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BEFORE THE  
DEPARTMENT OF TRANSPORTATION

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In the Matter of:                   :  
:  
PUBLIC WORKSHOP ON                   :  
NRC CONVERSION TO THE               :  
METRIC SYSTEM                       :  
:  
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The above-entitled matter came on for  
Conference, pursuant to Notice, before Zoltan R. Rosztoczy,  
Chairperson, at Holiday Inn Inner Harbor, Howard & Lombard  
Streets, Baltimore, Maryland, on Wednesday, November 15th,  
1989 at 8:30 a.m.

APPEARANCES:

Zoltan R. Rosztoczy Nuclear Regulatory Commission	Glen L. Sjoblom Nuclear Regulatory Commission
Bryan W. Baker Amersham Corporation	Paul E. Sieck Omhart Corporation
Seymour A. Weiss Nuclear Regulatory Commission	Lawrence Ruby Reed College
Ali Moslek University of Maryland	Uri Gat Oak Ridge National Laboratory
A. Frances Di Meglio Rhode Island Nuclear Science Center	James A. Shaffner Nuclear Regulatory Commission
Earl Easton Nuclear Regulatory Commission	Charles Flynn State of Maryland

## P R O C E E D I N G S

(Time Noted: 8:30 a.m.)

CHAIRMAN ROSZTOCZY: On the record.

Good morning, ladies and gentleman.

I am Zoltan Rosztoczy, Executive Director of the Regulatory Applications Division, NRC. I will be chairing this workshop.

As you probably know, this is a two day workshop. It started yesterday morning. We are finishing up our work today.

Yesterday basically we had two major parts of our discussion. The first part was on general government policy and NRC's approach and NRC's plans for the potential conversion.

And then in the afternoon we discussed more special terms, issues associated with nuclear power plants.

Today, in turn, we are going to talk about industrial and medical uses of nuclear materials and metrications issues associated with those. We are going to discuss academic and research institutions and metrication policy associated with that and finally management.

I would like to welcome all of you. And we are looking forward to hearing your views today.

The purpose of the workshop is to collect information that NCR in turn expect to use toward the

1 formulation of a metric policy for NRC. And our goals are  
2 to convert NRC's activities to metric in some orderly  
3 manner. What does orderly mean? That's a good subject for  
4 us to discuss. It's one item that we'd like to introduce.

5           And the second goal is to encourage the  
6 industry to voluntarily convert their activities to metric.  
7 Almost the entire world is using metric system. So, sooner  
8 or later we all will convert to the metric. The question is  
9 really timing, whether we are going to do it now or wait for  
10 a decade or more, or we are going to do it maybe in some  
11 partial sense.

12           I would like to summarize briefly some of the  
13 statements that that Doctor Beckjord made yesterday relative  
14 to NRC's policy and NRC's plan.

15           As you probably all know, a new law the  
16 Omnibus Trade and Competitiveness Act was published last  
17 August, August of 1988, and this act has in it certain  
18 provisions for metrication. Basically, it requires that the  
19 government agencies convert their business related  
20 activities to metric unless there is some good reason to the  
21 contrary.

22           We are here today to hear if such reason  
23 exists in any of the areas that we are going to discuss.  
24 Any time that you are aware of such reasons, we certainly  
25 would like to hear.

1           Among government agencies there is an inter-  
2 agency committee on metric policy that provides overall  
3 guidance, and NRC has a representative on that committee.  
4 Doctor Beckjord is the representative on that committee.

5           The Department of Commerce has certain coordi-  
6 nating responsibilities. You heard from them yesterday.  
7 Some of -- those of you who weren't here yesterday and you  
8 are interested, you can read the statements in the trans-  
9 cript of the meeting.

10           We have also received public comments in some  
11 previous rule making. Of course we received lots of  
12 comments yesterday, and we expect to receive a lot more  
13 today.

14           Insofar as NRC's practices at the present  
15 time, NRC does not have a formal policy. Instead, when an  
16 issue comes up, in terms of use of metric units, NRC makes a  
17 -- have been making a decision on a case by case basis  
18 connection with rule making. Normally most of our rules are  
19 in traditional or English units. We do have a few rules  
20 issues which have dual units in them.

21           In terms of our activities, somebody turned to  
22 us and suggested that we will be doing a submittal  
23 licensing. Some would talk to us in metric, and we agreed  
24 that they could do that provided they also included tradi-  
25 tional units together with the metric unit to have us to do

1 our work since our work was in traditional units.

2 In terms of our activities, we reviewed our  
3 activities to see which one of those would be the most  
4 affected by any change to the metric system. We found that  
5 there are four major areas in that licensing activities. In  
6 licensing activities we included not only the granting of  
7 licenses but also interface and communication licenses of  
8 the license that would be granted. This includes emergency  
9 response activities which needs special attendance because  
10 of the very short time involved. The development of  
11 regulation is basically putting our tools and regulatory  
12 guides in such a form that is easy to use for the industry.  
13 And finally, inspection activities. Those are probably the  
14 most important ones we are facing.

15 We also discussed yesterday various conversion  
16 options. Four options were mentioned. One option of one  
17 potential option is just to continue the same way we have  
18 been doing in the past. It simply would mean that we stay  
19 with English units and use dual units on the -- when  
20 somebody wishes to use metric.

21 Another option would be what we called a one  
22 step conversion. And that by a certain date NRC would  
23 change its activities to the metric system. From thereon,  
24 then communication with the NRC and the industry would be in  
25 metric, except in some areas where this is not practical.

1           A third option was gradual conversion where  
2 conversion would take place during a certain time period.  
3 During this time period we would use dual units to  
4 facilitate all of those who converted and those of us -- and  
5 all of those that did not. And then by the end of this time  
6 period, we would turn to the metric system.

7           Finally we discussed partial conversion.  
8 Under partial conversion we mentioned that certain selected  
9 activities would be converted to metric and other activities  
10 would not. For example, in connection with yesterday's  
11 discussion which centered on nuclear power plants, a  
12 potential way to do partial conversion would be to leave  
13 existing nuclear power plants on traditional units or  
14 English units and require that new applications come in in  
15 metric units so the new plants from now on then would be  
16 all, for after some date, would be in metric units.

17           I would like to also discuss a few house-  
18 keeping items. Today's workshop is a public workshop. The  
19 purpose is to provide an opportunity to everyone to express  
20 their views. We do have a few invited speakers. The way  
21 how we conduct a workshop is that first the invited speakers  
22 express their opinion through their introductory statements,  
23 and we follow this with a discussion period for each session  
24 separated. During the discussion period, anyone who wishes  
25 can comment or ask questions from any of the presenters or

1 from anybody else. And after the end of the discussion  
2 period we go on to the next subject, and we do the same for  
3 the next subject.

4 If anybody wishes to submit a written  
5 question, that's possible to. Then please hand it over to  
6 the people sitting on the right side of the table and ask  
7 the people and they will see to that that the appropriate  
8 people will respond to the questions.

9 Should you find after the workshop that some  
10 bright idea comes to your mind that you would like to  
11 communicate to us, that's available also. In that case,  
12 please just send in additional comments either to the people  
13 who were listed in the Federal Register announcement or send  
14 it to me, and we will see to it that it will be factored  
15 into our overall work.

16 In terms of conveniences, we will break in the  
17 morning for a coffee break and then for lunch. We will see  
18 how long today's session will last. Right now we are  
19 scheduled to finish the first two in the morning and the  
20 third one, the waste disposal, in the afternoon. Should it  
21 move a little faster, then there is a possibility that we  
22 can finish all three of them in the morning.

23 A transcript of our discussions and presenta-  
24 tion is being kept. The lady on my left is keeping the  
25 transcript. It's important that you use the microphone when



1 you are speaking. So, every time people who ask questions  
2 or make comments from the floor, before you do it, please  
3 state your name and affiliation and use one of the  
4 microphones. The speakers at the table also should use the  
5 microphones so that they need to be passed around once in a  
6 while. I think we can handle that without much problem.

7           Copies of the transcript are available. If  
8 somebody would like to buy one, then you should contact the  
9 young lady on my left, and she will make arrangement for you  
10 how to purchase them.

11           The basic purpose of the transcript is to  
12 facilitate our work. We expect to produce a summary report  
13 from the transcript which we will be using in our work, and  
14 we will have the transcript available to go back through and  
15 make use of.

16           There are telephones available in the hallway.  
17 If anybody has to make any phone calls, those are right up  
18 on this floor.

19           With that much of an introduction, I would  
20 like to ask if there is any question just on the conduct of  
21 the workshop?

22           If there are no questions on that, then we are  
23 going to the first session. I would like to ask Glen  
24 Sjoblom from Nuclear Materials Office of NRC to conduct the  
25 first part of the workshop and introduce his speakers from

1 the plant.

2 MR. SJOBLOM: Thank you, Zoltan.

3 I think Zoltan and I have a distinguished  
4 common element to share with you. We both have impossible  
5 names. His is something like Czechoslovakian or Russian and  
6 my is Swedish, but they're both impossible. The name is  
7 Sjoblom.

8 As Zoltan indicated, my purpose here today is  
9 to help to gain some information from the regulated commu-  
10 nity. We need to understand how the development of an NRC  
11 policy, related to the timing and how we conduct this  
12 transfer, this transition, will indeed affect the regulated  
13 community. And I would characterize our part of the NRC's  
14 view on this as quite open minded at this point. We have not  
15 taken a definitive position on that. We are, of course,  
16 guided by the Act passed by our Congress. And I think  
17 Zoltan indicated that some transition is inevitable because  
18 of that. So, what we want to try to understand is how what  
19 we do affects what you do.

20 By the title of the Act, Omnibus Trade and  
21 Competitiveness Act, indicated that Congress was interested  
22 in the competitiveness of U.S. companies in commerce. In  
23 the medical and industrial area of NRC, we regulate the use  
24 of nuclear materials in their medical applications and  
25 therapy and diagnostics, and we also regulate the industrial

1 uses of nuclear materials.

2           There is a subcategory of the industrial that  
3 deals with the fuel facilities, the facilities that  
4 manufacture nuclear fuel for the reactor. This is -- we  
5 attempted to get people to come from that segment, but to my  
6 knowledge, they were not able to be here today. But, to the  
7 extent that we can get input in any event from that segment,  
8 we would be most interested in that. So, if there are those  
9 of you in the audience who either wish to talk to that  
10 today, or wish to do so later, we would be most interested.

11           We do have with us today representatives of  
12 both the medical and industrial uses to speak with us. And  
13 after I raise what I think are some important though broad  
14 questions, I would like to then introduce them and allow  
15 them to give us their input. Then, subsequently, anyone  
16 else who wishes to make a statement is welcome to do so.

17           If I could have my first slide. Basically, I  
18 would just like to raise some questions here and I think  
19 help open peoples minds.

20           If I could have the next slide. There are  
21 basically seven questions. There are copies of these avail-  
22 able to you.

23           First of all, basically, what could NRC do  
24 that would help the competitiveness of U.S. companies in  
25 foreign sales? In other words, are there any actions, as we

1 move toward metrication that we could do or not do that  
2 would affect the ability of companies to penetrate foreign  
3 markets.

4           Could I have the next slide. And then, on the  
5 other hand, the question in reverse. Are there actions NRC  
6 could do which would affect the competitiveness in a nega-  
7 tive way, in other words, hamper it?

8           The third one. And then, the flip side is,  
9 are there actions that NRC could take, if we did so, that  
10 would indeed hurt the competitiveness of U.S. companies in  
11 this country. It's possible that we could have that happen  
12 if we did it in an incorrect manner.

13           The next one. And then, as we look at the  
14 number and types of products that involve radio active  
15 materials that are regulated by the NRC, there might be  
16 certain of those that are particularly sensitive to this  
17 metrication process. And if there are, we would be  
18 particularly wanting to find out what they are so that we  
19 might understand, after this conference, those impacts more  
20 deeply, provided that we can arrange some sort of dialogue  
21 later with the people who identify those particular kinds of  
22 products.

23           We have, just to give you an idea, in this  
24 country over a million devices involving radio active  
25 materials that are operating or being used by companies

1 either under a specific license from NRC or an agreement  
2 stated or under a general license: gages, light sources  
3 using radio luminescent processes, the many different kinds  
4 of radio pharmaceuticals. And there is, in other words, a  
5 vast array of products, and it seems that it is growing with  
6 time as the advantages of nuclear materials become  
7 recognized and become built into the infrastructure of  
8 industry and medicine.

9           And while some of these are short lived  
10 materials that have to be regenerated into new products  
11 quite -- on an ongoing basis, other ones have a longer half  
12 life.

13           There are also issues, I think, in this area  
14 related to not just the radiation units themselves, but the  
15 interchangeability of equipment. We're particularly  
16 concerned about making mistakes. And if, in the transition  
17 to metric we find that there are incompatible parts that are  
18 available, then we'll be concerned about that. So, we'd be  
19 particularly interested in understanding if there are any  
20 items for which there are interchangeable, today, inter-  
21 changeable parts which through a metrication process might  
22 become more difficult and might result in a safety problem.

23           NRC's purpose, of course, it's sole purpose  
24 really is to regulate the safety of the uses of these  
25 materials. And the metrication should be done in such a way

1 that it doesn't hamper that process.

2           Next slide. And I think this is another one  
3 which sort of encompassed by earlier questions. What is the  
4 relationship of metrication in this country for these types  
5 of things, the medical and industrial uses, to their uses  
6 abroad. In other words, do companies sell here and not sell  
7 abroad because of metric issues? Or are there ways that we  
8 can involve these companies in the process in such a way  
9 that the metrication in the country will contribute not only  
10 to facilitating our orderly transition here, but will also  
11 help the competitiveness of our companies.

12           Next one. And then I think all of these  
13 things, of course, affect schedule. The purpose of trying  
14 to target particular products sensitive to this metrication  
15 process is to see if there are indeed ones which we should  
16 right now switch because they will indeed help the competi-  
17 tiveness process.

18           Whereas, if there are neutral effects on our  
19 companies' competitiveness, perhaps they could be done, or  
20 the transition for them could be on a somewhat more  
21 leisurely pace consistent with other mandates of the agency.

22           And what sort of schedule does seem  
23 appropriate for a conversion to metric units? Should we  
24 have dual labeling, for example, on packages for a period,  
25 and if so, what period is that? What period of time seems

1 to be appropriate and what is the rationale for the period  
2 that is selected, that is suggested?

3           Next one. And I think I've already alluded to  
4 this. Is there a nexus between the schedule and what the  
5 NRC does and the competitiveness of companies? In other  
6 words, the premise, or one of the premises of the Act was  
7 that there is a direct relationship. How direct is that  
8 relationship for the industrial and medical uses?

9           Before I go to the next speakers, does anyone  
10 in the audience intend to make a statement, just so I can  
11 understand how the timing might be. You're all, of course,  
12 free to raise questions of the speakers, but is there anyone  
13 in addition to the ones, I think I have three, who are  
14 intending to make a statement now. Are there any in  
15 addition to those three that would like to make a statement  
16 on this particular sub-element?

17           Sir, did you?

18           Okay. So, we have four then.

19           Now, let me at this time then introduce our  
20 first speaker, Dr. Bryan Baker. Doctor Baker is the Manager  
21 of Environmental and Safety Regulatory Affairs with the  
22 Amersham Corporation whose headquarters in this country is  
23 in Arlington Heights, Illinois. And let me just introduce  
24 Doctor Baker.

25           MR. BAKER: Thank you.

1           Good morning. I guess I'm the first speaker  
2 today with a pronounceable last name.

3           If you hadn't already guessed, I started my  
4 career with Amersham in England and I still retain, I think,  
5 something of a British accent, but I hope it's understand-  
6 able.

7           As in my presentation yesterday, I want to  
8 emphasis that I am speaking from the perspective of an  
9 international supplier of radioactive materials. To  
10 summarize what I had said yesterday, Amersham and other  
11 international suppliers of radioactive materials are in  
12 favor of a conversion to SI units, with the use of both SI  
13 and what I term conventional units until 1999, after which  
14 year only SI units would be used. We do anticipate an 8  
15 percent rounding of package sized for the research radio-  
16 chemicals that I referred to yesterday so that a 40 MBq  
17 package, which is 1.08 mCi will be supplied instead of a 1  
18 mCi package.

19           I feel that it's important that we talk about  
20 SI units and not metric units because I'm talking mainly  
21 about total radioactivity, and there the old unit has been  
22 the Curie unit and that is still a metric unit, but we're  
23 talking about conversion to becquerels, and therefore I  
24 think it would be more appropriate to talk about SI units.

25           So, today I'm going to talk about the medical



1 and industrial products.

2           And could I have the first slide. The medical  
3 products we've got three groups to be considered. First of  
4 all are the in vitro diagnostic products. These are essen-  
5 tially radio amine acid products, and we envision a direct  
6 conversion from the Curie units to becquerels, since these  
7 products are supplied essentially as kits and not sold by  
8 total activity.

9           We don't perceive of conversion to SI units  
10 being a problem for users of these kits since the components  
11 are dispensed by volume following the manufacturer's  
12 directions. You don't have to take into consideration the  
13 total activity at all at that point. And at the end of the  
14 essay when the measurements of radioactivity are made, they  
15 are recorded in and the calculations made in terms of counts  
16 per minute and not in terms of microcuries or kilobec-  
17 querels.

18           Although there is no apparent advantage then  
19 to say an 8 percent rounding up with these particular  
20 products, there would not appear to be any problem with an 8  
21 percent increase if we wanted to do this across the board  
22 for all radioactive materials.

23           This would require an increase in the limits  
24 for in vitro diagnostic testing registration certificates.  
25 For example, at the moment, the maximum in a single vial

1 that can be supplied to a holder of one of these testing  
2 certificates is ten microcuries. If we go with the 8  
3 percent rounding, that would need to be increased then to  
4 400 kilobecquerels.

5           Turning then to the radiopharmaceuticals,  
6 these are products that are administered in vivo to  
7 patients. They may be given orally or alternatively  
8 intravenously with the dosage currently measured in Curie  
9 values. The unit dose is typically checked in a dose  
10 calibrator before being administered.

11           We see here a couple of options for conversion  
12 to SI units. First, there could be an 8 percent increase in  
13 radioactivity, as we have suggested may occur for radio-  
14 chemicals. Another possibility, which at least some manu-  
15 facturers are considering, is to take a fresh look at the  
16 individual patient dosage that is being used with these  
17 products and looking at relating that to the actual package  
18 size of material that is being provided. This could result  
19 in some package sizes rounded down while others might be  
20 rounded up.

21           Still in the area of radiopharmaceuticals, the  
22 committee that I had mentioned yesterday, the Radionuclides  
23 and Radiopharmaceuticals Committee of the U.S. Council for  
24 Energy Awareness has been in correspondence with the Food  
25 and Drug Administration on conversion to SI units. It's a

1 question of rounding up.

2           Now, FDA has been requiring manufacturers of  
3 radiopharmaceuticals to include SI units as well as conven-  
4 tional units for radio activity in the labelling, that is  
5 the labels that go on the products and the package insert  
6 that accompanies the product.

7           The FDA is now suggesting that from January  
8 the 1st, 1990, that the SI units are placed first followed  
9 by the conventional units. Now, the reason for this is that  
10 that date of January the 1st, 1990, is the date that the  
11 U.S. Pharmacopia (ph.) is adopting that format. Now, some  
12 companies, including our own, are already doing that on most  
13 products, putting the SI units first and then followed by  
14 the conventional units.

15           The third group of products here, sealed  
16 sources of radioactive material, these are used primarily to  
17 check instrumentation, checking dose calibrators, counters,  
18 and to check instrument performance, say the gamma camera.

19           The sources are currently supplied with a  
20 nominal value, a nominal activity value in Curie units and  
21 we would envision that an 8 percent rounding up would be  
22 used when we're going to go with the SI units only.

23           Another factor to be considered, and one that  
24 was certainly raised many times during the emergency  
25 discussion yesterday afternoon was the fact that the changes

1 that will be need on instrument dials, dose calibrators,  
2 survey meters and the like as the conversion to SI units  
3 only is made. And I would think that it would be useful to  
4 contact the Canadians and Europeans to see what their  
5 experience was, how they dealt with this particular problem.  
6 I realize that it would not be on the same scale, but at  
7 least it might provide some useful guidance.

8           Still on the question of, and more specifi-  
9 cally radiopharmaceuticals, the client journal in this  
10 country is the Journal of Nuclear Medicine. And reading  
11 from their notes to authors on units for measurement, "The  
12 international system of units, SI, is standard. Measurements  
13 of length, height, weight, and volume should be reported in  
14 metric units or their decimal multiples. Other measurements  
15 should be reported in the unit in which they are made.  
16 Alternative units, SI or non SI units, should be added in  
17 parenthesis by the author if indicated."

18           So, they're encouraging the use then of SI  
19 units and the AMA, I think about eighteen months ago, was  
20 insisting that all units be reported in SI units in publi-  
21 cations in their journals.

22           Looking at a recent issue of the Journal of  
23 Nuclear Medicine I came across thirteen papers that made  
24 reference to total radioactivity figures. And of those  
25 thirteen, nine gave the units in Curie values only; three

1 gave both units, dual units; and just one paper, a paper  
2 from Canada, gave just SI units. So, although they're  
3 requesting that authors use SI units, they're not really  
4 sort of getting it into practice yet.

5           Turning then to the industrial use, so far as  
6 our company is concerned, these are primarily sealed radio-  
7 active sources that are used in a variety of applications:  
8 smoke detectors, thickness gauging, oil well logging,  
9 radiography are some of the major applications. And users  
10 are really interested in the output of radiation from those  
11 sources, rather than by the total activity. In fact, as  
12 they are sold transferred to users, it's usually done with  
13 the nominal activity being the unit that is used.

14           And 8 percent rounding up activity would  
15 appear to be appropriate here. Amersham's customers many  
16 times are other manufacturers of equipment, and in fact  
17 you're going to hear from one of those manufacturers  
18 shortly. If, in fact, there was an 8 percent increase in  
19 the activity figures, then there would need to be adjust-  
20 ments to licenses and also in the activity figures quoted in  
21 the NRC's Registry of Sealed Sources and Devices.

22           One of the questions that was raised in the  
23 Federal Register notification of this meeting was how would  
24 the use of the metric system affect transportation of radio-  
25 active materials used in medical and industrial applica-

1 tions.

2 DOT requires the use of conventional units,  
3 but they will accept SI units as well. And, in fact, they  
4 did put out a brochure about two years ago explaining the SI  
5 system and giving conversion factors to assist people  
6 involved in the transportation of radioactive materials.

7 ICAO, the international organization, requires  
8 SI units with the option of showing both SI and conventional  
9 units. And the International Atomic Energy Agency in the  
10 1985 safety rules which I think most countries are adopting  
11 during 1990 certainly require the use of SI units but also  
12 allow for the use of conventional units.

13 So, in summary, our company and the other  
14 companies represented on the USCEA Radionuclides and Radio-  
15 pharmaceuticals Committee are in favor of the conversion to  
16 SI units. We favor the use of dual units until 1999, an 8  
17 percent increase in licensed amounts regulations and in the  
18 sealed source and device registry to cover the eventuality  
19 of rounding up, which we would see taking place towards the  
20 latter 1990's.

21 Thank you.

22 MR. SJOBLOM: You point out that -- you  
23 suggest converting completely in 1999. How would you  
24 address the -- what is the basis for that time and how does  
25 that conform with the U.S. Act and the timing expected of

1 it? Can you provide us some help there?

2 MR. BAKER: Okay. The on the question of  
3 timing, as I said before, we want to avoid the use of having  
4 two sets of labelling for products. The European economic  
5 community, I think, has been in the forefront of this  
6 conversion to SI units. They had originally established  
7 1990 as the date beyond which they would not accept anything  
8 other than SI units. That date they were going to have SI  
9 units only.

10 A couple of years ago they postponed that date  
11 until 1992, and earlier this year they put out a proposal to  
12 allow the use of both units until 1999.

13 Our experience here in the States has been  
14 that many people using radioactive materials are simply not  
15 familiar with SI units. Therefore, we feel that the longer  
16 then that the actual transition to SI units only, the longer  
17 that transition can be delayed, the less likelihood there is  
18 going to be a problem of errors arising.

19 MR. SJOBLON: So, you're saying the problem is  
20 not with the labels, the problem is just with the people.  
21 The problem we're having is converting the people to metric  
22 units rather than the labels and the equipment.

23 MR. BAKER: Well, I think there needs to be a  
24 greater awareness by users of radioactive materials of these  
25 SI units.

1 I think we have two separate problems here.  
2 One is an educational, and I didn't make reference to that  
3 this morning because I had addressed that yesterday, but the  
4 USCEA group that I had referred to had developed plans for  
5 an educational program to cover a three year period, a  
6 brochure to explain why the transition was being made, to  
7 spell out the various units involved, and to provide conver-  
8 sion tables. Certainly there does need to be education.

9 MR. SJOBLOM: Okay. There is many thousands  
10 of people who are currently trained in standard units,  
11 current standard units. Just what do you suggest is the  
12 appropriate way to go about converting the people to metric  
13 units?

