NUCLEAR REGULATORY COMMISSION

ORIGINAL

In the Matter of:

BRIEFING ON SECY-81-232 — COMMENTS ON THE

EPA-PROPOSED GUIDANCE FOR OCCUPATIONAL EXPOSURES

DATE: June 10, 1981 PAGES: 1 thru 84

AT: Washington, D. C.

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

BRIEFING ON SECY-81-232 - COMMENTS ON THE EPA-PROPOSED GUIDANCE FOR OCCUPATIONAL EXPOSURES

PUBLIC MEETING

Nuclear Regulatory Commission

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

Wednesday, June 10, 1981

The Commission met, pursuant to notice, at 2:05 p.m.

PRESENT:

JOSEPH M. HENDRIE, Chairman of the Commission
VICTOR GILINSKY, Commissioner
PETER A. BRADFORD, Commissioner
JOHN F. AHEARNE, Commissioner

ALSO PRESENT:

S. CHILK
F. ARSENAULT
Y. SHLOMO
J. BECKER
B. ALEXANDER
B. BAKER
H. THORNBURG
C. WILLIS
C. ONG
B. KREGER
R. CUNNINGHAM
D. RATHBUN
S. TRUBATCH

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DISCLAIMER

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PROCEEDINGS

CHAIRMAN HENDRIE: Why don't we get started.

The Commission meets this afternoon to hear from the staff on its comments on the EPA-proposed guidance for occupational exposures.

Frank, I take it you will have a lead for the staff.

MR. ARSENAULT: Yes.

CHAIRMAN HENDRIE: Let's go ahead.

MR. ARSENAULT: There are two sets of documents available against which my presentation will be played. I believe that both of these have been made available in sufficient numbers prior to the meeting. One is a matrix which illustrates the comparison between the proposed EPA standard and the ICRP approach to dose limitations, the current 10 C.F.R. 20, and the majority and minority staff views.

COMMISSIONER GILINSKY: There are two minority staff views.

MR. ARSENAULT: The majority and the minority staff views. Yes, there are two minority staff views.

The other documents simply are copies of the slides that I will use to assist in the presentation.

COMMISSIONER AHEARNE: When you are going through the presentation would it be possible for you to identify

any areas in which there were significant issues raised or disagreements expressed in the meetings that were held around the country in which NRC participated?

MR. ARSENAULT: Yes. Dr. Robert Alexander was the NRC representative during the hearings. He is prepared to address the comments that were received by EPA during those hearings.

I can summarize by indicating that the comments were largely critical. They ran the full gamut from the opinon that the standard was too lenient to those who felt that it was too stringent. I believe there were no comments at the hearings that were in support of the standard. Dr. Alexander will be prepared to give you additional details with regard to the hearings.

I think that the comments made during the hearings were so varied that it would be difficult for me to capture those points during the presentation. But certainly I will address the major issues that are involved in the standard.

(Slide presentation.)

If we could have the first slide.

The first four slides in fact list the principal recommendations and the principal items in the proposed EPA guidance. They are that any exposures should be justified by the benefits to be accrued from the activities within which they are experienced and that should include

consideration of non-radiation alternatives, for example, coal in the event of nuclear power, ionization versus photoelectric smoke detectors, and that sort of thing. This item is held in common with the ICRP approach, I might point out.

The second item in the proposed guidance is there should be assurance that collective doses are ALARA. I would point to the use of the word "collective" in this case. This is a consideration which would be applied when considering ALARA as opposed to the individual worker dose as well. It is an overriding consideration in this issue.

The second slide, please.

Another item is that doses should conform to the radiation protection guides. These are the limits that are to be imposed. This is the first major change from previous guidance which is that the effective dose equivalent should be combined internal and external exposure. This is at the level of five rem per year.

In calculating the effective dose equivalent, the external dose would be combined with weighted internal organ doses.

In addition to this overall five rem per year limit, there are additional limits imposed on individual organs. The dose limit that would be derived from application of the weighting factors would be large enough

to make at least conceivable the incidence of non-stochastic effects, that is direct somatic effects.

The limit applied by the proposed EPA guidance for that purpose was 30 rem to any organ with five rem on the gonads.

The equivalent ICRP approach to that problem was to apply a limit of 50 rem to the individual organs.

COMMISSIONER AHEARNE: Do we currently have any similar limit maximum other than limits on individuals organs?

MR. ARSENAULT: Not the equivalent of this. The approach in the current regulations is to apply limits on individual organs, a critical organ concept, and that prevents you from getting to these ranges.

I would note in passing that the organ weighting factors in the proposed EPA guidance are different from those of ICRP 26.

Next slide, please.

Another item in the guidance is the concept of a three-tier system of graded radiation protection actions. As written they would impose requirements for a three-tiered system and they specify the protection requirements for each of these categories and in addition apply a 100 rem lifetime dose limit.

The staff view on both of these is that there

should be no lifetime dose limit. With regard to the graded radiation protection actions we favor a multi-tiered system consisting of reference levels, but feel that the requirements should be left for development in regulations rather than being included in the guides.

COMMISSIONER GILINSKY: Are you going to go into these in detail?

MR. ARSENAULT: I will come back to the major issues and discuss them further later on. That would be one of them, yes.

The proposed guidance then establishes radioactivity intake factors which are the quantitative limits on the radionuclides to be absorbed into the body, which if absorbed into the body would produce organ doses equivalent to five rem.

COMMISSIONER AHEARNE: These are applied to the individual isotopes?

MR. ARSENAULT: Individual isotopes, yes.

Another principal issue, which I will return to later, is that in the guidance it is recommended that if an RIF turns out to be higher than the limits currently in use as a result of applying the weighting factors in the guidance, that the lower of the two values, that is the current value, would continue to be applied.

I will address that later. That is an item in

which the majority staff does not agree.

The sixth item in the guidance is that there is a requirement that limits be established below the radiation protection guides in the RIFs. This is a requirement. The majority staff considers that this is an ALARA issue as distinct from an occupational dose limit issue. I will address that again.

COMMISSIONER GILINSKY: Let me ask you, is any of this affected by the recalculation of the Hiroshima data?

MR. ARSENAULT: No. No, it is not affected.

COMMISSIONER AHEARNE: You are going to address that?

MR. ARSENAULT: I will address the issue, yes, unless you would prefer I address it now. I guess it would be better if we got through the description of the guidance before addressing that issue.

The proposed guidance suggests the limit for minors of one/tenth the limits for adults. This approach is shared by the current requirements as well as the ICRP approach.

Exposure limits for the unborn, the question of the additional sensitivity of the fetus. EPA proposes four alternatives for comment and does not take a position on which is to be preferred.

The majority staff view is that we should continue

with the current NRC policy that informed consent would be the way to establish the protection for the unborn rather than applying explicit additional requirements in the guide or the regulations.

The ninth and last major recommendation in the guidance is that special planned exposures which exceed the limits should require a prior notification to the regulatory authority, public disclosure of the requirement and case-by-case decisions.

The staff view on this is that such a procedure would not be responsive to the need for immediate action which is generally the context in which these requirements arise. We do believe that some general guidance should be provided by regulatory authority in advance and that disclosure on the event should be required, but the procedures prescribed in EPA guidance do not seem to reflect the realities of the situation.

Slide five, please.

Briefly comparing the current proposed guidance with the earlier FRC guidance and the current 10 C.F.R. Part 20, which is based on that guidance, the principal differences then are that the external and internal doses are to be combined for dose limitations.

This is regarded as a higher standard of protection and a stricter level of control than we now have

and compares to the five rem per year at three per quarter, but conditioned upon the formula of five times the age minus 18 lifetime limitation or career limitation. Wherein if the records of the individual were available permitting the calculation of his career dose, the formula was what provided the principal limit.

COMMISSIONER GILINSKY: What is an internal dose?

MR. ARSENAULT: You mean what does the phrase refer to?

COMMISSIONER GILINSKY: Yes.

MR. ARSENAULT: It refers to doses to individual organs based on the deposition in the body of radionuclides. It is usually a calculated dose.

It would probably be easier to explain that by a comparaison.

