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NUCLEAR REGULATORY COMMISSION

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

IN THE MATTER OF:

SUBCOMMITTEE MEETING

on

REGULATORY ACTIVITIES

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

SUBCOMMITTEE MEETING

on

REGULATORY ACTIVITIES

Room 1046
1717 H Street, N. W.
Washington, D. C.
Wednesday, 8 August 1979

The ACRS Subcommittee on Regulatory Activities met, pursuant to notice, at 8:45 a.m., Dr. Chester P. Siess, chairman of the subcommittee, presiding.

BEFORE:

DR. CHESTER P. SIESS, Chairman of the Subcommittee

MR. MYER BENDER, Member

MR. HAROLD ETHERINGTON, Member

PROF. WILLIAM KERR, Member

DR. SIESS: The meeting will come to order. This is a meeting of the ACRS Subcommittee on Regulatory Activities. I'm Chester Siess, Subcommittee chairman. The other ACRS members present today are Harold Etherington and William Kerr. The purpose of the meeting this morning is to discuss two matters; one is a proposed Regulatory Guide, or Provision 2 to Regulatory Guide 1.136, Material, Construction and Testing of Conrete Containment. The other is a proposed limited revision, it says here, of Appendix J to 10 CFR 50 on leak rate testing as it pertains chiefly to airlocks and penetrations. I believe that's Type C, is that?

MR. ARNDT: B.

DR. SIESS: Type A is the integrated leak rate. Type B is penetration in airlocks. What's type C?

MR. ARNDT: Type C is the small penetrations.

DR. SIESS: Okay. This meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act and the Government in the Sunshine Act. My Gary Quittschreiber, seated at my right, is the designated federal employee. The rules for participation in today's meeting have been announced as part of the notice that was published in the Federal Register on July 24th. A transcript of the meeting is being kept, and will be made available as stated in the Federal Register notice. We have

received no written comments or requests for time to make oral statements by members of the public.

We did receive, dated Monday, just for the members of the Subcommittee, from Sam Duraiswamy, some revisions to Part 50, Appendix J. Did everybody get those?

PROF. KERR: Yes.

DR. SIESS: I'll try to factor those in. I glanced at them. I didn't try to integrate them. What order would you like to take things up, Bill?

MR. MORRISON: We'd just as soon take up Appendix J first, but it's not crucial. Whatever your preference is.

DR. SIESS: Okay. Appendix J, as I understand it this is essentially an attempt by the staff to write into the regulations what they have been doing for a number of years, in other words, codify the exceptions that you've been making. That's my recollection, because I've been seeing reports back and forth, or letters back and forth, between the staff and licensees on testing airlocks. Am I right that the things that every time you open an airlock you have to test it to full pressure?

MR. ARNDT: That's correct.

DR. SIESS: To do that, you have to put a strong back on the inside door, which means you have to be inside.

MR. ARNDT: I don't know if you had to be inside, but you did have to put a strong back on. One of the

problems was that when the current Appendix was issued, it really didn't have provisions for existing designs, on what are now the older airlock designs, and on a number of plants this created a problem because it was a pretty hard and fast position as stated in the regulation. And we found it necessary, because of the design of the airlocks, the older ones, to grant some exemptions.

DR. SIESS: How did the airlock design differ? What is there about a current design airlock that allows you to do a full pressure test?

MR. ARNDT: I think there are several differences. One is on the design pressure that the airlock could be tested at. Another is whether they have double seals on the doors or not.

DR. SIESS: Now, if they've got double seals, you let them test the seals.

MR. ARNDT: Right. I believe that on some of the older ones they didn't have that possibility, therefore, you had to test in between the doors, you had to test the chamber.

DR. SIESS: What I thought you were saying is that Appendix J as written could be complied with for the newer designs.

MR. ARNDT: Yes. At the time it was written, it was written looking ahead to what was anticipated in the way

of designs coming out.

DR. SIESS: But Appendix J, as written, still didn't let you just test between the seals, did it?

MR. ARNDT: No.

DR. SIESS: So that would have meant you still had to test the airlock itself, internally.

MR. ARNDT: Right.

DR. SIESS: Does that mean that the new designs have a stronger fitting on that inner door or something? An inner door opens inside, so you depressurize the lock and you try to open that door.

MR. ARNDT: Correct.

DR. SIESS: And the new designs permit you to pressurize that thing up to full pressure?

MR. ARNDT: I believe they do, yes.

MR. ETHERINGTON: Pressurizing the lock requires a seal in the wrong direction and it doesn't test the seal in the right direction, of the inner door, isn't that right?

MR. ARNDT: That's right.

MR. ETHERINGTON: So it isn't a good test in that respect.

MR. ARNDT: It's what we had.

DR. SIESS: You could argue, Harold, that if the door would hold against the pressure trying to open it, it would be even tighter against the pressure trying to close

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it, but I'm not sure that's necessarily true.

MR. ETHERINGTON: No, I don't think it is, I mean, the seal is on the wrong side.

DR. SIESS: I mean if it was just the door that came up against the gasket like this, it would obviously be --

MR. ETHERINGTON: Yes, if that's all it were, yes.

MR. ARNDT: Now, as far as the changes going in here, we pointed out the major change, what we're doing is really in the Appendix, revising one paragraph at this time.

DR. SIESS: Now, let's see, the new sheets we got essentially replace the old ones.

MR. ARNDT: Correct. There was one sheet, replacement sheet, on the text of the paragraph.

DR. SIESS: The first page was the old Appendix.

MR. ARNDT: Correct.

DR. SIESS: Of course, that's still valid and pages two, five, six -- okay.

MR. ARNDT: Page two, enclosure one, which was the first page of the proposed new text, was revised. We sent a replacement page for that, where we added the phrase "or within 24 hours of opening, when the reactor is in an operating mode requiring containment integrity." The other three replacement pages were in the attachment to the value impact statement which addressed the changes -- excuse me,

I left out one other, there was an editorial change on that text on page two, enclosure one. At the bottom of the page, we inserted the words "not less than."

So for these two changes in the text that were sent down, we had to make corresponding changes to the value impact statement.

DR. SIESS: So the underlined material is the change to the change.

MR. ARNDT: Correct. The underlined material is the result of some comment received after the package was sent down to the ACRS. Now, the fundamental change is to eliminate the requirement on every plant to test the airlock after every single opening and to use a position which is consistent with what we have been using in individual exemptions that have been granted, which is on a three-day maximum period. We have tightened up the wording a little bit also, with respect to the penetration which might have been tested but then reopened before you go back to operation or maybe after you've gone back to operation.