14 MR. BAKER: Well, I think this is going to  
15 come in a number of ways. As I mentioned earlier, the  
16 journals where publications involving radioactive material,  
17 they are now requiring SI units. The people are going to  
18 need to become familiar then to have papers accepted in  
19 those publications.

20 At the industry group we are certainly going  
21 to be sending out mailings to users of our products and we  
22 will have information booths at society meetings and we will  
23 have the brochure to be provided and people will be able to  
24 discuss conversion at that point.

25 MR. SJOBLOM: And what about the institutions



1 in which medical practitioners use -- learn to use those  
2 materials. Do you know what they are doing to convert and  
3 to educate people?

4 MR. BAKER: I don't have details of those  
5 particular programs.

6 MR. SJOBLOM: And you are -- I have one other  
7 question and then there may be some others.

8 You indicated that there was a need to change  
9 the NRC Register of Sealed Sources and Devices. In what  
10 ways would that be changed?

11 MR. BAKER: that if there is going to be an 8  
12 percent increase in the radioactivity in a source, that  
13 Registry of Sealed Sources and Devices does specify the  
14 maximum activity of a source. So, that if in fact a company  
15 was supplying a source right at that limit, then there would  
16 need to be an 8 percent increase to allow that source still  
17 to be supplied to that particular model number.

18 MR. SJOBLOM: Now, you've -- I'm sorry. I've  
19 got another one here.

20 You've addressed primarily a switch to SI  
21 units involving radioactive -- the radiation units. Are  
22 there any issues on metrication that relate to changes of  
23 units other than the radiation units that relate to energy  
24 ability of equipment and the ability to sell say a radi-  
25 ography device or a gauge throughout the world that we

1 should be considering?

2 Are there any equipment items which are  
3 currently in standard units that need to be changed here and  
4 that would affect the interchangeability of this equipment  
5 throughout the world?

6 MR. BAKER: I don't think of anything that our  
7 company is supplying, but I think that we'll see from Ohmart  
8 might have some input on that, because I'm thinking about  
9 going back to research radiochemicals. I don't see any  
10 other units there. We're talking -- where specific  
11 activities are quoted. These are in terms of radioactivity  
12 per millimole, so we're already to SI units there.

13 Well, I'd have to give that some more  
14 thought --

15 MR. SJOBLUM: I was thinking about your Tech  
16 Ops, formerly the Tech Ops operation which is currently  
17 marketing radiography cameras. And I just wondered if there  
18 were any issues there other than the size of the source in  
19 terms of how much radioactivity it contains that would  
20 affect interchangeability in U.S. and foreign markets.

21 MR. BAKER: I can't think of any.

22 MR. SJOBLUM: Thank you.

23 MR. DIMEGLIO: I can think --

24 CHAIRMAN ROSZTOCZY: Please use the micro-  
25 phone.

1 MR. DIMEGLIO: I think there are some very  
2 obvious things in this area. If a radiography camera is  
3 designed to strap onto a ten inch pipe and the ten inch pipe  
4 disappears, then obviously the camera has to be modified,  
5 and this is something separate from the radioactive source  
6 that's within it. So, there will be dimensional problems  
7 with equipment which already exists and is built on inch  
8 pound dimensions.

9 And that could also be true in the medical  
10 industry. I mean, if your calibrator is made to take a half  
11 inch test tube and now you must use a test tube designed to  
12 metric, to real metric, you may have to design the  
13 calibrator, redesign the part in the calibrator unit. So,  
14 these things will always be there.

15 MR. BAKER: Well, I think many of the tubes  
16 that are currently used in the calibrators are already  
17 metric, and even if they're not, I think that there would be  
18 a fairly close approximation in diameter. I don't think it  
19 would preclude one from using those calibrators.

20 I would think as far as strapping on the  
21 radiography unit to a pipe, that would be the sort of  
22 flexible strap, which again could be adjusted.

23 MR. DIMEGLIO: Well, I'm just using that, of  
24 course, as an example of the kinds of things that you get  
25 into.

1 MR. SJOBLON: I guess what I am getting at is  
2 everybody immediately seizes, in these kinds of discussions,  
3 on the radiation units because we are a radiation related  
4 organization.

5 I suspect, however, that some of the more  
6 difficult problems are indeed more subtle than that and will  
7 arise due to incompatibility such as is being pointed out  
8 here. And I was trying to get a greater discussion of that  
9 particular aspect here. I think we all understand and have  
10 been converting actually towards the SI units, or intending  
11 to for some time.

12 But it's these other matters that are going to  
13 hamper competitiveness of products, and we want to try to  
14 avoid having to throw away a whole line of equipment, if  
15 that's possible, such as these dose calibrators. You  
16 indicated those are already compatible with say metric test  
17 tubes and the like. So, perhaps that one is not a problem.

18 Okay. Thank you.

19 We have another question here.

20 MR. RUBY: I could give another answer to your  
21 question, and that is every time that Amersham shifts  
22 radioactivity it does so in a DOT approved container. And  
23 that approval involves a certification which Amersham has to  
24 supply, and that certification involves a physical descrip-  
25 tion of the container, among other things, and that physical

1 description of the container does involve units. And so,  
2 there is something that is impacted and would be impacted  
3 rather quickly if any changes were contemplated.

4 MR. GAT: I have one comment also. Uri Gat,  
5 ORNL.

6 The prolonging of the transition to 1999 is a  
7 sure prescription for the RBM syndrome, retire before  
8 metric. We have tried that in this country before, and if  
9 it's ten years, people roll over and for the first seven,  
10 eight years do nothing. And it's a sure prescription for  
11 operation successful but the patient died.

12 It's probably okay from the company point of  
13 view to provide dual units. This way they can satisfy  
14 everyone, but if the government will accept that as  
15 accepting the units, dual units at the choice of the user  
16 for this entire period, this is a sure defeat of the intent  
17 of the Act that says that we should be by 1992 predominately  
18 metric or SI, and I think that's very important.

19 We have seen that nobody uses dual units.  
20 Everyone -- when there are dual units, everyone picks the  
21 one set that they want and prefer to use.

22 MR. SJOBLUM: Our next speaker is Paul Sieck  
23 who is the Manufacturing Vice President and Radiation Safety  
24 Officer with the Ohmart Corporation which is in Cincinnati,  
25 Ohio.

1 Paul.

2 MR. SIECK: Doctor Baker, I think I'd have to  
3 say that not only are you the first but probably the last  
4 speaker today who has a pronounceable name.

5 One of the things that concerns me very much  
6 in this matter of the "I'm not ready for that thing yet,  
7 maybe not until tomorrow." I keep wanting, in my own mind,  
8 to refer to this as the "Ominous Trade Act and Anticompeti-  
9 tive Act of 1988," because from our point of view, there  
10 isn't much good about it.

11 To document the biases that I have, I think I  
12 need to tell you a little bit about our company. We are a  
13 small company. We have about 140 employees, and our  
14 business is making industrial gauges. We make density  
15 gauges, level gauges, moisture gauges, thickness gauges.  
16 Nearly all of them use radioactive materials, and all of  
17 those that do use sealed sources in the 5 millicurie to 9  
18 curie range. If you want to make a quick translation,  
19 that's 185 megabecquerels to .33 terabecquerels -- I hope.  
20 About 98 percent of those are Cs, the rest are Sr-90 and  
21 Americium 241, Kr-85, and some other stragglers.

22 Our customers are mostly large companies.  
23 They are in the chemical or food processing industries; they  
24 are in pulp and paper; and they're in the web converting  
25 industries. We do export. Our export business was about 25

1 percent of our business as recently as five years ago.  
2 Today our export business is 40 percent of our total. And  
3 we've done it all without the metric system.

4 Now, with respect to the use of the metric  
5 system, domestically it's not very complicated. We don't  
6 use it at all. We have no interest in it at all.

7 For that portion of our business which is  
8 export, what we've done is to put the radiation conversions  
9 in our computer as well as the dimensional conversions and  
10 those pieces of paper that have anything to do with that  
11 come out both ways, and nobody in our organization, except  
12 the first guy who put it in, has to know anything. It comes  
13 out automatically.

14 It's interesting that not a single one of our  
15 foreign reps, including those in Brunei, Borneo, Liberia,  
16 and Burma have even so much as raised the question. Our  
17 inquiries come in in whatever units they want. Typically  
18 they come in in our customary units. They don't always come  
19 in in English, they sometimes come in in German, Japanese,  
20 Spanish, so we have to deal with those languages all the  
21 time.

22 So, one of the questions that was asked of us  
23 today is whether or not a switch to the SI units will make  
24 us more competitive in foreign markets. And the answer to  
25 that is unequivocally no. We see nothing to be gained, as

1 far as our export business is concerned.

2 Well, is there anything good about this from  
3 our point of view as a gauge manufacturer? Probably not  
4 unless you want to consider the uniformed sharing of the  
5 misery as a plus. So, if there aren't any obvious pluses,  
6 let's look at the minuses.

7 To start with, I believe everybody in this  
8 room understands the stigma that's attached to the word  
9 nuclear in the mind of the public. I can tell you that that  
10 stigma is also attached to the word nuclear in the minds of  
11 our customers. It shouldn't be any surprise to you that  
12 nobody buys a nuclear gauge who doesn't have to. Nobody. I  
13 can stretch that out, noooobody. So, anything that we do to  
14 make life more complicated for our customers has a negative  
15 impact on our business and not a positive impact on our  
16 business.

17 Well, let's look at a couple of numbers. When  
18 I was preparing for this I called a number of our large  
19 customers, three in particular, and I told them what the NRC  
20 was up to because none of them had seen the Federal  
21 Register, of course. Not very many people read that, about  
22 the same number who look in the Washington Post to see what  
23 the Cincinnati Bengals did. It took me two days to find out  
24 that they lost the game.

25 (Laughter)



1           So, I talked to these customers, our major  
2 customers, and these are world class customers. These are  
3 people who do business in every country in the world,  
4 including the other four that we talked about in the last  
5 couple of days, and not one of them had anything good to say  
6 about this project. In fact, they gave a whole new  
7 dimension to the idea of long distance calling because I had  
8 to hold the handset out here when they began to talk. They  
9 were not happy with it.

10           It was interesting, that I asked them a ques-  
11 tion about how they handle the metric system in other ways,  
12 in other ways other than those having to do with radiation.  
13 And they all gave me the same answer. They speak whatever  
14 language their customer wants them to speak, but when they  
15 go back home, they speak English.

16           So, the next question I asked them was what  
17 was it going to cost to make a conversion. And I understood  
18 my charter here was to discuss only those things having to  
19 do with radiation, so we did not talk about any other switch  
20 in metric, simply those having to do with sieverts and  
21 becquerels and nothing having to do with weights and  
22 measures. And I got some answers.

23           One, who is probably the biggest user of  
24 gauges, at least of our gauges, estimated the cost to his  
25 company, for just the radiation issues, was \$300,000 to

1 \$400,000. That breakdown included the training of hundreds  
2 of people, replacing all of their manuals, replacing all of  
3 their survey equipment, and replacing source holder tags  
4 throughout their organizations. And many of these tags are  
5 on gauges that are in some pretty inaccessible places. None  
6 of them saw any benefit, only cost.

7 I saw an NRC document recently in connection  
8 with greater than Class C waste and that estimated that  
9 there are domestically about 7,900 licensees with about  
10 31,000 gamma and beta gauges installed. So, this is not a  
11 trivial cost, and there is no visible benefit, so far, in  
12 the eyes of our customers.

13 So, I decided I would talk to some other  
14 people. I did something that the Federal Government frowns  
15 upon. I talked to my competitors. I polled four of our  
16 major competitors and the response I got was exactly the  
17 same. They could see no good reason to do it. They also  
18 generally agreed, with one exception, the exception was a  
19 guy who admitted he really hadn't thought about it, all  
20 agreed that there were some substantial costs involved,  
21 again just from the radiation point of view.

22 One of our competitors, who is about our size,  
23 did address the issue of the other metric measurements, and  
24 they estimated their costs at \$250,000. We estimate our own  
25 cost on the order of \$100,000 to make this choice, this

1 change. We don't consider it a choice.

2 I couldn't believe this thing was all so one  
3 sided, so I decided I'd try something else. Some of you may  
4 know that in Ohio we have an organization called the Ohio  
5 Radioactive Material Users Group. Nice catchy name, ORMUG.  
6 There are about forty organizations in there, no radi-  
7 ographers that I'm aware of, but there are some universi-  
8 ties; there are some hospitals; there are some power  
9 companies; there are some survey equipment manufacturers;  
10 and there are some laboratories.

11 I got about fifteen responses back out of the  
12 forty or so membership. Generally the universities and  
13 hospitals said "Yeah, we ought to do it." The manufacturers  
14 said "Forget it." And the manufacturers of survey equip-  
15 ment, which was kind of interesting to me, were evenly  
16 split. One said, "Yup, do it." The other one said, "No,  
17 don't do it." Now, both of these organizations have a  
18 potential bonanza in the supplying of new measuring equip-  
19 ment, survey meters and so on, and yet, even there, they  
20 didn't feel that it was an important move to make.

21 Not one of the people who responded in any  
22 category indicated that there was any particular benefit.  
23 There were some people who were kind of purists who felt  
24 that we ought to do it just because we ought to do it, as  
25 I've heard a number of people say here in the last day or

1 so, without regard to the consequences, let's just do it.

2           The one thing that I did learn was that nobody  
3 is luke warm on this subject. I talked to one radiation  
4 safety officer from a major, major university in Ohio and he  
5 told me that any unit of measure, like the becquerel that  
6 has to have eight or ten zeros after it to be significant is  
7 a lousy unit of measure. I agree with him. I think it is.

8           Another sales manager was gleefully pointing  
9 out to me in his letter all of the recent publications in  
10 which the conversions were wrong. This guy also feels so  
11 strongly about it that he put out a newsletter in his sales  
12 organization in which he devoted two of the four pages on  
13 this issue and tried to -- you may get an awful lot of mail  
14 because he was asking his customers to write and tell the  
15 NRC what a lousy idea this is. So, there we are.

16           On the other side, there was one guy who  
17 personally held me responsible because the Congress in 1803  
18 did not give up feet and inches. I didn't do it.

19           In an attempt to find out -- I'm still looking  
20 for something good for this. I discussed with both the  
21 users and our competitors the question of safety and trans-  
22 portation, which are in reality the same issue of that of  
23 changing our frame of reference. All of us were concerned  
24 about the enormous differences in the sizes of some of these  
25 units and the effect in particular on emergency response

1 personnel for instance. One rem of exposure is not a real  
2 big deal. One sievert of exposure is a heck of a big deal  
3 and we're concerned about that.

4           And the transport index, for instance,  
5 presents a little bit of a problem. It has taken us forty  
6 years to get the carriers to understand what a transport  
7 index is. Now, we're proposing to change it by a factor of  
8 a hundred. We must recognize that the truckers are not  
9 materials licensees; fire fighters are not materials  
10 licensees; emergency teams are not licensees. So, what is  
11 being proposed here can affect thousands of people and  
12 confuse thousands of people for the sole purpose of some-  
13 body's idea that this helps us be competitive somewhere else  
14 in the world.

15           Fortunately, in this case, adapting to the  
16 system of microsieverts divided by ten does at least allow  
17 the use of the same number and gives you a reasonably --  
18 gives you the same frame of reference for a transport index.  
19 And that, so far, is the only good news I've been able to  
20 find.

21           In the matter of the becquerel versus the  
22 curies, it's another story. One example, in the Dangerous  
23 Goods Regulations of the IATA in table 2.3A, they offer one  
24 conversion -- from curies to gigabecquerels. In table 5.7F  
25 on the subject of A1 and A2 quantities, they offer one

1 conversion -- curies to terabecquerels. For people who  
2 don't work with these numbers every day, we don't see  
3 anything but confusion with no benefit, no improvement in  
4 competitiveness, no improvement in safety.

5           We must remember we are not dealing with  
6 scientists; we are not dealing with people who read the  
7 literature. We are dealing with people who really don't  
8 want our stuff and the only reason they get it is because  
9 it's the best way to do the measurement. If we complicate  
10 their lives, we make it tougher for them. If we make it  
11 more expensive for them they are going to be looking at  
12 things like, well, is 2 percent accuracy just as good for us  
13 in our operation as 1 percent accuracy if we can get read of  
14 all that dog gone nuclear stuff in the process, and we have  
15 to be concerned about that.

16           We also have some concerns, and I personally  
17 have some concerns about how the news media and the anti  
18 nuclear forces will interpret this move, given their  
19 infinite capacity for misinterpretation. I can just see it  
20 now: "All along you've been telling us that this exposure  
21 is just one rem and it's really in sieverts and that's a  
22 hundred times bigger. You've been lying to us all this  
23 time." We happen to be in the neighborhood of the Fernall  
24 (ph.) Plant, and if you've been reading -- we have Newsweek.  
25 We do have newspapers in Ohio, and we occasionally cover the

1 Washington scene. We refer to it as "inside the beltway."  
2 Of course we also think that Congress is the opposite of  
3 progress.

4           Anyway, in those areas, the news media has  
5 made a big thing out of the number of tons, the number of  
6 gallons, the number of whatevers that have gone off site.  
7 The fact of the matter is that almost nothing has gone off  
8 site, but that is really not the issue in their minds. So,  
9 we're concerned about how that might be interpreted.

10           Finally, though, after giving all the reasons  
11 why we think this is a bad idea domestically and totally  
12 unnecessary for those of us who do business outside of the  
13 United States, we all recognize there isn't much we can do  
14 to stop this steam roller. All we can hope to do is come up  
15 with a retreat route that will keep us from getting  
16 destroyed in the process.

17           Well, first to the issue of timing. Of even  
18 the most enthusiastic proponents of the change that I talked  
19 to, only one thought that there was no time necessary for  
20 the conversion. This was the same guy who thought that I  
21 screwed it up back in 1803. The next lowest said two to  
22 three years, and we're talking about thirty five organiza-  
23 tions that I talked to. Most of us were in the five to ten  
24 year class with several, though, talking in terms of a  
25 generation. It had not occurred to me until Uri mentioned

1 it here a few minutes ago that, if I can postpone this thing  
2 for five years, I will be retired and as far as I'm  
3 concerned, the problem will have gone away.

4 With that in mind, we do have a proposal. Our  
5 first proposal is to forget the whole thing. But, failing  
6 that we would like to follow or we think the following  
7 scenario might be of some value.

8 But remember now, we're talking only in  
9 radiation related units. With regard to the other units of  
10 measure, for our business, we are categorically opposed. We  
11 must remember again that we are a small company. Our compe-  
12 titors are all either small companies or small divisions of  
13 other companies and we do not control anybody.

14 We use, in our company, about 150 varieties of  
15 bolt. If we need some, we go to the nearest hardware store  
16 or we go to the local wholesaler. If he wants to carry  
17 metric, we'll get metric. If he doesn't want to carry  
18 metric, we're not going to get metric. We cannot go to the  
19 local machine shop and say "You must do this in metric."  
20 They say, "No quote." So, we do not control anybody. In  
21 fact, for our size, we probably don't even influence  
22 anybody.

23 But the costs of making these conversions can  
24 be enormous for us. Maybe a quarter of a million dollars  
25 isn't much to some companies. It can wipe out a company



1 like ours. We have about 35,000 drawings in our files right  
2 now. We've been around a long time. It costs us just as  
3 much to change a drawing as it costs our largest company in  
4 the United States to change a drawing, and what do we get  
5 out of it? We're already doing 40 percent of our business  
6 overseas. Nobody is asking us to do anything else, so why  
7 should it be imposed on us?

8 But, recognizing that it is going to be  
9 imposed on us, let's take a look here and this is what we  
10 propose to do:

11 First off, first we would say require all  
12 manufacturers and distributors of source material or devices  
13 to show both units on such items beginning two years after  
14 the final rule with the option of showing both in the  
15 interim.

16 This will allow us to work off old inven-  
17 tories, to rewrite manuals and to begin serious training of  
18 employees, customers, and emergency response personnel.  
19 Right now we run schools about once a month for our  
20 customers. Those people have spent a great deal of money  
21 being trained. They're going to have to come back and be  
22 trained again, and it's going to take some time to  
23 accomplish that.

24 During that time we suggest that you  
25 coordinate with the DOT to revise the Transport Index and

1 the A1/A2 quantities requiring the display of both units  
2 starting two years after the final rule with the option to  
3 show both in the interim.

4           And when talking about these units, we propose  
5 that we settle on a single preferred prefix for the  
6 becquerel versus the curie, so that the people who don't  
7 deal in this every day can have a frame of reference that  
8 will stay put. We do not think we ought to have to explain  
9 the difference between a giga and a tera. The benefit of  
10 that is not visible, and we already know what we're going  
11 through in getting stuff overseas today, not because of the  
12 problems in the other country, but because of problems in  
13 our own country. If we express on a hazardous manifest that  
14 something is in terabecquerels, it's not at all unusual for  
15 the carrier to come back and say, "Gee, that's wrong. We  
16 never heard of that, it should be in gigabecquerels. What  
17 the hell is a terabecquerel?" Strike that.

18           We've got the issue of certificate of  
19 competent authority, which is a DOT issue primarily, but  
20 here again, the confusion is already terrible. We just had  
21 a shipment held up going, I think it was to Brazil, in which  
22 our certificate of competent authority referred to the  
23 allowable activity in a particular source capsule. It took  
24 us two days to get the people who were handling this to  
25 understand that the fact that we were shipping forty of

1 these things did not violate our certificate. So, we've got  
2 these things all the time.

3           And we need to deal in a set of numbers that  
4 makes some sense. The difference between a curie and  
5 becquerel is just too big to play with. Let's get a prefix  
6 that gets closer to that issue and maybe the word would not  
7 be "becquerel." Maybe the word would be "gigabecquerel"  
8 without a hyphen.

9           We then recommend that we grandfather all the  
10 devices that are already in the field and recognize that  
11 some of those will be there for another twenty to twenty  
12 five years. A gentleman from FEMA yesterday I think shook  
13 the crowd when he said he hadn't bought a survey meter since  
14 1964. Our people are doing the same thing. We're upgrading  
15 gauges now electronically that were built in the '50's and a  
16 lot that were built in the '60's. Here again we do what the  
17 customer wants. With the digital electronics we can print  
18 out or show on our readouts whatever the heck units he  
19 wants, whether he wants tons per hour or furlongs, we can  
20 give them to him. But we have to recognize that these  
21 things are out there and there are thousands of them.

22           We think then the next thing to do is to  
23 revise all the relevant parts of 10CFR using both units.

24           And last, we think that we should leave those  
25 things in the field grandfathered. Ignore them, forget that

1 they exist, but require the use of only the SI units about  
2 three years later. Leave the present units optional and  
3 they'll disappear on their own eventually because from that  
4 point on you will be requiring only one. And you'll notice  
5 that I'm doing my best to leave our customers alone.

6           So, let me remind you again that although  
7 we've made a proposal for the switch, we see it as an added  
8 cost of doing business. We see no visible benefit. In  
9 particular, we see no competitive advantage, which is  
10 supposed to be the object of this exercise.

11           Thank you.

12           MR. SJOBLOM: So, --

13           MR. SIECK: So what's new?

14           MR. SJOBLOM: So, Paul, I would characterize  
15 then that you wholly support the basis for the Act we are  
16 considering implementing here. Would you care to --

17           MR. SIECK: If I said that, I'm sorry.

18           MR. SJOBLOM: Would you care to explain the  
19 rationale for the two year phase in time and the three year  
20 phase in time that you just showed on your slide?

21           MR. SIECK: Sure.

22           The first one is that I think recognizing that  
23 people are people. Somebody asked before are people the  
24 problem. People is probably the whole thing. This isn't a  
25 numbers problem, it's a people problem.

1           But, recognizing that nobody's going to do  
2 anything they don't have to do, our recommendation is that  
3 you require the use of both units two years after the final  
4 rule, because during that time my rationale is that we will  
5 be disposing of all inventory of labels, disposing of old  
6 manuals, rewriting manuals, starting to train people. So,  
7 that's our rationale for getting the thing started.

8           After that we feel that it's just going to  
9 take that long to get people trained so that they accept  
10 this information and we just think it takes that long. We  
11 just don't think you can turn this on and off like a faucet.

12           MR. SJOBLOM: Let me pursue this a little bit  
13 further. I'm trying to understand. You're suggesting that  
14 for a two year period that we have both units and then three  
15 years later what happens?

16           MR. SIECK: Three years later I would suggest  
17 you change the regulation to require -- first I'm saying  
18 require both.

19           MR. SJOBLOM: Yeah.

20           MR. SIECK: For the first period. The second  
21 period require only the SI units and ignore the other ones.

22           MR. SJOBLOM: So, five years from the final --  
23 from the initial action --

24           MR. SIECK: You would be using the SI units in  
25 everything in which we deal with the NRC.

1                   And again now, this recommendation is only on  
2 those matters dealing with radiation, not with measurements  
3 of inches and feet and so on. We don't think the NRC ought  
4 to be in that business at all, from our point.

5                   MR. SJOBLOM: Any questions for the speaker  
6 from the audience?

7                   Zoltan?

8                   CHAIRMAN ROSZTOCZY: I have two questions.  
9 The first one is a very short one. You mentioned that 10CFR  
10 in this proposal that 10CFR should be converted to dual  
11 units, but there was a no time interval allotted for that.  
12 Would you keep it in dual units for an indefinite period of  
13 time?