The external dose is the dose to the body resulting from external sources of radiation, as when you are in a radiation field.

The other form of radiation exposure is the ingestion or inhalation of radionuclides and their deposition ---

COMMISSIONER GILINSKY: That is what the internal dose refers to.

MR. ARSENAULT: --- and the internal dose is that latter. Right.

COMMISSIONER GILINSKY: Don't we combine those now?

MR. ARSENAULT: No, they are not combined now. You have a limit for an external dose of five rem per year at three rem per quarter and 5 rem to the minus 18, plus separately there is a limit of 15 rem, or in the case of some organs 30 rem, from internal exposure.

COMMISSIONER AHEARNE: Is that an annual, one-time dose?

MR. ARSENAULT: That is an annual.

COMMISSIONER AHEARNE: But there is no limit then on the ---

MR. ARSENAULT: There is no combination of the two. So it is at least theoretically possible to get five rem in one year from an external source and additional exposure to individual organs from internally deposited radionuclides. That is why it is considered that the combination represents a higher standard of protection.

The 100 rem lifetime limit proposed in the EPA guidance is as compared to the career limitaton of five times the age minus 18 in the current requirements.

COMMISSIONER GILINSKY: How many people in industry today have gone past the hundred rem limit?

MR. ARSENAULT: I don't know the answer to that. Does anyone here know?

MR. ALEXANDER: There are very few, a handful.

COMMISSIONER AHEARNE: Are the records good enough to know?

COMMISSIONER GILINSKY: We don't really know. But you think it is a rather small number?

MR. ALEXANDER: It is a small number. In the DOE labs there are some that if you include the internal dose from plutonium and things like that the total dose has already gone over 100 rem.

COMMISSIONER GILINSKY: Does that include doses received early in the program?

MR. ALEXANDER: Yes.

COMMISSIONER GILINSKY: A better point to fix on might be doses received from, say, the fifties or sixties on, and I assume things would tighten up a bit. I guess I am trying to understand why a hundred is limiting and why you feel that is a constraining number.

MR. ALEXANDER: The EPA selected that number. The amount of dose allowed now for, say, a 50-year career to make the arithmetic easy would be 250 rem. Using the risk factors from the Bier Report and other publications that leads to what some people consider to be a somewhat high risk. For example, the cancer incidents using these risk factors among people getting five rems per year every year during a working lifetime would be about seven percent.

The EPA people felt that that was too high and

they wanted a reduction in the lifetime risk and therefore they chose 100 rems as a lifetime limit as a way to achieve that.

COMMISSIONER GILINSKY: But I gather that the NRC staff feels that is too low a limit.

MR. ARSENAULT: We feel that the benefits to be derived from the application of such a limit do not compensate for the impact that it might have on some individuals.

Again, the principle of informed consent might apply here. A hundred rem lifetime level represents 20 years at the full limit of five rem.

I should point out, first of all, that this would only apply to a very limited number of individuals.

COMMISSIONER GILINSKY: That is what I am trying to get at. Would it in fact impact anybody?

MR. ARSENAULT: If it would not impact anybody, then one could argue that it is irrelevant and not a useful limitation.

COMMISSIONER GILINSKY: How many people would it impact?

MR. ARSENAULT: Well, if we have now a few, a very few people who are over the 100 rem lifetime limit, it would impact those. I didn't get a number so I can't give it to you. It is principally the impact on the worker's sense of

security and whether or not he feels he has a career if he is in one of the higher risk areas of this occupation.

COMMISSIONER GILINSKY: I would have thought one would want to limit at an earlier age.

MR. ARSENAULT: That is another aspect of this. First of all, the 100 rem lifetime limit does introduce an element of insecurity into the job environment. Secondly, why 100 rem? The incremental risk from 95 to 96 and 99 to 100 is no different than the incremental risk from 100 to 101 or 105 to 106.

COMMISSIONER GILINSKY: Well, that is true.

MR. ARSENAULT: It is true across the full spectrum of exposure. So that in dealing with the incremental level we don't see any particular reason for choosing 100 rem.

I guess that was the final argument.

COMMISSIONER AHEARNE: There is another aspect.

MR. ARSENAULT: There is another aspect, yes.

COMMISSIONER AHEARNE: You remember that Tamplin in one of his petitions had raised just that sort of point and had suggested it might be more appropriate to have a lower annual limit for younger people and then raising it for higher annual limit as age went up. I guess the NCRP has begun to look at that and to see whether taking into account some sort of age risk and see if you wouldn't get a

different approach.

MR. ARSENAULT: There is a qualitative argument that it is likely that this limit would be reached only by people who are already entering a age sector where the risk is diminishing. It is 20 at these and it is not expected that an individual would get five rem per year. But even if he were at that high level of exposure it would be a 20-year period before he absorbed 100 rem at which point he is entering an age when the risk might be reducing but that is a qualitative argument. It is a subjective decision.

COMMISSIONER AHEARNE: I think probably an adequate summary is there is no good analytic base for 100, 250, 200, 150 and ---

COMMISSIONER GILINSKY: Well, but that is true of 5 and 30 and 15 and so on, isn't it?

COMMISSIONER AHEARNE: Well, as Bob was saying, you can provide risk estimates to fit all of those, but when you try to ask the question of what is the impact? When you talked about the higher numbers, I think that the potential candidates are very small and the industry's records aren't probably good enough to really pick up that small number.

When you start getting down to things like 5 or 10, yes, you have got a very large number of people who would be impacted. When you get into the 100, 150, 200 and 250 region you are talking about a very, very small

population who would fall into that category.

MR. ARSENAULT: You rapidly reach the point where you must deal in subjective considerations here. But if you accept a 50-year career period as distinct from a 20-year career period, you are talking about the difference between a 100 rem limit and a 250 rem limit, which with the linear theory it represents a factor of two and a half in risk.

I would suggest to you that factors on that order in the risk equations seem to be minor variations when considered with the variation in risk that people face from the various sources.

So the question is really whether introducing this limit on top of the current exposure limits provides a benefit to the workers that is commensurate with the impact that it could have on the security and career lines of a few and we feel that it does not.

Slide six.

The principal differences between the EPA guidance and the ICRP 26 recommendations, which are favored by the majority staff view, are that the organ weighting factors are different, and I will come back to that in a moment, and that the non-stochastic organ dose limit is different.

The fact is that there is little to choose between these two numbers. The 30 and the 50 both would be effective in avoiding non-stochastic effects. The virtue of

the 50 is that it is consistent with the ICRP system which has been internationally accepted and applied.

COMMISSIONER AHEARNE: Has it been internationally accepted? The way the paper was written, and I realize that that is now almost two months ago, or it is two months ago in fact, it was that it is in the process of being accepted.

MR. ARSENAULT: That is probably a more accurate statement than to say that it has been. The progress is steady and always in the same direction. It seems clear that this is to be the accepted system of dose limitations, but I believe you have more accurately expressed the current situation.

With respect to the gonads, the EPA has established a separate organ limit of five rem per year, while the ICRP includes them as one of the organs to be included in the cumulative exposure for the five rem limitation. EPA suggests a 100 rem lifetime limit and the ICRP has no such lifetime limit.

COMMISSIONER GILINSKY: Could you say a word about the ICRP? Does it have any official status?

MR. ARSENAULT: No, I don't think it has an official status in the sense that I understand the question. We certainly have no commitment to accept the ICRP recommendations.

COMMISSIONER GILINSKY: Are countries represented

on the ICRP or just individuals chosen or what?

MR. ARSENAULT: Individuals are chosen with a view to ensuring international representation.

COMMISSIONER AHEARNE: Dick is raising his hand.

MR. CUNNINGHAM: The ICRP is mainly a scientific body. Individuals are chosen for their scientific specialty without particular concern for the country from which they are drawn and of course they try to get a balance of viewpoints scientifically. It is typically for their scientific knowledge of their specialty in the area.

