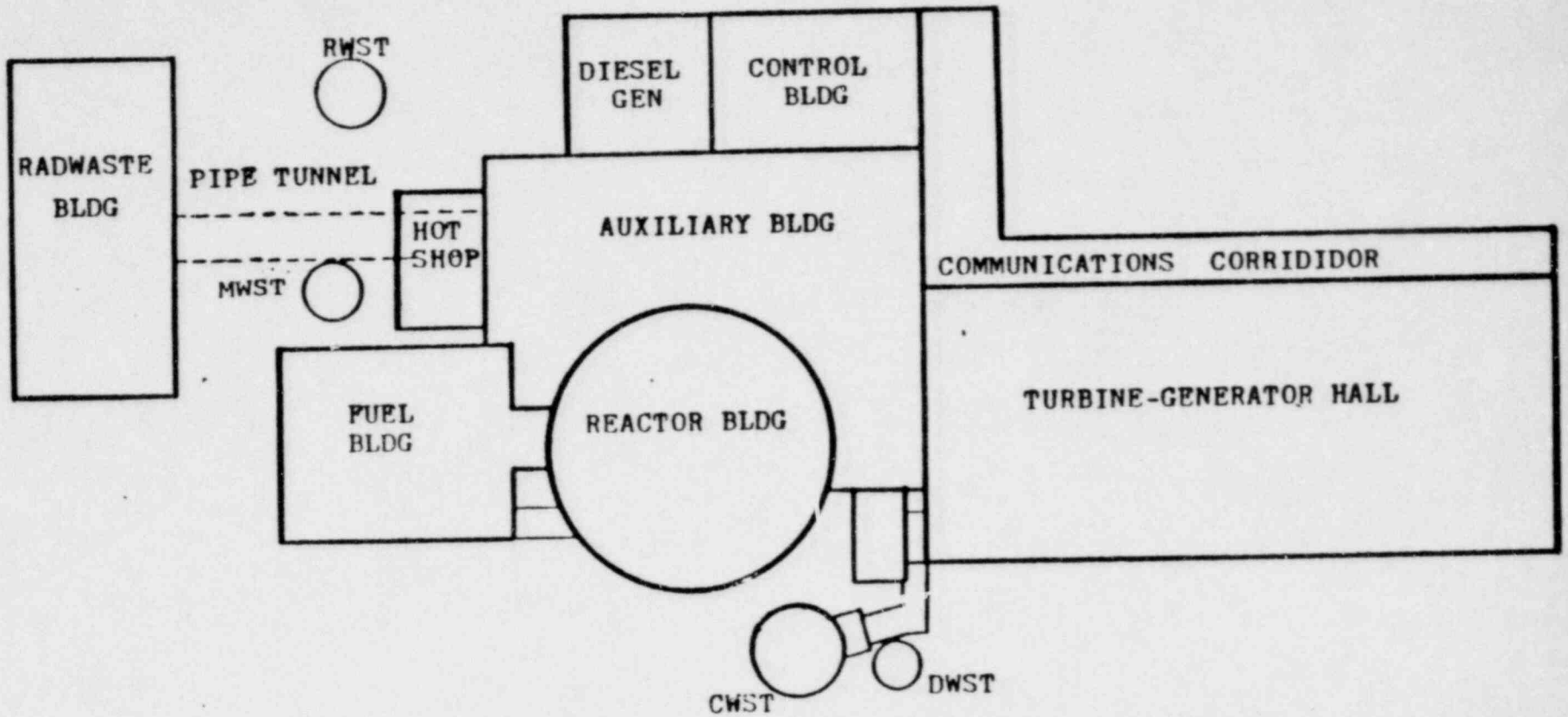
*CONSULTANT AGREEMENTS WITH INDIVIDUALS FROM THESE FIRMS.