14                   MR. SIECK: I would keep it in dual units  
15 forever or until it becomes necessary to change it.

16                   By putting both units in the 10CFR, you don't  
17 change anything. You simply put a date beyond which only  
18 the SI units are required. And the fact that we show -- or  
19 we might show conventional units also would be irrelevant  
20 because all of our business then, with the NRC after that  
21 period of time, would have to be done in the SI units. The  
22 other would be sort of incidental, and I think will  
23 disappear on its own.

24                   CHAIRMAN ROSZTOCZY: Is the logic behind this  
25 approach that there would be some old equipment still in use

1 which is in conventional units?

2 MR. SIECK: Yeah. The equipment that's out in  
3 the field we don't believe should be touched at all. We  
4 should be able to use that forever.

5 Now, we're talking about manufacturers and  
6 distributors, people like us. We don't think that the user,  
7 our customer, ought to be involved at all in this at this  
8 time or during this period.

9 CHAIRMAN ROSZTOCZY: My second question  
10 relates to the cost estimate that you quoted for your case.  
11 You quoted a number of cost estimates, but as I understood  
12 one of them was your own.

13 Let me start from the point that you indicated  
14 that 40 percent of your business is export business at the  
15 present time and you have really no problem of dealing with  
16 people who want metric goods as opposed to the ones who  
17 don't want the metric goods.

18 What is your interface with NRC, and if NRC  
19 would convert -- so I'm not talking about your conversion --  
20 NRC would convert its activities to metric, meaning that the  
21 NRC engineers would be working -- by the way we are outside  
22 the beltway, so I'm not sure -- So, NRC people would be  
23 working in the metric. Would that affect you at all or  
24 could you interface with NRC with the same ease as you are  
25 presently interfacing with your customers who are on the

1 metric?

2 MR. SIECK: Well, to start with, the interface  
3 with our customers is still in conventional customary units.  
4 I made a comment earlier about having in our computer  
5 conversions for shipments. That is solely to satisfy  
6 various regulators through whom our equipment passes on the  
7 way to our customers. That is not an issue with our  
8 customer at all. So, to satisfy our customer, we have no  
9 obligation, at this time, to do anything metric.

10 Given the time frame that I propose, I believe  
11 that we would simply have to absorb the cost of doing this  
12 and would be able to comply with the NRC working in those  
13 units at the end of this five year period following the  
14 final ruling.

15 CHAIRMAN ROSZTOCZY: The part that I don't  
16 understand yet is where does the \$100,000 come from. Is  
17 that basically --

18 MR. SIECK: Well, that's \$100,000 worth of  
19 survey meters.

20 CHAIRMAN ROSZTOCZY: But that represents your  
21 conversion?

22 MR. SIECK: Yes.

23 CHAIRMAN ROSZTOCZY: If you would not convert  
24 but NRC would convert its activities, would there be any  
25 cost or any difficulty for you?



1 MR. SIECK: Well, I think that depends a great  
2 deal on what conversion means to the NRC. If conversion  
3 means that when you inspect us you expect our survey meters  
4 to read in sieverts, yeah, there's a cost, the same cost.

5 If you convert and simply talk to us, or let  
6 us talk to you in conventional units, there is no cost. It  
7 depends on how the NRC wants to talk to us. If you want to  
8 talk to us in metric, then we've got to make the  
9 conversions.

10 CHAIRMAN ROSZTOCZY: If whatever we issue  
11 would be issued in metric or dual units for some transition  
12 period, and if what you send into us would have to be, after  
13 some date, metric but nothing is, obviously when we inspect  
14 we would inspect in whatever form it actually operates,  
15 would then there be any cost?

16 MR. SIECK: Given that scenario, probably not.

17 CHAIRMAN ROSZTOCZY: Probably not. So, the  
18 \$100,000 is then basically converting your entire operation  
19 over to metric. And if you would do that, then you would  
20 expect to service all of your customers in metric from then  
21 on?

22 MR. SIECK: Well, by that time, what I  
23 proposed would say that yeah, we would ship to them in those  
24 units. That's not going to make them happy, but yeah, we  
25 would expect to do that.

1                   We're looking for a retreat route. Since it  
2 doesn't look like we're going to get out of it, we're  
3 looking for the thing that's going to hurt us least.

4                   CHAIRMAN ROSZTOCZY: Thank you very much.

5                   MR. SJOBLUM: I had one other question.

6                   You made reference to a survey you had done of  
7 other companies. I'm wondering, is the form of that survey  
8 something that could be provided? In other words, did any  
9 of these companies write you letters? And if so, do you  
10 suppose it's possible that they could be provided to the  
11 NRC?

12                   MR. SIECK: I would say that -- what I did was  
13 send -- in the case of the competitors and the users, those  
14 were done by phone. I did get one written response from a  
15 competitor.

16                   In the case of the Ohio Radioactive Material  
17 Users Group, I sent out a survey in which I asked three  
18 questions: Should we change? If so, why? If we change,  
19 should we be bilingual optionally for some period of time?  
20 And if we change, should it be mandatory bilingual for some  
21 period of time? And the last question was, How long should  
22 it be before we go entirely to SI units.

23                   And again, this was all dedicated to the  
24 radiation side of the business. I was not -- frankly, I was  
25 not aware that I was going to deal with the rest of it at

1 that time.

2           Those people responded. I can probably give  
3 you some numbers gleaned from those figures, but I would not  
4 give you any information from any of those customers without  
5 their permission.

6           MR. SJOBLOM: Well, I would just encourage  
7 that perhaps after this conference that you might try to put  
8 down in a tabulated form, to the extent that you feel it's  
9 appropriate, and perhaps send that into the NRC. I think it  
10 would be of some value to us.

11           MR. SIECK: I really have no objection to  
12 contacting those people and find out if they care whether we  
13 publish it or not. It doesn't matter to me.

14           CHAIRMAN ROSZTOCZY: Mr. Sieck, I would like  
15 to kind of second that suggestion with the understanding  
16 that what we are interested in is not the names of the  
17 individual companies or individuals who were contacted, but  
18 rather just an overview of basically what you said for the  
19 record today, but maybe in a little bit more understandable  
20 concise form.

21           So, if you could sum up what you already know,  
22 and if in some areas needed to be a little bit rounded up,  
23 then just introduce that.

24           MR. SIECK: I'd be glad to. Gee, I go back  
25 home and get assignments from my boss, just like that.

1 MR. SJOBLUM: I think there are several other  
2 questions. Let me start in the back here.

3 MR. WACHTEL: I'm Jerry Wachtel with the  
4 Office of Systems Research in the NRC. I have a question on  
5 training and human error. You talked about the implication  
6 for retraining emergency response crews, fire fighters,  
7 etc., in the use of the new measures. You also talked about  
8 the recommendation for grandfathering equipment already out  
9 in the field.

10 The question I have is the reconciliation  
11 between those two: training folks who have used the old  
12 measures in the use of the new, and keeping equipment out  
13 with the old measures. Is there not some implication for  
14 the risk of increased error in the use of these devices  
15 certainly during the transition period and perhaps for as  
16 long as the old equipment remains in the field?

17 MR. SIECK: Yeah, there is. The kinds of  
18 incidents that are likely in our industry have far less  
19 consequences than the instance that might occur in the  
20 nuclear power industry.

21 The kinds of incidents that occur in our  
22 business are a lost source or some guy, as happened  
23 recently, a general licensee removed a source holder and  
24 gave it to a scrape dealer who proceeded to grind it up in a  
25 grinder. We make good stuff, he missed the source. Those

1 kinds of things are relatively low level.

2                   And one of the first things that happened is  
3 required and makes sense is that they start screaming for  
4 people like us or they scream for the State or the Federal  
5 Regulator. So, very quickly you have people giving them  
6 advice as of the value.

7                   The kind of instruction we would give to our  
8 customers would be advice on the order of when you realize  
9 you've got something wrong in the meter pegs you get every-  
10 body back to the 2MR per hour level so that you're down at a  
11 reasonable level, and then yell for help. So, it's  
12 relatively straight forward in our business compared to the  
13 kinds of things that some other industries might have.

14                   MR. WACHTEL: Thank you.

15                   MR. SJOBLOM: Abe?

16                   MR. FISS: Abe Fiss, NRC.

17                   You said, of course, you weren't prepared to  
18 discuss conventional linear and weight measurements, but I  
19 have a question.

20                   In your business, when you receive an order  
21 from overseas, do you get dimensional requests for your  
22 gauges in addition to the radiation specification? And do  
23 you get requests for use of metric fasteners or holes for  
24 metric fasteners on your equipment? And if so, how do you  
25 deal with it?

1 MR. SIECK: Okay. We rarely get such requests  
2 and the reason is probably because of the nature of our  
3 products.

4 Density gauges, for example, have adjustable  
5 fastenings so that when they clamp onto a pipe it really  
6 doesn't matter whether it's metric or not. There is a whole  
7 big range of ways to fasten it. Level gauges, for example,  
8 are mounted to a vessel. If they give us a metric dimension  
9 we'll do it, but normally they don't. We tell them what it  
10 is. We provide clearance holes and they provide their own  
11 bolts.

12 Once, in all the time I recall, did we have a  
13 problem where we were obligated to provide metric fasteners.  
14 And in that case, our rep in the country sent the fasteners  
15 in with the order so it was pretty straight forward.

16 We do occasionally run into a situation where  
17 our gauge has a flange that has to mount to a customer's  
18 flange. In that case, we would comply with whatever the  
19 customer wants. If he wants it metric, we'll figure out how  
20 to get it for him in metric. It may cost us a fair amount  
21 of money. The equivalent flange in metric, for instance,  
22 might cost us three times the conventional flange. Normally  
23 we absorb that cost because it happens so rarely, once every  
24 five years or something like that. It's very rare.

25 MR. SJOBLOM: There was another question over

1 on this side I believe.

2 MR. GAT: Uri Gat, ORNL.

3 Doesn't DOT already require you to do  
4 labelling because of the shipping index? And if not,  
5 doesn't your export require you to do dual labelling or will  
6 they require so?

7 MR. SIECK: The answer to the first question  
8 is no, DOT does not require us to do it.

9 The answer to the second question is yes. And  
10 in those cases we're only talking about pieces of paper.  
11 When we pack the unit we put it into the computer in  
12 customary units. It comes back out of the computer in both  
13 units. Here we're talking dimension, weight, and activity.

14 In the case of transport index, most of our  
15 stuff goes IATA, and incidentally, the transport index is  
16 the same in both languages since it's an undefined number.

17 MR. GAT: It's by intention. There was a big  
18 fight about this one.

19 MR. SIECK: Well, I'm glad whoever fought it  
20 won. That's the only thing in this whole business that  
21 doesn't require somebody to have a different frame of  
22 reference.

23 You know, there is a big difference between a  
24 becquerel and a curie and pint and a liter. If they were  
25 closer, we would probably be giving you a lot less argument.

1 MR. SJOBLOM: Thank you very much, Mr. Sieck.

2 MR. SIECK: You won't let me go, huh?

3 MR. SJOBLOM: Oh, you've got one more here?

4 MR. GAT: Yes. One very short question.

5 You give us the \$100,000 in terms of the con-  
6 version. Just in order to put it in perspective, could you  
7 tell us what is the total sale of your company in a year?

8 MR. SIECK: We are a closely held company and  
9 that's not public knowledge.

10 MR. GAT: That's not public knowledge.

11 MR. SIECK: But, compared to what I've heard  
12 here so far, it's not very much.

13 MR. SJOBLOM: All right. Thank you, Mr.  
14 Sieck.

15 We also have Mr. Uri Gat from Oak Ridge  
16 National Laboratory who would like to address this particu-  
17 lar issue.

18 MR. GAT: Good morning.

19 I guess I belong to those guys whose name are  
20 difficult to pronounce but at least they're easy to spell,  
21 and then my accent is Southern Appalachian.

22 The information that I -- really what I wanted  
23 to give is a little bit of information about the transition  
24 in the medical areas and primarily I served on the Combined  
25 Committee that ANMC, American National Metric Council, and



1 the AMA had to go to what they called "going SI." They call  
2 it "going metric."

3 I think the major thing that I can report is  
4 the first thing they did is they required journals to go all  
5 SI. However we just heard this morning that in actuality it  
6 wasn't completely done although, as I'll tell you in a  
7 minute, the radiation units were always a little bit an  
8 exception.

9 The reason that I'm not totally up to date on  
10 that is that very quickly I recognized that the medical  
11 industry, medical professions really were metric for a long,  
12 long time. They had some what, for lack of other words I'll  
13 call "poor metrics." They used prefixes in the denominator  
14 which tends to confuse, particularly when you combine those  
15 units. And they used masses for unit volumes to measure all  
16 kinds of blood concentrations, medical concentrations, and  
17 so on -- medicine concentrations, such as milligrams per  
18 hundred decilitres or a decilitre or milligram or grams per  
19 hundred milliliter.

20 And they kind of decided to clean up shop and  
21 do better medicine, and did it under the disguise of going  
22 metric. And they changed such things as using the mole,  
23 which is a better measure for what they actually were trying  
24 to achieve, because it doesn't matter what your mass units  
25 are in your blood concentration of cells. The number, the

1 relative number that's there, the mole is a better measure  
2 for that. So, these were some of the major changes.

3 They were also trying to clean up their act a  
4 little bit and go, instead of a hundred millilitre, to go at  
5 least to a liter, which let along a cubic meter, which I  
6 believe they were successful last I heard and last time I  
7 was invited that was to be implemented within -- the  
8 implementation started and it was to be implemented within  
9 the year.

10 That's very many similar concerns to what you  
11 hear here all the time, except they call those azouro (ph.)  
12 doctors who don't come for an update but once every thirty  
13 years. And they're a little bit concerned about that  
14 information diffusing down to those areas where a guy has  
15 equipment that he bought when he finished medical school and  
16 hasn't bothered to renew the equipment since.

17 Some other units that we have a specific  
18 problem are really non units, the normal solutions, the  
19 equivalent solutions, milli-equivalents and so on. They  
20 were trying to get away from those because those are, unless  
21 you really remember your high school chemistry or chemistry,  
22 then most people tend to have difficulties with that. And  
23 laboratories have some difficulties with that, particularly  
24 when it comes to the equivalent that may be ambiguous.

25 So, they were trying to go away from those

1 units also and use the mole again. Therefore, most of the  
2 changes involved moving to the mole. At the same time, the  
3 mole is the most -- the unit that was the newest. If you  
4 will recall, there was really no -- there was the gram  
5 equivalent before that, and all kinds of things, and people  
6 were not familiar with it. The mole is also very oddly  
7 defined, its number of entities and so on, and there were  
8 some big discussions about the usage of this unit. And they  
9 really wanted to use a different name, the gram equivalent.

10 That's kind of where the discussion went for a  
11 long time. And there was the same issue: Why switch if you  
12 can use the old thing and there will be no confusion than go  
13 to the new one? And the discussion could almost have been  
14 the same as we've heard here in the last day and a half.

15 When it comes to radioactive units, they  
16 basically decided not to touch them, to let the other places  
17 kind of impose that on them. And that explains why, in the  
18 journal, the radioactivity units were not changed and  
19 tolerated in any units. And there was a recommendation of  
20 using dual units. Again, there was a big issue. When it  
21 comes to the entire medical issue is associated with safety  
22 and lives. And when you bring those words up, then it's  
23 much more difficult to change. As we see here again, when  
24 it comes to safety, the arguments get very intense.

25 So, the decision was kind of made that the

1 radioactive units will not be touched by the medical  
2 association, separate from the rest of the change, which  
3 brings in the NRC. And that was mentioned at the time that  
4 they are regulated. And at that time, which was about five  
5 or six years ago, there was no tendency to go from other  
6 places. And, as a result, nothing or very little happened  
7 in the radiation related units which were also less known at  
8 the time.

9 This is kind of really what I wanted to report  
10 about. I will be glad to answer any questions if I can, but  
11 you need to remember that my information is a little bit  
12 older than we have heard earlier this morning.

13 DR. BAKER: My understanding is that the AMA  
14 requires the reporting of body constituents, for example, in  
15 terms of moles per volume. But in terms of prescriptions,  
16 those are still given in conventional units. That, I think,  
17 is the area where there is most likely to be some confusion.

18 MR. GAT: Yes, indeed. And the problem was  
19 again the similar problem to what I mentioned with the  
20 radioactivity units is that the AMA and the ANMC failed to  
21 invite the manufacturers of pharmaceuticals to be part of  
22 that conversion, and they didn't know how to impose that on  
23 the producers of pharmaceuticals who continued to provide  
24 that in the traditional units which were all metric and good  
25 SI, grams per whatever, either grams straightforward,

1 milligrams, combinations of that; or in solutions grams per  
2 unit volume.

3           They did want and worked preferring to go to  
4 the mole per unit volume in certain case of solutions. And  
5 they really wanted the medicines themselves also to moles,  
6 because again it has the most significant unit and has a  
7 much better meaning. It takes two conversions to get from  
8 the grams to the amount of effective medicine that you get,  
9 while the mole takes only one conversion and that's your  
10 body mass. You administer proportionate to your mass, to  
11 body mass.

12           And the reason, of course, is that they did  
13 not get the pharmaceuticals industry early enough into the  
14 game and at that time. So, they went along with whatever  
15 was available.

16           But the preferred unit is mole. And I under-  
17 stand that if they get the opportunity they will change that  
18 and they were engaged in beginning to do that.

19           Thank you.

20           MR. SJOBLUM: Thank you very much.

21           Are there any other people in the room who  
22 would like to make any additional comments relative to this  
23 sector of our regulated community?

24           Yes, sir.

25           If you would like to come up, that would be

1 fine.

2 MR. SHEPHERD: My name is Marshall Shepherd,  
3 and I'm with Allied Signal.

4 And we are in the uranium conversion business.  
5 I'd like to make a few comments in regard to conversion.

6 We presently use dual units in dealing with  
7 foreign utilities. In other words, if they ask for a  
8 kilogram of material, we provide that. In addition, some  
9 external reporting is done in the SI units.

10 From an internal point of view, in terms of  
11 process equipment, procedures of physics equipment, instru-  
12 mentation, all of that is in our standard customary unit.  
13 There will be a lot of cost in conversion to the SI unit.

14 From a safety standpoint when we look at our  
15 operators training, gentlemen, many of you discussed a  
16 nuclear reactor. The training that goes on there is quite  
17 different. We are very concerned about that.

18 The average age of the individuals within our  
19 organization, at least in the hourly work force, would be  
20 around forty years of age. And I'm not being critical of  
21 older people because many of us fly in the category, but the  
22 average education is around a high school equivalency. And  
23 when you start throwing this change in, in terms of the new  
24 language, the SI language, these people have a lot of  
25 difficulty in understanding Psi, Psia, inches of water

1 column, inches of mercury. They have tremendous difficulty.

2 I recall one operator, at one particular time  
3 I asked him exactly what his reading on the gauge was and  
4 how he understood it. Instead of telling me exactly what  
5 the pressure reading was, he said, "Well, I have this mark  
6 up here, and I know if it goes beyond that mark that I've  
7 got a problem."

8 So, that's the intellectual environment that  
9 you deal with when you get outside maybe the reactor and the  
10 utility process, get away say into conversion, the conver-  
11 sion business and possibly in the milling aspect.

12 Also, from a maintenance standpoint, safety  
13 considerations, using the proper tools. What happens if an  
14 individual uses a metric tool when he should be using the  
15 standard U.S. tool? It could cause a major US6 release. It  
16 could be catastrophic, especially for the industry.

17 From a business point of view, right now the  
18 business is really price driven and from the conversion  
19 point, loyalty driven in terms of say the Far East utility,  
20 and enrichment driven exactly where they would like to have  
21 their enrichment performed. And I certainly cannot put it,  
22 at this point, that it's metric driven.

23 From an external point of view, and external  
24 reporting, I would have to agree that we all need to be on  
25 the same wavelength.

1                   From the emergency preparedness standpoint, I  
2 don't see a problem at all with that.

3                   But, from the internal point of view, I am  
4 somewhat concerned in that we have systems that are in place  
5 that are working. To change those systems would be very  
6 costly.

7                   From a health physics point of view, radiation  
8 protection. We agree that that reporting should be  
9 eventually in the SI system. We should be on the same wave-  
10 length there.

11                   But, our recommendation is that we would use a  
12 period of time as such that a dual unit would be reported so  
13 that we could gradually phase into this to avoid the calcu-  
14 lational errors, the reporting errors that could be expected  
15 when one doesn't know the language. And we expect -- and  
16 I'm calling this a language and I see it as a different  
17 language. And it's a big concern for us because we do not  
18 want to report errors or have errors in reporting.

19                   That concludes my comments.

20                   MR. SJOBLUM: Thank you, Marshall Shepherd.

21                   Does anyone have any questions for him?

22                   Yes, go ahead.

23                   MR. ISLANDER: Lars Islander, NRC.

24                   Regarding communication and understanding and  
25 the language and regarding the industrial use -- this is a



1 more general comment -- we should be aware that radioactive  
2 materials and sources are used on a much broader basis than  
3 medical application packaging and surveying.

4                   At a time of lost projects, not too far in the  
5 past, we have been using, and we have spin-offs of this  
6 today in the industry, using radioactivity in sources for  
7 density florid measurements on a very sophisticated and a  
8 very broad basis.

9                   Now, the fringe benefits of converting into  
10 SI, whichever avenue we take, slow, fast and so on, is also  
11 that one that in most countries where people are brought up  
12 in a nonconventional, meaning SI or metric systems, if you  
13 are speaking to them about the usage, for example florrids  
14 cubity per second, a gallis -- So, this is completely,  
15 cannot be translated in their mind into the metric units of  
16 florrid. The same applies for pressure and stresses,  
17 partially for temperature. We know from the local stations  
18 about low temperature range, but for the high temperature we  
19 divide by two to get Fahrenheit, but otherwise, it is  
20 completely a nightmare, not to speak about viscosities and  
21 other things.

22                   So, therefore, conversion, if you intend to  
23 speak about the usage of sources in radioactivity materials,  
24 and CAT scans, and scattering whatever else, that those are  
25 the more -- serve as the methods now used very broadly. You

1 cannot discuss that with a user who is not brought up in  
2 that system. He cannot have a calculator during a  
3 conference or a business meeting. So, those are the --  
4 those will be the fringe benefits for reducing the net costs  
5 of a company selling the products.

6 MR. SHEPHERD: Someone else mentioned we're  
7 talking about people here and we're talking about in terms  
8 of the conversion aspect. And these people start talking in  
9 terms of kilometers per gallon, in terms of measuring the  
10 efficiency of their automobile, they I think they will be  
11 ready to take on the SI system in the work place.

12 MR. SIECK: In our business, whether domestic  
13 or export, our customer doesn't really give a hoot about the  
14 radiation units. He's concerned about the units at which  
15 his product is being measured, and we already meet that. We  
16 give him whatever he wants, whatever language he wants. So,  
17 his user of the gauge doesn't need to know that, except for  
18 safety reasons.

19 And the same thing is true in this country.  
20 We have many, many customers who get answers to basically  
21 the same questions different ways. We make a gauge for  
22 measuring a plastic sheet for instance as it goes down a  
23 web. There are probably a half a dozen ways in which our  
24 customers want that answer, but inside that thing is the  
25 same little krypton source, and the user really doesn't care

1 about that. He wants to be safe, and whatever makes it easy  
2 for him to be safe is all that he cares about.

3 MR. SJOBLON: If there are no other speakers,  
4 let me try to just summarize a little bit of what I got out  
5 of what has been said here.

6 There is, of course, concern and -- for the  
7 change, and I think the concerns have to do with costs.  
8 They also have to do with safety. There is seemingly a  
9 clear consensus that it really isn't the equipment, it's the  
10 people. There seems to be a feeling that if the Congress  
11 meant what it put in the law, and if they don't change it  
12 again, that some sort of a transition is inevitable. And so  
13 we're faced then with determining a time frame and an  
14 approach.

15 We've had some very useful written sugges-  
16 tions, I think, from the Ohmart Corporation as to what sort  
17 of a transition seems right for them given the inevitable.  
18 And we certainly appreciate the willingness to venture forth  
19 and to making a suggestion like that. We talked a little  
20 bit about training, and I think that is the underlying thing  
21 that we're going to have to face as a nation here -- that  
22 all of our people need to be somehow trained. We also heard  
23 about grandfathering of equipment in the field, and that  
24 seems certainly a rational thing to consider.

25 So, I'm sensing that we should, at some point,

1 begin to train the people in both units, where we must; and  
2 then, at some point, begin to express things more and more  
3 in SI units; and then at some point, hopefully down the  
4 line, we will have then the older equipment and the older  
5 people continuing to work in perhaps both units. And then  
6 the newer people coming out of our grade schools, and our  
7 high schools, and our colleges will be, hopefully by then,  
8 working in SI units. Of course, as a small entity in the  
9 entire nation, the U.S. Nuclear Regulatory Commission has an  
10 extremely small role in this whole transition, and the  
11 success that the nation has will depend on training of the  
12 mass of people in these kinds of units.