They don't have an official recognition in the sense that we have or that necessarily their recommendations are adopted by other countries. There is some official tie-in on the books with the first federal radiation policy guidance that came out following the general ICRP recommendations as well as the NCRP. Usually the ICRP recommendations are taken by international organizations. In this case ICRP 26 is taken by IAEA with international labor organizations, the World Health Organization and OECG. They are about to adopt ICRP 26 in their basic safety standards. It is all one document and it is just about to be adopted.

COMMISSIONER AHEARNE: Is Moeller on that?

MR. CUNNINGHAM: Dave Moeller?

COMMISSIONER AHEARNE: Yes.

MR. CUNNINGHAM: He was on Committee Four. I am not sure if he is still on there now.

VOICES: He is.

MR. CUNNINGHAM: He is still on there.

MR. ARSENAULT: If you will go on to slide seven you will see the difference in the weighting factors that are recommended by EPA and the ICRP.

The fact is that except for the difference in the elimination of the separate limitation for gonads provided by EPA and their inclusion as one of the major organs, the difference in these factors is not really significant. I would accept one set of factors over the other as well as the other except that the ICRP does have the virtue of being internationally accepted. Now, this is a more fundamental fact.

COMMISSIONER GILINSKY: What problems are created by our not following the ICRP guidelines.

MR. ARSENAULT: Because of the way these factors are applied.

COMMISSIONER GILINSKY: I don't mean just in using these weighting factors or using any of these recommendations.

MR. ARSENAULT: The weighting factors in fact are probably right at the heart of the answer to that question. Using factors other than those recommended by the ICRP

actually results in a difference in the definitions of some of the rather basic terms involved because of the way they are applied. This would make it difficult to compare U. S. experience with that of other countries or of anyone else under the different system. It would be possible to make a translation from one to the other but it would awkward.

COMMISSIONER GILINSKY: How complicated is this? Are we talking about a little program?

MR. ARSENAULT: In some cases it might involve just recalculating everything all the way back to the source data and then calculating forward into the other system.

COMMISSIONER GILINSKY: What is it you would be comparing?

MR. ARSENAULT: Let's see, rem ---

COMMISSIONER GILINSKY: Give me a for instance.

MR. ARSENAULT: The end point frequently in the implementation of the system would be to establish derived air concentrations in the case of the ICRP, and I have been warned not to use the word "equivalent," and its comparable term which is a maximum permissible concentration in air for the EPA system.

The exposure to these concentrations for some standard work year would be taken as equivalent to five rem exposure. The use of different factors then results in a different level of actual exposure being represented on the

records as five rem.

If one wanted to do a comparison he would have to back calculate to the actual environment encountered and then apply the other factors and recalculate the exposure.

COMMISSIONER GILINSKY: Well, you just come out with a different exposure.

MR. ARSENAULT: Yes.

COMMISSIONER GILINSKY: But you just do this once as far as I can see.

MR. ARSENAULT: You would do any time you wanted to compare the two systems, or you could keep books on both systems so that you could do these comparisons. It is only relevant if you do want to compare your experience.

COMMISSIONER GILINSKY: I seem to be missing something here.

COMMISSIONER BRADFORD: You have got a lot of volunteers.

MR. KREGER: It seems to me important to consider though how we ask for information. The record that we now ask for from licensees, for example, is total external dose. Now, we are in the process of modifying Part 20. But, for example, in that modification we were able to consider that total dose was always obtained in a particular way and the same way that ICRP obtained it, then we wouldn't necessarily have to ask for additional information like how

much of that dose is this organ and that organ and how much is internal and how much is external.

We could still compare those doses with people that had calculated the total body dose equivalent by the ICRP method if our licensees were doing it by the ICRP method. If we were doing it by a different method you would have to go back and either change the regulation to ask for a lot more information to be able to make the comparison between other countries and other usages or you really wouldn't be able to do it.

COMMISSIONER AHEARNE: Are the EPA weighting factors different from the ones that are now in use in this country?

MR. ARSENAULT: Are you asking Bill or me?

COMMISSIONER AHEARNE: Either.

MR. ARSENAULT: Well, we don't use weighting factors in the same way that these are proposed to be used. We have organ limits.

COMMISSIONER AHEARNE: I guess what I am getting at is if either the EPA system or the ICRP system is adopted and we now have our licensees reporting doses, so many rems, how are we going to relate that to the information we have up to this time from licensees?

MR. ARSENAULT: That is a good question.

(Laughter.)

CHAIRMAN HENDRIE: There will have to be some factor calculations for conversion.

MR. ARSENAULT: With either system.

COMMISSIONER AHEARNE: That is what I thought.

CHAIRMAN HENDRIE: Bill is waving his hand.

MR. CUNNINGHAM: I think the difference is rather simple. ICRP sets their weighting factors so you come out with a comparable risk of five rem.

COMMISSIONER AHEARNE: Could you use the mike, Dick. I don't think the people in the back can hear you.

MR. CUNNINGHAM: What the ICRP does is take the scientific data by organ does and come out with weighted organ factors that are meant to achieve a comparable risk for the organs comparable to a total body dose of 500 milligrams per year or five rem per year. So it is just comparing risk.

The EPA, on the other hand, includes in their weighting factors for some organs like the thyroid I thought, but some of them anyway, an ALARA factor, which is an economic factor and this begins to confuse the picture.

Now, if you adopt the EPA limits, ALARA changes depending on technology. You aren't comparing risk, you are introducing other factors that destroy that kind of comparison of risk. Now, it is okay to adopt ALARA, but you don't want to do it through this system that just compares

risk. Otherwise, it becomes very difficult to go back through the regulations and reconstruct that every time you want to change ALARAs.

COMMISSIONER AHEARNE: In other words, Dick, you are saying that it is your impression that the reason that EPA's factors are higher than the ICRP is because they have folded the ALARA concept in.

MR. CUNNINGHAM: Yes.

COMMISSIONER AHEARNE: Do you agree?

MR. ARSENAULT: Well, I must admit that it is not clear to me how they arrived at their factors in detail. In any case, I regard the technical distinction between the two sets of factors as negligible technically.

COMMISSIONER AHEARNE: But administratively significant.

MR. ARSENAULT: Administratively I think there is a significant difference. We have later in the presentation a qualitative assessment of the cost impacts of these two systems. That is one of the areas in which there would be a significant difference, as I say, because we would be using a system that is fundamentally different from what we expect to be a widely accepted international system.

The next slide.

Here I have summarized the majority staff recommendations which are that the NRC accept the ICRP 26

system with dose limitations for reasons that I think have been made evident now.

We feel that they are based on the best scientific data available and have the virtue of being internationally accepted and it would facilitate the sharing of international experience and the comparison of experience.

COMMISSIONER GILINSKY: Let me ask you this. What fraction of the total work force that would be subject to either our standards or ICRP standards does the U. S. work force form? In other words, what part of it are we.

MR. ARSENAULT: You mean what fraction of the international work force subject to ---

COMMISSIONER GILINSKY: Radiation standards.

MR. ARSENAULT: I could only guess, and I guess that less than half.

COMMISSIONER GILINSKY: Is it about half?

MR. ALEXANDER: I don't know what fraction the radiation workers constitute of the world.

COMMISSIONER GILINSKY: What fraction of the radiation workers are the U. S. radiation workers?

MR. ARSENAULT: What fraction of the worldwide radiation workers subject to systems of this kind does the U. S. radiation work force represent. I think that is the question.

COMMISSIONER GILINSKY: Right.

MR. ARSENAULT: I am not sure we can get a qualitative answer.

CHAIRMAN HENDRIE: If you scale it on power plants it is about a third.

MR. ARSENAULT: I think that would be a mistake though.

COMMISSIONER AHEARNE: I thought the larger portion of our U. S. workers were not power plant workers.

MR. ARSENAULT: That is a question we might have the answer for. Can you give an estimate, Bob, of the fraction of total radiation workers in the U. S. represented by power plant workers roughly?

MR. ALEXANDER: Well, there are believed to be more than a million so-called radiation workers in the country now. I guess the power plant workers are now about 70,000.

MR. ARSENAULT: That is now a large fraction.

COMMISSIONER AHEARNE: I am sure, on the other hand, we have probably poor information on the Russian and their country's radiation work force.