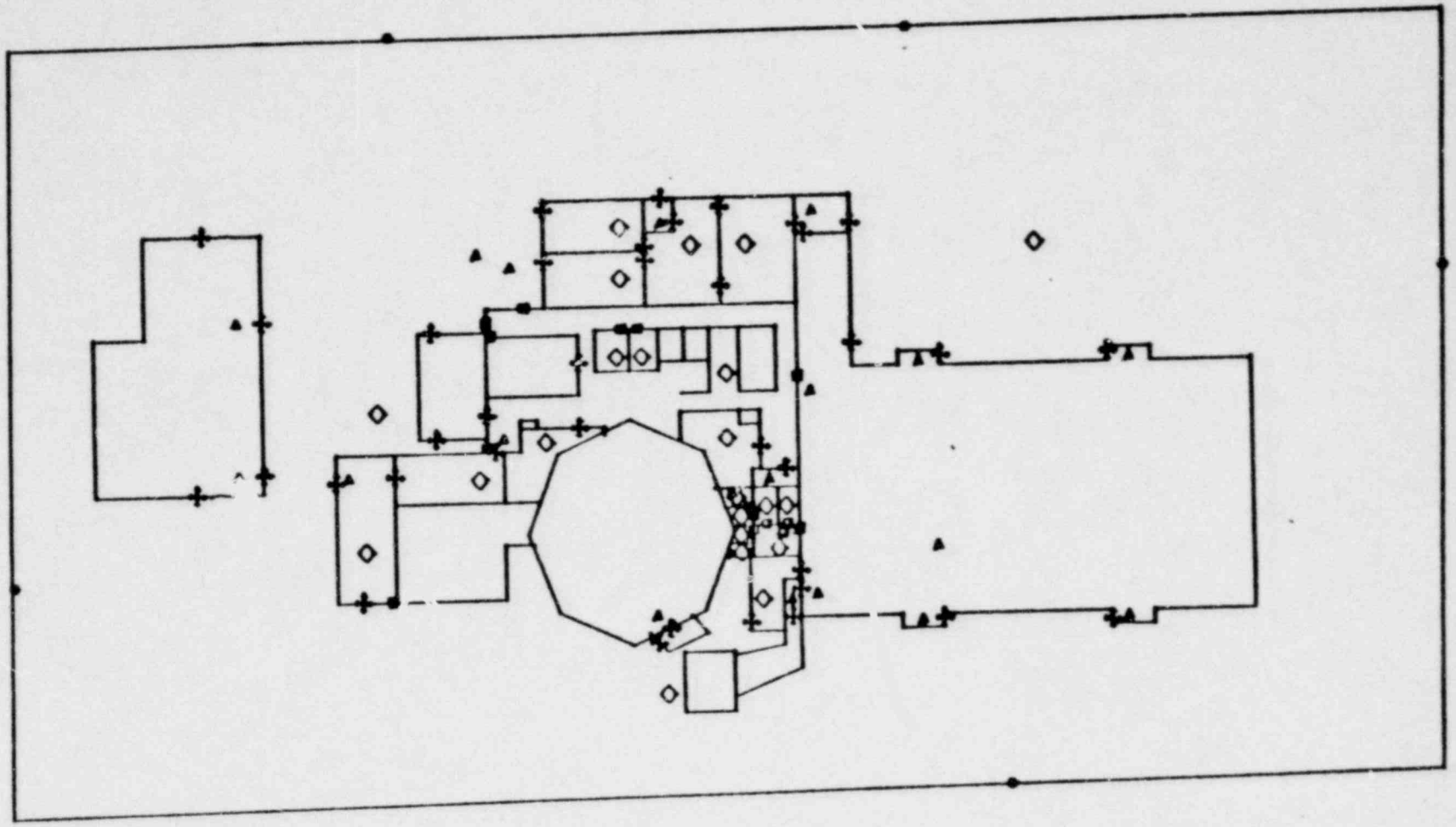
9

BASELINE PLANT SELECTION AND CHARACTERIZATION

- STANDARDIZED NUCLEAR UNIT POWER PLANT SYSTEM (SNUPPS)
  - SYSTEM DESCRIPTIONS
  - SABOTAGE FAULT TREE ANALYSIS
  - VITAL AREA ANALYSIS
  - PLANT LAYOUT DIGITIZATION



BASELINE PLANT (SNUPPS) PHYSICAL LAYOUT



SNUPPS DIGITIZED LAYOUT - LEVEL 2

PLANT DESIGN OPTIONS

- IDENTIFY PRACTICABLE ALTERNATIVES
- DOCUMENT IN CONSISTENT FASHION
  - SELECTIONS BASED ON PLANT FUNCTIONS TO BE PRESERVED
  - FOUR CATEGORIES BASED ON KIND OF DESIGN OPTION
- DEVELOP OPTION TO THE POINT IT CAN BE EVALUATED