13           When we get to the particular units involving  
14 radiation, there seems to be a feeling that, with regard to  
15 selling products, it's easy for the very few people and  
16 companies that need to make these conversions to do so. We  
17 heard one company say they have these things in the computer  
18 and they'll provide and label the product however their  
19 customers are required perhaps by their regulatory agencies  
20 to have them labeled.

21           But, the problem seems to be in dealing with  
22 the very large number of people that have to manage and work  
23 in the processes in this country. And so, I sense that  
24 NRC's policy needs to pay particular attention to the way in  
25 which we change over insofar as it affects the peoples lives

1 who are manning these processes, first because there are  
2 many, many, many more of them; and second, because the level  
3 of sophistication of many of these people is not really  
4 sufficient to allow them to internally manipulate these  
5 numbers in any event.

6           And I think that summarizes what I have heard  
7 today, and I would carry that back. I would encourage  
8 anyone who wants to submit anything in writing to do so. I  
9 would hope that the gentleman from Ohmart would indeed  
10 provide us the results of his poll to the extent he can do  
11 so.

12           And unless there are any other suggestions  
13 along this line, this session is over.

14           If I look at the time, Zoltan, I think we've  
15 gone a little bit over, but I think we've done it pretty  
16 much in the time.

17           CHAIRMAN ROSZTOCZY: Thank you very much.

18           We appreciate this session, and we would like  
19 to have now a coffee break. We have coffee and tea out in  
20 the hallway. Let's have a fifteen minute coffee break. So,  
21 we are going to reconvene at 10:40.

22           Off the record.

23           (Whereupon, at 10:25 a.m. there was a fifteen  
24 minute break.)

25           CHAIRMAN ROSZTOCZY: On the record.

1                   Our next session this morning is going to  
2 discuss the metrication issues associated with academic and  
3 research institutions. And the NRC representative who's  
4 going to make his introductory remarks and going to handle  
5 this session is Seymour Weiss who is Director of the Non-  
6 Power Reactor Decommissioning and Environmental Project  
7 Directorate.

8                   Sy, it's your turn.

9                   MR. WEISS: Good morning.

10                  As Director of the Non-Power Reactor Decommis-  
11 sioning and Environmental Project Directorate, my world  
12 encompasses about fifteen off-power reactors that range from  
13 zero up to twenty megawatts, and those plants that are in  
14 the process of being commissioned.

15                  As such, I probably touch on all of the areas  
16 that have already been discussed today or will be discussed  
17 later. The spectrum of non-power reactors consists of  
18 decommissioned facilities, operating facilities, license  
19 renewals, conversion from high enrichment to low enrichment,  
20 and one facility under construction, and I even have -- or  
21 am getting, one application for construction permit. This  
22 is something out of the ordinary, something new.

23                  So, my first slide here shows some of the  
24 goals that I had in mind for this session and some of the  
25 things that I hope will get discussed. I would like to see

1 the extent that the metric system is currently in use at  
2 Universities and other research institutions advanced to a  
3 greater extent than the nuclear power industry. What are  
4 their thoughts? What kinds of plans do they have for future  
5 conversion? Does the academic and research community look  
6 at itself as taking a lead in this area?

7           Next we have adverse and positive aspects of  
8 NRC conversion. How are grants and procurements and  
9 business related activities being affected as well as the  
10 things that we regulate, which are the non-power reactors  
11 and the nuclear materials aspect. So, hopefully we'll  
12 address both the adverse impacts and the positive impacts.

13           Next slide. The second slide is an attempt,  
14 it's and effort to see if we can get a little bit more  
15 specific information in the area of academic grants and  
16 contracts. After 1992 using metric units only. Is this a  
17 valid approach to life? Is 1992 too early? Maybe we should  
18 try a different approach.

19           What about consistency with the units used at  
20 a facility by the researchers? Should we mandate a change  
21 in submittals to us when applications are sent in for grants  
22 and contracts?

23           Progress reports. Progress reports on various  
24 contracts. Should we specify in the grant or the contract  
25 the system of units that should be used? What approach

1 should we take?

2 Long term contracts. Is it necessary to  
3 convert at a specific time? Or should we maintain consis-  
4 tency over the length of the contract?

5 Equipment modifications. Equipment modifica-  
6 tions that are related to the research that's being carried  
7 out and also new equipment purchases. Should these be  
8 specified as to the units they use?

9 And last, what about other government  
10 agencies. Integration with DOE and with national labs who  
11 are on major contracts. What kind of coordination is there?

12 The last slide is somewhat more specific to  
13 the non-power reactor community which we regulate but who  
14 also participate in grants and contracts. We look at  
15 license amendments, license renewal, emergency and physical  
16 security plans, we look at tech specs. Should these be  
17 conventional and metric? Should it be at the option of the  
18 licensee? Or should we, after a certain time period, say it  
19 has to be expressed in one or both of these systems? What  
20 about revisions to licenses? How would we handle that?

21 Now, the question is, will this lead to  
22 confusion when other federal, state, and local government  
23 agencies are involved? And this is something that should be  
24 addressed.

25 Facility layout. Conventional and metric.



1 Should it be the option of the licensee?

2 What about replacement parts?

3 What about operator confusion? If I start  
4 monkeying around with the control room, what effect does  
5 this have on the operator?

6 Training program. Another area that should be  
7 addressed.

8 New applications. After 1992, should I only  
9 accept new applications in metric? What is the opinion of  
10 people?

11 Now, it's interesting that in the one appli-  
12 cation for construction permit we have, it is a reactor that  
13 had been at one university and was being transferred to  
14 another university. So, here it is already defined  
15 physically and built and it's being moved. What kind of  
16 units should it be? Where does that fall in? And I suspect  
17 that there will be other cases like this where a research  
18 reactor is moved from one school to another.

19 The inspection reports of safety evaluations  
20 that we write. How would they be done?

21 Non-power reactors are also used to train  
22 operators that are eventually going to find their way into  
23 the nuclear industry and the power industry. There has to  
24 be some way of looking at consistency between how they're  
25 trained and the universities and the schools and how the

1 power reactor industry operates.

2 I think we also need to address the economic  
3 considerations of a change. Most universities are very low  
4 budget operations. They have difficulty in getting funds,  
5 and we need to address the impact of any changes on these  
6 universities.

7 Before I introduce the speaker, I guess one  
8 thing kind of bothered me in sitting through some of the  
9 talks today, and that was the absence of emphasis on human  
10 factors. In a previous life time I had worked at the NRC in  
11 the human factors area. The things that have to be con-  
12 sidered are you don't want to confuse the operator. You  
13 don't want to mislead the operator, and you want to facili-  
14 tate communications between the various operators. And a  
15 research test reactor, I think this is very, very important,  
16 just like it is in a power reactor.

17 During emergency operations you want to make  
18 sure that the stress is reduced as much as possible on an  
19 operator such that in dealing with a panel that might have  
20 different units on the front of it and different units on  
21 the back of it, and an operator goes to verify a measure-  
22 ment, this can create a problem. And I think this is an  
23 important area that needs to be addressed.

24 The other thing I wanted to toss up for  
25 discussion is maybe we ought to look at a phase-in type

1 program with the research and academic community rather than  
2 rigid dates. For example, maybe we ought to consider first  
3 addressing health physics and radiological safety and  
4 conversion into metric units, and then follow that up some  
5 time period later with nuclear materials and sources,  
6 addressing that area. A third you might address facility  
7 components, and then last facility operations.

8 I'm not in favor of this one way or the other,  
9 but I think this is something that maybe we ought to talk  
10 about a little bit to get away from the firm fixed date way  
11 of looking at things.

12 So, hopefully I've sort of generated enough  
13 for our speakers here and our panel.

14 And the first speaker is going to be Larry  
15 Ruby from Reed College. He has talked here a little  
16 earlier, but briefly he had been in the nuclear engineering  
17 department at Berkeley for 28 years where he managed there  
18 the nuclear reactor. And since 1987 he has been in semi-  
19 retirement at Reed College in Oregon, Portland, Oregon where  
20 he is the manager of their nuclear reactor.

21 MR. RUBY: Thank you very much.

22 As you know from previous discussions, I have  
23 suggested a policy of substantially new activities of the  
24 NRC being entirely in metric and ongoing activities of the  
25 NRC being done with minimal impact but also in metric.

1           At Reed College where I manage the nuclear  
2 reactor, we have been requested by the NRC to submit revised  
3 technical specifications in the near future. And so, there-  
4 fore, what I mean by minimal impact on an ongoing program  
5 turns out to be rather pertinent to what I now do. In other  
6 words, I have to put my money where my mouth is, or maybe I  
7 should say more properly Reed College's money.

8           And so, what I am asking our review committees  
9 to approve is a set of technical specifications which  
10 fortunately in substance are identical with what we had  
11 before, only because of NRC standards they will go from  
12 eleven pages to forty five pages. But, from the standpoint  
13 of substance, nothing changes excepting that all questions  
14 of units will be treated now with the SI units expressed  
15 primarily, and the older units, whatever it was, either U.S.  
16 customary or older metric, expressed in parenthesis.

17           And this submission will be contingent on two  
18 concessions from the NRC, the first that we may demonstrate  
19 compliance in either of the two units. And this means that,  
20 for example, we do not need to replace any of our instrumen-  
21 tation, which we actually financially could not do at this  
22 time; and secondly, that we can respond to examinations in  
23 either of the two units, which means that since my operators  
24 need to essentially memorize the technical specifications,  
25 they do not need to double the set of numbers they need to

1 use because of this new policy.

2 I am hoping that this will be favorably  
3 received as technical specifications which will be in com-  
4 pliance with the new Omnibus Trade Act and I guess now only  
5 time will tell.

6 However, before finishing the discussion, I  
7 would like to say something about the problem of the older  
8 radiation units versus the newer radiation units. First of  
9 all, I think from my standpoint I would like to see the same  
10 philosophy adopted; namely, an interim period where both  
11 sets of units would be acceptable.

12 However, much has hinged in the past upon what  
13 the Department of Energy has said in 10CFR20 because both  
14 the NRC and the EPA have essentially adopted their regula-  
15 tions from that particular document. Now, the Department of  
16 Energy has had Part 20 under revision for about maybe eight  
17 years, if I remember correctly. I have seen an early  
18 version of that revision. It had dual units in it. And in  
19 addition, it still retained some features which are not  
20 desirable in SI, such as expressing concentrations in some-  
21 thing per cubic centimeter or something per millilitre.

22 I don't know what the recent status of the  
23 revisions are, but I think that it would serve the purposes  
24 of clarifying the situation if the NRC would encourage the  
25 Department of Energy to do something about Part 20 in the

1 near future, and in particular, to come up with a version  
2 that would satisfy the requirements of the Omnibus Trade  
3 Act.

4 Thank you.

5 MR. WEISS: Do we have any questions?

6 Zoltan.

7 CHAIRMAN ROSZTOCZY: I would like to make one  
8 comment in connection with 10CFR Part 20.

9 10CFR Part 20 is presently under revision and  
10 it's under NRC's regulatory responsibility. NRC is making  
11 the changes. It's proposed set of changes have been  
12 prepared and have been submitted to the commissioners for  
13 their consideration and right now it's in front of them.  
14 So, we don't know yet what's going to happen, but there's a  
15 possibility that within a few months maybe there may be  
16 something issued.

17 MR. RUBY: Can you say anything in more detail  
18 about what has been done?

19 CHAIRMAN ROSZTOCZY: That was -- one of the  
20 issue was that how the units should be there. And, as far  
21 as I know, it is the customary units and metric units in  
22 parenthesis.

23 MR. WEISS: Any other questions?

24 Yes.

25 MR. PRICE: My question is for the college or

1 the university in the future, just taking the reactor or the  
2 nuclear portion. If you were to go off and buy new meters  
3 in the next two years or refit something of that facility,  
4 think about upgrading or changing in any sort, would you now  
5 require metric? That's the first question.

6 Second, when you communicate with your local  
7 communities on the parameters for that reactor, as far as  
8 civil defense or emergency situations, what system do you  
9 communicate in?

10 MR. RUBY: Number one, with respect to instru-  
11 mentation, there are two classification of instrumentation:  
12 radiation instrumentation and everything else.

13 And with respect to the radiation instrumenta-  
14 tion, I think I would like to have now instruments that  
15 would be in dual units with dual scales so that I could  
16 either interpret them in terms of sieverts or of rems, but I  
17 would want the scales to be clearly delineated so that it  
18 would not be a source of error rather than a source of  
19 assistance to me.

20 With respect to the other instrumentation, it  
21 sort of depends on to what extent the NRC will allow us to  
22 retain everything that we have, because if I replace instru-  
23 mentation, I have to replace procedures which specify  
24 readings on those instruments. And this turns out to be a  
25 rather titanic job and I worry about how our operators will

1 survive in the interim.

2                   So, my preference is that I prefer not to face  
3 that situation if it could possibly be avoided.

4                   MR. WEISS: I guess, in today's world, when  
5 you buy replacement parts, let's say for a control console,  
6 you're probably going to go digital. And if you do that,  
7 you have the option generally of specifying whatever units  
8 you want, and it's generally easy to switch from one to the  
9 other.

10                   MR. SIECK: It may be easy on the specifica-  
11 tion sheet, but when looking at it from the operator side,  
12 which would you specify?

13                   MR. WEISS: Looking at it from the operator's  
14 side?

15                   MR. SIECK: Operator's side.

16                   MR. WEISS: That's getting back to my human  
17 factors problem.

18                   If my operator is dealing with other instru-  
19 ments and he's verifying information, he has to have  
20 something that is consistent all the way through. It makes  
21 it very difficult for an operator when he is looking up  
22 something, let's say rad position, and he's concerned about  
23 rad position and it's inches on his primary display, and he  
24 goes to verify it someplace else and it's given to him in  
25 centimeters. And this is just a very simplistic example.



1 So, the human factors aspects of the conversions are very,  
2 very important and something that has to be done on an  
3 integrated fashion. You can't just do it on a piece meal  
4 type thing.

5 This is especially important when you have an  
6 emergency situation and the operator is being placed under a  
7 lot of stress. And then to do conversions in his mind, I  
8 think you can run into difficulty. And this is an area, I  
9 think, that just needs to be addressed.

10 MR. SIECK: Thank you.

11 MR. WEISS: Zoltan?

12 CHAIRMAN ROSZTOCZY: Just a brief question.

13 Larry, do I understand you correctly that you  
14 are saying that you would continue operating the reactor in  
15 the traditional units basically because of the instrumenta-  
16 tion? That's the instrumentation that you have, that's what  
17 the operator has to live with, so you would continue to  
18 operate it in English units, but in your new tech specs you  
19 would have dual units?

20 MR. RUBY: That's correct. That is the thing,  
21 I think, that would make the transition the least costly and  
22 the least confusing at the present time.

23 MR. WEISS: Any more questions or comments?

24 Our next speaker is Ali Moslek from the  
25 University of Maryland. He's in the Nuclear Engineering

1 Department. His specialty is risk and safety assessment,  
2 and he has been looking at the benefits and the disadvan-  
3 tages of the two systems.

4 MR. MOSLEK: Good morning.

5 Perhaps among the speakers today I'm the least  
6 qualified to talk about the subject, given the short notice  
7 I got in placing another speaker.

8 And this is one of those subjects that I have  
9 a strong opinion and wise opinion, but very little to talk  
10 about.

11 In response to the questions that was raised  
12 initially in the Federal Register and in accordance with the  
13 way we normally deal with these things, such as the method  
14 of research project yesterday, I went around and talked to  
15 people. And I also asked one of my graduate students to do  
16 what they normally do, to go read a book and give me the  
17 essence on that and kind of domesticate the subject.

18 So, what I'm offering you, going to tell you  
19 about today is basically based on that limited investigation  
20 that I did. Tried to see what the general feeling is in the  
21 College of Engineering in the University of Maryland College  
22 at College Park.

23 Much to my surprise, when I got the opinion  
24 poll from the faculty, those whom I talked to in several  
25 departments including nuclear engineering, there was a

1 strong interest to move and basically convert to the metric  
2 system, SI system. And that went across different  
3 departments, different disciplines all the way from  
4 electrical engineering to capcol (ph.) and nuclear.

5 And to summarize what I observed was that in  
6 most -- in several areas, if I go over what I could  
7 categorize basically, it turns out that the majority of  
8 courses are taught in that SI these days at College Park.  
9 Those include, for instance, reactor physics, you know, in  
10 our department.

11 Some were mixed. The mechanical engineering  
12 and nuclear engineering both teach heat transference and  
13 dynamics in both units. There are exceptions where some  
14 courses are taught entirely in the conventional units for  
15 good reasons. And an example is the systems analysis and  
16 reactor design from the hydraulics point of view, and that's  
17 because there was a concern that our graduates would have to  
18 interact with the industry, go work for the industry, who at  
19 this present time is almost entirely the conventional  
20 system. So, we teach those courses in those units.

21 Despite this, the mix that we have, the  
22 majority being the SI system, both the faculty and a group  
23 of students I talked to prefer the SI system. And it turns  
24 out that most of the students are fluent, our future  
25 graduates will be fluent in both systems so there wouldn't

1 be any problem for the future generation in understanding,  
2 having the right feeling for the numbers and the units if  
3 they work for the industry. They say that the SI system is  
4 more natural for physical sciences, and I tend to agree with  
5 that.

6           It's a decimal base, base 10, and it's a lot  
7 easier in terms of conversion and remembering the relation  
8 in different quantities that way. And also, some of those  
9 are based on, you know, physical processes that are closer  
10 to the physical sciences such as the range of temperature  
11 from freezing to boiling, from zero to a hundred, rather  
12 than something that is for, you know, designed for human  
13 body temperature such as 32 to you know 100 degree  
14 Fahrenheit.

15           So, the students and the faculty felt, the  
16 majority of them, that they would prefer the SI system. And  
17 other than some of the courses that be required to be taught  
18 in the conventional system, most courses are taught in SI.  
19 Text books, most modern text books are written that way, SI.  
20 And even some of the reference materials are now being  
21 converted. In fact, I brought one the Chart of Flow of  
22 Fluids for valves and pipes and fitting material. We have  
23 the conventional system and now we have the metric system.  
24 So, even the reference manuals are now becoming available.

25           As far as education is concerned, we see, you

1 know, very little problem, and our concern of this is that  
2 essentially the interface with the industry.

3           In the area of research, we have two  
4 categories of research. We have the research that requires  
5 tools, equipment, experimental usage, and we have things,  
6 you know, pencil and paper. If NRC required the change in  
7 their grants, reports and contracts, the submittals to NRC,  
8 we don't see a significant impact on the research which are  
9 analytical and have very little experimental work.

10           However, as everybody expressed a concern  
11 here, conversion in the area of tools in our labs and  
12 experimental research will be felt if, you know, the impact  
13 would be felt there given the limited budget that we have in  
14 universities to deal with these things. That is, you know,  
15 a common, I think, concern that most of us have here.

16           Much to my surprise, the operators in our  
17 reactor are trained in both units, and they are ready to  
18 respond. Now, we are talking about thirty, a small environ-  
19 ment compared to power reactors so, you know, you can't  
20 really extrapolate these figures, but as far as the univer-  
21 sity is concerned, the research reactor we have we can  
22 operate either way in terms of procedures. However, the  
23 instruments, particularly the radiation instrumentations are  
24 all in the conventional unit.

25           But, the result of the research, when you

1 publish most technical journals require SI units these days,  
2 with the option of putting the conventional units in  
3 parenthesis if you want. And, in that sense, it's not going  
4 to have any impact on us either.

5           Do we have any plans for a full conversion in  
6 the future? I did not see any sign of that. It seems that  
7 the metric system, the SI system is gradually taking over,  
8 at least in the College of Engineering. And it seems a more  
9 natural system and people are rebuilding their notes, the  
10 class notes, the instructors are using those system.

11           However, as I said, you know, you're still  
12 concerned about, you know, if there is a requirement to  
13 change and we have to comply with those in our plans and our  
14 experimental research work.

15           The question of budget constraints on changing  
16 the equipment is going to be, you know, a concern for us.  
17 It's an important issue.

18           What kind of adverse impact would those  
19 changes have on other activities at the university? The  
20 only concern that we have, other than the ones that I  
21 expressed, is that if we make a full conversion and send our  
22 graduates out and the industry has not caught up with that,  
23 then they will not be as effective as they might otherwise  
24 be. So, in the interim we prefer to continue teaching the  
25 courses that we think will be interfaced with the industry

1 in the conventional units.

2 And we also, as I listened to most of you this  
3 morning, the concern expressed by most of you about the  
4 human factors, that side of it. And being a risk assessor,  
5 I'm concerned about the impact of the changes on operators  
6 in nuclear power plants in particular. And as I can see,  
7 there are similar concerns in other parts of the industry.

8 So, the transition, we think, will be  
9 difficult. However, I think the -- when you look at the  
10 benefits overall, moving toward a more -- more of a global  
11 economy these days, I think the overall the benefits would  
12 out weigh the difficulties we're going to be facing during  
13 the transition period.

14 That's about all what I have to offer today.

15 MR. WEISS: Thank you.

16 Do we have any questions or comments on this?

17 MR. SIECK: You indicated that your people who  
18 operate the reactor are trained in both units. How many  
19 people are involved in that?

20 MR. MOSLEK: We have four full time people  
21 ranging from, you know, starting from the Reactor Director  
22 who is also a licensed operator, and three full time  
23 assistants who do that, and then several graduate students  
24 who are licensed operators. So, you're talking about ten.

25 MR. SIECK: The instrumentation is all in

1 customary units?

2 MR. MOSLEK: Yes. Yes. Particularly  
3 radiation.

4 MR. SIECK: So, if you were to have some sort  
5 of a crisis in the unit today, everybody would still deal in  
6 the customary units?

7 MR. MOSLEK: Yes.

8 MR. SIECK: So, that for right now, the dual  
9 training is irrelevant, for right at this minute in this  
10 case.

11 MR. MOSLEK: Yes. The procedures are based on  
12 the customary.

13 MR. SIECK: Somebody asked the question  
14 earlier of Doctor Ruby as to whether he would buy instrumen-  
15 tation next time around in either metric only or in dual  
16 units. How would you respond to that issue?

17 MR. MOSLEK: Again, going back to the  
18 preference, the preference is we would prefer the SI units.  
19 However, as I said, we are under other constraints such as  
20 we prefer again to keep the equipment we have as long as we  
21 can.

22 So, it would depend on the overall  
23 environment, to what extent we would be required to change.  
24 And I think if we have to change, given the constraints, we  
25 will, and I think that's consistent with what is preferred.



1 But, again, as I said, you know, we have the budget  
2 constraints unfortunately.

3 MR. SIECK: Let me demonstrate my ignorance of  
4 how this thing operates. Is it practice for you, when you  
5 replace instrumentation, to simply shut the place down and  
6 replace everything? Or do you do like the rest of us do in  
7 our business and you buy one meter at a time, or one --

8 MR. MOSLEK: No, no, no. In the real world --

9 MR. SIECK: -- or one thing at a time.

10 MR. MOSLEK: Yeah. Yeah.

11 MR. SIECK: So, if you were to make a conver-  
12 sion in instrumentation, you would almost necessarily have  
13 either both kinds or dual kinds.

14 MR. MOSLEK: Dual kinds is the type of thing  
15 that would be, again, the ones that we can find would be the  
16 dual if we can find them.

17 MR. DIMEGLIO: I'd like to address that last  
18 question a little bit. I think that's probably facility  
19 dependent. For example, when we replace equipment, whether  
20 or not we go SI or whether or not we go standard American  
21 depends on what we're replacing. For example, if we were to  
22 replace the temperature measuring channel, and we were to do  
23 that today, we would undoubtedly go SI. We now measure in  
24 Fahrenheit. We would probably measure in centigrade, and we  
25 don't think that's a very significant problem for our

1 operators.

2           If we were to go, though, from gallons per  
3 minute to cubic meters per second, we'd have to think a  
4 little harder because now we end up with numbers which are a  
5 little bit more difficult to interpret.

6           So, I think it depends what instrument you're  
7 talking about at the control system. If we were to do a  
8 whole control system, and some of us hope that we can do  
9 that in the next few years, I think we would probably go SI  
10 and spend the time training the operators so that they are  
11 now familiar with the totally new instruments. But  
12 remember, the exchange of a control system is a quarter of a  
13 million dollar project for many reactors. And so then you  
14 can afford the time -- relative to that, you can afford the  
15 time and the money to retrain your operators totally rather  
16 than partially.

17           MR. WEISS: Any more questions or comments?

18           MR. MOSLEK: One from the audience.

19           MR. WACHTEL: Jerry Wachtel from NRC.

20           Just a comment on this training issue. If you  
21 replace one instrument or one component for one subsystem  
22 and not the other it not only has an implication on the  
23 training for that component or subsystem, it has an implica-  
24 tion on your operating procedures and on your training  
25 manuals and on the training of the trainers who have to

1 train the students. And if you're dealing with a partial  
2 versus a complete change over in training, the implications  
3 become much wider in terms of continuing a dual training.  
4 Some in SI units and some in conventional, which is a very  
5 different problem than if you're making a complete change.