DR. SIESS: Let me interrupt you a minute. When you talk about opening the penetration, this [illegible] be maybe electrical penetration that has a plate over it with a gasket?

MR. ARNDT: What we started out considering was a situation which I understood had occurred, where a type A

test had been run following a type A test on equipment hatch had been used. It had been opened, but before going into operation.

DR. SIESS: I understand about hatches.

MR. ARNDT: That came under the type B test.

DR. SIESS: But I'm trying to make a distinction between hatches and penetrations.

MR. ARNDT: Right.

DR. SIESS: And I'm trying to visualize opening a penetration. Now, there are all kinds of penetrations. A pipe penetration is a built-in piece of equipment, it's got all sorts of sleeves and stuff. What kind of penetrations can be open?

MR. ARNDT: Electrical penetrations, I understand, on the one plant had been opened during operation because of some repair maintenance work. It had to be done.

DR. SIESS: These are things that have a bolt at the cover of something that you can take off and get in and work on the insulation. Are the connectors inside there, the electrical penetrations?

MR. ARNDT: I'm not that familiar with them. It's been a long time since I've seen a diagram of the electrical penetration, but I don't believe they have connectors in them. I think it is a continuous wire through a penetration with a potting compound, which surrounds the wire and

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directed in such a way that you wouldn't have any streaming path directly through the penetration. If you had any gap between the potting compound and the wire --

DR. SIESS: This is mainly aimed at airlocks, manlocks, equipment locks, but it does also cover penetrations.

MR. ARNDT: Correct.

DR. SIESS: You consider an airlock a penetration?

MR. ARNDT: No, we don't, in the sense of this paragraphs. Airlocks, we have covered by themselves with the sub-paragraphs here under 2-B. The penetrations would include those that are not airlocks, personnel or escape locks, would include the equipment hatch, which is not a double door unit, it's a single door unit. And it would include electrical mechanical penetrations. Some of them are individually tested. Some are tested as multiple units, and that's covered by the portion of this paragraph under 2-A.

DR. SIESS: Now, what kind of penetrations employ a continuous leakage monitoring system? These are penetrations that are pressurized internally, and with some means of monitoring leakage?

MR. ARNDT: Right. I know they exit. I don't have examples of which ones.

DR. SIESS: What about a containment like

Conn. Yankee, Haddam Neck? If I'm not mistaken, Haddam Neck keeps pressure on the containment at all times. They can argue they've got a continuous leak rate test on the containment; is that true, do you know?

MR. ARNDT: I'm not familiar with that particular plant.

DR. SIESS: Or sub-atmospheric.

MR. ARNDT: The subject of continuous leakage monitoring, we may be giving some further thought. There is planned another revision of Appendix J, which is a general revision, not just this paragraph, but there are a number of clean up items as far as clarifications.

A lot that we've learned in the years that it's been out, that could be improved. We plan to make that general revision. As part of that we are considering looking at that continuous leakage monitoring system and what kind of credit can be given to it in the leakage program. We decided this time with this paragraph not to pursue any change to the wording as we have it on that.

DR. SIESS: Why did you make the change to, not less than p sub A. Did somebody want it to go higher?

MR. ARNDT: To put it in line with the previous paragraph, which says, not less than, and the fact that if we left it tested at p sub A, it means specifically at a single pressure level, no more than, no less than. And that

wasn't critical to us.

DR. SIESS: Who caught that, the lawyers?

(Laughter.)

MR. ARNDT: No, our tech spec people caught that.

DR. SIESS: P sub A is what?

MR. ARNDT: Design Accident Pressure -- excuse me, it's the peak calculated.

DR. SIESS: Accident pressure which is a little less than design pressure. Harold, do you have any questions?

MR. ETHERINGTON: No.

DR. SIESS: Bill.

PROF. KERR: There was one place I was looking for, where it seemed to me one might also have considered inserting "not less than p sub A." I thought I wrote it in.

MR. MORRISON: The bottom of page two, enclosure one.

DR. SIESS: It's down there. On page three of enclosure one.

MR. ARNDT: I think I see where you mean. Airlock door seal testing shall not be substituted for the six-month test of the entire airlock at p sub A.

DR. SIESS: To be consistent, I guess it could read, not less than.

PROF. KERR: There's also, on page eight of

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enclosure two, a similar one which says p sub A.

DR. SIESS: That's in the value impact statement, Bill.

PROF. KERR: Yes.

MR. ARNDT: Yes.

DR. SIESS: In which one, seven?

PROF. KERR: Yes.

DR. SIESS: That says pA or reduced pressures, but that is not the same kind of --

PROF. KERR: In the event of the testing, it cannot be at p sub A. You ought to check. I just thought it seemed a little inconsistent.

MR. ARNDT: Yes. This repeats the wording that shows up on page three, enclosure one. And if I change one, I'll change the other.

PROF. KERR: Other than that, Chet, I have no comments.

DR. SIESS: Let me ask, in general, a couple of questions. I've been reading LERs and in a number of instances where they had a leak in the airlock it was because the seal got damaged, something got caught in the seal.

MR. ARNDT: Right.

DR. SIESS: Is there something either in tech specs or just normal operating procedures that says when you

open that lock and you close it, that somebody sort of looks at the seal to be sure there's nothing sticking to it, that they didn't leave a welding cable running through there or something else? Do you know what they do in the plant?

MR. ARNDT: After reviewing that information you referred to, it occurred to us also about maybe putting something in about a visual inspection. "Look at the seals before you close the door." However, we felt that that was not really appropriate in a regulation.

DR. SIESS: No. I just wondered what people do.

MR. ARNDT: This is something that I think we'll be taking up with our tech spec people.

DR. SIESS: If somebody just goes in and comes out, they're not likely to damage it, but if they had to do something in the plant, they've hauled stuff in there --

PROF. KERR: They also might put in something that says, "Don't get your foot caught in the door when you close it."

DR. SIESS: That's hard to do, with those doors.

MR. ARNDT: If there's a reasonable way of emphasizing that to the plant personnel without imposing on them some kind of paper requirement that is going to burden them, where the NRC inspector is going to come in and say, Show us the log that you initialed that every time you close this thing, you also swore that you looked at the seal.

DR. SIESS: Well, the way you encourage that is to penalize people for not doing it, I guess. Does that test frequency go up every time they have a failure?

MR. ARNDT: No. They test until things are the way they should be, and test frequency is not altered.