MR. ARSENAULT: I believe that in the United States the application of nuclear technology outside the power plant industry is perhaps more prevalent than it would be in many countries. My guess would be less than half of the total work radiation workers would be found in the

U. S. I won't go beyond that. I would suspect it may be closer to a third.

The staff also feels that there should be no career dose limit for reasons that we have discussed at some length. We consider that there are conservatisms involved in the radiation protection systems. There are uncertainties in risk analysis which we feel would make it unreasonable to create the anxiety and the problem for workers, or in the rare cases even a practical problem of security for individual workers on the basis of the proposed benefits that would derived from a career limit.

COMMISSIONER AHEARNE: That encompasses then not only disagreeing with the 100 limit of EPA but also dropping the current formula for career limits.

MR. ARSENAULT: The current formula for career limits, yes. We feel that that is not necessary.

The staff position is also that ALARA issues should be removed from the guidance on occupational dose limitations. The two issues are quite distinct. One sets absolute limits on the exposure which is regarded as safe wthin the work place. The other principle establishes that one should attempt to achieve some economic balance and to reduce exposures to that which is as low as one can get consistent with the costs and the benefits associated with the activity. They aren't the same and they shouldn't be

mixed.

Finally, the protection of the unborn should be based on informed consent which is and has been and in our view should continue to be the basis for the NRC approach to this problem.

COMMISSIONER AHEARNE: Could you go into that a little bit. I gather you do agree with the minors having a limit of one/tenth the adult workers?

MR. ARSENAULT: Yes. Well, one of the advantages in dealing with the minors is that you know what you are dealing with. In the case of fertile women, one of the difficulties is that during a period when the fetus is most sensitive to radiation, neither she nor the employer is likely to know that the condition exists. So that there is some question about the effectiveness of establishing some special protective mechanism.

The application of some policy which is uniform with respect to women but not uniform with respect to workers of course raises the problem of a quality and the right to work, et cetera.

COMMISSIONER AHEARNE: Let me see if I can ask a couple of questions.

Making a limit of one/tenth the adult for minors is based on the conclusion that children are more susceptible?

MR. ARSENAULT: Yes. It is based on the sensitivity of the very young and the general policies that relate to child labor laws and protection of minors and the lack of any compelling argument in favor of bringing the minors into the work force.

COMMISSIONER AHEARNE: But it starts from the conclusion that the very young are more sensitive?

MR. ARSENAULT: It includes that consideration, yes.

COMMISSIONER AHEARNE: I tried to read the Bier Report and other material and it wasn't in effect clear to me. Is it correct that the general conclusion is that the fetus is more susceptible? Is that correct?

MR. ARSENAULT: Yes, that is a general conclusion. I don't think there is any dispute.

COMMISSIONER AHEARNE: So then is it also correct that the reasons of not imposing a limit for pregnant women are based on other than the associated radiation hazard? In other words, what I am saying is that it seems to me that you start with the conclusion of, yes, there is greater radiation harzard there. So that barring other factors you would then, I would conclude, impose a tighter limit because the rest of the rationale, limits at all, limits on minors, seem to have the concept that there is a radiation hazard and when there is a greater radiation hazard you impose a

tighter limit.

So if the conclusion is that for a pregnant woman there is a greater radiation hazard, in the absence of other factors one would have to impose a tighter limit. It appears that the conclusion that you don't impose a tighter limit has to be based either on it is infeasible or you conclude it is illegal.

MR. ARSENAULT: Within the context of your question and within the logic in which it is posed the answer is yes. I would point out to you only that there are some additional considerations that are at least relevant to this.

Suppose we found that a particular group within the population at large were more sensitive to radiation than the average among workers, would we then establish a different radiation protection limit for that subpoplation? I don't know the answer to that.

COMMISSIONER AHEARNE: Well, we already have. It is called minors.

MR. ARSENAULT: I am just pointing out that while I would be prepared to answer the question you asked in the affirmative as a personal view, and I think it is widely shared, it could not be extended to apply to other populations necessarily.

COMMISSIONER AHEARNE: That is not obvious. What

I am trying to understand is the regulatory philosophy that underlies the conclusion and then, if I understand that correctly, I have to conclude that there are other factors which take you away from that. I just wanted to make sure I understood what those other factors were.

MR. ARSENAULT: That is correct. As I said, I would answer the question that at least internally I would answer in the affirmative. There is a recognized higher level of risk per exposure.

COMMISSIONER AHEARNE: That is why the ICRP then came up, at least according to your table, they have reached a conclusion that there should be a tighter restriction imposed on pregnant women.

MR. ARSENAULT: Yes, on pregnant women, right, and it is a part of the consideration that goes into the lower limit.

Slide nine goes to the point which I indicated a moment ago. It is at the heart of the difference between the two systems and deals with the radioactivity intake factors, the annual limits of intake.

It should be recognized that the ICRP system is generally more restrictive than current standards. The same could be said of the EPS system.

COMMISSIONER GILINSKY: Could you give us some indication of the degree to which current standards would

have been tightened?

MR. ARSENAULT: Would be tightened?

COMMISSIONER GILINSKY: Yes.

MR. ARSENAULT: Well, it is difficult to be quantitative, but it goes back to the argument I mentioned on the very first slide. When one applies the same five rem annual limitation but not computes the exposure as a result of both external and internal dose, there is almost inevitably a reduction in the allowed exposure as a result. As I say, it is a little difficult to translate that quantitatively because the systems are so different.

COMMISSIONER AHEARNE: Is it true that the concentration factors though are relaxed?

MR. ARSENAULT: No. In general I think they will not be relaxed. The next point on this slide is that some of the derived air concentrations would be higher than the current maximum permissible concentrations. That is, some would be relaxed. Therein lies one of the points in the EPS's system.

COMMISSIONER GILINSKY: Could you explain why that is?

MR. ARSENAULT: Yes. I can explain in general terms, but if you push me beyond the superficial I am going to have to get help.

(Laughter.)

The application of the current limitations on all organs results in derived air concentration limits that are based on the metabolic relationship between the exposure of the individual to that air concentration and the consequent deposition and exposure to a specific organ.

When one moves to either the EPA or the ICRP standard in which the risk to the individual resulting from organ dose is considered, then the organ dose may very well be increased or decreased compared to the current standards. Even if one used the same metabolic models, then the derived air concentration would be increased in the case where the organ to which that radionuclide was most relevant had its dose increased by this risk approach. So in some cases they might be increased.

In addition, new metabolic models are being applied which could have the effect of increasing the air concentrations even when the organ doses were the same. So both factors can work to result in increased permissible air concentrations of specific radionuclides, and in some cases that is the result of the application of this new system.

COMMISSIONER GILINSKY: How great an increase are we talking about?

MR. ARSENAULT: I don't know the figures on that. Has anyone done calculations?

MR. ALEXANDER: They range from about 10 percent

to a factor of 17 in the case of Strontium 90.

MR. SHLOMO: I have here a whole listing of available comparison figures. It shows some lower and some higher.

COMMISSIONER AHEARNE: Is the strontium the highest?

MR. SHLOMO: Strontium 90 is insoluable. In 10 CFR 20, strontium is two times ten to the minus nine, that is your lowest. The soluable is eight times higher and this comes out to a calculation equivalent to this.

COMMISSIONER AHEARNE: Now, is the difference between the EPA and the ICRP based on EPA's disagreement with the technical basis or based on the belief that you should not raise a limit that is already existing?

MR. SHLOMO: First of all, there will be a difference between the ICRP and EPA based on the different weighting factors and based on the difference of the cap 30 rem versus 50 rem ICRP.

In addition, EPA made the recommendation that for those cases where the new derived limits turn out to be higher than the one in current use the old one should be retained. We consider this being an issue of ALARA. Those limits, as Mr. Arsenault explained, were derived in a coherent system based on the same risk. We have better models, we have better understanding of carcinogenicity of the different organs and they might result in different

limits.

If you would arbitrarily change those limits, then the relative concentration of the annual limits of one radionuclide versus another radionuclide will lose the equivalence of risk an it will cause considerable problems in our reviewing summation.