6 MR. DIMEGLIO: This is a comment on the  
7 comment.

8 I think that you've got to remember that we're  
9 working in a university environment, and we're generally  
10 working with operators of the type that the power industry  
11 is now trying to get too. And so, I think sure you have to  
12 change your operating procedures, and that is at least you  
13 have to change a few numbers in them. You don't really have  
14 to change the procedures, but I don't think in the environ-  
15 ment of a research reactor with fewer operators and  
16 operators of a slightly different type than you get in the  
17 power industry that mixed units is the biggest problem, is  
18 that big a problem.

19 They're using mixed units all the time. For  
20 example, we designed a new columnator for our experiments  
21 and no one objects to the fact that the dimensions of the  
22 columnator are two millimeters by two feet. That doesn't  
23 stir up all kinds of problems in a university environment.

24 So, --

25 MR. MOSLEK: Yeah. I agree with you. I think

1 the concern that is expressed here is more like, you know,  
2 the concern for the outside world rather than the  
3 university.

4 MR. WEISS: Zoltan?

5 CHAIRMAN ROSZTOCZY: I have two questions, one  
6 for Ali and another one for all members of the panel.

7 Ali, you mentioned that the text books these  
8 days are mostly in SI units. Science text books like  
9 physics and chemistry has been in SI units for quite a  
10 while. If I specifically ask the question for engineering  
11 text books, what form are those today?

12 MR. MOSLEK: I was referring to engineering  
13 text books essentially rather than -- yeah. Most of the  
14 books coming out these days and most of the ones that are  
15 being used at College Park are evidently SI. I know of the  
16 courses that I have taught, and I've asked other people who  
17 say the same thing.

18 Some books are in both units, but those are  
19 terrible actually because they have made the conversion in  
20 some chapters and not in others. It's very confusing,  
21 although most of the students these days understand both of  
22 them.

23 CHAIRMAN ROSZTOCZY: The second question is  
24 really to the -- and which has just been discussed, the  
25 instrumentation on the university reactors.

1           In terms of power reactors, the old approach  
2 used to be that when a U.S. company sold a reactor outside  
3 the country, then they produced exactly the same reactor  
4 with exactly the same instrumentation that they provided for  
5 American utilities. The only difference was that in the  
6 control room the plates on the instruments were in metric  
7 units as opposed to having the conventional unit plates.

8           Have any of the universities that you are  
9 associated with this conversion to metric, in terms of  
10 operating the reactor, simply by placing new plates on your  
11 instruments?

12           MR. DIMEGLIO: First of all, that question  
13 really hasn't been faced because the research reactor  
14 community has not had, until recently, the funds for equip-  
15 ment replacement on a -- or even relabelling on a large  
16 scale, but it is something that's being discussed now  
17 because there are some programs in place which might provide  
18 money for new instruments.

19           And so, this is something which is being  
20 discussed now in the community. And I don't think there  
21 really is a consensus as there has not been much discussion,  
22 but the general attitude of the committee -- of the  
23 community, which I sensed when I was preparing my presenta-  
24 tion for today, is that metric is the way. And so, I would  
25 expect that to be implemented when they go out and begin to

1 change equipment and where it would be the appropriate time  
2 to relabel or to rescale some of the instruments.

3 It just hasn't been done on a large scale in  
4 the research reactor community, and so it's not really  
5 possible to answer that.

6 MR. WEISS: Our next speaker is Uri Gat from  
7 Oak Ridge National Laboratory. He's the Metric Coordinator.  
8 He's been Metric Coordinator at University of Kentucky.  
9 He's been pushing metrics for longer than anyone else. He's  
10 First Vice Chairman of the ASPM working on the 380 standard.  
11 He's talked to you a number of times already.

12 MR. GAT: Thank you.

13 I have two corrections to make. Number one,  
14 there is at least one person here that I know for sure has  
15 been pushing metrics longer than I and I have learned a lot  
16 from him and maybe got some of my initiation from him, and  
17 I'm not supposed to name him.

18 The other thing is sitting next to Frances  
19 here, I was reminded that my accent is not Southern  
20 Appalachian but New England or Rhode Island since I was born  
21 in Jerusalem, but he may explain that later when he sees the  
22 similarity.

23 I was asked to talk about the SI in academic  
24 and research institutions, and a lot of it will be  
25 repetitive because things have been said quite a few times

1 before.

2 We have mentioned galore that publications in  
3 scientific areas, practically all of them require SI. There  
4 are a few islands here and there that will tolerate dual  
5 units, and there are very, very few, one of them being  
6 heating, ventilating, and air conditioning that still allow  
7 you to use non-SI.

8 I'm mentioning that because this is the one  
9 area where the entire expertise of the engineering use to  
10 say it was dependent on the fact that the units are confused  
11 because these people here -- our energy comes in kilocalor-  
12 ies, which are confusing by themselves. The sun out there  
13 comes in Btu's per square foot. These things come in watts.  
14 There are things that come in horse power. And by the time  
15 he calculates the air conditioning, wherever it comes from,  
16 it goes in tons. And by the time he installs it, he needs  
17 to convert it back to kilowatts.

18 And the entire expertise is the conversions.  
19 And if you avoided that, if you had everything coming in  
20 watts, then all you'd need is a third grade education to add  
21 them up and maybe put in a factor for the efficiency. I'm a  
22 little bit exaggerating, but not much.

23 The world is SI and science and academia is  
24 perhaps the areas which are most international. These are  
25 the areas in which we have dealt with practically everyone

1 including the Russians and the Chinese and behind the Iron  
2 Curtain and whatever. So, the common language there is,  
3 without any doubt, SI. And since this language was created  
4 for the sole purpose of being an up-to-date, state-of-the-  
5 art language of measurements, it is obvious, it comes  
6 naturally to use that in the area of academia.

7                   Furthermore, there is really no other units,  
8 and that was mentioned also a couple of times. There is no  
9 inch. The inch is defined as 25.4 millimeters. There are  
10 no -- there is no other system any more, and when you come  
11 to academic research, particularly in the nuclear area,  
12 you're talking about accuracy of the kind that is not  
13 available in any other system. You could not -- you cannot  
14 really express atomic dimensions in inches or in feet,  
15 yards, furlongs or whatever other units you want to come up  
16 with. So, it's almost a requirement in academia in most  
17 areas.

18                   And we have heard that even in the nuclear  
19 area where, and I'll come back to that a little later, there  
20 is an interface. You start the physics in metric, not very  
21 good SI, but metric. And then some place you switch over  
22 and the net result is that you have a confusion there.  
23 We've gotten used to it and we live with it.

24                   And I'm now beginning to work on a reactor,  
25 and I'll mention that, you can see that it spates (ph.), but



1 when you interface between -- try to interface between the  
2 physics guy who do the core calculations and the guys who do  
3 the engineering, you have a real problem. We are aware of  
4 it and we have gotten used to paying the penalty, but  
5 nevertheless, it exists.

6           Communications are clear only in SI. And we  
7 have heard enough about Chernobyl, but Oak Ridge was  
8 responsible for accumulating the data base that came out of  
9 Chernobyl. And, if you recall at the very beginning, no  
10 data came out of Russia and it came out of all countries  
11 around it, Finland, Sweden, Germany, Italy and a whole bunch  
12 of Austria. And it is unbelievable what all happened in  
13 there because on top of the question of the units came the  
14 problem of real mistakes where people were giving you  
15 exposures in becquerel per square meter, or people were  
16 giving you some other units of contamination in rods and  
17 rems and in sieverts.

18           And partially what happened there, where the  
19 people who put the data into data bases, just took the data  
20 as it was, which means that it was called "exposure."  
21 Nobody looked at the unit. And you have numbers there that  
22 deviate by many, many orders of magnitude. Initially the  
23 data base was not very useful because of these extreme  
24 deviations, let along numerical errors that were in there,  
25 let along questions of accuracy and averaging and so on.

1                   Many people were convinced, as a result of  
2 these Chernobyl events, which excluded, by the way, items  
3 not only radiation items, items like temperature, wind  
4 velocity, how far it will go and where it will go. The  
5 whole reporting that was associated with that, the net  
6 result was that many, many people are now convinced that  
7 this is the way to go. That doesn't make them less  
8 reluctant to change. They would like for everyone to go to  
9 their system, whatever it is. But the need to go to a  
10 singular system across the world, and there is no doubt in  
11 anyone's mind that the only one you can go to is SI.

12                   Schools and universities are a mixed bag, and  
13 we've just heard that we get all kinds of things. And I'd  
14 just like to -- my personal experience, we entertain during  
15 summer periods, students usually between their junior and  
16 senior year to do work. And a couple of years ago I had a  
17 student from VPI who was, she was a girl, and she was really  
18 versed in SI, I mean better than I although I've been really  
19 in that thing. And besides the fact that she was a very  
20 good engineer and did excellent work, when she got work to  
21 do, and the data base, the incoming data, she worked on a  
22 modern sort reactor, the U.S. reactor, she had to design.

23                   The first thing she did with the incoming data  
24 base was convert it all to SI, did all her calculations in  
25 SI, and then at the presentation at the end, people asked

1 that she give also equivalents in other units. So, what she  
2 did. .he converted at the end, at the tail end, and it kind  
3 of surprised me too.

4 We have a generation that is coming up, but  
5 what we do, the first thing, is beat it out of them when  
6 they come start working for us. And this is the big fallacy  
7 of trying to let that go for a generation. It won't happen  
8 unless we have some kind of a guidance that it's going to  
9 happen.

10 Talking about research institutions, and I'm  
11 talking primarily about -- I do have knowledge about most  
12 national laboratories. One of the things that I served on  
13 is on the Metrication Committee of the IMOC, which may give  
14 you a clue where I learned my first SI. I'm of being an  
15 Interagency Metric -- Mechanical Operating Group for the  
16 weapons laboratories.

17 And one of their big problems was how to  
18 transfer weapons so there would be no misunderstandings  
19 between labs, because if you go to the conventional system,  
20 this is not the system. You can get it from one place in  
21 inches and from another place in feet in inches and this  
22 requires conversion. It's another one of these fallacies.  
23 The only one that doesn't require conversions is if you go  
24 SI.

25 All the inspection in weapons labs is done in

1 SI for a long, long time. That's what's left over from the  
2 previous round.

3 But, coming to where we are right now, and I'm  
4 talking mostly about the national labs, not the weapons  
5 labs, the attitude is paper is tolerant and the editors we  
6 finally succeeded, for example, R&L to require that in  
7 publications and the publications themselves require that  
8 from the SI. So, people do the conversion usually at the  
9 ends. And you don't see a problem any more. You don't hear  
10 a problem.

11 From time to time you get a question that I  
12 told some guys here yesterday, a guy will call me and say  
13 "Your metric gives me trouble. I have to have my Btu's and  
14 I'm looking in your metric guide," at the time it was Metric  
15 Practice Guide, "and I find Btu's in there. Which one  
16 should I use?" And of course, and they differ by as much as  
17 5 percent.

18 And I said, "Hey, you're a funny guy you.  
19 That's not a conversion question. Which Btu did you use?  
20 And I'm willing to bet, without seeing your work, that you  
21 have at least three significant figures in there. And, if  
22 so, you must know which Btu to use."

23 So, the issue that we attribute to SI is not  
24 always that issue. The issue is very often embedded and it  
25 only comes out when we talk about SI.

1                   Which brings me to the next point and that is  
2 an interface with hardware. We've heard that a lot here  
3 today. When it comes to hardware, that's anchored in  
4 concrete and in steel. You can't change that. You can do  
5 soft conversions, however, the engineering community has  
6 been very, very reluctant to change and basically has not  
7 changed. We have tried at least new projects to bring them  
8 up in SI, as Ruby said "born in SI" when there are new  
9 projects.

10                   And there is one specific one that I would  
11 like to mention that we have missed the boat. There are add  
12 on in buildings. Nobody had any previous knowledge about  
13 that issue three or four years ago. And for some reason  
14 that beats me, forever I will not understand, somebody came  
15 up with curies per liter. The numbers in becquerel per  
16 cubic meter would have been much nicer, much easier to  
17 understand. It's not millicuries per some liters or some  
18 horribly complicated. And nobody -- just think yourselves  
19 back. When you start a new area, you learn the numbers  
20 whichever they are. Now it's beginning to be a little too  
21 late because already we have it in some legislatures and in  
22 support programs and what have you. Now again it's a  
23 conversion issue. So, new projects, if we can and we've  
24 tried internally.

25                   Another big issue is the issue of "they will

1 not understand." One of the major reasons that I am on many  
2 of these committees is to kind of present the radiation  
3 units and the energy units and I've mentioned the Btu's, but  
4 there are about 50 energy units in use, and I mentioned  
5 those HVAC, the ton of which is for refrigeration, the ton  
6 of TNT. There are about 50 of them, barrel of oil, tons of  
7 coal, and there are about 150 total. I had a slide here  
8 which shows many of those.

9 CHAIRMAN ROSZTOCZY: Uri, I just noticed that  
10 you have about seven slides and we are on the second one.  
11 Is there any chance that we could accelerate it a little?

12 MR. GAT: I'll accelerate and I'm not going to  
13 stay that long on the others.

14 So, on new projects we really need to go to  
15 new stuff.

16 Existing hardware is a big issue, and as I  
17 said, I'm beginning to work on a reactor, the high flux  
18 isotope reactor and all the documentation, the hardware  
19 documentation is in English. And another thing and that is  
20 the safety related. Nobody will dare change any of the  
21 documentation now because it may have some safety  
22 implications that may be really serious.

23 SI progress and regress. I think in order to  
24 make progress we need guidance and coordination, and of the  
25 kind we've heard, we need to know where we're going. We at

1 ORNL have converted, at one point in time about ten years  
2 ago, in radiation to reporting in SI units. And it wasn't  
3 my doing. It was someone else. Unfortunately they didn't  
4 consult with me. And the first reaction we got was from  
5 theories that absolutely go back and we're still fighting  
6 that attitude. We must have guidance and coordination. It  
7 cannot, particularly on the legal related aspects, and  
8 that's why it's so important to have the 10CFR done so that  
9 it will at least tolerate SI for those who want to do it.

10 I mentioned the safety aspect before and the  
11 economic aspect is we've heard that a couple of times today.  
12 That if we don't do it in a coordinated fashion, then it's  
13 going to be very expensive. If we do it in a well planned  
14 and coordinated fashion, my suggestion and in some cases in  
15 examples where we have actually done it. We have the large  
16 core test facility which was a national program. Portions  
17 of it went SI and there was no impact whatsoever on the  
18 economy. They had a good excuse because the coils from  
19 other countries came in SI in metric.

20 That was covered galore. I just want to kind  
21 of summarize the advantages for academic applications: is  
22 of course the simplicity associated with that, few mistakes,  
23 the coherence of the system which was discussed quite a bit,  
24 and that is a very important factor, and again it has  
25 implications for safety, the fact that it is decimal, the

1 same as our numerical system.

2           It's not ambiguous, and that's something that  
3 has not been mentioned before. The symbols are unique and  
4 they are the same in every language. They are interna-  
5 tional. They are symbols not abbreviations, and therefore  
6 there are no place for mistakes again. It has advantage  
7 from an NRC point of view, fewer mistakes, better safety.

8           And of course, they are interdisciplinary  
9 which is most important, and that is the most important  
10 factor in science again and in academia because this is  
11 where the people deal in the disciplinary.

12           What you've heard the opposition on no need to  
13 change is always in restricted areas where you are, what I  
14 call an end user of units. You can live with any units. My  
15 wife cooks and she has a cup which is not a cup and not a  
16 fraction of a liter or whatever, and she uses that. And her  
17 grandmother told her that you take three quarters of that  
18 and half of sugar and so on and it comes out a perfect cake  
19 every time. I don't know what she'll do when that cup will  
20 break, but I guess any cup will do. So, if you're an end  
21 user, you don't manipulate the units. You could use any  
22 units. In horse races you'd still use furlongs. I don't  
23 know how many of you know what a furlong is.

24           To SI or not to SI, go SI or not go SI. SI is  
25 here to stay. We've heard that galore. Other units are



1 based on SI which is coming to the accuracy question. There  
2 is a real problem when you come to other units, and some of  
3 it was mentioned yesterday.

4 I think the easiest way to go SI is to phase  
5 out non-SI and to do that on a planned coordinated basis.  
6 SI is simple, coherent, and enhances safety, competitive-  
7 ness, understanding and progress. And that is important and  
8 that's part of the competitiveness. We are making mighty  
9 few progress. Most of the new stuff is coming from abroad  
10 and to facilitate progress we must use state-of-the-art  
11 technology and SI is part of that state-of-the-art  
12 technology.

13 There are some special issues that are  
14 associated with our academia and research, and these are the  
15 standards in SI. I mentioned some of that before and I'll  
16 mention it very briefly. The electron volt and the barn are  
17 units that are not strictly SI depending on what you call  
18 SI, however, they are in such a wide use and they are  
19 permitted by the CGPM, the International Treaty of the Meter  
20 if you want which is implemented by the CGPM, the Conference  
21 Generale Poir de Measure (ph.) and need to be retained. So,  
22 the terminology is very important and I pointed that out in  
23 a couple of questions yesterday.

24 The health physics units have been discussed  
25 enough so that I don't need to mention them again.

1 I do want to mention one specific issue and  
2 that is the "R." The "R" is a pure bad unit and it is  
3 really a non-unit. If at all defined it's very poorly  
4 defined. Some people think it's a roengen, some people  
5 think it's a rad and some people think it's a rem and some  
6 people think it's something new that is good for all of  
7 these. And you find that among the experts, and you find  
8 that in the literature, and you find that used totally wrong  
9 in, I would dare say, most cases if not all because if one  
10 guy has it well defined, the others don't know what he  
11 meant.

12 The temperature is a little bit a special  
13 issue and we've heard today about going to Celsius being  
14 relatively easy. The difficulty there is mostly that the  
15 conversion is not the factor but it is also shifted a little  
16 bit. One should carefully consider whether one wouldn't  
17 like to go to the Kelvin. Although it may not give you an  
18 every day feeling, that would have significant advantages  
19 from a scientific point of view.

20 I mentioned on several occasions before the  
21 accuracy and significant figures. Only SI with its prefixes  
22 allows you to express accuracy and significant figures.

23 And to kind of summarize, the SI is  
24 progressing slowly but inevitable. We've heard that and I  
25 was pleased to hear that that was practically the general

1 agreement by now. Internationally this is the only accepted  
2 system. Problems when interfacing with hardware and they  
3 will persist for quite a while, and we need planning and  
4 coordination, and I hope this meeting here will bring that  
5 about.

6 That's all I have.

7 MR. WEISS: Do we have any questions?

8 Zoltan, don't we have anything from you?  
9 You're missing this one?

10 CHAIRMAN ROSZTOCZY: No, I'm sorry. I have to  
11 pass this time.

12 MR. WEISS: I guess Zoltan is getting hungry  
13 so we'll see if we can speed things up.

14 Our next speaker is Frank Di Meglio. Frank,  
15 his main claim to fame right now is he's Chairman of the  
16 National Organization of Test, Research, and Training  
17 Reactors and he has been their Chairman three previous times  
18 and he is the current Chairman. His current work effort is  
19 Director of the Rhode Island Atomic Energy Commission and  
20 he's also an adjutant professor of nuclear engineering at  
21 the University of Rhode Island.

22 Frank.

23 MR. DIMEGLIO: Thanks, Sy.

24 My comments were prepared recognizing that we  
25 would be near the end of the program, and so many things

1 that could have been said I assumed would already have been  
2 said and so these will not appear in what I say.

3 Also, there are copies of the formal presenta-  
4 tion, which is very short, I think out in the hallway for  
5 those who are interested.

6 I also will revise my presentation based on  
7 some of things that I've heard here. So, I'm pleased to  
8 participate in this workshop as a representative of the  
9 United States Non-Power Reactor community.

10 These reactors are operated by the U.S.  
11 Department of Energy, the Department of Commerce, Industry  
12 and Universities. Since the United States Government  
13 agencies which operate non-power reactors will develop their  
14 own metric policies, my comments mainly concern the  
15 remaining reactors, especially the university reactors.

16 In addition to the approximately 32 university  
17 type reactor licenses, there are many by-product and special  
18 nuclear material licenses at many additional facilities or  
19 institutions, that is those that don't run reactors,  
20 including some by-product licensees issued by agreement  
21 states. While not addressing these additional licenses  
22 directly, I think my remarks in general will be applicable.

23 All these institutions will be impacted by the  
24 metric act, the metric requirements of the Omnibus Trade and  
25 Competitiveness Act since most of them have grants from

1 federal agencies such as the Department of Energy or the  
2 National Science Foundation and all deal with the NRC in  
3 business activities, or deal with an agreement state which  
4 in turn must deal with the NRC.

5 Most of these institutions are in the business  
6 of education and the metric system has been a part of their  
7 teaching. All of the individuals at these institutions,  
8 these licensed institutions are, of course, familiar with  
9 the metric system. And while not always using the preferred  
10 SI units, have in fact utilized one form or another of the  
11 metric system in much of their work. They support the  
12 conversion to the metric system and I think I can say this  
13 because I called the Executive Committee of the TRTR  
14 organization and all of them support this statement that we  
15 support the conversion to the metric system.

16 But, now having said this, that we support the  
17 conversion, there remains the more important question of how  
18 to implement the change.

19 The first group of reactors that I'd like to  
20 talk about are the current reactors. All these current  
21 reactors were designed using the inch/pound system, and  
22 conversion for these existing facilities will be slow and  
23 probably never complete. Any back fit demands on these  
24 reactors, especially in the areas of equipment, including  
25 control system equipment, will simply mean that reactors

1 will disappear. Back fit demands in paperwork would  
2 probably not be as drastic, but it too would probably mean  
3 that some of the reactors will simply go out of business.  
4 And these facilities will never be hard metric overall.  
5 They can, however, be metric in some aspects, and I'd like  
6 to give a couple examples of these.

7           Calculations at these facilities have been a  
8 hybrid, with the neutronic calculations in metric and the  
9 engineering calculations in inch/pound system. These calcu-  
10 lations can easily be done in metric with an occasional  
11 inch/pound equivalent reference until we develop a feel for  
12 the numbers. For examples, it will be a long time before I  
13 realize that .0912 cubic meters per second is 1,500 gallons  
14 a minute or that 4 times 10 to the minus 4 microcuries per  
15 cc is 1.48 times 10 to the 7th.

16           And I'd like to stop and make an additional  
17 comment based on some of the things I heard here today on  
18 this concentration. There was a recommendation that maybe  
19 in 10CFR, and now in particular Part 20, we have a dual  
20 system. I'd like to remind everybody that a number like 4  
21 times 10 to the minus 4 microcuries per cc is a result of a  
22 calculation done by some international body where they took  
23 into effect standard man, body burden, biological half life.  
24 They came up with some number. It most certainly was not 4  
25 times 10 to the minus 4. It was rounded to that number.

1 So, to simply create a table which in one instance says 4  
2 times 10 to the minus 4 and in another instances says 1.48  
3 times 10 to 7 becquerels per cubic meter makes no sense,  
4 because if they had done the calculation in SI units, they  
5 would not come up with the number 1.48 which is a ridiculous  
6 number to put into an MPC table.

7           The other unit that I had used here in my  
8 little example was 100 millirems per hour. This is .278  
9 millisieverts per second. The problem comes because we  
10 haven't addressed whether we're willing to take the hour as  
11 the unit for dose rate. We've spoken a lot about dose but  
12 survey meters really read dose/rate not dose. If we're  
13 willing to accept the hour as the unit of time in a survey  
14 meter, the conversion of a survey meter is automatic. The  
15 scales are all one for one. You simply split the decimation  
16 point and now say sievert, and that should be easy to teach  
17 people, but we have to agree to use the hour and not the  
18 second in order to do that. And the hour is, we heard  
19 yesterday, considered an acceptable SI unit.

20           Equipment replacements now at this reactor  
21 though would be -- at this existing reactor, would be a  
22 mixed bag. While we may specify metric for a replacement  
23 primary pump, we probably won't be able to buy that pump in  
24 metric for the foreseeable future and therefore will have to  
25 buy something using inch/pound.

1 I, in getting ready for this paper, I asked my  
2 engineer last week. I simply said, to see his reaction, "We  
3 have to replace the primary pump. On the SI units are  
4 available to you. What do you do?"

5 His response was exactly what we heard  
6 yesterday. Engineers all received the same training. "I'll  
7 buy it in Europe for you." Of course, that's not part of  
8 the ground rules. And so, he produced a four page document  
9 for me to buy a pump trying to use the metric system, and of  
10 course, this is really totally unworkable for an existing  
11 facility. And, even if you tried to do it, the pump  
12 inevitably is a hybrid because it has to match existing  
13 facilities. And so, you have to have inch/pound units,  
14 inch/pound dimensions there somewhere.

15 Metering and recording equipment replacements  
16 on the other hand, I think, are a different situation. The  
17 most difficult part of changing a temperature or flow  
18 monitor and recorder to metric is the education of the staff  
19 which interprets the data. We've heard this before and I  
20 think that is true and some are more difficult than others.