DR. SIESS: That brings me to another question. Before Three Mile Island came along, we had an item for future discussion in ACRS on leak testing. I wanted to get the staff in and talk about leak testing in general, type A and the other types. And I might as well bring it up here, so you guys can start thinking about it. I think we'll get back to it one of these days.

I've been reading integrated leak test reports that come in, and very frequently, when they start making the integrated leak rate test, they can't get the thing pumped up because somewhere there's a leak. They go around and they fix all the leaks and then they finally make the test. And when they get through with the test, it's down at a half or a tenth of one percent of whatever the tech spec figure is, and it just goes along like that for another five years, I guess, whatever the period is.

I couldn't get an awful lot of confidence in the leak rate test when you had to patch up all the leaks before it could pass it, but just before you made the test, the leak rate might be just about anything.

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MR. ETHERINGTON: But they are penalized, aren't they, if they have to fix things? They're penalized by requiring more frequent testing.

DR. SIESS: No, not on the integrated testing.

MR. ETHERINGTON: On the initial one, you mean?

DR. SIESS: The one they make every five years.

MR. ETHERINGTON: I don't think they should be allowed to go around fixing things without penalties.

DR. SIESS: Apparently, they can. Now some of these leaks aren't leaks, in other words they're not necessarily that stuff would leak to the atmosphere. It would just go through the first valve into another system or something. Every penetration doesn't go to the atmosphere, right?

Some of them go to closed systems outside containment, in fact, into the PHR, so I've never been able to get a feel for the significance of an integrated leak rate test, for example, where there was a greater leakage than was allowed, because what I'm interested in is leakage that provides some path to the atmosphere. Obviously, I think maybe we've learned from Three Mile. We haven't got the whole picture yet, but if stuff gets into the secondary side -- not secondary side, but auxiliary side, it can eventually get to the atmosphere, going out a leaky pump seal through filters, et cetera. So something gets out

kap eventually. All the systems aren't watertight.

But I was wondering if anybody has made any kind of a study, I guess it might have to be probabilistic, as to what is the probability at any given time that the leak rate is below some value.

It's not a simple system where leak rate increases. And at the end of five years, you pull it down back here. It goes back up, you pull it back down to here and you never let it get above a certain value.

I know you think of some degradation because that's why the leak rate test has to be below the total allowable leak rate.

You're supposed to allow for some degradation between tests. But there's just no indication that the degradation is any kind of a continuous thing. It's some valve that's not closing tight. That's been the fix on those cases, take a valve out.

How much confidence do we have that at any given point in time if we pressurize that containment to TA, the leak rate would meet the part 100 limit, for whatever that's worth?

MR. ARNDT: I don't know whether we have any probability such as you mention, whether the allowable leakage limit is existing at any given point in time. But Appendix J, in setting up the type B and type C tests, type B for the penetrations and type C for the containment isolation

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valves establishes different frequencies, different intervals on these most likely sources of leakage. And in between your type A, integrated leak rate test, you'll be performing these local and individual tests on your most likely sources of leakage.

And I think that the combination of these has given us, qualitatively, not quantitatively, a feeling that we have, or are maintaining an acceptable leakage level in that structure.

DR. SIESS: I'm inclined to agree, but I'd get a lot more confidence out of type B and C and the airlock tests, which are made at frequent intervals, than I do out of the integrated leak rate test.

And I guess one of the questions in the back of my mind is what purpose does the integrated leak rate test serve?

There are no sources of leakage other than penetration isolation valves and airlocks. The staff always assumes that something gets out somewhere through the concrete or through the liner or something else.

I've seen enough concern about minor welds, you know, because when they make an integrated leak rate test and they don't need it the first time, it's invariably a pretty good leak. You don't get big leaks through penetration, right?

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When penetrations fail, a leak rate, a type B test, it's not a big amount. When an isolation valve fails, a type C test, it's usually a pretty good leakage because the valve didn't seat right.

MR. ARNDT: Right.

DR. SIESS: Or an airlock.

MR. ARNDT: It may be also that the valve wasn't closed the way it should have been closed. That could provide a leakage path.

DR. SIESS: The biggest potential for a leak is a valve.

MR. ARNDT: Right.

DR. SIESS: Now when you do a valve test, I guess type C isolation valve, what you do is pressurize between the two isolation valve levels. So if one of them is leaking in, it still shows as a leak.

So that's a conservatism, I guess, Harold.

MR. ETHERINGTON: Yes.

DR. SIESS: If one of them is leaking in and one of them is leaking out the same amount, you really get twice as much leakage as would be important. But you count it that way.

So there's a conservatism in that.

The same way on penetrations, right? Penetration is ususally closed off at both ends. It has to be. If you want

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leak testing, you internally pressurize the penetration, don't you?

MR. ARNDT: I think there are different ways of testing the penetrations. They may be one-sided tests such as a channel around the perimeter, or, for example, a bellows-type of penetration between two, say, skins of the bellows, testing in between that rather than a linear unit.

DR. SIESS: Has anybody ever made a study of the type B and C tests to see what the failure rate is, for example? If we were going to go into a probabilistic analysis and how much they failed, whether I'm correct in my feeling that it's type C on isolation valves that usually represents the biggest leakage and not type Bs on penetrations.

MR. ARNDT: From what I've heard, that is the case. But I don't know of any studies specifically. I don't know if anybody else has heard of any.

DR. SIESS: Any failure on a type B or C test requires an LER, doesn't it?

MR. ARNDT: Yes. And we get a list of those. And in preparing this change to this paragraph, we had extracted from the LERs going back some time what kind of failures had been related to airlocks specifically. And we came up with the information you mentioned, that a lot of this is really something that can be visually picked up -- dirt on the seals, the seal is out of its groove, there's an obstruction which

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lays across the seals and prevents the door from closing properly -- readily apparent situations which could lead to leakage.

But I don't know that there have been specific studies made to take these failures and list them and relate them to the general population and say, well, the probability of this type of penetration failing is X-times that other, you know, that general population

DR. SIESS: And the failure of a type B or type C or even an airlock test does not necessarily mean you would have had leakage in an integrated leak rate test.

MR. ARNDT: That's correct.

DR. SIESS: The inner door or the airlock could be leaking, not awful, but if you pressurize the containment, the outer door would have held it.

MR. ARNDT: Correct.

DR. SIESS: And the same could be true on some isolation valves where there are check valves. You get the pressure on them from the check.

But think about the question of what function the integrated leak rate test serves. It must serve some function. It can't be extremely important because you only require it every five years.