Whenever from an ALARA standpoint it is feasible and desirable to lower the limits, then our regulation or guidance might say this particular licensee would want half the limit, but let not change the limits.

MR. ARSENAULT: This discussion in fact moved us well down this list. The comments you just heard explain why the DACs and MPCs, that is the derived air concentration limits in the ICRP system and the maximum permissible concentrations in the air in the EPA system, are not directly comparable.

Also, Dr. Yaniv has addressed the question of the fact that the DACs are based on contemporary scientific data and equivalency of risk so that when the sensitivity of individual organs is taken into account, as we indicated, the derived air concentrations may in fact be larger than they are under the current system of organ limits.

Dr. Yaniv also addressed the fifth item. He is making my life very easy, and that is that the majority staff view is that when these derived limits turn out to be higher, taking into account the various factors that are relevant to this equivalent risk calculation, then one

should establish these limits at that derived value.

The control at lower limits of exposure is, as he pointed out, an ALARA issue and we feel that in many cases it will be justified to apply lower limits but through the application of ALARA rather than the equivalency of risk principle.

SIide ten.

The question of the implementability, the convenience or complexity of implementing the ICRP 26 system has been discussed. This of course will be decided entirely within the context of the regulations that are drafted to implement this system.

We are looking at the revisions implied for 10 C.F.R Part 20 now and it is our goal to establish for licensees that have specific exposure conditions simplified means for summing the internal and external exposures. For the other licensees in which such simplification is not possible, we expect to provide specific procedures and guidance on how to go about performing that.

COMMISSIONER AHEARNE: What is the status of the revision of Part 20?

MR. ARSENAULT: We have in hand a draft of the rule itself. It now remains for us to document the considerations that went into that draft in the statement of considerations as supplementary information. That is

underway and it is probably some weeks away from being ready.

Also, the rule is drafted as a rule and therefore it implies various things to the licensee rather than specifying them and we need to document some of those implications.

COMMISSIONER AHEARNE: To the extent that it is a germane question, does it track more to EPA recommendations or the ICRP 26 recommendations?

MR. ARSENAULT: It tracks the ICRP 26 recommendations.

Another point which is common to the various systems that are being considered, it is common to EPA and ICRP and it is common also to the current 10 C.F.R. Part 20, is that the 50-year committed dose from the intake of radionuclides in any particular year is taken into account that year. In other words, the 50-year commitment is put on the records in the year in which the radionuclide is absorbed.

There has been some discussion with those not subject to 10 C.F.R. Part 20 that this would be an extremely difficult or awkward requirement to fulfill. We would only make the observation that there isn't any change from the existing system of regulations in this respect.

With regard to costs, we felt that we should address this, but it is extremely difficult to assess what

the cost implications are for any of these systems until they have been translated into practical regulations. But we have done our best to try to indicate whether we would expect the costs to be either minor or significant.

In the case of the justification requirement, we feel this would be minor. We feel that justification is required by current procedure but it would have to be made more explicit under the new systems.

The requirement that ALARA be made mandatory implies that the licensees will have to be more rigorous and explicit in documenting the rationale for and the application of the ALARA principle and that NRC will of course have to review and approve these and that there will be some enforcement applications as well. So we would rank the cost implications at this point as significant.

The system of dose limitations and the application of these calculational methods, in either system the initial cost would be significant. We feel that the EPA guidance, because it would require these complex translational manipulations in the future, has the potential for a much more significant ongoing cost than the ICRP approach.

COMMISSIONER AHEARNE: If one wants to do that translation.

MR. ARSENAULT: Yes, if one wanted to do the translation. I think it is clear that we would want to

benefit from the experience of radiation exposure in other countries and to compare our experience with theirs. A great deal can be learned from that. My own view is that such a translation is inevitable.

With regard to the radiation protection requirements, that is the required ---

COMMISSIONER AHEARNE: Before you lose that point let me ask you a question. The radiation exposure history of the bulk of the people in the United States who are exposed to radiation is maintained under whose regulation? Is it NRC or is it non-NRC? The EPA guidance would apply to some class of people.

MR. ARSENAULT: Yes.

Commissioner Ahearne:

~~MR. ARSENAULT:~~ How large a segment of that are the people that we regulate?

MR. ALEXANDER: The percentage of workers affected that the NRC regulates is 15 percent.

COMMISSIONER AHEARNE: Of all of those who would be affected by the EPA guidance?

MR. ALEXANDER: Yes.

COMMISSIONER AHEARNE: So most of the people to be affected by the EPA guidance are not regulated by the NRC?

MR. ALEXANDER: Yes. When I say 15 percent I am talking about the I believe 26 non-agreement states where we license and regulate the rest. I don't know what the number

is.

COMMISSIONER GILINSKY: Where are most of the rest of the workers? In wh t sort of industry?

VOICE: Medical, X-ray.

COMMISSIONER GILINSKY: Is that where the bulk of it is?

MR. ONG: The EPA background documents out in 1975 were 1,160,000 U. S. workers. The number I got from John Davis about three days ago was workers covered by NRC totalled 233,000 right now of which there was 78,000 ---

COMMISSIONER AHEARNE: But you would have to fold in the agreement states on top of that.

MR. ONG: I would say about 25 percent of the total workers.

CHAIRMAN HENDRIE: What happens to the records of workers licensed in agreement states in activities that we would license if they were not agreement states? Do we end up holding those records or do the states or who?

MR. ALEXANDER: They are held by the licensees.

CHAIRMAN HENDRIE: By the licensees.

COMMISSIONER AHEARNE: The ideal situation is the world and the rest of the U. S. all use the same system and then you don't have to translate. But if there is going to be a disagreement, it is not clear to me whether we would be more concerned with comparability with the rest of the world

or more concerned with comparability with the rest of the U. S.

MR. ARSENAULT: The EPA standard would apply to those who are regulated by the NRC.

COMMISSIONER AHEARNE: I understand that. But you see, the EPA is committed and goes down one path and we go down the ICRP path. It wasn't clear to me that we would be better off in the ones we had to do our comparison with.

MR. ARSENAULT: Well, I think I should point out that while the staff majority strongly favors the ICRP approach over the EPA approach, and we are recommending to the Commission that the NRC officially inform EPA of this preference, it seems clear that whichever direction EPA ultimately decides that the NRC is likely to fall in line behind it. That is precisely why we feel that now is the time to convey to the EPA what our current perceptions are.

COMMISSIONER AHEARNE: We don't have to though, do we?

MR. ARSENAULT: I would turn to my legal counsel.

MS. BECKER: If you will notice on page 3 of the staff paper in a footnote OELD has rendered the opinion that although we are not compelled to follow EPA guidance, as a matter historically and as a matter of fact we probably would. Mrs. Mapes who wrote the legal opinion on that is in the audience.

COMMISSIONER AHEARNE: Not with EPA?

MS. BECKER: No, here.

MR. ARSENAULT: So that implication is in our minds.

CHAIRMAN HENDRIE: Let's hear what Bill has got to say and then we will get to Jim.

MR. KREGER: Well, I think Frank started out by saying that there is practically universal disagreement with the EPA guidance. Every one of the actual rules that gets established that implements that guidance will be done by a particular agency like NRC or the Department of Energy or the Department of Defense and so forth.

If all of them disagree with it, the question of whether any or very many will actually implement those as they now stand is quite in doubt I think.

MR. TRUBATCH: I think we have to distinguish between an independent regulatory agency and an Executive Branch agency as far as compliance with the FRC standards.

MR. ARSENAULT: It is clear to EPA that a very significant revision of their standard is implied by the results of the hearings. What direction they will go in is of course a matter of speculation.

CHAIRMAN HENDRIE: Do you still have a comment you wanted to make?

MR. CUNNINGHAM: Just on the question that

Commissioner Ahearne raised of whether we wanted to compare internationally our results under standards or nationally. The issue goes much more beyond that. It is whether or not we are able to maintain orderly and systematic regulations that we can review on a periodic basis.