21 Okay. Upgrading of existing reactors I think  
22 until recently was probably not a big problem, but many of  
23 you may know that the Department of Energy -- well, not the  
24 Department of Energy but the U.S. Congress has recently  
25 passed legislation, at the urgings of the research reactor



1 community which is providing money now for upgrades of  
2 reactors, it's been funded to the tune of \$1 million dollars  
3 this year. This is in the days of Gramm-Rudman, a brand new  
4 program, and we expect this program to grow over the years  
5 to somewhere between \$10 and \$20 million dollars.

6 This means there will be money for new control  
7 systems to upgrade our reactors. There will be money for  
8 new equipment. And so, I think this is an important  
9 consideration. But I also think that upgrades on the  
10 existing reactors will probably not differ much from the  
11 situation for existing reactors already described, since the  
12 new equipment, again, has to interface with existing equip-  
13 ment and that always makes the job more difficult.

14 New facilities I think will be metric,  
15 especially if there is an example set by the Federal Govern-  
16 ment in projects like the advance neutron source, the new  
17 production reactor, SDI, and the super collider. I think  
18 basically what we're saying is that if the government is  
19 really serious about this and the advanced neutron source is  
20 not built metric, I think they'll lose their credibility.  
21 And the same is true of the new production reactor. If the  
22 government resources are not large enough to produce a  
23 production reactor in metric, I don't see how they can think  
24 that the universities resources are large enough to convert  
25 or to begin the conversion process to their reactors.

1                   Metrication of these major federal projects,  
2 along with the work of the Department of Defense in  
3 preparing military standards in metric could provide back-  
4 ground for the operators in these university research  
5 reactors, especially in new facilities.

6                   I'd like to discuss just two other facilities  
7 which are important to the operators of the non-power  
8 reactors. The first issue is that of dealing with the NRC  
9 without a mountain of paper work. We've heard some  
10 examples. I'd like to present a couple more examples. For  
11 example, even if the technical specifications in a reactor  
12 use Fahrenheit degrees, in other words, the limits in  
13 temperatures are all in the tech specs and their designated  
14 as Fahrenheit degrees, this means that you would, at least  
15 now, would be measuring and setting all your safety limits  
16 based on Fahrenheit. It should be possible to convert this  
17 to Celsius degrees without prior approval of the NRC. More  
18 important, it should be possible to change a one inch bolt  
19 to a 25 millimeter bolt, everything else being equal,  
20 without prior approval of the NRC.

21                   For this type of metrication we envision  
22 something like a 50.59 change with perhaps some kinds of  
23 limits set in advance of what can be done in this area.

24                   Finally there is the matter of the radiation  
25 units, and I've already touched on that a little bit. Most

1 people now have thoughts of the Curie, the roengen, which I  
2 think is a perfectly respectable unit. I've seen many  
3 definitions of the roengen which are acceptable and make  
4 sense for exposure dose. And I also admit there is plenty  
5 of confusion on it, though. Most people have thoughts that  
6 the Curie, the roengen, and the rem and the rad as neutral  
7 units belonging in neither the inch/pound nor the metric  
8 system exclusively. Until very recently, all countries and  
9 most international committees have used these units.

10           The public discussion concerning the proposed  
11 changes in 10CFR up until at least the very present have all  
12 been based on the retention of existing units. More and  
13 more, however, SI units are appearing at international  
14 meetings and in international reports. These are radiation  
15 units. If SI units prevail, and I personally have no  
16 problem with that, even though there are many problems to be  
17 overcome, the technical community will adjust. I have no  
18 doubt that my operators, for example, can convert to  
19 sieverts per hour with very little difficulty. The public,  
20 however, is another situation. They are only now beginning  
21 to understand radiation in the current units. To obtain  
22 even this marginal public understanding by the public in the  
23 new units I think will require considerable time.

24           That's what I have formally to say.

25           M. WEISS: Okay. Thank you. Do we have any

1 questions or comments?

2 I guess everybody is awfully hungry.

3 Before we -- oh, yes. Go ahead.

4 MR. STANGLER: Marlow Stangler from FEMA.

5 I agree with you, Frances, that the roengen is  
6 well defined. It's a certain amount of ionization that  
7 affects the volume of air or quantity of air if you want to  
8 measure it in grams. The problem is the people that use it  
9 make a mistake. And the other problem is that the roengen,  
10 which is abbreviated "R," is very similar to rem and rad.  
11 The rad is radiation absorbed dose; the rem is rent and  
12 equivalent man (ph.) and people throw the three together.

13 Now, for most gamma radiation, the people  
14 measure with a survey meter which really is an exposure  
15 meter, an exposure rate meter. It really measures exposure  
16 rather than dose, but it measures the exposure quite  
17 accurately. And it's not the survey meter's fault, it's the  
18 people that are using it and confusing it.

19 Now, for gamma radiation and x-rays of high  
20 enough energy and if the instruments are properly built,  
21 essentially we have a one-to-one ratio between the roengen,  
22 the rad, and the rem. The problem is when we start  
23 measuring things other than those defined energy levels of  
24 gamma radiation or real low energy x-rays or other types of  
25 health physics radiation like alpha or beta particles. For

1 example, one rad of health radiation would probably be about  
2 10 -- no more like 20 rems of in terms of damage to a  
3 person. I'll admit the alpha particle is primarily an  
4 internal problem and most people here probably don't have to  
5 measure it.

6 But, I was also going to ask Lawrence, I  
7 guess, what dual unit -- or what the dual unit is that he  
8 put on the meter and what kind of radiation you're  
9 measuring. Is it gamma radiation?

10 MR. RUBY: It would be.

11 MR. SPANGLER: Okay. If you've got gamma  
12 radiation then it's no problem. You could put a sievert  
13 unit on it. But, if you've got other radiation units that  
14 you're going to be measuring, a sievert is not the proper  
15 choice because that's equivalent to the rem and really you  
16 would need to go to a coulomb per gram or kilogram on the  
17 meter dial.

18 MR. DIMEGLIO: First of all, I think the first  
19 part, if I can kind of go in here, the first part of your  
20 question, the confusion exists now only because R, rem, rad,  
21 rep or anything else you want to take from history all begin  
22 with "R" and all sound alike.

23 MR. SPANGLER: Right.

24 MR. DIMEGLIO: You can get the same kind of  
25 confusion with sievert and gray.

1 MR. SPANGLER: And maybe worse.

2 MR. DIMEGLIO: The only reason why there  
3 probably won't be the confusion is because the names are so  
4 vastly different. No one is going to say "sievert" when  
5 they mean "gray," but people will frequently say "R" when  
6 they mean "rem." The only unit that you really use in the  
7 field is the rem, and that involves a quality factor.

8 MR. SPANGLER: Right.

9 MR. DIMEGLIO: Okay? You use rem. When you  
10 work around a reactor, since you can measure neutrons and  
11 you can measure betas, and you can measure alphas, if you're  
12 talking about uranium, you use the rem all the time.

13 And so, I don't think there is really any  
14 confusion. It is just the fact that they all begin with "R"  
15 and so people lump them all and they say "R" when they  
16 really mean "rem."

17 MR. SPANGLER: But I think we've been using it  
18 right in the --

19 MR. GAT: Oh, but there is a disagreement. He  
20 said that the unit you use in the field is roengen all the  
21 time and you say rem.

22 MR. DIMEGLIO: That's because he deals -- he's  
23 from civil defense and he deals with other things.

24 MR. GAT: But --

25 MR. DIMEGLIO: The unit you use in the field,

1 if the field happens to be a nuclear reactor, is rem.

2 If the unit you use in the field, if the field  
3 happens to be after an atomic bomb blast, is R because he's  
4 dealing exclusively with gamma rays and he's dealing  
5 exclusively with the effect in soft tissue. So, everything  
6 becomes one and it doesn't matter whether you say R, rem.  
7 Probably say rad or rem, but no one would make any -- it  
8 wouldn't make any difference.

9 MR. STANGLER: But you can call it a rem only  
10 because you have a well defined field of radiation that  
11 you're measuring, radiation energy.

12 MR. DIMEGLIO: You always call it a rem. The  
13 quality factor becomes one.

14 MR. STANGLER: Right. As long as quality  
15 factor one your gray and your sieverts are alike.

16 MR. DIMEGLIO: Yeah, but also now.

17 MR. STANGLER: But if the quality factor  
18 varies --

19 MR. DIMEGLIO: You can also call it a rem now  
20 is what I'm saying.

21 MR. STANGLER: Yes.

22 MR. DIMEGLIO: And you're always right.

23 MR. STANGLER: If you have a quality factor  
24 one, right.

25 MR. DIMEGLIO: Which you do have for x-rays.

1 MR. STANGLER: Right.

2 MR. DIMEGLIO: And gamma rays.

3 MR. STANGLER: Right.

4 MR. GAT: But not true for the roengen and the  
5 rem. One, only to one significant figure. There's a 17  
6 percent difference between the roengen and the rem even with  
7 quality factor one.

8 MR. STANGLER: But we don't know the effects  
9 of radiation on people any more accurately, which is another  
10 problem.

11 MR. GAT: In theory, zero.

12 MR. STANGLER: Right.

13 MR. WEISS: Okay. Before we take our lunch  
14 break we have one more two minute presentation.

15 I kind of alluded to the human factors concern  
16 and we have a gentleman from the NRC's human factors branch  
17 in the office of research and he would like to take a couple  
18 of minutes, Jerry Wachtel, and talk to us a little bit.

19 MR. WACHTEL: Thanks, Sy.

20 I promise to take only two minutes.

21 I wanted to get you all when you were lean and  
22 hungry rather than stuffed and complacent after lunch.

23 As Sy said, a number of speakers both  
24 yesterday and today have alluded to the human factors issues  
25 that confront us here, but we haven't really addressed it in



1 detail and I just wanted to take these two minutes to  
2 sensitize some of you to some of the issues that we're  
3 concerned about.

4           While this legislation and this bill may be a  
5 Trade and Competitiveness Act, I think we need to keep in  
6 mind that NRC's primary mission is protection of the public  
7 health and safety. And whatever policy may ultimately be  
8 adopted by the NRC and the nuclear industry, and however  
9 that policy is ultimately implemented, the impact on the  
10 people who must make the system work is really critical.

11           I just want to name a few areas in which the  
12 human factors concern may be expressed. One is equipment  
13 design and use. Not only equipment in control rooms, but  
14 equipment used for maintenance, instrumentation, operations,  
15 etc.

16           Another which was discussed somewhat yesterday  
17 is communications. Communications not only between  
18 licensees and the NRC but between the United States govern-  
19 ment and foreign governments in the event of some accident  
20 of major proportions. Communications among different  
21 organizations who must respond to emergencies of one kind or  
22 another.

23           Even in the field of nuclear medicine, commu-  
24 nications between physicians and pharmacies in specifying  
25 prescriptions we have seen a lot of data about errors in

1 communications in filling nuclear medicine prescriptions.

2 Another area is training of personnel. We've  
3 talked about that quite a bit and I won't go into any  
4 details about that.

5 Another very big area is procedures and  
6 operator aids that are used, especially emergency  
7 procedures.

8 Another that's hardly been discussed, except  
9 perhaps very briefly yesterday, is the question of  
10 simulators. Plant referenced, high fidelity simulators used  
11 for training of nuclear power plant operators; simulators  
12 used in nuclear medicine and their fidelity to the equipment  
13 that has to be operated.

14 Another issue is the issue of operator  
15 licensing and licenses. In nuclear power plants we issue  
16 plant specific licenses to operators, but routinely we give  
17 multiple unit licenses. There are a number of plants around  
18 the country with two units or three units, and even though  
19 those units are almost never identical, we will issue dual  
20 unit or triple unit licenses to people.

21 We have a lot of data that indicates errors  
22 being made by a licensed operator in going from unit one to  
23 unit two because of small differences. And we think about  
24 the impact of metrication and changes. We have to keep  
25 those kinds of issues in mind.

1                   Advances in computer power, artificial  
2 intelligence, expert systems are increasingly coming into  
3 use particularly in the design of advanced reactors and  
4 control rooms. We are increasingly seeing computers in use  
5 in nuclear medicine. We have some research under way right  
6 now about the human errors in teletherapy, brachytherapy  
7 (ph.), and use in treatment planning computers in nuclear  
8 medicine.

9                   The data that we have got available to us, not  
10 only in the nuclear industry but in many other industries,  
11 highway transportation, aviation, maritime, military all  
12 seem to indicate that upwards of 60 percent of all accidents  
13 are not due to equipment failure. They're due to human  
14 error. Depending upon what reports you read, those numbers  
15 go as high as 80 or 90 percent. We may have to take some of  
16 it with a grain of salt, but the fact remains that human  
17 error is increasingly the major problem because the equip-  
18 ment is getting better and better all the time.

19                   So, unless we consider the human factor very  
20 early in this process, I think we run the risk of enormous  
21 costs on the human side of this transition, and a greater  
22 risk of error throughout the industry, especially throughout  
23 the transition process that may inevitably have to take  
24 place.

25                   Thank you.

1 MR. WEISS: Do we have any questions or  
2 comments?

3 Abe.

4 MR. FISS: One short question for Doctor  
5 Wachtel. In recent years Canada and Great Britain have  
6 converted to metric using an approach that was fairly  
7 draconian from what I've observed.

8 Have you got any information on the human  
9 factors impacts of those conversions in terms of both their  
10 scientific and industrial fields and general public  
11 acceptance and public error and accident rates and so forth  
12 as a result of that kind of conversion.

13 MR. WACHTEL: I don't think we have any hard  
14 data. We've got a lot of anecdotal data. And the anecdotal  
15 data that we have indicates that those draconian measures  
16 seem to be a better way to go in terms of the human response  
17 than the long drawn out transition process.

18 We're in the process now of gathering some  
19 more of that data for some specific areas of research we're  
20 involved with, particularly advanced control rooms in which  
21 the Canadians are way ahead of us. We're trying to learn  
22 from them and learn how they did it, but they've been pretty  
23 successful at it.

24 MR. WEISS: Okay. I think that's it for this  
25 morning.

1 Zoltan, are you taking us all out to lunch?

2 (Laughter)

3 CHAIRMAN ROSZTOCZY: Yes.

4 Thank you, Sy. I think that completes our  
5 second session today. We have one more last on waste  
6 management, and that one is scheduled to start at 1:30.  
7 That would give us about one hour and ten minutes for lunch.  
8 I hope that is sufficient.

9 So, I hope to see all of you back here at 1:30  
10 for the last session.

11 Thank you.

12 Off the record.

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## 1 AFTERNOON SESSION

2 (Time noted: 1:35 p.m.)

3 CHAIRMAN ROSZTOCZY: On the record.

4 Ladies and gentlemen, we are ready for our  
5 last session of this two day workshop. This last session is  
6 dedicated to waste management.7 And under waste management we would like to  
8 discuss both high level and low level waste management. So,  
9 any comments, suggestions, or questions that you have in  
10 that area will be appropriate for this session.11 We would like to introduce Jim Shaffner who  
12 will be our moderator of this session. And he's a Project  
13 Manager in our low level waste division.

14 Jim.

15 MR. SHAFFNER: Thank you, Zoltan.

16 If I may be so presumptuous, I think I'd like  
17 to sort of change the name of the session and call it pot  
18 pourri since I'll talking primarily about low level waste  
19 management. I know Earl is going to be talking about trans-  
20 portation issues that I think go beyond waste management,  
21 and I don't believe we have anybody from the NRC who's going  
22 to be talking about high level. I will try to cover it as  
23 best we can with the people that are here.24 First of all, I'd like to welcome and commend  
25 those of you who came back this afternoon to listen to some-

1 body talk about waste management rather than partake of our  
2 great Washington Metropolitan area weather, or I guess more  
3 correctly Baltimore Metropolitan area weather. This is, by  
4 the way, typical of the area for this time of year, for  
5 those of you who come from other parts of the country.

6 (Laughter)

7 I'll be giving a few remarks, as I said, in  
8 the area of low level waste management. As I listened --  
9 could I have the slide that introduces me so I feel  
10 comfortable with my name up there? I'll be giving a few  
11 introductory remarks in the area of low level waste manage-  
12 ment with the full realization that we are at the back end  
13 of the fuel cycle as well as at the back end of this  
14 conference, and there is very little that has been left  
15 unsaid for me to cover, I think, just to maybe bring home a  
16 few of the points that were made by other speakers from the  
17 perspective of the area of low level waste management.

18 As I was listening to the other speakers I was  
19 trying to think of a few of the deltas that might be  
20 associated with the low level waste program. And the  
21 primary one that I came up with is, for reasons I'll explain  
22 a little bit later, we happen to be in the unique position  
23 that the commercial low level waste program in this country  
24 is going under a period of transition that is roughly  
25 coincident with the transition that we're talking about at

1 this conference.

2           And that is, we're going, pursuant to the Low  
3 Level Waste Management Policy Act and Amendments Act passed  
4 in this decade, we are going into a transition from a few  
5 sites that have been operating historically in the past to  
6 supposedly a new suite of sites, disposal sites that will  
7 come on line in the next decade.

8           May I have the next slide, please. I think  
9 those of us in the low level waste program of course assume  
10 that we are the center of the universe and the sun and the  
11 stars revolve around us. But, I think it might be a fair  
12 assumption that some of you are not intimately familiar with  
13 the commercial low level waste program in this country, and  
14 therefore I thought perhaps a few remarks in background  
15 might be in order.

16           First of all, the potentially impacted  
17 entities are what you might expect: The waste generators,  
18 which pretty much include the entire population of people  
19 who deal in radioactive materials; people who transport the  
20 waste from the generator or the broker to the disposal site;  
21 the people that handle broker and process radioactive waste;  
22 the disposal site operators themselves. And it's on this  
23 group that I'll probably be focusing most of my remarks.  
24 It's an area that I'm most familiar with. The vendors that  
25 provide the goods and services and expertise that the other



1 people in the industry rely on; and those of us who consider  
2 ourselves waste managers and regulators.

3           And I'd like to digress a moment on that area  
4 to remind you that the low level waste program, or the low  
5 level waste in this country is regulated by the NRC but also  
6 in many cases by agreement states pursuant to Part 274(b) of  
7 the Atomic Energy Act.

8           Therefore, we have the situation in some cases  
9 where we have dual -- and I'm not going to get into the area  
10 of mixed waste; that's a whole other issue -- but just  
11 speaking simplistically of Atomic Energy Act material, we  
12 have the situation of, in some cases, dual regulation of  
13 radioactive material and the attendant implications that it  
14 might have with converting to new units.

15           And the next slide, please. As I alluded to  
16 earlier, there are currently three operating low level waste  
17 -- commercial low level waste disposal sites in the United  
18 States. They're located in Beatty, Nevada; Barnwell, South  
19 Carolina; and Hanford, Washington. The latter two, Barnwell  
20 and Hanford are regulated both by the states in which they  
21 reside, again pursuant to the Atomic Energy Act, and also by  
22 the NRC for source -- I'm sorry, for special nuclear  
23 material greater than critical mass quantities.

24           As I put on this slide, two of these sites are  
25 destined to close in the beginning of 1993. The Hanford

1 site is unique in that it will remain open and be a waste  
2 site that goes into the so-called "new era." Pursuant to  
3 the two Acts that I alluded to earlier, there will be a  
4 suite of new sites that will be taking care of wastes that  
5 comes from low level waste compacts throughout the country.

6 Now, this compacting process, for those of you  
7 who aren't familiar with it, it has been an agonizing  
8 political process. And what it has led to is the very  
9 likely circumstance that eventually there will be anywhere  
10 from eleven to fourteen new low level waste sites in the  
11 contiguous United States in the very diverse geography and  
12 opening any time between 1993 and at 1996.

13 These sites will likely be licensed by  
14 agreement states and, of course, the agreement states must  
15 have legislation and regulations that are compatible with  
16 the NRC but not necessarily identical with those of the NRC.

17 So, therefore, we have a situation where in  
18 the immediate circumstance that we're discussing here, you  
19 know, scratching our heads and saying: "How are we going to  
20 look at the agreement state programs if they don't  
21 identically adopt the units that we adopt? Or, you know,  
22 should we impose that as a requirement?" We have certain  
23 level -- we have levels of hierarchy in which we insist on  
24 the adoption of our regulations.

25 May I have the next slide, please. In the

1 area of regulatory authority, of course this isn't new. The  
2 hierarchy is statute, regulation, license, and guidance.  
3 The statute that I mentioned earlier is the Low Level Radio-  
4 active Waste Policy Amendments Act.

5 It's curious in that it does, in the only  
6 units that it has, it specifies allowable volumes and  
7 penalties based on cubic feet of waste. So, we'd have to go  
8 back and ask our esteemed political representatives, you  
9 know, to change that for us or provide some clarification or  
10 else we'll have to sit down and do the conversion ourselves.

11 In the area of regulation, of course, you're  
12 well aware. We use actually a curious dichotomy of units  
13 now. We seem to go with impunity back and forth between the  
14 English and the SI units in our -- and it varies in degree  
15 from regulation to regulation it seems. The curious one  
16 that I -- example that I wanted to bring up was the  
17 situation of the license.

18 And I -- the next slide I -- this is actually  
19 the units that I pulled out of the Washington State license  
20 for the Hanford low level waste site. And I just went  
21 through the license chronologically and pulled out the units  
22 in that license. And it gives you a pretty good feel for,  
23 you know, how we mix our units, so to speak, in this  
24 business.

25 Next slide, please. As far as impacts of

1 metrication on the low level waste program, I think again  
2 this gets back to some points that were made earlier today.  
3 It depends primarily on the degree and rigor of the imple-  
4 mentation and they can range from very minor to far  
5 reaching.

6                   Possible health and safety impacts. That's  
7 sort of a red flag, but unlike the academic community, the  
8 people that are out there working in the trenches, and I  
9 mean literally in the trenches, are not rocket scientists.  
10 These people, these training is very job specific and it's  
11 not based on a good scientific background in many cases.

12                   You know, the rad techs and even the RSO's  
13 that work at these low level waste sites currently, their  
14 primary training comes from the company that operates the  
15 waste site. And they're taught to think and act, you know,  
16 based on certain circumstances and in certain units. And  
17 the, you know, the training that, you know, it would  
18 probably involve a fairly rigorous process and degree of  
19 training that would have to accompany any change in units  
20 that were imposed on the licensee in this regard.

21                   The impacts that we may expect include, of  
22 course, changes in reporting requirements; obviously changes  
23 in measurement of compliance. We talked about gauges this  
24 morning. The changes in vendor products and services. You  
25 know, do we -- the traditional disposal package for low

1 level waste that we think of is a 55 gallon drum. Now, the  
2 question is, you know, does it become a whatever the number  
3 is in liter drum? Or do we, you know, recast the drum and  
4 make it, you know, with a digit and a couple of zeros after  
5 it in the metric system?

6           Again, I alluded to the re-training and the  
7 last one is re-thinking. You know, again, people tend, as I  
8 just emphasis, this point was made earlier, people tend to  
9 think in certain units. They tend to respond -- you know,  
10 certain values have meaning to them, and if all of a sudden  
11 these values change, particularly with peoples whose  
12 training base is fairly sketchy anyway, you know, this is  
13 something we will have to take into account as we look at  
14 the implementation.

15           Now, the one plus that we have in this area,  
16 as I mentioned earlier, is the fact that we are in a transi-  
17 tion period that coincides with the period that is earmarked  
18 for metrication. And at the same time we are going from  
19 what has been traditional low level waste disposal in this  
20 country shallow land burial to most of the compacts are  
21 leaning toward a more of a high tech, kick the tires type of  
22 disposal technology, concrete walls and very, very high tech  
23 sophisticated disposal mechanisms. Which, of course, on one  
24 hand introduces another level of sophistication that has to  
25 be dealt with in changing units, but it also, given that

1 we're basically starting from square one, it provides a good  
2 opportunity to, you know, impose a new system right from the  
3 start and, you know, get things rolling in the right  
4 direction.

5           As I conclude my remarks, I would just like to  
6 leave with a couple of questions to consider. I'm not  
7 really sure -- I think -- the instructions that I was given,  
8 rather than to allow subsequent speakers to address them, to  
9 just kind of, you know, throw them up there and let anybody  
10 who wants to react to them, and it's probably maybe a little  
11 difficult to see in the back because I tried to get too much  
12 on here.

13           But, what will be the impact on you if NRC  
14 affects and administrative conversion to the metric system?

15           And the same question as far as the functional  
16 conversion?

17           What is required in order for low level waste  
18 site workers to think metric? Is it feasible? Is it  
19 practical?

20           Do the units in your organization -- do the  
21 units in which your organization currently does business  
22 differ from those used by the NRC?

23           Regarding low level waste management, are  
24 there legitimate health and safety concerns associated with  
25 metric conversion?

1                   With that, I conclude my formal remarks. If  
2 anybody has any questions for me or if not I'll introduce  
3 the next speaker.

4                   Okay. The next speaker on the program is Earl  
5 Easton. Earl is with the Transportation Branch of the  
6 Division of Safeguards in Transportation of the NRC Office  
7 of Nuclear Material Safety and Safeguards.