MR. ARNDT: It performs a function that reassures us that there hasn't been something overlocked, that we haven't

covered by installed leakage testing capability in some local penetrations, in such tremendous number of penetrations through this structure that it gives us that assurance, at least early on, that everything has been really covered.

DR. SIESS: Not just early on. It's more likely after 30 years that somebody's forgotten to do something.

MR. ARNDT: Also, it covers the situation where you might hypothesize that the containment liner has deteriorated, for one reason or another, and it has not been picked up in the course of the operation, or through other existing detection systems.

For example, some plants have leak chases all over the containment liner welds and they can test those weld seams directly without testing the whole containment.

But only some plants have that.

So the overall leakage test makes sure we haven't missed something and also tells us that on the general surface of the containment, there has been no undetected deterioration of that surface.

Many people consider that very unlikely, but it's still something that has to be checked.

So you can feel sure that there are no small leaks involed.

DR. SIESS: Let me postulate something. Let's take a pre-stressed concrete containment with a steel liner and

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let's go in and drill a one-inch hole in the liner and then run an integrated leak rate test.

Do you think you'd find that hole?

MR. ARNDT: With no pressure on the containment?

DR. SIESS: An integrated leak rate test.

MR. ARNDT: Probably not.

DR. SIESS: That's P/A. It's a half P/A.

MR. ARNDT: I doubt that you would.

DR. SIESS: I doubt you would, too. It would have to go between the liner and the concrete far enough to find an outlet somewhere, wouldn't it?

MR. ARNDT: And the pre-stressing would probably keep it uncracked.

DR. SIESS: What about non-pre-stressed? You might pick it up, right?

MR. ARNDT: There, you'd again -- half of the calculated peak accident pressure, the stress has been very low on other rebar, and it's unlikely that you would open up any new or existing crack paths through that concrete at that pressure level. That structure would still be very lowly stressed, and there shouldn't be any direct paths from the liner out to the outside.

DR. SIESS: That sort of shoots down your integrated leak rate test for liner deterioration.

MR. ARNDT: It goes, except there is some --

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DR. SIESS: Except for gross materials.

MR. ARNDT: Some thought being given and, actually, in many cases, being done, not to use the half P/A as the integrated leak rate test pressure -- that's outside the subject of what we're discussing here.

DR. SIESS: That was one of the ones I would come to next.

MR. ARNDT: But going to the full calculated peak accident pressure as the type A test pressure, and at this point, for conventionally pre-stressed reinforced concrete containment, you're raising your stresses to a point where maybe you'll see something.

DR. SIESS: Pre-stressed, you still wouldn't crack it.

MR. ARNDT: Not in pre-stressed, no.

DR. SIESS: Now what's the status of that. When we were discussing surveillance on, what was it, unbonded containments or something, somebody said that the leak rate people were planning to go to P/A. Therefore, we'd essentially get full pressure test on a containment; you know, like the structural integrity test every five years.

Has that been slowed down?

MR. ARNDT: What we did initially, that Regulatory Guide 1.90 on pre-stressed inspection, we were trying to dovetail with what we understood was developing in respect to Appendix J at that point in time and anticipate what the change

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might be in the direction it had been going -- as far as I know, it's still going -- is to prefer a full pressure"vest rather than a half-pressure test for the integrated leak rate test.

DR. SIESS: Do you remember the meeting we had with the German RSK last fall to discuss leak rate testing? I think Charley Hoffmeyer might have been there.

MR. ARNDT: I was at one meeting with them, but I don't recall it dealing with integrated leak rate testing.

DR. SIESS: You might try and find the report that we made on that meeting. They had some comments about the integrated leak rate test at low pressures. And I guess that they were talking -- I can't remember now whether they were talking about high pressures or not -- but they thought that the scatter and the results at low pressure just didn't give them much confidence.

MR. ARNDT: I think that there's quite a controversy between advocates for low pressure and high pressure testing. Both sides feel that their condition will reveal some situations that the other test won't.

For example, if you take a penetration with a potting compound or a compression seal, as you observe a higher pressure on it, that's going to tighten up more, it's going to pack tighter, it will seal tighter. Therefore, maybe your low pressure test will be considered a more valid test

than your high pressure test.

However, if you have penetration of a different type where you don't tend to seal the penetration pattern with the higher pressure, then your high pressure test would be the more valid one because in that condition, you're going to release more through a given opening.

DR. SIESS: Now to get back to your concept of the reason for the integrated leak rate test, there's a couple of things. One is that it could disclose gross degradation in some portion of leakage barrier that was not subjected to type B or C tests, such as the liner or the concrete or whatever it might be, aren't right.

The other one, I guess wasn't that clear? I can put it this way: If it could detect leakage through a penetration that for some reason had not been subjected to a type B or C test --

MR. ARNDT: Right.

DR. SIESS: You know, things do get overlooked sometimes. If that's true, then the fact that prior to making an integrated leak rate test they find that some penetration of some isolation valve is leaking excessively, they go in and fix it, you know, in order to make the type A test.

This doesn't bother you because, presumably, that valve was checked every six months, or whatever the rate was for the type C tests. So that the interval between tests is

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low enough that the fact that it failed just before the integrated leak rate test is no different than failing in some other six-months interval. Presumably, your interval, your test interval is set low enough to maintain some level in between tests.

MR. ARNDT: I'd have to say yes to that. I think the confidence level is there, but it's qualitative, not quantitative.

DR. SIESS: It seems to me that since we really hang so darn much on leak rates, I look at Three Mile Island, and, of course, we don't think that the containment leakage there contributed significantly to the off-site releases, unless you want to call the failure to isolate and get the stuff out to the auxiliary building.

But, of course, Three Mile didn't see very much pressure. A pressure spike, apparently. I don't believe that there is any radioactivity release associated with that pressure spike. I haven't tried to correlate the radioactive sequence with the other sequence. But sitting there at, what, 2 or 3 psi, Three Mile Island apparently didn't leak. It had a few billion curies inside it, but not very much go outside.

But it does seem to me that either we're putting too much emphasis on the leak rate or we're not enough concerned about just how good it is. There must be enough data

from type B and type C tests to look at integrated leak rate tests so that somebody could do some kind of a reliability-type study to say with what confidence we know what the leak, what rate would be in between tests.

Darn it, if it isn't as high as we'd like it to be, then we forget about the darn thing or change it.

MR. ARNDT: I think that this is a good suggestion for us to pay attention to when we go for our general revision on Appendix J.

DR. SIESS: I think it's a possible research subject.

MR. ARNDT: On the three different types of subjects.