EXAMPLES OF DESIGN ALTERNATIVES

- HARDENING CRITICAL SYSTEMS
  - HARDENED CONTAINMENT BUILDING
  - HARDENED ULTIMATE HEAT SINK
  - HARDENED ENCLOSURE FOR MAKEUP WATER TANKS
- LAYOUT MODIFICATIONS
  - SEPARATION OF CONTAINMENT PENETRATIONS FOR REDUNDANT PROTECTION SYSTEMS
  - SEPARATION OF POWER CABLES IN UNDERGROUND GALLERIES
  - ALTERNATE CONTROL ROOM ARRANGEMENTS
  - ECCS ACTIVE COMPONENTS WITHIN CONTAINMENT (ANNULUS)

EXAMPLE OF DESIGN ALTERNATIVES

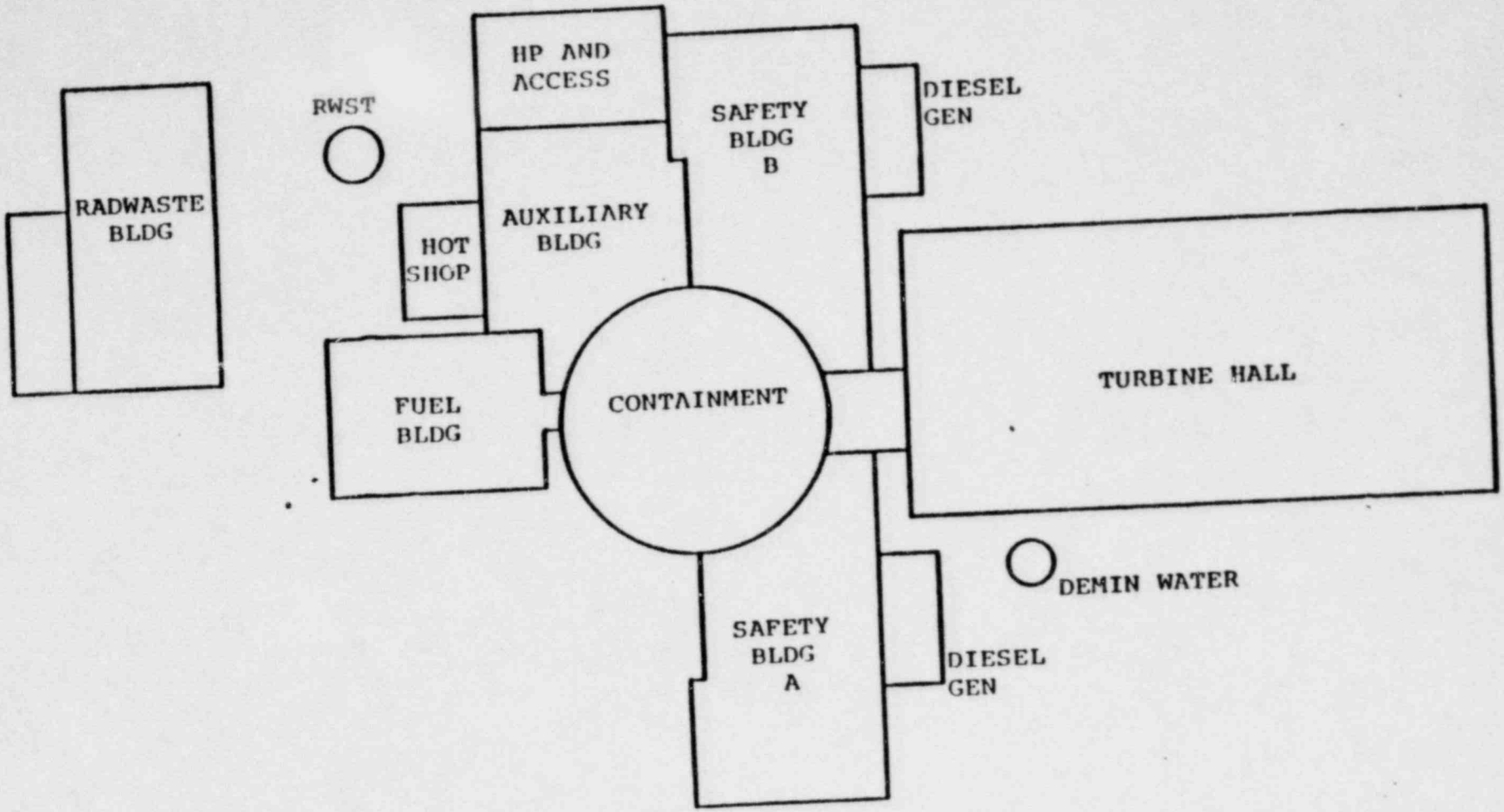
- SYSTEM CHANGES
  - ISOLATION OF LP SYSTEMS CONNECTED TO REACTOR COOLANT PRESSURE BOUNDARY
  - ALTERNATE CONTAINMENT CONCEPTS
  - TURBINE RUNBACK
- ADDITIONAL SYSTEMS
  - INDEPENDENT SAFE SHUTDOWN DECAY HEAT REMOVAL SYSTEM
  - ADDITIONAL INDEPENDENT, DIVERSE SCRAM SYSTEM