8                   Earl.

9                   MR. EASTON: I thought I'd add a little color  
10 to this, green, red.

11                   The NRC's role in the transportation of radio-  
12 active materials is primarily approving shipping containers  
13 to move these materials. We share that function with the  
14 Department of Transportation.

15                   CHAIRMAN ROSZTOCZY: Could you speak a little  
16 bit closer to the microphone?

17                   MR. EASTON: We share that function with the  
18 Department of Transportation. We regulate those packages  
19 over a certain threshold of material. Low level packages  
20 basically fall under the Department of Transportation.

21                   This slide illustrates where the impacts of  
22 changing to an SI system would occur in what we do on the  
23 transportation. Primarily we operate under 10CFR Part 71  
24 which incorporates, by reference, 10CFR Part 49 -- I'm sorry  
25 49CFR. That is the Department of Transportation regula-

1 tions. So, in essence, we are incorporating another  
2 agencies regulations. So, we may be incorporating metric  
3 units already through a back door route.

4 The Department of Transportation is the  
5 competent authority for the IAEA system of approving  
6 packages. So, they have the IAEA units coming through into  
7 our regulation and then through the back door into ours  
8

9  
10 In the meantime, our applicants really don't have a  
11 common policy on the use of metric or SI units. 95  
12 percent of our applications come in in English units. We  
13 approve those and write our reports and certificates in  
14 English units. The 5 percent that come in in metrics we  
15 convert to English, approve those, and issue our reports in  
16 English units.

17 All of our regulatory guides which tell appli-  
18 cants how to respond to our regulations are written  
19 primarily in English units. A lot of these deal with  
20 structures which strength of materials are in pounds per  
21 square inch. A lot of the codes that we reference for a  
22 particular package are also in pounds per square inch type  
23 units, ASME codes, ASTM codes. For example, when they  
24 specify a grade of steel they might say at A/55 which means  
25 to the structural engineer 55,000 pounds per square inch.  
They know right away. All those designations are in English



1 type units.

2 Standards. Some of the Anzee (ph.) standards  
3 that we use in referencing in our certificates of  
4 compliance, that's your approval document for transportation  
5 packages, some are in metric, some are not. But we've been  
6 forced to adopt the ones that aren't in metrics. So, within  
7 our certificate, when we reference standards, some are  
8 referencing English units, some are referencing SI units.

9 A lot of the background material that we use  
10 in licensing packages is in the form of technical reports  
11 that come from Oak Ridge Laboratories, Andea (ph.),  
12 Lawrence, Livermore. The history of these reports is almost  
13 all in English units. To switch to metrics we'd have to  
14 convert back and forth to make use of that data. We spent a  
15 great deal of money in developing custom made computer codes  
16 for analyzing shipping containers. These are all in English  
17 units. If we were to phase in an SI unit, we would  
18 probably, until we got the codes squared away, have to  
19 convert from metrics to English, run the codes, and convert  
20 back. And this will probably be a big undertaking.

21 Reference manuals are all in English units.

22 Drawings and blueprints are particularly  
23 important in transportation because this pins down what the  
24 package is. Each of our certificate of compliance  
25 references detailed drawings and blueprints. You have to

1 build a package exactly according to those drawings. All of  
2 our certificates are in English units. There are no  
3 exceptions.

4 Accompanying each certificate that we issue is  
5 a safety evaluation report. This is the document everybody  
6 turns to right away if the package is involved in an  
7 accident or something of that nature, and all of those are  
8 written in English units too. So, we would have to go back  
9 and convert in all of these areas and that would be quite an  
10 undertaking.

11 To give you some idea of what an undertaking  
12 that might be, we have over 200 certificates outstanding,  
13 200 different types of packages approved for shipment of  
14 radioactive materials. Now, each of these packages has  
15 multiple users. Each user is required to register with the  
16 NRC prior to their first use of the package. That's so we  
17 can track these packages. If there is some change that has  
18 to be made, we can contact these people. So, we estimate  
19 that there are over 3,000 users of these 200 certificates  
20 that are registered. There have been problems in the past  
21 where we found people using the packaging that did not  
22 register. So, there may be even more.

23 But, to change to the metric system we would  
24 have to get new drawings. All these users are required to  
25 have the drawings operating procedure for each package. We

1 would have to get that information to over 3,000 people.

2 Like I mentioned before, all the drawings,  
3 blueprints, specifications, calculations, that includes most  
4 of our computer calculations are all done in English units.

5 Our certificates have an indefinite life.  
6 That means they never go away. We do require that they be  
7 renewed every five years. And should we phase in the SI  
8 system, this might be a way to phase it in. When the  
9 renewal for a package comes up, require that all renewals  
10 have to be in SI units. If that involves going back and  
11 changing all the certificates and all the SER's that would  
12 be a massive undertaking. Right now we don't see that as  
13 practical, going back and converting 200 of these, mainly  
14 because, I guess, we only have nine people to do this.

15 We don't have, like I mentioned before, we  
16 don't have a policy, a conscious policy for dealing with  
17 units. Most of our applicants are in the U.S. and they ship  
18 within the U.S. Part 71 just deals with domestic shipments.  
19 So, that system has worked very well.

20 We do, on occasion get international packages,  
21 and these are from referral through the Department of  
22 Transportation. These come in almost always in SI units and  
23 our policy has been to convert these to English units, do  
24 our analysis on them, double check them, and write to the  
25 Department of Transportation in English units. And then

1 they, of course, would issue the approval. We don't  
2 actually issue the approval.

3           So, why have all our applications been in  
4 English? Well, it has been satisfactory. Our applicants  
5 have not complained. In fact, we have a cask that is  
6 currently about an inch away from approval here from an  
7 applicant in Georgia, but the cask is being manufactured in  
8 Spain. And talking to those, that applicant, they had no  
9 problem with having the application in English and approved  
10 in English and having it manufactured in Spain.

11           But, I don't think it would be a very big  
12 issue to convert, except maybe the computer codes and all  
13 the other codes. Within the actual certificate we may be  
14 able to convert very easily, but there is a lot of inter-  
15 mediate work that would need a lot of effort.

16           These are some of the people that may be --  
17 have to suffer the consequences: Cask designers. These are  
18 the ones that actually draw up the blueprints, the plans,  
19 and get our certificate.

20           Cask fabricators. They're not always the  
21 people that design the cask. In fact, some of our cask  
22 designers go over seas to get their cask made. So, it may  
23 be a totally different set of players.

24           The ones in this country and abroad, the NRC  
25 does have an inspection program where they'll go and watch

1 the cask being fabricated and make sure it's done to the  
2 drawing.

3 Cask users. Some 3,000 people are registered  
4 to use casks. That doesn't mean there are 3,000 individual  
5 users. Some users may register for multiple casks, but they  
6 have to have 3,000 sets of documents out there.

7 Shippers. These are your common carriers.  
8 They'll have to switch over.

9 Other government agencies are impacted. We do  
10 a lot of certification of cask shipping packages for the  
11 Department of Energy. Some of these shipments are totally  
12 within the U.S. We did the troop pack container, for those  
13 of you familiar, to ship teranic (ph.) waste from DOE  
14 weapons facilities. That was done basically in the hybrid  
15 units with 55 gallon drums, if not an SI unit, and most of  
16 their waste is measured in 55 gallon drums.

17 Waste management personnel, at the receiving  
18 end would also have to know the units that they need to know  
19 to unload the packages.

20 And regulators. That's primarily us. We put  
21 ourselves down as being impacted too because we know there  
22 is a great deal of conversion that we have to do.

23 But, all of these people, since there are 200  
24 certificates out there and we don't envision that they'll  
25 all be changed over night, all of these people, plus even

1 the emergency response people will have to operate under a  
2 dual system during the period of conversion.

3           So, I dare say that all these people don't  
4 have the same backgrounds or level of training and it might  
5 be a big impact to have this many people out there under a  
6 dual system for, you know, five years, ten years, I don't  
7 know. Just something to think about.

8           The actual impact would depend on the degree  
9 of implementation done. If it were decided that older  
10 certificates would be grandfathered, the impact would be  
11 lessened. For current licensees, of course the application  
12 requirements would change. These applicants have, in many  
13 cases, adopted the same computer programs that we use to  
14 evaluate shipping casks. So, they would have to convert all  
15 their computer programs, too.

16           Reporting requirements. Of course they'll  
17 have to change that to report in the right units.

18           Inspection procedures. We have them now  
19 written in primarily English units, but we would change  
20 that and of course they would have to change too.

21           And of course codes and standards. If we went  
22 to a pure SI system we wouldn't want standards of anything  
23 but SI.

24           So, we figure there is a certain amount of  
25 inefficiency inherent in that process in converting between

1 the units and coordinating with possibly the Department of  
2 Transportation and the Department of Energy and IEA. I  
3 think that we feel that new applicants, and actually I guess  
4 the present applicants, have the possibility of increased  
5 error during the transition period. They are used to doing  
6 business one way, running certain codes, and they may have  
7 input errors or whatever, and it could have a big impact on  
8 the final result.

9 I guess what it really all boils down to is  
10 units are a cultural thing like language. You tend to be  
11 brought up in a language and think in that language. Upon  
12 learning a foreign language you may become very fluent, but  
13 you still think in your mother tongue and then translate to  
14 that language. And we feel that's the place where we're at  
15 now. We'll be thinking in English still for a while and  
16 translating into SI units. We feel if the nation, I guess,  
17 and the Agency were really committed to conversion, it would  
18 really start in the elementary school and on up in training  
19 people to think that way, re-orient them in a cultural way.

20 I guess the bottom line is, sure, we can  
21 convert into these units. It would be a great effort, and I  
22 guess knew of director who is willing to make that effort,  
23 but we want to realize that there is a potential for error  
24 and inefficiency along the way.

25 So, any questions?

1 CHAIRMAN ROSZTOCZY: One question. You  
2 mentioned the various difficulties that one would face and  
3 one of them was the computer codes.

4 I'm kind of under the impression that the  
5 computer codes are much more adoptable to a change over than  
6 human beings, and that probably can be done with relative  
7 ease.

8 For example, I'm not sure exactly what are the  
9 codes what you are using, but could one simply take the  
10 inputs in the new units that you intend to use, let the code  
11 convert it to whatever the code is using, and at the end  
12 simply print out the result in both units, which is a  
13 relatively minor change to a code and would probably fully  
14 accommodate everybody?

15 I am not saying this is the only solution.  
16 Obviously there are better solutions, and in the long run  
17 probably somebody will convert the whole code. But, even a  
18 simple conversion like that could fully accommodate that.

19 MR. EASTON: It's not as simple as just  
20 converting the input and output. A lot of these codes have  
21 built in libraries and data properties. Some of the ASME  
22 code strengths and materials which are in Psi. It involves  
23 going in and changing that in the body of some of these  
24 codes.

25 So, it involves paying basically a contractor



1 probably a bunch of money to go in. These codes were custom  
2 designed, that's probably one of the problems, specifically  
3 in English units, and it would involve probably a contract  
4 that would be costly to go in and change some of those.

5 Also, because the NRC has adopted this code,  
6 almost the whole industry has adopted these codes, so they'd  
7 have to make the same changes, changing the same libraries  
8 and putting in new code references and things.

9 Oh, it can be done, but I think there's a  
10 potential for error in doing it.

11 MR. SHAFFNER: Any more questions for Earl?

12 Thank you, Earl.

13 What I'd like to do now is just using the  
14 questions that I posed in my talk as a -- to seed the cloud,  
15 so to speak, try to stimulate more discussion, first I'd  
16 like to give Mr. Charles Flynn from the Maryland Department  
17 of the Environment a chance to come up here and address my  
18 questions. And I'm sure he'll address them better than I've  
19 posed them, then we'll throw open the floor for some final  
20 discussion.

21 MR. FLYNN: Thank you.

22 As I mentioned the last time I was up here,  
23 I'm substituting for Mr. Quillin and I find myself pretty  
24 much at a lost, but we'll do the best we can.

25 As Mr. Shaffner has said, I am with the State

1 of Maryland. I am in the Department of the Environment and  
2 in the radiological health program. My personal job is  
3 licensing the Maryland licenses.

4 So, to look at the first question, what will  
5 be the impact on us, our particular group if we, if the NRC  
6 goes to the metric system?

7 Obviously as to the licensing agent, I would  
8 end up either rewriting all the licenses to shift from  
9 curies to becquerel and include, as Doctor Baker has said,  
10 the 8 percent increase. That would be no great  
11 responsibility or great job. We have 540 licenses so it's  
12 not impossible to handle. We could get it done.

13 However, there would be the necessity of  
14 changing our survey equipment in the inspection area.  
15 Obviously it's now in really roengen's, whatever, curies and  
16 so forth, and we would either have to get new survey equip-  
17 ment or new scales for the equipment we already have.

18 I think the biggest problem in adapting to  
19 this would be the mental gymnastics, if you can call it  
20 such, which the various employees in the division now go  
21 through, or would have to go through in the change of units.  
22 We would have to rethink because, I don't know about anybody  
23 else, but I've never picked up a roengen of anything, but at  
24 least I've worked with it over twenty years or so and have  
25 some concept of what it means. To me, a becquerel is

1 something I've heard about, period. I've never worked with  
2 so I would have to rethink this in my own job and I'm sure  
3 the others in the job would too.

4           Looking at the second question, what is  
5 required for a low level site worker to think metric? Is it  
6 feasible? Is it practical.

7           I sort of wonder, and I don't mean to  
8 denigrate the worker at all, but how much does he really  
9 think the genus he's working in now? The packages come in  
10 and must meet certain requirements that are specified in  
11 regulations, but it is not the site worker's job to evaluate  
12 this. And what the package is marked, as long as he knows  
13 what it should be marked, that's all he has to worry about.  
14 He would have to worry about the radiation coming from this,  
15 but once he learns one meter he can learn another meter to  
16 make surveys of the things that are coming in.

17           So, I don't think it really takes a lot of  
18 rethinking of the site worker.

19           Going on the the third question, do the units  
20 in which your organization currently does business differ  
21 from those of the NRC?

22           Frankly, I don't think so. I think we are the  
23 same now. At least I hope we are. We better had be because  
24 we're an agreement state and we have an obligation to be  
25 compatible. So, we are working in mostly metric, mostly the

1 curie, rad, rem bit. If NRC goes into the SI units,  
2 obviously we would be expected to follow suit. We'd have to  
3 in becoming or retaining our compatibility.

4 Then, going onto the fourth question regarding  
5 low level waste management, are there legitimate health and  
6 safety concerns associated with metric conversion?

7 I haven't given this too much thought, but off  
8 the top of my head I would probably say no, for the simple  
9 reason that no matter how you mark the package, when you  
10 package it you are working towards certain standards and the  
11 radiation coming from that package must be within certain  
12 limits. So, when it finally gets to the site, it doesn't  
13 make a bit of difference what it's marked, what the units  
14 are. It's still going to be a safe, acceptable package to  
15 work with, without any radiation damage to the worker. At  
16 least that is the top of my head thinking.

17 You may agree with what I've said, and maybe  
18 you think I'm way out in left field, but that's about how I  
19 would answer these four questions.

20 CHAIRMAN ROSZTOCZY: Mr. Flynn, you mentioned  
21 that you have more than 400 licensees whom you are dealing  
22 with. What is the State's policy in terms of renewing  
23 licenses?

24 A few minutes ago, in connection with the  
25 transportation, I think Earl mentioned that we renew those

1 licenses in every five years.

2 Do you have any time period during which they  
3 have to be renewed?

4 And then how much do you know about other  
5 states? Is your practice along these lines similar to other  
6 states? Do all more or less do the same?

7 MR. FLYNN: Frankly, the renewal period, the  
8 existing license is for five years. It must be renewed at  
9 the end of the five years.

10 And I'm not sure whether we're unique or the  
11 other agreement states are the same way or not. But, what  
12 we do is demand a whole new application. We do not accept a  
13 letter saying "Our application is the same as five years  
14 ago." We demand a completely, totally rewritten applica-  
15 tion. And the purpose of this is to make people think and  
16 remember what it is they are asking for, what they are  
17 doing, so that they know what they are applying for.

18 It is possible, and more than possible, it's  
19 probable that in five years the personnel will change. So,  
20 that the initial people who owned the license are probably  
21 replaced at the end of five years. So, to go back and  
22 rubber stamp the old application would be ridiculous.

23 What the policy is with the other states, I  
24 honestly don't know.

25 CHAIRMAN ROSZTOCZY: This license renewal

1 would be possibly an opportunity where one could pick up the  
2 metric system if that would be good.

3 MR. FLYNN: Oh, yes. Yes. It could -- it  
4 would probably be better to do it that way if we go to a  
5 metric system or the SI system, as they come in rather than  
6 pick them all off the shelf and rewrite them.

7 Any other questions?

8 MR. SHAFFNER: Thank you very much, Mr. Flynn.  
9 Everybody must be in a hurry to get out.

10 If there are -- I'm going to give you one more  
11 opportunity to respond or rebut anything that was said by  
12 the three speakers this afternoon. Otherwise I'll turn the  
13 program back over.

14 Go ahead, Earl.

15 MR. EASTON: Just a comment I forgot.

16 If you're an NRC licensee and you want to use  
17 a radioactive material package, you're required to have a QA  
18 program approved by the NRC, and that's renewable every five  
19 years also. Each user has to have an NRC approved QA  
20 program.

21 This might be an area too that can be used to  
22 convert to metrics by putting in special emphasis or clause  
23 in the QA program that the people at these sites have to be  
24 trained in these units or something of that nature.

25 I was just wondering whether the states have

1 any requirements for QA's for their licensees that, you  
2 know, you might use as an instrument?

3 MR. FISS: Frankly, I don't think we do, no.

4 MR. DIMEGLIO: But, I think the answer to  
5 that, though, I think would vary because of -- I can answer  
6 Zoltan's question about Rhode Island.

7 Our licensing procedure for by-product  
8 material is very similar to what we just heard. We have  
9 five year licenses that have to be totally renewed. I  
10 suspect if you go down through the list of agreement states,  
11 you will find that there is great similarity in the way that  
12 they regulate, for two reasons:

13 One, is they all have to be compatible with  
14 the NRC;

15 And secondly they all follow the council of  
16 state governments which pushed out suggested regulations.

17 And answering the question of quality  
18 assurance, in certain parts of the regulations, for example  
19 as they apply to medical applications, quality assurance  
20 programs are called out in many of the regulations.

21 But, for by-product use in industrial or  
22 research organizations, quality assurance programs are not  
23 called out in the regulations. But, for medical uses, they  
24 are. And again, this is based on the council of state  
25 governments and the way the NRC is going in the issuance of

1 by-product licenses.

2 MR. SHAFFNER: We have a comment in back,  
3 please.

4 MR. ISLANDER: Lars Islander, NRC.

5 Without trying to look too optimistic or over  
6 simplifying, but what I'm understanding, and please help me  
7 if I'm not understanding well, we have mainly three areas  
8 for conversion: one is the already discussed units of  
9 radiation and related; the second is the weight; and the  
10 third is the length, the sizes. Maybe we have also the  
11 thermal power dissipated by the waste.

12 Is there anything else to convert from one  
13 system to the other? But they are related to these physical  
14 entities or anything else. I understand.

15 MR. GAT: You have concentrations. You have a  
16 whole bunch of different combinations.

17 MR. ISLANDER: Well, that's mass per mass.  
18 Oh, it can be dimensional also.

19 CHAIRMAN ROSZTOCZY: Uri, would you please use  
20 a microphone.

21 MR. GAT: I said there were other units like  
22 concentration moles per sometimes units of volume which are  
23 derivatives of unit of lengths, but if you so want,  
24 everything is devised from seven base units.

25 MR. SHAFFNER: Yes?



1                   CHAIRMAN ROSZTOCZY: I have a question for  
2 Frank DiMeglio.

3                   In connection with your previous answer you  
4 mentioned the Council of State Governments. What is the  
5 role of the Council of State Governments in this specific  
6 area, the nuclear area? What type of guidance do they  
7 provide? And where is it available?

8                   MR. DIMEGLIO: I think I'm familiar with the  
9 Council of State Governments has done because Rhode Island  
10 has only been an agreement state since 1979. And so, we  
11 have gone through this process rather recently.

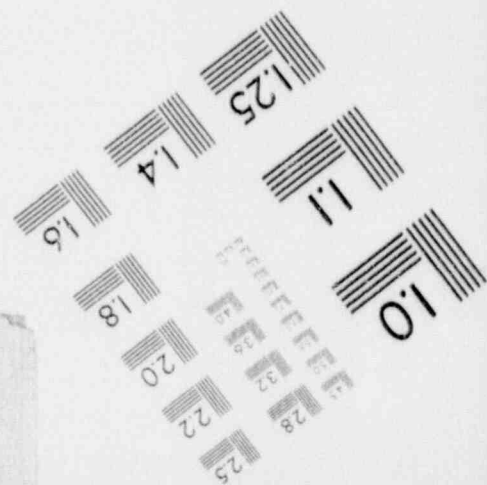
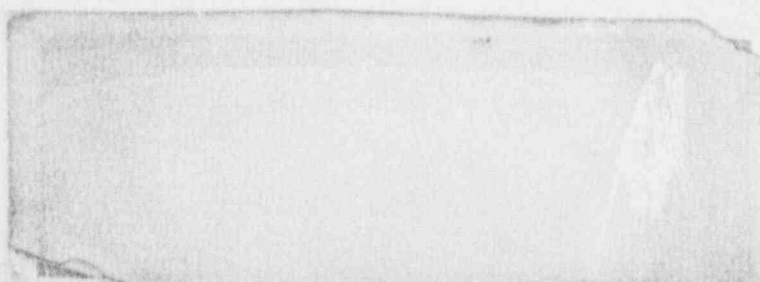
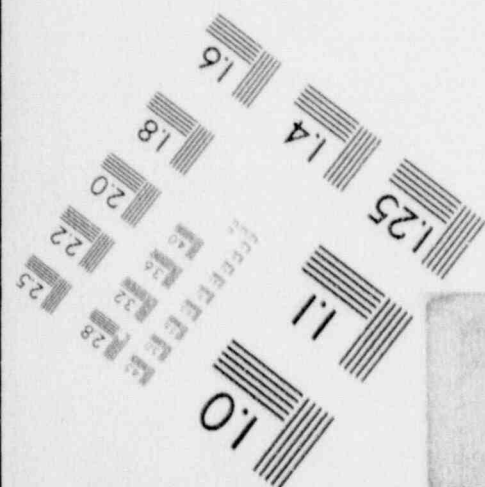
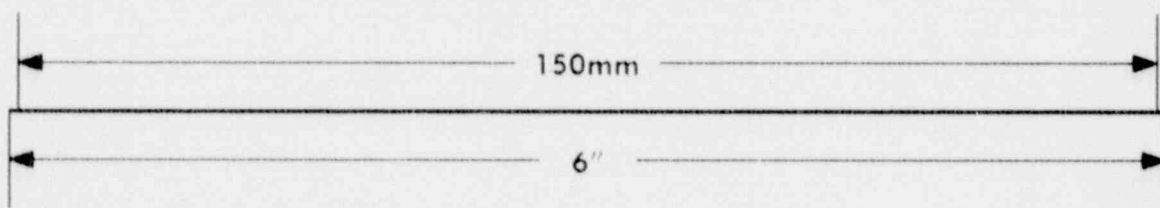
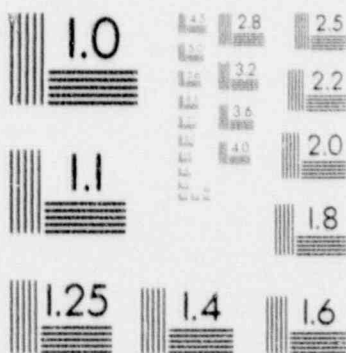
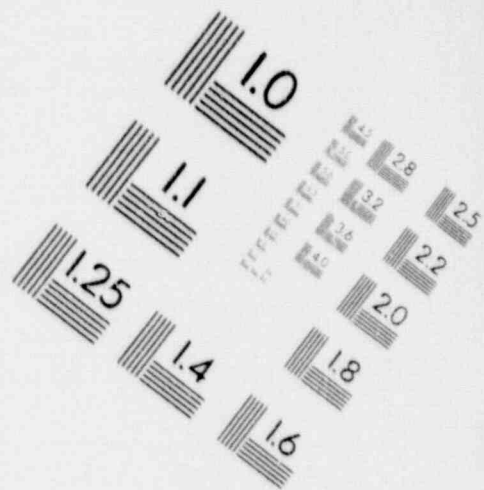
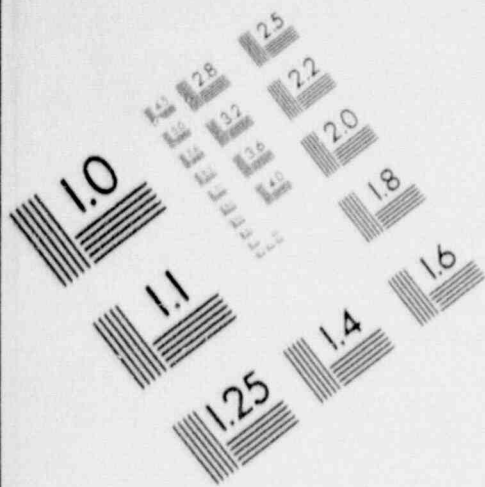
12                   The Council of State Governments, and also  
13 other organizations such as the -- we heard from one of them  
14 yesterday -- the Association of Managers of Radiation  
15 Programs in Agreement States. Most of these organizations  
16 put out guidance for the use of the states in developing  
17 their programs for regulation of radioactive materials.