DR. SIESS: I think that there's a research component in here. I'm not sure. If there isn't now, it has to be formulated better.

MR. ARNDT: I think we'll look into this. At the very least, we have various reports on test results and LER reports on failures. And perhaps we could compile the data from that and derive something from that data that would tell us where the most probable failures are and what the reason is.

DR. SIESS: There's a frequency magnitude issue. The license from Three Mile Island here need to be looked at. The leak rate comes into the licensing process and the safety review pretty much in terms of LOCA.

You assume that we've got P/A, peak calculated

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accident pressures. We take a source term from Reg Guide 1314 and we take a leak rate of the tech specs to which these tests are related. We take some 5 percent meteorology and we compute some doses.

And, of course, we compute some doses which are absolutely outrageous in view of Three Mile Island.

On the other hand, our source term may be equally outrageous in terms of Three Mile Island. I don't know. What the whole leakage thing fits into that scenario which -- I'm not sure it's a bonding scenario any more, or an acceptable scenario.

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Certainly, it's not acceptable to the public in terms of the numbers we come out with in the SER. The numbers we come out with in the environmental impact statement, on a realistic basis for a LOCA, are much smaller. In fact, for Three Mile Island 2 the environmental impact statement Class 8 large LOCA was 600 and some-odd person-rems within a 50-mile radius, which is about the same order which we got for three-mile.

I'm having trouble fitting the leak rate thing into the overall picture now. I just don't have that much confidence.

MR. ARNDT: Your comments are good ones, and I think when we go for our general revision --

DR. SIESS: I know how we got where we are.

MR. ARNDT: -- we can factor these in, pardon.

DR. SIESS: I know how we got where we are but when we go back and tie the leak rate entirely to the Part 100 siting criteria, you know, which leads to unacceptable consequences by public standards, I think it needs looking at. I don't know whether Standards should look at it, or Licensing, or what.

MR. ANDERSON: There is something other than the minimum considered in the WASH-1400 report. They considered that there was going to be hair leakage based on the probabilities.

DR. SIESS: WASH-1400 always carried everything to a core melt.

MR. ANDERSON: I think they had studied somewhat the probability. We'll double-check that.

DR. SIESS: I don't remember whether WASH-1400, you know, looked at realistic accident pressures, or whether they just sort of used the LOCA analysis to get the pressures and so forth.

MR. ARNDT: I think also the Lessons Learned -- Three Mile Island 2 Lessons Learned Task Force had addressed itself in recommendations to looking at Appendix J. I don't recall --

DR. SIESS: I don't recall that.

MR. ARNDT: I don't have the report with me, but I thought they were considering looking at that also.

DR. SIESS: Maybe when we get through with Three Mile, we'll get back and talk to the staff about leak rate testing. Really, the more basic question to me is not the leak rate testing but where we stand on leak rate, and why. Because I've seen in the past few years the structural design of containments change significantly simply because of the leak requirement. I don't think the meteorology has changed that much, but something has changed to where everything is a double containment.

We'll just see more and more of those, and it's

p being dictated by a particular calculation, a particular requirement which may be important. After all, Three Mile Island, if it showed anything, it showed that containments are awful nice things to have.

MR. ARNDT: I'm not so sure about the more recent containments, but the meteorology model, I think, was very significant with respect to the structural design used. For example, in Beaver Valley, the application of an additional barrier, I think was due to meteorological modeling of the site. Where the original design might have been fine on one site, here it was felt that additional protection for that site was desirable.

DR. SIESS: I think maybe there were some changes in the meteorology. But I haven't seen any site -- of course, I haven't seen very many CPs recently, but I'm talking about four or five years, I haven't seen any site where the old two-tenths percent leak rate was acceptable, and that's what we were using ten years ago. We've still got some of them. The leak rates were two-tenths percent, then they started going to one percent; then they started going to double containment, to get down to one-tenth percent. You know, we've done some pretty extreme things.

PROF. KERR: One of the things that happened was changing a goal to half the goal at the CP stage. That probably helps some, because I can remember plants coming in

with 299.8 rems to the thyroid at the OL stage, and we found that acceptable. You just don't see that anymore. You see at the OL stage, 15 rems to the thyroid, one, two, three, four, five rem, whole body. Everybody's got tightened up, even on Part 100. I'm not quite sure why.

I've got nothing against containments and low leakage, but a double containment at Three Mile wouldn't have changed the releases, I don't think, one bit.

MR. ARNDT: I agree.

DR. SIESS: And if it's an isolation valve that doesn't close, the fact that you've got a double containment doesn't help you one bit. Sometimes I think the regulations -- where the reason for them has sort of gotten lost -- have led to design changes or solutions that are not necessarily improvements in real safety. They're an improvement in a calculation, which may or may not affect the real safety.

Okay, this is going out for comment, right?

MR. ARNDT: Right.

DR. SIESS: Any objections?

MR. ETHERINGTON: No.

DR. SIESS: The next one we've got is Revision 2 of 1.136. 1.136 is entitled Material, Construction and Testing of Concrete Containments. It's a qualified endorsement of ASME boiler and pressure vessel code section 3, revision 2, original draft. And revision 1 was the

original ground. Revision 1 just dealt with Article CC 2000, which was Materials and the new draft has expanded that to deal with essentially all of the parts of CC 1002, 4, 5, 6 and 7, and 3 is Design; am I right?

MR. MA: That's right.

DR. SIESS: That's covered in another one, isn't it?

MR. ANDERSON: No.

DR. SIESS: Don't we have a rate guide that has load factors and stuff like that? I thought we had a couple of rate guides that addressed that.

MR. ANDERSON: That was on 349, other concrete structures.

DR. SIESS: Okay. It's on 349, and actually, all the staff has added to cover five more chapters is about two items, right?

MR. MA: That's correct.

DR. SIESS: I went through positions. One was not changed; two was not changed; three simply gives a cross reference to Reg Guide 1.107; four was not changed; five, I think is new; and six is new. They deal with 5000 and 6000. Rather than go through these item-by-item, let's just see what comments we have. It's fairly clean. I have a couple.

In Item 3, where you simply change the reference

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1107, that's on the chloride limits, which is about as hot a subject as you can get into. And I think now you're quoting 318, and I don't know that 318 -- all I can tell you is that 318 is not considering the change right now I can tell you that since I'm chairman of the 318 Subcommittee.

MR. ARNDT: Okay.