ALTERNATIVES SELECTED FOR CONCEPTUAL DESIGN

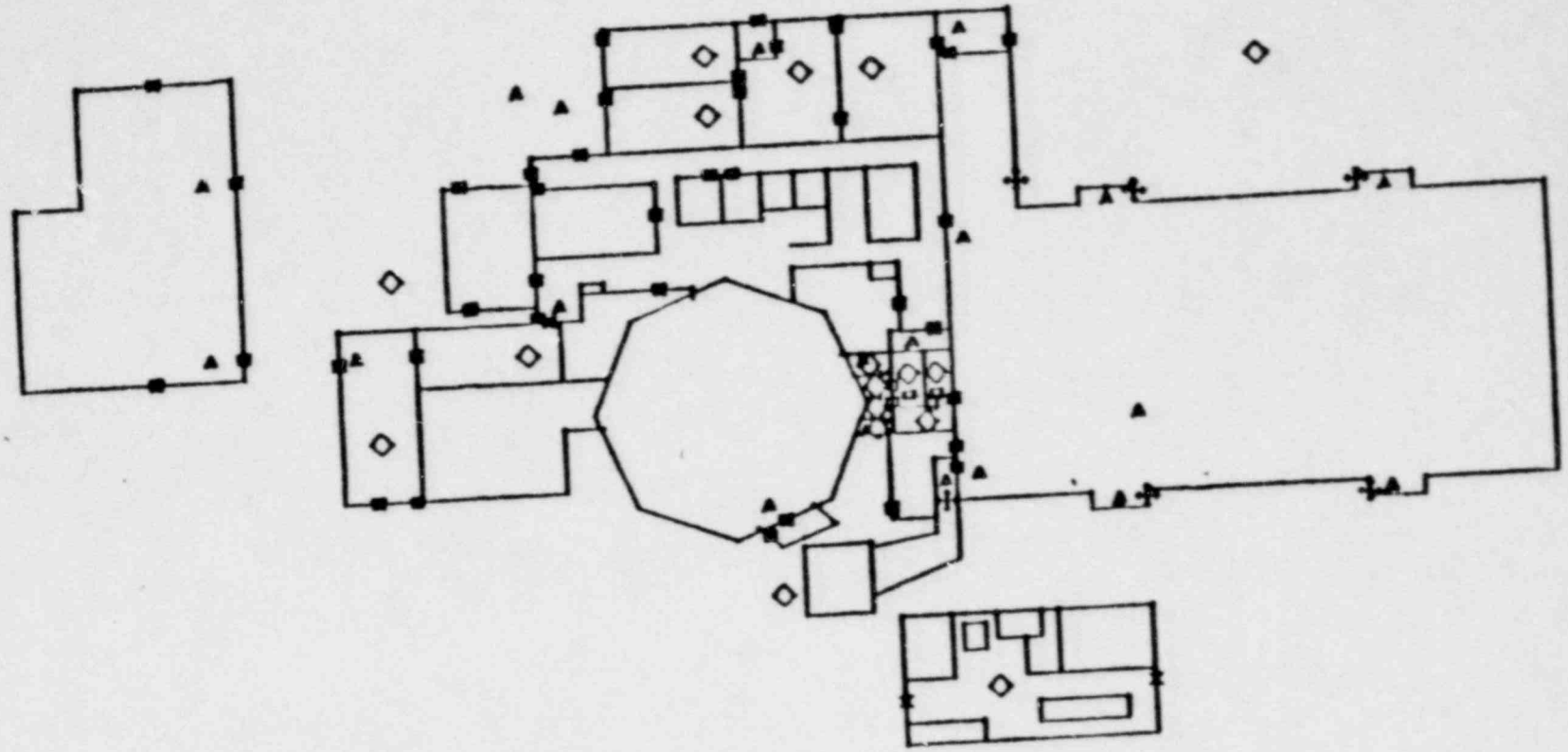
- HARDENED ENCLOSURES FOR MAKEUP WATER TANKS
- SEPARATION OF CONTAINMENT PENETRATIONS FOR REDUNDANT TRAINS OF SAFETY EQUIPMENT
- PHYSICALLY SEPARATED AND PROTECTED REDUNDANT TRAINS OF SAFETY EQUIPMENT
- HARDENED DECAY HEAT REMOVAL SYSTEM
- ISOLATION OF LOW-PRESSURE SYSTEMS CONNECTED TO THE REACTOR COOLANT PRESSURE BOUNDARY
- DESIGN CHANGES TO FACILITATE DAMAGE CONTROL