18                   And the Council of State Governments, many  
19 years ago in probably the 1960's, put out guidance which  
20 could be used by states who wish to become agreement states.  
21 And, for example, when Rhode Island became an agreement  
22 state, we relied very heavily on the suggested formats and  
23 regulations that were put out by this Council.

24                   Now, I have no idea where these documents come  
25 from. They sort of just appeared on my desk one day, but

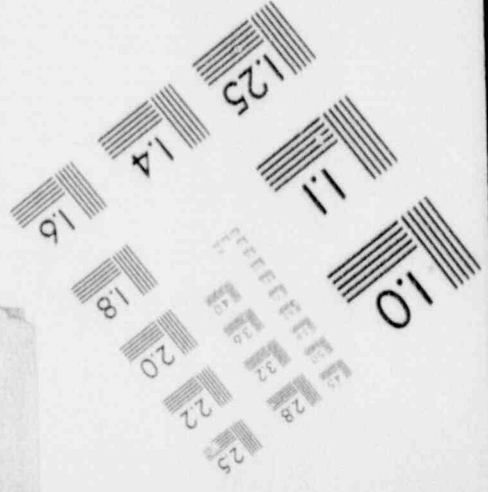
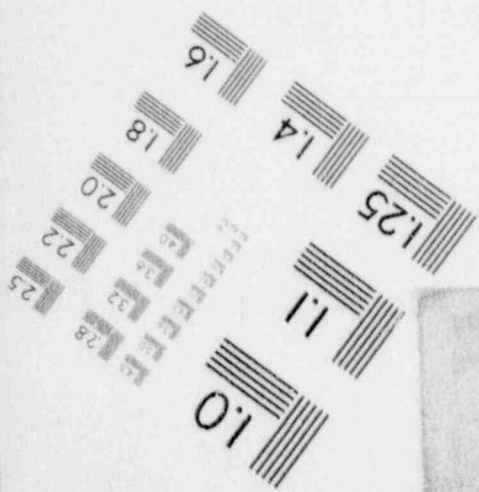
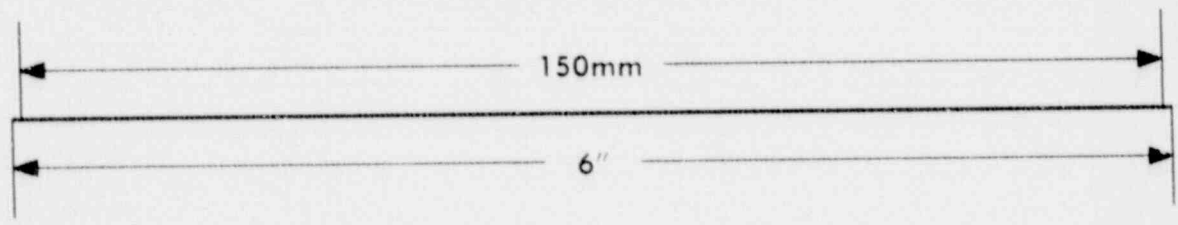
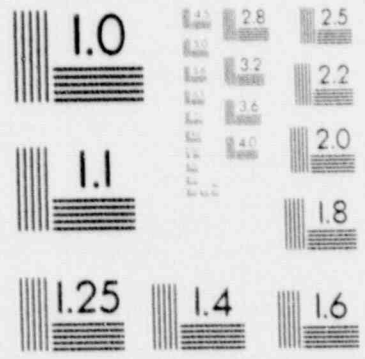
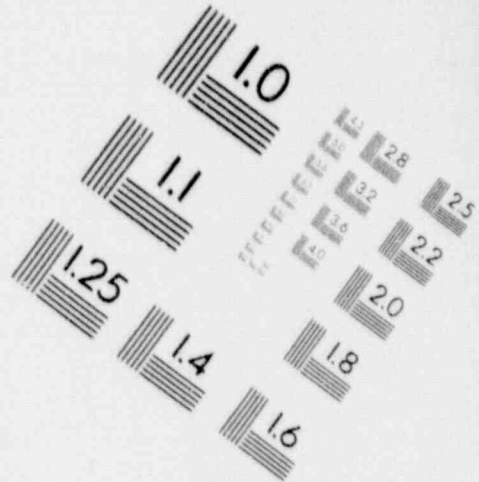
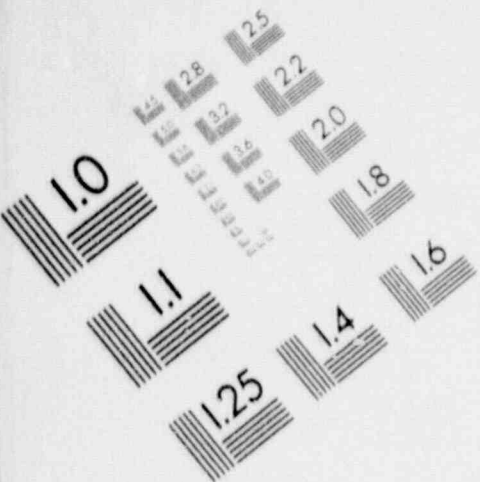
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## IMAGE EVALUATION TEST TARGET (MT-3)



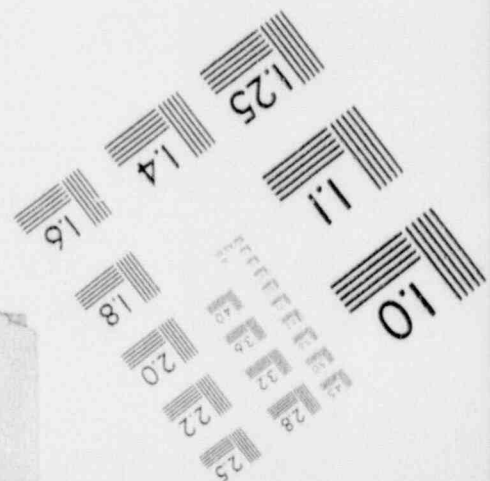
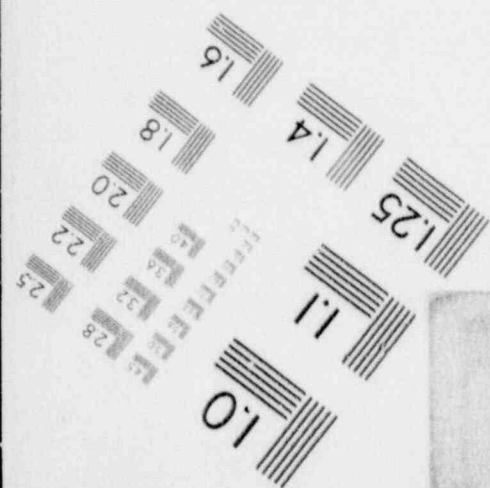
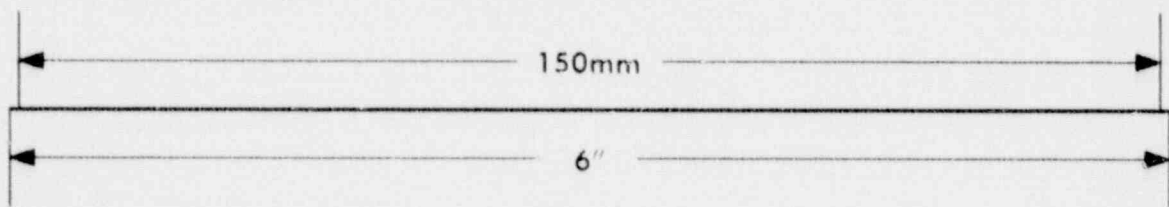
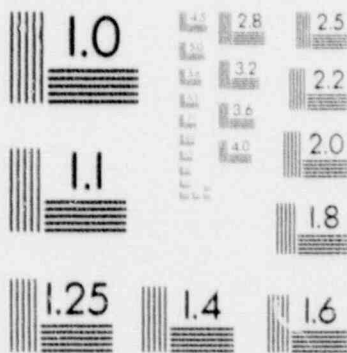
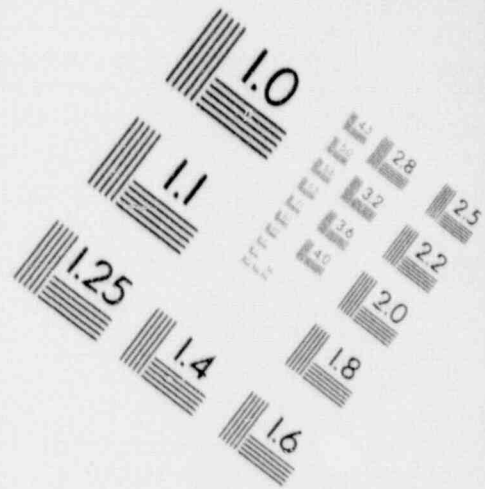
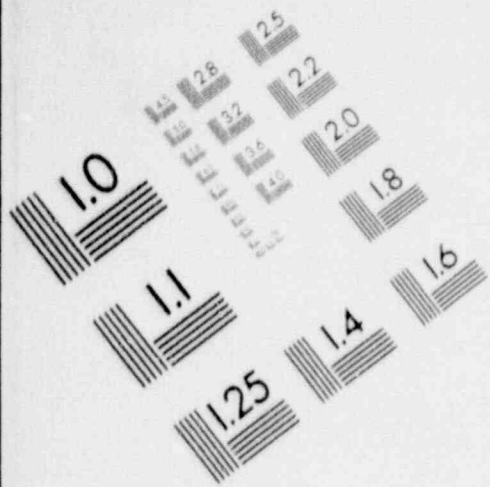
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## IMAGE EVALUATION TEST TARGET (MT-3)



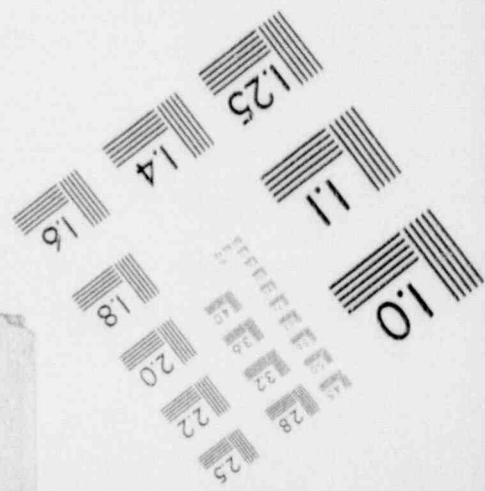
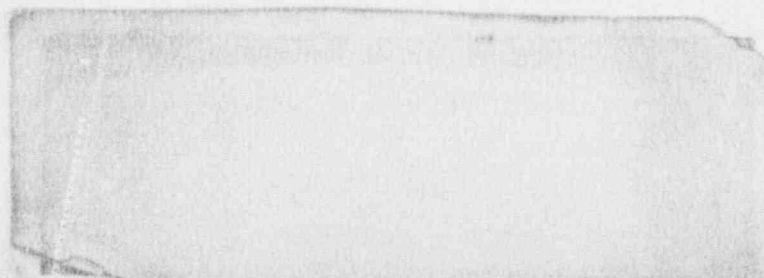
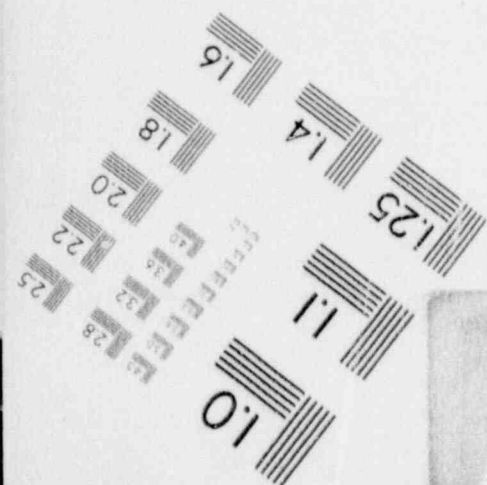
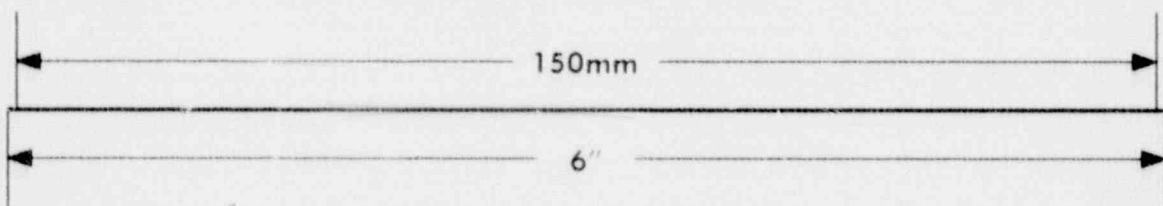
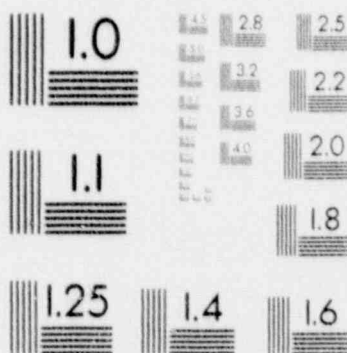
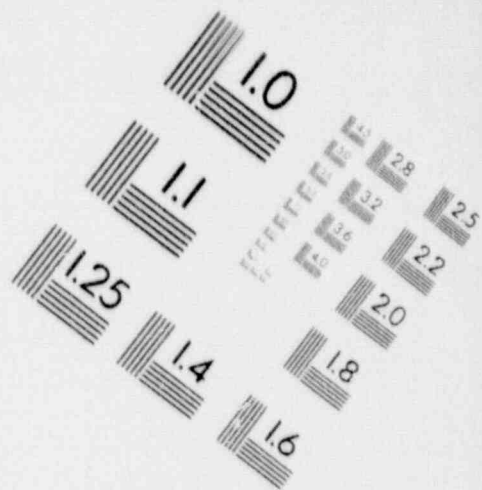
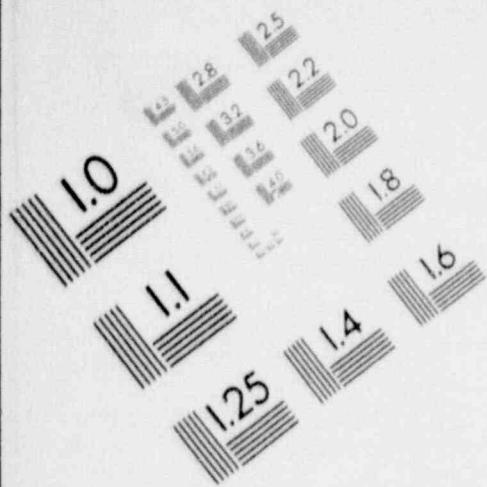
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## IMAGE EVALUATION TEST TARGET (MT-3)



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## IMAGE EVALUATION TEST TARGET (MT-3)



1 the people in the state governments, like the health depart-  
2 ments, would know where these types of documents come from.  
3 I don't really know, you know, where you would get these  
4 things today.

5 MR. FISS: I think you're referring to the  
6 Conference of Radiation Controlled Program Directors.

7 MR. DIMEGLIO: Yeah. I'm referring to both,  
8 actually.

9 MR. FISS: Okay.

10 MR. DIMEGLIO: Yes.

11 MR. FISS: And that is in Kentucky, Frankfort,  
12 Kentucky, if I'm not mistaken.

13 MR. DIMEGLIO: Well, for example, they put out  
14 guidance. We just went through a revision of our regula-  
15 tions which pertained to nuclear medicine and regulation of  
16 x-ray machines. And we relied very heavily on this  
17 Conference. They have all -- they have very many working  
18 groups which make recommendations on what should go into  
19 regulations. And most states rely very heavily on these two  
20 groups to decide what goes into their regulations.

21 MR. SHAFFNER: Yes?

22 MR. SIECK: Would you put your slide back up,  
23 please?

24 MR. SHAFFNER: Sure.

25 MR. SIECK: In the absence of somebody repre-

1 sending the low level waste industry, I'd just make a couple  
2 of observations on those questions.

3 I think all of us have discussed the first one  
4 at excruciating length as to what we think about the conver-  
5 sion and the effects it might have on us.

6 In the second case, as to what is required for  
7 low level site workers to think metric, I think it probably  
8 is feasible, maybe uniquely so in that area, because you're  
9 dealing with (a) a relatively small number of people; (b)  
10 people who essentially do the same thing every day; and (c)  
11 people who have a relatively narrow range of things to think  
12 about with respect to the waste program.

13 So, I think it probably is practical in that  
14 area, maybe more so than in anywhere else we've talked about  
15 in the last couple of days.

16 With respect to the units that we use, so far  
17 we still speak the same language as the NRC, particularly  
18 with respect to the fees.

19 Regarding low level waste management, are  
20 there legitimate health and safety concerns associated with  
21 metric conversion?

22 My response to that is twofold. First,  
23 probably not. There are probably no legitimate health and  
24 safety concerns, but there are an awful lot of illegitimate  
25 health and safety concerns in this respect. So, I would

1 suggest that the NRC needs to get into the public relations  
2 business with respect to this, and let me cite just one  
3 anecdote in connection with low level waste.

4           Ohio is in the Midwest compact, such as it is.  
5 Michigan just recently published the list of the three  
6 selected sites. One of those sites is in St. Claire County  
7 which is a county in which Port Huron lies. According to  
8 the speaker I heard representing the State of Michigan, just  
9 two weeks ago, the day after that site was announced as a  
10 possible site, the banks and the building and loan companies  
11 in that county ceased putting out home improvement loans on  
12 the basis that the property values were about to be  
13 decimated.

14           So, I'd suggest to you that not only do you  
15 have the real problems, but you need very much to get  
16 involved in the public relations aspect of this thing,  
17 because as I said this morning, and as other people have  
18 said, the news media and the antinuclear people have an  
19 infinite capacity for misinterpretation. And I think that  
20 may be a bigger problem than anything else with respect to  
21 low level waste.

22           In the rest of the instances you're dealing  
23 with those of us who, while we may not like it, can learn to  
24 live with it and we understand it, but the public does not  
25 understand it.



1 MR. SHAFFNER: Yeah, I deliberately stayed  
2 away from the political aspects in my remarks because your  
3 point is well taken. The type of hysteria that you refer to  
4 is not atypical, as you might imagine. We see it all over  
5 the country every time an area is earmarked as just even a  
6 candidate area or some area under consideration.

7 And obviously, because of that, the units in  
8 which we do business in the low level waste area is, you  
9 know, very far down the hierarchy of things that are on  
10 peoples minds right now in this business.

11 Getting back to -- as I listen to the response  
12 to some of these questions, I was thinking that I perhaps  
13 should have corrected them just a little better.

14 When I said site workers, I was trying to get  
15 under the umbrella of all people who do business at the  
16 site, not just the guys that are actually taking the waste  
17 off the truck and putting it into the trenches. I mean, I'm  
18 talking rad techs, RSO's, people like that. So, there are  
19 people out there that do, you know, that are required in  
20 their jobs to think metric. And it's, you know, something,  
21 although, as pointed out, fairly simplistic there is a need  
22 for some thought in the business.

23 With regard to the comment on how you do  
24 business, I happen to know that -- the governing regulation  
25 right now that NRC has for low level waste is Part 61. It's

1 being grandfathered somewhat in the existing sites. One of  
2 the requirements in particular requires that so-called Class  
3 C waste be buried at least five meters below the surface of  
4 the earth.

5 I called up a licensee and I asked him, you  
6 know, how they implement that requirement. And of course he  
7 told me they have a, you know, they measure down 16.4 feet  
8 and take care of it. And, you know, that's quite frankly,  
9 the response that I expected. So, you know, they don't do  
10 business in the regulatory units, but obviously they know  
11 how to report, you know, they can give back to us in the  
12 units that we, you know, that we require the information in.

13 Any additional comments?

14 Yes?

15 MR. GAT: One just brief reminder. There are  
16 agreement states beyond the states, one of them being the  
17 Air Force, for example, that need to be considered also.  
18 They may have some unique problems with association with  
19 that. They're dealing, for example, with the plated uranium  
20 in our little problem with shipment and all. So, there are  
21 other units to be considered.

22 MR. SHAFFNER: Uh hmm.

23 This gentleman is on the way to the  
24 microphone.

25 Yes?

1 MR. STANGLER: Okay. Marlow Stangler from  
2 FEMA.

3 Frank mentioned the Council of State Govern-  
4 ments, which I think is a legitimate organization that does  
5 liaison lobby type work. I think they develop model  
6 legislation which they recommend that the states then  
7 incorporate.

8 I think they had a model Civil Defense Act  
9 back in the late 50's, as I remember. I know they had the  
10 one on the agreement states. I think they have a head-  
11 quarters in Washington, D.C. It may be at the Hall of  
12 States, which is near Union Depot. I'm not sure.

13 You mentioned the Conference Radiation Control  
14 Program Directors. That is a technical group made up  
15 primarily of the health -- radiological health people out of  
16 the states with Chuck Hardin in Kentucky being the Executive  
17 Director. But I'm sure we can find their address in the  
18 phone book.

19 There is also a National Governors' Associa-  
20 tion and several other organizations of that type.

21 MR. SHAFFNER: If you have trouble getting it,  
22 get my number. I've got it back at the office. I don't  
23 have it with me here.

24 Yes?

25 MR. RUBY: I am disappointed that there is no

1 one here today from the high level waste isolation program  
2 because that is -- there is?

3           Okay. Has not spoken extensively at least on  
4 the subject, because I was hoping that we could have an  
5 authoritative statement that says if there is any strong  
6 chance that high level waste isolation is going to be born  
7 in metric, we need to know the information today.

8           And of course, my position is that advanced  
9 programs should be born in metric and all then regulation,  
10 including all documentation, design, procedures, etc.,  
11 should be in SI. I think that is consistent with the intent  
12 of the law. And it occurs to me that it is not only advance  
13 reactors and high level waste management, but other advance  
14 programs would be impacted in addition.

15           For example, the atomic vapor isotope laser  
16 separation process -- is that the proper -- yes, I think so.  
17 Avalis (ph.), yes, Avalis (ph.) is supposed to some day to  
18 have a plant which is NRC regulated. A pilot plant is being  
19 built at the Livermore laboratory already. I don't know to  
20 what extent that is metric. Livermore does lots of metric  
21 manufacturing at the present time. It could well already be  
22 metric, but if it's going to be eventually regulated when  
23 it's in the demonstration plant stage in metric, I bet those  
24 people would like to know that right now.

25           Finally, as long as I dreaming here, way down

1 the pike there is something called nuclear fusion. And the  
2 nuclear fusion people want to build a device which they call  
3 a compact ignition torus, at the present time. It's another  
4 step on the way to doing something practical which as yet  
5 seems very, very difficult to do. But, if the fusion  
6 reactor were to look anything like the present designs, then  
7 it's major utility would be as a plutonium producer, not as  
8 an electricity producer, in which case it certainly is going  
9 to involve NRC regulation and maybe even if it isn't a  
10 plutonium producer it would involve NRC regulation.

11 So, there is another program that might be  
12 interested to know what the future holds.

13 MR. FISS: I can say a few words about NRC's  
14 high level waste management program, but unfortunately very  
15 few.

16 High level waste program, as I'm sure you  
17 know, is going to have one facility as presently planned  
18 with the prospects of sometime next century a second  
19 facility. There will be one licensee, the Department of  
20 Energy.

21 And the position that NRC is taking right now  
22 with regard to use of SI versus conventional units is to  
23 frankly take the easy way out and beg the question and say,  
24 "Well, we'll see what our licensee wants to submit his  
25 application in. If he will submit it in SI, then we will

1 review him in SI. If he submits it in conventional units,  
2 we'll go along with that."

3 Since DOE has taken the lead in terms of site  
4 selection and site characterization and so forth, we're sort  
5 of looking over their shoulder. We're allowing them to take  
6 the lead, at this point, in terms of selection of units as  
7 well.

8 MR. SHAFFNER: Any more comments?

9 If not, I'll turn the program back over to  
10 Zoltan to wrap up.

11 CHAIRMAN ROSZTOCZY: I would like to thank all  
12 of you for attending this workshop.

13 We have received many comments, many sugges-  
14 tions, many recommendations. Not all of these recommenda-  
15 tions point in a single direction, so we have our job cut  
16 out for us to sort this out and try to make some sense out  
17 of it.

18 We intend to do that, and as I mentioned  
19 earlier, we probably will prepare a proposed policy state-  
20 ment for the Commission consideration next spring. After  
21 the action it will be issued for public comment. At that  
22 time you will have a second opportunity to comment on  
23 specific policy that the Commission is planning to put  
24 forth.

25 Thank you very much again for coming, and we

1 hope to see you some day somewhere.

2 Thank you.

3 Off the record.

4 (Whereupon, at 2:37 p.m., the conference was  
5 concluded.)

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