DR. SIESS: I just wonder if just for the benefit of the user, whether it wouldn't be just as well to put al the words in Position 3 instead of cross referencing another guide. To make a person go look up another guide -- I haven't any strong feelings, but --

MR. ARNDT: There's a particular reason for this. Items one through four are sort of in the committee development process. There are being changes made to the code. Changes have not been made effective, they're not out in an addendum to the code, and with the exception of number three, items one through four are going through as shown. Item number three, the Committee is attempting to make some progress on it, but there's still fairly intense discussion between the Committee and us as to what the chloride limits should be. There are other factors than just the chloride limits, although this refers specifically to that.

DR. SIESS: No it doesn't. By reference to 1107, it limits other things than chlorides.

MR. ARNDT: Right, the chemical requirements.

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What I'm saying is between the Code Committee and Reg Guide 107, there's also some controversy as to the time at which it should be in place in the structure and tension, without having any environmental protection. That's outside of this reference here --

DR. SIESS: All I was saying is there's not any change in substance, but would it be convenient for the user if you just simply repeated in here the requirements from 107 instead of referencing them?

MR. ARNDT: Not rea ly, because what we're hoping is -- maybe too optimistically -- that the Code Committee will decide that the contents of 107 or the discussions that we're having after the issuance of 107, can come out in an addendum to the code, in which case, if they do that, we'd have no need for the regulatory guide any longer. But what's more likely is that they may come out in some modified form, which maybe they and we can agree upon, and it may not fully be exactly the same as 107 now is.

Now, if we come up with something that's a little different from the current 107, then we have to go back and change 107 and this guide, both, whereas if we wind up with a compromise position with the Committee, different than what's currently in 107, and we had the wording in here, we'd have to change both rather than one.

DR. SIESS: So you could only change one. But

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this assumes that it is satisfactory, that if you change 107, the change also applies here.

MR. ARNDT: Correct.

DR. SIESS: And that is true.

MR. ARNDT: That is a fact.

DR. SIESS: So that is an advantage I can see. Okay.

MR. ETHERINGTON: What happens if the code conforms completely to your Reg Guide requirements? Do you just withdrae the Guide, or do you leave it and endorse the code in the Guide?

MR. ARNDT: If they have put all the points that we're concerned with into the code, then we feel that there's no longer any need for the Guide itself. It's a redundant piece of paper. And so long as we have no further points of contention on that subject, then we don't need the Regulatory Guide.

DR. SIESS: But you do need the reference.

MR. MORRISON: What you're saying, I don't understand.

DR. SIESS: Let me try. If the code is completely acceptable without any reservation, the way you would accept it would not be by a Reg Guide thing, it's completely acceptable. But by referencing it, there's a place in Part 50 where you reference acceptable standards.

MR. MORRISON: We had the codes and standards in Part 55(a). But I think what Gunter is saying is a little confusing. If the code was completely acceptable to us in our present course, we would still need a Regulatory Guide that would endorse it as an acceptable way.

DR. SIESS: Why not? If you put it in 55(a) —

MR. MORRISON: If we think it's mature enough, then we can do this with any standard where we think we'd want to put it in the regulations, under the Regulatory Guide. That is another option open to us. But we'd have to endorse it by one mechanism or another.

DR. SIESS: You can either put out a Reg Guide that endorses it up to a certain addendum, or you can put in 55(a), which is the same thing.

MR. ARNDT: Right. Yes, I can see where I may have confused the issue.

DR. SIESS: You're always a year and a half behind in 55(a), which doesn't bother me. It used to bother Dr. Bush quite a bit.

MR. MORRISON: We're usually that far behind on our other standards that we're endorsing on Regulatory Guides, too.

MR. ARNDT: We wouldn't need a specialty guide like 107 if all of these provisions were in the code. We would continue a guide like this guide, which is endorsing

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-- we're attempting through this guide to endorse the code as a whole.

DR. SIESS: What does 107 cover?

MR. ARNDT: It covers grouting, the in-service inspection of containments -- excuse me, it covers the grouting of pre-stressing tendons.

DR. SIESS: There are codes which are acceptable and these are the ones, Section 3, Division 1, is covered by 55(a).

MR. MORRISON: 55(a).

MR. ANDERSON: We're planning on revising 50, 55(a) to broaden it. Right now it only covers Class 1 metal components. One of our priority tasks is to complete the rewrite, 50, 55(a) and to broaden it, including starting to pick up metal containments. I don't believe we're going to pick up concrete containments for some time. We want to see this code mature somewhat.

DR. SIESS: Well, it looks to me like CC is getting pretty close to what you want.

MR. ARNDT: It is, but it's not at the point where we're in close enough agreement with the Code Committee that we could go and put it in the regulation.

DR. SIESS: These are -- maybe they're a little better than nits, but they're not great big issues.

MR. ARNDT: Agreed.

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DR. SIESS: They're relatively minor differences, considering what's in them.

MR. ARNDT: Our procedure here has been to attempt to pick up as much of Section 3, Division 2 as we can in adjustable bites. This is the first expansion of the original Guide. The first issue of this Guide covered the materials only. This issue of the Guide goes beyond that.

DR. SIESS: You have still got differences on 3000, I know. Let's go to page six, where the two new items -- the first one of them is on 52-10. I have one comment. In line three, it should be "those embedments," I believe. "Those embedments shown on the drawings." I think it's a little clearer that way. Anybody have any questions about 52-10, Item 5?

(No response.)

DR. SIESS: What about Item 6? That seems to be something the code ought to pick up and fix, because I don't think -- did they argue about that, gentlemen?

MR. MA: No.

DR. SIESS: Because the way it was worded, if you read English, it didn't require a remedial measure, but there wasn't much point in mentioning it, unless you intended to require it.

MR. ARNDT: I'm not sure that that was the intentional wording in the code.

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DR. SIESS: It was just very poor wording.

MR. ARNDT: But once they make the changes to the code --

DR. SIESS: They might make it before this goes final.

MR. ARNDT: It's a possibility.

DR. SIESS: Mike, do you have any questions?

MR. BENDER: No.

DR. SIESS: Anybody else? Any objection to this going out for comment?

PROF. KERR: I have no objection. I have a comment on page three, l.1363, where the staff believes these recommended limits are more conservative and can provide better assurance. I'd feel better if it were something like "needed assurance" rather than "better assurance." One can always become more conservative --

DR. SIESS: Where is that, Bill? Oh, I see it. Item 14.

PROF. KERR: One can always be more conservative and provide better assurance. It seems to me what you want is -- you don't think the existing is good enough and you want some needed insurance.

MR. ARNDT: Correct.

MR. BENDER: Can I ask an extraneous question?

PROF. KERR: No.