ALTERNATE PLANT CONFIGURATIONS

- BASELINE + HARDENED ENCLOSURES FOR MAKEUP WATER TANKS
- PHYSICALLY SEPARATED AND PROTECTED REDUNDANT TRAINS OF SAFETY EQUIPMENT (INCLUDES SEPARATION OF CONTAINMENT PENETRATIONS)
- BASELINE + HARDENED DECAY HEAT REMOVAL SYSTEM



MODIFIED PLANT PHYSICAL LAYOUT



BASELINE PLANT PLUS HARDENED DHRS PHYSICAL LAYOUT

EVALUATION OF PRELIMINARY REFERENCE DESIGNS

- VALUE - SAFEGUARDS EFFECTIVENESS OR INCREASED RESISTANCE TO SABOTAGE
- VALUE ANALYSIS TOOLS - EXTERNAL THREAT - SAFE/VAA/ENGINEERING JUDGMENT
  INTERNAL THREAT - SUBJECTIVE ENGINEERING JUDGMENT
- IMPACTS - COSTS
  MANPOWER REQUIREMENTS
  OPERATIONAL CONSTRAINTS
  SAFETY
- IMPACT ANALYSIS TOOLS - COST - ESTIMATES FROM DESIGN DRAWINGS

  MANPOWER REQUIREMENTS
  OPERATIONAL CONSTRAINTS
  SAFETY
  > ENGINEERING ANALYSIS

VITAL AREA ANALYSIS OF BASELINE AND ALTERNATIVES

	NUMBER OF VITAL AREAS		NUMBER OF AREA COMBINATIONS
	I	II	
BASELINE	5	37	56
BASELINE + HARDENED ENCLOSURES	5	37	56
PHYSICALLY SEPARATED AND PROTECTED	4	39	292
BASELINE + HARDENED DHRS	3	40	56

SAFEGUARDS EFFECTIVENESS - INSIDER CONSIDERATIONS

- **BASELINE**
  - COMPARTMENTALIZED
  - MULTIPLE ROUTES
  - OPERATOR ACCESS - BOTH TRAINS SIMULTANEOUSLY
  - ADMINISTRATIVE CONTROLS AT COMPARTMENT LEVEL

- **PHYSICALLY SEPARATED**
  - SEPARATE TRAINS WITH SINGLE ACCESS
  - COMPARTMENTALIZED WITHIN TRAINS
  - WELL-DEFINED ACCESS ROUTES
  - SEPARATES OPERATING AND EMERGENCY EQUIPMENT
  - OPERATOR ACCESS - ONE TRAIN AT A TIME
  - ADMINISTRATIVE CONTROLS ON TWO BUILDINGS

- **BASELINE + HDHRS**
  - COMPARTMENTALIZED
  - EXTRA REDUNDANCY FOR TRANSIENT EVENTS
  - WELL-DEFINED ACCESS ROUTES TO DHRS
  - ADMINISTRATIVE CONTROLS ON ONE ISOLATED BUILDING