If we follow the EPA method we have ALARA built into the basic limits where we are really dealing with a risk number. As time goes on that becomes extremely confused. When ALARA changes it means we have got to change our basic radiation protection limits and that is not the way the system should operate because we will have a series of ALARA numbers depending on what industry we are regulating. It just becomes chaotic if you follow the EPA system over the long term.

COMMISSIONER AHEARNE: I had been told, and I guess Bob since he attended all the hearings can verify or contradict. I have been told that in the hearings there were comments made that some of the foreign governments are having difficulty following the ICRP 26 recommendations, either understanding them or implementing them.

MR. ALEXANDER: That is true.

COMMISSIONER AHEARNE: Was that because they found them difficult or found them sufficiently confusing and illogical?

MR. ALEXANDER: I am sorry. Right now I don't

have the details.

MR. CUNNINGHAM: I might add to that that I tended leaning to translate the ICRP 26 recommendations into the international basic radiation protection standards for these various international organizations.

It is true that a lot of countries have trouble translating ICRP into a practical working regulation. The international standards are sort of an intermediate thing. Our people in developing Part 20 have a difficult time but it can be done.

The system is set out in ICRP. Everybody I have talked to from other countries seemed to agree that the system is good, but it takes a lot of work and a lot of experience getting to the practical applications down at the level where you are working in the field and where working health physicists can utilize them easily but that is our responsibility. It is workable and I haven't heard anything to the contrary.

MR. ARSENAULT: On radiation protection requirements, the EPA guidance, as I mentioned earlier, includes a requirement that a three-tier system be established and prescribes the radiation protection requirements at each level. We feel that will impose a significant administrative burden on the licensee with consequent costs on it, and that the application through

regulations of reference levels and appropriate general guidance for each is a more effective way of achieving a similar result. That could be done through the application of the ICRP recommendations.

The EPA requirement that the lower of either current or new derived limits be applied we feel would represent a significant cost for reasons that have been made clear. Mr. Cunningham referred to this. This confuses ALARA issues and radiation protection limits issues and will result in additional difficulty in trying to compare the dose records for individual workers.

Limits lower than the radiation protection guides for specific jobs. There is a recommendation that regulatory agencies for specific activities establish limits lower than those prescribed in the radiation protection guides. This would, in our view, create regulatory confusion that we feel would be better avoided and represents costs both for the agencies and for the licensees.

With regard to the issues on minors, there are no cost impacts from either system.

With regard to the unborn, the question marks merely indicate that the EPA did not take a specific position on that.

The provisions for exceeding the radiation protection guides under specific circumstances don't have

significant cost impact in either system.

Finally we get to the Hiroshima and Nagasaki data. The question was asked earlier whether the staff position reflects the new dose calculations for Hiroshima and Nagasaki. The answer is no.

In fact, the point we would make rather emphatically is that the current discussion on this issue is fraught with uncertainties. There seem to be no bases for arriving at firm conclusions in either direction. The data is very preliminary. Each discussion of the issues involved in these recalculations identify new parameters, the sensitivities to which you have ---

COMMISSIONER GILINSKY: Well, wouldn't there be a change if you accepted the new results as being correct?

MR. APSENAULT: Well, the problem is that there is no coherent set of results that one can accept as correct and apply to effect changes. I will, however, answer your question by saying that the best staff estimates are that the largest likely impact on the radiation protection guides might involve a factor of two and possibly three. It is in that range.

COMMISSIONER GILINSKY: Translating into a factor of two or three in air concentrations or what?

MR. ARSENAULT: Potentially, yes.

MR. SHLOMO: Not necessarily higher but it could

be also lower.

MR. ARSENAULT: Yes. There is no clear indication of which way this will go.

COMMISSIONER GILINSKY: Why would it be lower? I thought the new data suggested that the effects ---

MR. SHLOMO: The total dose in Hiroshima was higher based on the new calculation, but lower. Not lower, it was only the neutron component that was lower.

COMMISSIONER GILINSKY: Right. Given certain effects that suggests that the ---

MR. ARSENAULT: The risk is lower.

MR. SHLOMO: The risk is lower. If you have a higher does it has the same effect.

MR. ARSENAULT: The risk would be lower and the effect on the regulations would be to relieve them.

MR. SHLOMO: It is a question between neutron and and gamma. It is not a simple drop in our direction. There is an analysis that shows for certain types of tumors there are slight increases and for total tumors it decreases based on the new dose system and the data. This is a paper from Lawrence Livermore by Strom and Dobson.

COMMISSIONER GILINSKY: Were they saying that the gamma dose was higher or were they saying that there was no neutron dose?

MR. SHLOMO: The original paper by Lowell and Mendelson which wasn't published is a preprint based on the table of a comparison of the T-65 doses and the recalculated

doses. On a rad basis, there are curves in here, on a rad basis the total dose in Hiroshima comes out to be higher. The gamma component is higher. The neutron component is lower. In Nagasaki the neutron doses are lower. Most of the health effects come from Hiroshima.

MR. ARSENAULT: I hasten to point out that most of this data represents preliminary results. Little of it has been subjected to publication in referee journals and the usual scientific debate and peer review that we would like to see before accepting it as valid. The staff position is succinctly stated that there simply is no basis for deriving firm conclusions from the available information and that it could go in either direction.

COMMISSIONER AHEARNE: Frank, was there a meeting in May?

MR. ARSENAULT: Yes, there was.

COMMISSIONER AHEARNE: Did anything concrete come out of that meeting?

MR. ARSENAULT: Only a concrete recognition of chaos. I think that is a fair statement.

COMMISSIONER AHEARNE: In the Science article that was one of the few published areas on it essentially a reader would reach the conclusion that the NRC was uninterested in trying to explore this area.

MR. ARSENAULT: One can infer that from the

article. I did not.

COMMISSIONER AHEARNE: I am not saying it would be correct. I wanted to lead to the question are we interested?

MR. ARSENAULT: I think the answer is that we are keenly interested in the debate itself and the results of it. I point out, however, that the current staff view is that it will not have a very large impact on our regulations.

COMMISSIONER AHEARNE: I was just concerned. This sounded as though even the exploration of the issue couldn't get funded anywhere. The one agency that was willing to fund it and the guy says that well, it really isn't our area of interest but nobody else would pick it up.

MR. ARSENAULT: I understand your question a little more clearly now. I think that if we could see an avenue of supporting research which would resolve some of the issues we would be happy to support it within the limits that are available to us.

I do believe that the implications of this are so far reaching and so broad and so universally applicable that it seems far more fitting ---

COMMISSIONER GILINSKY: This is what now?

MR. ARSENAULT: This is the resolution of some of the questions that are involved in the recalculation of the Hiroshima and Nagasaki doses.

The implications are so broad in their application

that we consider it far more fitting that one of the agencies doing the basic research in this area does support it. Now, I would not reject a proposal that the NRC ---

COMMISSIONER AHEARNE: I guess my concern would only be that I would hope the work gets done and doesn't get put aside because every agency feels that it is so board that it clearly is not their responsibility to do it.

MR. ARSENAULT: Well, I am not aware there is any danger of that at this point.

COMMISSIONER GILINSKY: Let's see. Does what you are saying now jibe with what you were saying earlier? Now you seem to be saying that this may have a pretty major effect on all the conclusions.

MR. ARSENAULT: The breadth of its effect should not be confused with its magnitude.

(Laughter.)

COMMISSIONER GILINSKY: Come again?

MR. ARSENAULT: Well, when I say it has far reaching implications I think it has implications for policies for the use of radiation in various agencies. It has a potential impact on the dose calculation in many areas not regulated by NRC. It is that sense of breadth is what I meant.

COMMISSIONER GILINSKY: What led you to recommend different numbers for the various regulatory limits? That

is what I am asking. Does it have that potential?

MR. ARSENAULT: Yes. I have made the point that the best staff estimate now of the impact that it might have on health risks associated with radiation exposure are within the factor of two or three. Given the uncertainties associated with the dose effect relationships right now I do not regard those as large factors. We certainly would reflect them in our regulation.