MR. BENDER: I'll ask it anyway. Having become aware of the rock anchor problem, what's being done about getting something to deal with those kinds of adversities? That doesn't come under this.

MR. ARNDT: It's not covered here. I'm not up to date, exactly what's happening. I think that there is some activity currently going on, looking at this.

MR. BENDER: There's water intrusion into the rocks. That much I know. The problem is whether, with all the attention we're giving to grouted tendons in the concrete, we aren't ignoring the most important matter, which is whether the integrity of the rock anchors that are used for that purpose have really been properly controlled by a regulation. I don't want to take the matter further. It just reminded me of it, in looking at this.

MR. ANDERSON: On your suggestion, we looked at the word "better" and I'm not sure we can provide the needed assurance of avoiding unforeseen problems, because we can't foresee all of them.

PROF. KERR: Well, my point is you can always make things more conservative, and thus presumably provide better assurance, but you can take next week, you can take an even more conservative stance to provide better assurance. It does not seem to me that that's a valid argument for doing something. The fact that you are more conservative and

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provide better assurance --

MR. ANDERSON: I'm not sure we're going to provide all the needed assurance of avoiding unforeseen problems.

PROF. KERR: Well, if you don't provide the needed assurance, then you shouldn't use that change, because the change presumably is one which you think will provide needed assurance. Otherwise you wouldn't be recommeding it, would you.

MR. ANDERSON: When it comes to unforeseen problems.

PROF. KERR: Assurance doesn't mean certainty, to me.

MR. MORRISON: That's right. I don't have any problem with the "needed assurance."

PROF. KERR: It's in it.

MR. ETHERINGTON: Would it be a compromise just to leave out "more conservative"? "These recommended limits provide better assurance. If you can provide better assurance at small cost, you should do so." I think that's part of the philosophy.

DR. SIESS: I am not sure it's at a small cost.

MR. ETHERINGTON: Well, I don't know, compared with the cost --

DR. SIESS: That's the chloride. That's not in the position, Bill.

PROF. KERR: No more comments.

DR. SIESS: Anything else?

(No response.)

DR. SIESS: Okay. We'll say "Okay" on sending that one out for comment. I doubt if you're going to get very many comments, because that particular position is already in force on the chloride. You're covering grouting in another reg guide; right?

MR. ARNDT: That's right. This is just for consistency.

DR. SIESS: What have you got for us next month, if anything, Bill.

MR. MORRISON: We have nothing for next month.

DR. SIESS: You guys are busy on something else?

MR. MORRISON: Our people are diverted on working on licensing cases and new projects as a result of the TMI Lessons Learned.

DR. SIESS: I want to know when Gunter Arndt became an expert on leak testing. These structural engineers are pretty versatile.

(Laughter.)

MR. ARNDT: We're still on the record.

MR. MORRISON: When we lost our previous expert.

DR. SIESS: Who is that?

MR. MORRISON: Joe Melvin. He went to MUS.

MR. ANDERSON: About two or three years ago.

MR. ARNDT: As a matter of fact, my association with Appendix J goes back a considerable number of years, when I first backstopped an individual who had the responsibility for revising the Appendix in its current form, to its current form. And he left shortly thereafter, and since I h- worked with him on it, I continued coordination on it. And it's recently been that time has elapsed from the issue of that regulation to a period where people have to implement. The time period involved had passed, and we started getting information in Licensing that

indicated the Appendix needed changing. And NRR has drawn up, as a result of their experience with the current one, a number of changes they want made, a number of recommendations for change. I will be coordinating that action.

DR. SIESS: Bill, leaving out the discussion about leak testing, in general, which really didn't relate specifically to the guide, what did we accomplish here this morning that we couldn't have accomplished perhaps by just some written comments from members of the subcommittee to the staff? I am still looking at ways to reduce some of our effort in this area, particularly on guides that are going out for comment. Once I suggested we might even consider not reviewing them until after they had been out. In this case, we had relatively minor items -- that is, noncontroversial -- and yet, you know, we've convened three to four members of the committee and brought you guys down here from Bethesda for an hour and a quarter.

MR. MORRISON: I know this is something that we have discussed before.

DR. SIESS: Did you get anything more out of this than you would have we had sent you a few comments in writing on these two guides?

MR. MORRISON: In the regulation in the guide that we discussed this morning, probably not. And, in fact, where, because of previous commitments we have been unable to meet and maybe we only had one guy down here, rather than defer it, I

suggested that perhaps we could get your comments by mail without having a meeting.

But I think it depends on the individual guides and regulations as to the extent of discussion that takes place. I think that particularly on the more controversial guides, we think that the meetings, even before we go out for comment, are worthwhile.

DR. SIESS: I wanted to limit it to these two because, for example, suppose we had a procedure whereby I saw these two a little bit in advance, looked at them, and said I didn't think there was too much controversy and suggested to the staff that they simply circulate them to the members of the committee to see if there were any comments, and we would not consider them at a meeting. That would have been satisfactory?

MR. MORRISON: That would have been satisfactory.

I think there is some other factor that we should probably take into account. That is the extent of public involvement, too. Suppose that a guide is in that category but you also received a couple of requests for public comment.

DR. SIESS: That would affect my decision. But, again, on a guide like these two changes, they both go out for public comment, they will be back before they're made final, and there will be ample time for the public to comment and to appear before this committee if they want.

Now, in this instance of just these, two following the

procedure, I suggested we could have saved a meeting if we had had a couple more substantive issues. Then I wouldn't see much point in trying to handle something like this by correspondence. We might just as well bring it in and take it up in the same meeting, unless it's going to extend the meeting longer than would seem desirable.

But does the subcommittee see any reason for not trying that if the occasion arises? It won't happen too often.

MR. ETHERINGTON: No. I think that would be fine. Of course, it does presuppose that we get some kind of a look at this enough in advance to decide whether we'll need a meeting or not.

DR. SIESS: What I thought is that I would look at it; and if I thought that we didn't need a meeting, I would ask the members to comment or to indicate whether they preferred to discuss it in a meeting.

MR. ETHERINGTON: Of course, you can always call a meeting and then cancel it. I think that's possible; isn't it?

MR. QUITTSCHREIBER: Yes.

DR. SIESS: I think the number of times where we could avoid a meeting entirely might be few, because we might have an effective guide coming in and two for comments, and we might juast as well take them all up.

MR. ETHERINGTON: This is when we clearly could have avoided a meeting.