IMPACTS OF DESIGN ALTERNATIVES

• BASELINE	NO ACTUAL COST DATA 62 OPERATORS/TECHNICIANS OPERATIONS/MAINTENANCE ACCEPTABLE SAFETY ACCEPTABLE
• BASELINE + ENCLOSURES	COST INCREASE $0.5 - 1.5 MILLION NO CHANGE OPERATIONS/MAINTENANCE/ SAFETY

IMPACTS OF DESIGN ALTERNATIVES

- PHYSICALLY SEPARATED

  COST INCREASE $16 MILLION

  POSSIBLE INCREASE IN MANPOWER

  OPERATIONS - ROUNDS LONGER

  MAINTENANCE - TIMES LONGER DUE TO ACCESS

  EQUIPMENT MOVEMENT MORE DIFFICULT

  SAFETY - ADDITIONAL HPI REDUCES RELIANCE ON OPERATING SYSTEMS

  SEPARATE SHUTDOWN PANELS AFFECTS CONTROL LOGIC

  PERSONNEL - TWO MAJOR PLANT AREAS WITH STRICT ACCESS CONTROLS

  CONTROLS MAY AFFECT ATTITUDES

IMPACTS OF DESIGN ALTERNATIVES

- BASELINE + HDIIRS

  COST INCREASE $9 MILLION

  POSSIBLE INCREASE IN MANPOWER

  OPERATIONS/MAINTENANCE - MODEST INCREASE WITH ADDED SYSTEMS

  SAFETY - ADDED REDUNDANCY FOR TRANSIENTS

  PERSONNEL - ONE AREA WITH STRICT ACCESS CONTROL

  LESS REACTION TO LIMITED CONTROLS

IMPACTS OF DESIGN ALTERNATIVES

- PHYSICALLY SEPARATED

COST INCREASE $16 MILLION

POSSIBLE INCREASE IN MANPOWER

OPERATIONS - ROUNDS LONGER

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CONCLUSIONS

- STRUCTURAL DESIGN CHANGES ALONE DO NOT APPEAR TO PROVIDE SIGNIFICANT ADDITIONAL PROTECTION
- DESIGN CHANGES CAN FACILITATE IMPLEMENTATION OF PHYSICAL PROTECTION
- FOR PWRs HARDENED DECAY HEAT REMOVAL SYSTEMS APPEAR PROMISING
- DAMAGE CONTROL USING INSTALLED SYSTEMS MAY HAVE SOME POTENTIAL FOR COUNTERING SABOTAGE (OR ACCIDENT)

RECOMMENDATIONS

- PHASE II SHOULD EXTEND PRELIMINARY ANALYSES RATHER THAN PURSUE DETAILED DESIGNS
- FURTHER DEVELOPMENT OF A HARDENED DECAY HEAT REMOVAL SYSTEM SHOULD BE INCLUDED IN THE ASSESSMENT OF ALTERNATE LWR SHUTDOWN HEAT REMOVAL CONCEPTS PROGRAM
- ADDITIONAL STUDIES TO EXAMINE INFLUENCE OF DESIGN ON INSIDER CONTROL SHOULD BE UNDERTAKEN
- THE POTENTIAL OF OPERATOR ACTIONS FOR COUNTERING SABOTAGE SHOULD BE PURSUED FURTHER
- A MORE DETAILED ASSESSMENT OF DESIGN MODIFICATIONS FOR EXISTING PLANTS SHOULD BE UNDERTAKEN

GUIDANCE FOR SAFEGUARDS AT POWER REACTORS

10 CFR 73.55 - AMENDMENTS UPCOMING

- VITAL AREA ACCESS
- PAT-DOWN SEARCH REPLACEMENT MEASURES
- VERIFICATION OF GUARD FORCE APPLICANT DATA (APPENDIX B TO PART 73)
- PROTECTION AGAINST INSIDER SABOTAGE
  - PRE-EMPLOYMENT SCREENING
  - BEHAVIORAL OBSERVATION
  - WORK RULES
  - COMPARTMENTALIZATION
  - OTHER TECHNIQUES