I want to point out before leaving that point that the current regulatory standards are based on what we regard as a conservative reliance on the no-threshold linear dose relationship. If one accepts the lightly linear quadratic dose effect relationship that is implied by the data, there is a conservatism built in. The risk estimates now are based not only on Japanese data, so that one must be guarded in assessing the impact they should have. So the best staff estimates are for a factor of two to three. I should perhaps say the maximum.

COMMISSIONER GILINSKY: Do we have any work going on in this area at all? Is anybody looking at it in NRC?

MR. ARSENAULT: Well, again, in the sense of the Hiroshima and Nagasaki data, no. Everyone in the NRC is looking at it right now but we are not funding any work which is aimed at resolving the issues raised.

COMMISSIONER GILINSKY: Is anybody doing any work

in house other than reading these articles?

MR. ARSENAULT: Other than reading the results of the research that is going on, I would say no.

COMMISSIONER AHEARNE: What about that Chicago meeting.

MR. ARSENAULT: In fact, we received reports from the Chicago meeting. We did not send a staff member, no.

COMMISSIONER GILINSKY: Why don't we do something?

MR. ARSENAULT: You mean why are we not funding research?

COMMISSIONER GILINSKY: Or do some calculations on our own.

MR. ARSENAULT: We are doing calculations. We are following the results of the research in the scientific work carefully.

COMMISSIONER AHEARNE: Of course, the basic calculations aren't really things that we would be able to do. The basic calculations are recalculation of the actual doses in Nagasaki and Hiroshima.

COMMISSIONER GILINSKY: Well, he can look and see whether he agrees with them or not.

COMMISSIONER AHEARNE: I am a little disturbed we didn't even go to that meeting.

MR. ARSENAULT: Well, it was a judgment call on a last-minute basis and we assessed the risk. We felt that we

were adequately represented by people whose judgment and reporting capability we trusted.

MR. ALEXANDER: Well, I think the scientific community right now is trying to decide how to approach this problem, particularly through the NCRP. Once those decisions are made, I am sure we can be looking for some visits for funding.

COMMISSIONER AHEARNE: Should we reflect at least some of this in our comments to EPA?

MR. ARSENAULT: Someone asked me that question yesterday and I puzzled over how we might reflect our perception of the current debate in our comments to EPA and concluded there wasn't anything useful we could say.

COMMISSIONER AHEARNE: Well, I guess at a minimum we might reach a conclusion that here is a major issue that seems to be growing in this particular area. Silence indicates either we don't know of it or we don't believe that EPA should do anything about it.

We could either say we know of the issue and we don't see it being able to be resolved in the hear future so EPA should go ahead, or we could say we know of the issue and we don't think it is going to be able to be resolved in the near future but we think EPA ought to at least hold until a further assessment is done.

MR. ARSENAULT: Yes.

COMMISSIONER AHEARNE: We could do one of those which would be a more positive position on our part as to what EPA ought to do with respect to this.

MR. ARSENAULT: I think a statement that we believe that we should continue to make efforts to take account of the best available information while the work is going on to resolve some of these issues would be possible and possibly useful.

COMMISSIONER AHEARNE: Do you think EPA ought to hold until that is resolved?

MR. ARSENAULT: No, I do not.

COMMISSIONER AHEARNE: I would guess we ought to say that if that is where the consensus is.

MR. ARSENAULT: My understanding of their views perhaps prevented me from focusing on the utility of that observation. We can include that.

I believe that brings me to the end of the prepared presentation.

CHAIRMAN HENDRIE: Other questions?

COMMISSIONER AHEARNE: I would like to I guess before getting to the minority views at least understand. As I read your chart and read the minority views, at least one of them, the minority believed that there should be a notification system set up for high dose workers when a risk reaches some preset level. I gather the staff majority does

not agree with that. Could you explain what would be wrong with that?

MR. ARSENAULT: Yes. Perhaps I should briefly summarize the minority views and the staff's reaction to it.

In the minority view No. 1, as it is referred to here, which is that of Dr. Alexander, and he can address it at greater length, there are two points.

The first is that the lower of either the current or new derived limits be applied and we have already addressed that in relation to the EPA standard.

The second is that rather than having a lifetime dose limit that some pre-established risk be used as a point at which the worker would be informed.

The current work on the revision to 10 C.F.R. 20 includes within it consideration of the mechanisms for informing workers on a more routine basis as to the levels of exposure and of keeping workers informed concerning the implications of that exposure.

The identification of some specific level of exposure is likely to imply that that level has some property about it that other levels do not have and of course this would not be true.

COMMISSIONER GILINSKY: But that is true of every level.

MR. ARSENAULT: Exactly.

COMMISSIONER GILINSKY: Somewhere you have got to set requirements and points at which you become concerned. You know, there is a certain arbitrariness about them, but you know it is just like day and night. It is hard to tell when day goes into night but there is a difference between noon and midnight.

MR. ARSENAULT: That is true.

COMMISSIONER GILINSKY: This is pretty readily apparent.

MR. ARSENAULT: That is true. The alternative, however, that we have offered that we are considering is not to use that argument to not notify at any level but rather using that argument to indicate that he should be notified at every level. The question of a routine notification and a general worker education program is the alternative to notifying ---

COMMISSIONER GILINSKY: What is the concern here, that the worker will be unnecessarily upset or what?

MR. ARSENAULT: Well, there is the question of whether some specific level should be identified for worker notification.

COMMISSIONER GILINSKY: Would you see some effect on his job as a result of him crossing a point which is, you know, while it is not a regulatory limit would nevertheless be some sort of a threshold?

MR. ARSENAULT: Some of the staff have raised as one of the points to be considered the impact on the employer's practices of establishing this notification level, that it might affect practices in a way that is not consistent with its intention and might regard it as some non-official limit and try to avoid reaching levels at which the level were notified.

COMMISSIONER GILINSKY: That isn't so bad, is it?

MR. ARSENAULT: Well, it depends a little bit on the means that the employer uses for not reaching that level.

COMMISSIONER GILINSKY: What are you saying?

CHAIRMAN HENDRIE: If you fire a guy who is five percent below the level, why that may not be to the worker force a satisfactory way of observing the limit.

COMMISSIONER GILINSKY: Is that what you mean?

MR. ARSENAULT: That is one of the possible ways he might arrive at it. He might apply some techniques for using more people for particular activities to limit exposure. He may accept this notification limit as an unofficial limitation on exposure. As such it would replace the authoritative limits on exposure.

Now, that has a number of implications, one of which Chairman Hendrie mentioned. The other is the way he might apply these techniques. It is only an element that has been raised. It is not a compelling argument.

COMMISSIONER GILINSKY: What is the opposite side of this discussion?

MR. ARSENAULT: The argument in favor?

COMMISSIONER GILINSKY: Yes.

MR. ARSENAULT: I would suggest that Dr. Alexander might want to offer that himself, if we could ask him to comment.

MR. ALEXANDER: Well, I have never been a staff minority before so I don't know exactly how to handle this except just to relate to you what my thinking is.

I think the issue that we are dealing with is whether or not the government should be concerned about a small group of high dose workers that are in a higher risk category than other radiation workers. We don't know exactly how many there are but it is almost certainly less than a thousand and may be as few as only four or five hundred workers who get five rems per year every year or more.

So that out of maybe a million and a half radiation workers how concerned should we be about this small group?

COMMISSIONER GILINSKY: Let me ask you, would you expect those to be concentrated in one or another industry, or would they be spread around?

MR. ALEXANDER: No. They are concentrated

primarily in the nuclear power industry and in the medical industry.

(Laughter.)

COMMISSIONER GILINSKY: That is about right.

(Laughter.)

MR. ALEXANDER: That was a Freudian slip, I am afraid.

(Laughter.)

If we don't need to be concerned about so few workers then the problem goes away of whether the government should do anything about it or not and I believe that pretty much represents the staff majority opinion.

The EPA feels that something should be done about them and I agree with the EPA. The only thing is I don't agree that a career lifetime limit is the proper way to go because of potential career interference by the government and I believe there are other ways to go about it.