DR. SIESS: This one we could have avoided a meeting, but we could have a case with three or four effective guides. That means an all-day meeting, but we could cut a meeting down to half a day. There are various things that we can do. These Wednesdays are getting pretty valuable to the committee for other meetings, and sometimes half a day is enough.

But we'll try this and see if it works. It's not out of line with what you said, Bill.

Then, next month we have nothing.

Will you have anything the month after that?

MR. MORRISON: I haven't really looked that far ahead on our schedules, but I will let you know at the time of the meeting next month.

DR. SIESS: Okay.

Anything else, gentlemen?

MR. ETHERINGTON: Yes. I would like to ask a question about integrated leak rate testing. It's a very difficult test, of course, but, as I recall, North Anna 1 ran a leak test, and they came out with a negative leak rate which didn't look right to them, so they rationalized away the negative part and came out with an extremely small positive leak rate.

This doesn't seem very satisfactory. Have you any thongs on that?

MR. ARNDT: I am not familiar with that, sir, I am afraid.

MR. BENDER: I remember it, Harold.

MR. ARNDT: I know the containment itself is supposed to operate.

MR. ETHERINGTON: It doesn't give you much confidence with the real figure they get.

DR. SIESS: They're all using the absolute method now, aren't they, rather than the reference document?

MR. ARNDT: I believe they are.

DR. SIESS: They're putting du Pont monitors and thermometers around, and so forth. You get absolutely no confidence in that whatsoever. What I do get some confidence from on the integrated leak rate test is that they have to calibrate after they've run their 24-hour tests that they then must put in a known leak and run for, what, four hours or something like that. And they've got to be able to pick up that known leak within plus or minus 25 percent. Now, that gives me a little confidence that what they got was right.

MR. ETHERINGTON: I don't remember on North Anna, per se.

DR. SIESS: What were they talking about? Out-gassing from the concrete? I don't remember. But this thing is so darned sensitive to temperature, they put about 20 thermometers around, you know, and then they got all these complicated -- it takes a computer program to compute this.

PROF. KERR: They just failed to calculate the

relationship between pressure and temperature correctly. Then you get a negative leak rate.

MR. ETHERINGTON: But they made all the known corrections, you see.

PROF. KERR: But maybe the corrections weren't properly done.

MR. ETHERINGTON: I am only saying I don't have much confidence in the number; that's all.

DR. SIESS: It doesn't give you any confidence except when you've seen the calibration test; you get a little confidence if that works, that the thing is working right. I think I would give a little more confidence to the calibration test if it was made first, rather than afterwards; but that may be just a minor point.

MR. ARNDT: One of the reasons we would like to make a later, more general, change to Appendix J is so that we can leave the technical aspects of running conducting a test, the mechanics of testing, to the industry standard that has been recently developed and expanded, and leave the criteria for the leakage rate in the regulation.

But for the reasons you're citing as examples, there is going to be considerable change anticipated in the way people go about conducting the tests; and having an industry standard which we participate in and follow along with, which will be sort of the handbook of doing the test, we find it to

be a valuable way of keeping the testing techniques current and keeping them as accurate in doing them and interpreting them as possible.

DR. SIESS: I think, following what Mr. Etherington said -- and I certainly agree with him -- in terms of the assurance that the containment will not leak in the event of an accident, I don't think the integrated leak test, the interval it's made and how it's made, contributes very much to my feeling of assurance.

I think the Type B and C tests, being sure that penetrations are tight and that valves close and are closed, give me a lot more assurance because they're made at more frequent intervals.

But from my feeling about the failure rate there, I don't know how much assurance that I get, and I think the level of assurance really depends more -- if you did a probabilistic analysis, your level of confidence would depend much, much more on your Type B and C test than on a Type A test.

MR. ETHERINGTON: I don't want my comment to be construed as my not being in favor of integreated leak rate tests. There are a lot of reaction forces underlying, and you could develop a crack in a weld that wouldn't be found any other way. On your one-inch hole, assuming that you have 10/1000 gap there, or a bad fit or something, once it gets away from the hole, I think it will find its way out. And I find that would

be about 2/10 of a percent a day on a one-inch hole for the 10-mill gap.

DR. SIESS: It was 40 psi on that liner. I am not sure it was there, either.

MR. ETHERINGTON: I don't know. The roughness, the unevenness.

DR. SIESS: The concrete is cast against the steel.

MR. ETHERINGTON: It's cast against the steel. Does it stay there?

MR. BENDER: There is lots of buckling in those lines.

DR. SIESS: The thing is, the intergrated leak rate test, I believe, made at five-year intervals at half the pressure, if you did a probabilistic type of analysis, you would find that the confidence limits you got from that would be pretty poor compared to what you would get from your Type B and C tests.

I am not arguing against integrated leak rate tests, either.

MR. ETHERINGTON: No, that's right. That's all I wanted to say.

DR. SIESS: It's a gross test. It's likely to show up something and make some sense, because that's really what you're after. But I am also not sure that failing it is all that significant, either, if it fails because a valve line closes.

MR. BENDER: If I could just add another element of thought to Harold's point. An intergrated test that tries to establish a leak rate of like a quarter of one percent of the system volume per day is just not within the measuring capability of the systems. So, I think tests like the North Anna test --

DR. SIESS: You have got darned few containments that are as high as a quarter.

MR. BENDER: -- Show up that measurement. It seems to me that just from the standpoint of overall control, that being able to show that the leakage is less than one percent of the system volume per day is the kind of assurance you need in order to be sure that all the penetrations are closed up. And that's the part that I think has the highest uncertainty.

It seems to me, when you're thinking about leak testing, one of the things that ought to be dealt with is that, just to be sure that all the mechanisms do operate. These containments that have buffered connections on them are permitted to leak in all sorts of ways, and a leak rate test that is masked by those buffers is not really much of a leak test, anyhow.

So, I think that whole aspect of it can stand some scrutiny, what leak rate should you establish where you've got a buffered system, just to the extent that the staff wanted to get some reasonable assurance that the closures are being made well.

MR. ARNDT: I would like to add as a footnote -- I mentioned the standard before; this is the consensus national standard, ANCI-N-274, containment system leakage testing requirements. And we would like to, in future, not have Appendix J be technical as far as the mechanics of the test are concerned.

MR. BENDER: Would you plan to reference the standard?

MR. ARDNT: Yes. The current one does, as a matter of fact. The reference is sort of the predecessor to the standard.

DR. SIESS: Anything else, gentlemen?

(No response.)

DR. SIESS: Thank you.

The meeting is adjourned.

end#4

(Whereupon, at 10:10 a.m., the meeting was adjourned.)

* * *