PROBLEMS WITH REACTOR SAFEGUARDS GUIDANCE

- MUCH OF TECHNICAL GUIDANCE OBSOLETE
- MANY TOPICS NOT ADDRESSED AT ALL
- NOT AIMED AT CONTINUING COMPLIANCE

TYPICAL REACTOR SAFEGUARDS GUIDANCE TODAY

GUIDE	SUBJECT	DATE/STATUS
R.G. 1.17	PROTECTION AGAINST SABOTAGE	6/73 (OBSOLETE)
R.G. 5.12	USE OF LOCKS	11/73 (OBSOLETE)
R.G. 5.7	PERSONNEL ACCESS TO MAA'S, PA'S, AND VA'S	6/73 (REV. 4/80 FOR FUEL CYCLE FACILITIES)
R.G. 5.20	TRAINING, EQUIPPING & QUALIFYING GUARDS	1/74 (OBSOLETE)
R.G. 5.43	PLANT SECURITY FORCE DUTIES	1/75 (OBSOLETE)
R.G. 5.44	PERIMETER INTRUSION ALARMS	6/76 (REV. 8/80 FOR FUEL CYCLE FACILITIES)

SOME TOPICS NOT ADEQUATELY ADDRESSED NOW

- VITAL AREA ACCESS REQUIREMENTS
- PRE-EMPLOYMENT SCREENING
- WORK RULES
- COMPARTMENTALIZATION TECHNIQUES
- EMERGENCY POWER SYSTEMS FOR SECURITY EQUIPMENT
- STANDARD FORMAT AND CONTENT

HOW WAS PROBLEM HANDLED FOR FUEL CYCLE FACILITIES?

- PHYSICAL PROTECTION UPGRADE RULE GUIDANCE COMPENDIUM
- NRR REQUEST FOR SIMILAR PACKAGE

PHYSICAL PROTECTION UPGRADE RULE GUIDANCE COMPENDIUM

- 16 NEWLY DEVELOPED TECHNICAL GUIDANCE DOCUMENTS:
  - -- VAULT DESIGN
  - -- CAS/SAS DESIGN
  - -- ENTRY, EXIT CONTROLS
  - -- OBSERVATION TECHNIQUES
  - -- DURESS ALARMS, ETC.

- IMPLEMENTATION DOCUMENTS
  - -- INTENT & SCOPE GUIDE
  - -- DESIGN METHODOLOGY GUIDE
  - -- STANDARD FORMAT & CONTENT GUIDE

- BIBLIOGRAPHY OF NON-NRC GUIDANCE
  - -- INCLUDED 200 TECHNICAL DOCUMENTS FROM OTHER SOURCES

POWER REACTOR GUIDANCE NEEDS

TECHNICAL GUIDES

- WORK RULES FOR PROTECTION AGAINST THE INSIDER THREAT
- VITAL AREA ACCESS CONTROL
- METHODS OF COMPARTMENTALIZING AND HARDENING VITAL AREAS
- EMERGENCY POWER SUPPLY FOR PHYSICAL SECURITY SYSTEMS AT POWER REACTORS
- GUARD FORCE SELECTION AND SCREENING CRITERIA
- OTHER SAFEGUARDS TOPICS AS NEEDS ARE IDENTIFIED

IMPLEMENTATION MATERIALS:

- STANDARD FORMAT AND CONTENT GUIDE
- INTENT AND SCOPE GUIDE

ESTIMATED COST

- $140K FOR FY81
  $200K FOR FY82

SCHEDULE

- START OCTOBER 1980
- FIRST DRAFT GUIDANCE MATERIAL COMPLETE FEBRUARY 1981
- OTHERS TO FOLLOW UNTIL MID - 1982

Tape 4

NRC SAFEGUARDS RESEARCH

BY

GERALD K. TOMLIN

PRESENTATION TO THE
ADVISORY COMMITTEE FOR REACTOR SAFEGUARDS
JUNE 26, 1980

SAFEGUARDS RESEARCH SUBELEMENTS

PHYSICAL PROTECTION

MATERIAL CONTROL AND ACCOUNTING (MC&A)

THREAT AND STRATEGY

PHYSICAL PROTECTION (PP) RESEARCH

REGULATORY OBJECTIVE

TO ASSURE THAT THE LICENSEE PROVIDES ADEQUATE PROTECTION AGAINST MALEVOLENT ACTIONS DIRECTED TOWARDS SABOTAGE OR THEFT OF SNM.

MEANS TO ACHIEVE REGULATORY OBJECTIVE

SELECTION OF APPROPRIATE PERFORMANCE CRITERIA

EVALUATION OF SAFEGUARDS AGAINST THESE CRITERIA

RESEARCH OBJECTIVE

TO SUPPORT THE REGULATORY OBJECTIVE BY THE DEVELOPMENT AND APPLICATION OF PP

- CRITERIA SELECTION AIDS
- EFFECTIVENESS EVALUATION AIDS
- OTHER STUDIES

MATERIAL CONTROL & ACCOUNTING (MC&A) RESEARCH

REGULATORY OBJECTIVE

TO ASSURE THAT THE LICENSEE PROVIDES ADEQUATE PROTECTION AGAINST CHANGES OF SNM LOCATION, QUANTITY, OR COMPOSITION WHICH COULD CONTRIBUTE TO THEFT OR SABOTAGE.

MEANS TO ACHIEVE REGULATORY OBJECTIVE

SELECTION OF APPROPRIATE PERFORMANCE CRITERIA

EVALUATION OF SAFEGUARDS AGAINST THESE CRITERIA

RESEARCH OBJECTIVE

TO SUPPORT THE REGULATORY OBJECTIVE BY THE DEVELOPMENT OF MC&A

- CRITERIA SELECTION AIDS
- EFFECTIVENESS EVALUATION AIDS
- OTHER STUDIES

THREAT AND STRATEGY RESEARCH

REGULATORY OBJECTIVE

TO ENSURE THAT NRC BASES ITS REGULATORY ACTIVITIES AND OPERATIONAL RESPONSIBILITIES ON THE BEST AVAILABLE INFORMATION CONCERNING THREATS AND CONSEQUENCES OF SUCCESSFUL ADVERSARY ACTIONS.

MEANS TO ACHIEVE REGULATORY OBJECTIVE

THREAT STUDIES

CONSEQUENCE STUDIES

INCIDENT RESPONSE STUDIES

RESEARCH OBJECTIVE

TO SUPPORT THE REGULATORY OBJECTIVE BY THE DEVELOPMENT OF A BETTER UNDERSTANDING OF THREATS, CONSEQUENCES OF THEFT OR SABOTAGE, AND INCIDENT RESPONSE.

THREAT AND STRATEGY

FY80	FY81	REQ FY82	PPPG FY82	REQ FY83	PPPG FY83
.1	.2	.4	.4	.6	.6

COMMUNICATED THREAT ASSESSMENT

CONSEQUENCE ESTIMATION

SAFEGUARDS EMERGENCY COMMUNICATIONS

ANALYSIS OF SAFEGUARDS POST-INCIDENTS

SAFEGUARDS INCIDENT EVALUATION

PHYSICAL PROTECTION			REQ	PPPG	REQ	PPPG
	FY80	FY81	FY82	FY82	FY83	FY83
	2.9	3.2	2.4	2.4	3.2	3.2

TECHNOLOGY BASES FOR FIXED SITE PHYSICAL PROTECTION APPLICATIONS

TECHNOLOGY BASES FOR TRANSPORTATION PHYSICAL PROTECTION APPLICATIONS

INSPECTION METHODS FOR PHYSICAL PROTECTION

SAFEGUARDS FOR PROLIFERATION RESISTANT FUEL CYCLES

SHIPPING CASK SABOTAGE SOURCE TERM ASSESSMENT

PHYSICAL PROTECTION (CONT'D)

SOURCE TERM CHARACTERIZATION RESULTING FROM EXPLOSIVELY CAUSED SECONDARY VIOLATIONS OF SPENT FUEL SHIPPING CASKS

EXPLOSIVE ATTACK ON SPENT FUEL POOLS

SPECTRUM OF GRADED SAFEGUARDS

POWER REACTOR SAFETY/SAFEGUARDS INTERFACE

BREEDER REACTOR AND REPROCESSING SAFEGUARDS

ENERGY PARKS

REGIONAL STORAGE SITES AND SPENT FUEL REPOSITORIES

MATERIAL CONTROL AND ACCOUNTING			REQ	PPPG	REQ	PPPG
	FY80	FY81	FY82	FY82	FY83	FY83
	1.0	1.4	2.4	2.4	2.5	2.5

TECHNOLOGY BASES FOR MATERIAL CONTROL AND ACCOUNTING APPLICATIONS

MATERIAL HOLDUP STUDIES

STRATEGIC ANALYSIS FOR SAFEGUARDS SYSTEMS

U-235 MEASUREMENT BY RESONANCE NEUTRON RADIOGRAPHY