If I might use an analogy. If a worker who had been receiving five rems per year for ten years decided to leave the nuclear industry and become a test pilot, I believe we would all agree that the government should not interfere with him in choosing that new career. I believe that the same thing applies if he wants to continue after getting any dose levels, such as a hundred rem, if he wants to continue being a power worker, the Federal Government

shouldn't tell him that he can no longer do that.

But I do believe that we ought to do something. What I think we should do is simply make sure that these workers understand that they are in a higher risk category. That brings up the idea of the risk notification system so that when a worker arrives at a level of risk comparable with other safer industries that he be notified that he has, according to the best scientific estimates that have been devloped, that he has arrived at that point and now is the time for him to make an informed decision as to whether or not he wants to continue in radiation work.

COMMISSIONER AHEARNE: Let me ask just a couple of other questions.

With respect to No. 9, you have on the chart that you sent up that the majority agrees with ICRP 26 which sounds like on your chart a very explicit set of limits. I thought from reading 81-232 that this majority opinion on the No. 9 was a general description. So which was correct?

MR. ARSENAULT: I am not sure that I understood the question.

COMMISSIONER AHEARNE: If I turn in here to your answer, the letter that you are proposing to send in recommendation No. 9, it says that you would like to revise the existing recommendation and you have some language revising it. It essentially says that the licensee can

exceed the RPGs for cause and the agency can establish on a generic basis the reasons for doing that.

On the chart you have sent up it says the ICRP recommendation is the one that you endorse and the ICRP recommendation is that you can exceed the RPG to twice the annual limit per event at five times this limit in a lifetime. Those just don't seem to be the same.

MR. SHLOMO: You are basically correct. There is a discrepancy in the Commission paper. There is no mention of specific limit. In the staff discussion in the preparation of the Commission paper we agreed that the limits as represented ICRP 26 or exceeding RPG would be the appropriate one. Therefore, maybe not entirely correctly, it appeared on this majority staff position.

COMMISSIONER AHEARNE: Does that mean that you would propose to revise the response to EPA or does it mean that you would propose that if EPA accepted your proposal that the way that we would implement it would be to ---

MR. SHLOMO: The second.

COMMISSIONER AHEARNE: I see. All right. I guess I would agree with that as being a better approach, but I just wanted to make sure I understood.

You also say in your chart that we, as far as No. 2 on ALARA, we would accept ICRP 26. Now, ICRP 26 includes the concept of optimization. That is what you would want

EPA to include in their proposed rule or in their rule; is that correct?

MR. ARSENAULT: The difference is EPA optimizes on the collective dose and we are not sure that that specific parameter should be the one that optimizes over.

COMMISSIONER AHEARNE: I didn't recall EPA introducing the optimization concept.

MR. ARSENAULT: Well, they didn't refer to optimization. They simply say that ALARA should be applied to reduce the collective dose to levels as low as reasonable.

COMMISSIONER AHEARNE: Right.

MR. ARSENAULT: That is a specific parameter.

COMMISSIONER AHEARNE: I thought optimization brought the cost aspect in much more strongly. Is that incorrect?

MR. ARSENAULT: I suppose it is a matter of the way you read it. It is the words "as low as reasonably achievable" that brings the cost impact to bear.

COMMISSIONER AHEARNE: So when you say that you would endorse the ICRP approach you would like to remove the collective aspect? I gather you are drawing a distinction between the EPA approach and the ICRP approach and I am trying to understand what that distiction is that you are drawing.

MR. ARSENAULT: I would like to find the exact

words. If I can ask my associates to pitch in on any point on which I go awry.

(Laughter.)

I think the distinction is that in arriving at an optimization one looks at a larger number of factors related to the dose reduction as opposed to the cost of achieving that reduction than merely collective dose which is a specific parameter in the EPA standard. To us that is a preferable way of expressing what our goals are.

MR. ALEXANDER: I worked with the EPA people in developing this guidance for a period on the order of six years and I think I understand what they are after with respect to the ALARA concept. They want the ALARA concept, the occupational ALARA concept to be implemented by all the regulatory agencies. The exact way or manner of implementation is to be left up entirely to these regulatory agencies.

If our agency chooses to adopt the ICRP concept of optimization, we are perfectly free to do so. But if we choose to do it in some other manner, we are perfectly free to do so. So is OSHA and DOE and all the others.

COMMISSIONER AHEARNE: I know what the recommendation says, but that is not what the chart says.

CHAIRMAN HENDRIE: We have got a hand over here. Let's see what the comment is.

MR. BAKER: I am Bob Baker from the regulatory staff. As I understand it, and I am not an economist, but I have been working with some of the international groups on some of these concepts.

First, let's go back to justification. Justification is a net benefit that can be shown from an operation. In other words, one looks at the costs, the benefits and there should be a net benefit. That is justification.

The optimization, as I understand it, is simply the differential of the cost/benefit equation. In other words, one can take this differential and look at alternatives. You have condition "A" and condition "B". You now look at what are the costs from moving from "A" to "B" and the benefits to be derived, including the changes in the population collective dose, if you will.

The point is you have certain costs associated with operations, certain benefits with operations, certain detriments such as collective doses which may be expressed in terms of an economic unit or monetary unit and there is for optimization a very, I would use the word "mathematically precise condition."

COMMISSIONER AHEARNE: I understand that. The only issue I was trying to get at is the letter that we were proposing to send to EPA said we agree with their approach.

It is an agreement with the ICRP recommendations. The chart that was sent up indicates at least somewhere in the staff here is a belief that there is a difference between the two. It wasn't clear to me if (a) there was a difference, and if there was, which side we came down on, and we ought to at least when we go to EPA say if there is a difference and which side to come down on.

MR. BAKER: I think generally speaking we are in full agreement with them but we also recognize that the actual implementation of a mathematically definitive cost/benefit analysis is very difficult.

COMMISSIONER AHEARNE: Of course.

MR. BAKER: So we would use the elements in making some judgments.

COMMISSIONER AHEARNE: Let me just ask a couple of other minor questions.

Who regulates dental technicians?

MR. ALEXANDER: That is primarily done by the states.

COMMISSIONER AHEARNE: The states would regulate dental technicians.

How about X-ray technicians.

MR. ALEXANDER: The same.

COMMISSIONER AHEARNE: The same thing.

How about uranium miners?

MR. ALEXANDER: Miners, if you exclude the mills, the miners are regulated by MSHA of the Department of Labor.

COMMISSIONER AHEARNE: Do they regulate on radiation exposure?

MR. ALEXANDER: Yes.

COMMISSIONER AHEARNE: And Energy Department workers?

MR. ALEXANDER: Well, Energy Department workers and their contractors, the radiation exposures are controlled by the Department of Energy itself.

COMMISSIONER AHEARNE: I was just trying to make the point that there is a large bulk of high exposure people that we don't reach.

The last question and this I notice has driven a recent PN. Would you allow someone who wanted to get a job who was 16 or 17, after you have explained the hazards, to waive the one/tenth requirement?

MR. ARSENAULT: I don't think that is anticipated. I would ask if anyone knows of any suggestion that such a provision be included?

MR. ALEXANDER: There is a law against that. That would not be a final decision for the NRC to make.

COMMISSIONER AHEARNE: There is a law against what?

MR. ALEXANDER: Against allowing a person under 18 years of age to receive more than one/tenth of the

permissible limits.

COMMISSIONER AHEARNE: There is a federal law?

MR. ALEXANDER: Yes. That has been on the books for many years. That was the original basis of the AEC's ---

COMMISSIONER AHEARNE: So the one-tenth tracks back to federal law?

MR. ALEXANDER: Yes.

COMMISSIONER AHEARNE: Bill.

MR. KREGER: I would just like to say that I think the same thing applies to going one year below 19 that applies to going one year over 50 if you are already at a hundred rem. I don't think any of us think of those as thresholds. There is no real difference between the risk of five rim to an 18-year-old and the risk of five rem to a 19-year-old.

So, you know, if you applied logic you wouldn't set a threshold at the upper end and you wouldn't necessarily apply a threshold at the lower end.

COMMISSIONER AHEARNE: Those are all my questions.

COMMISSIONER GILINSKY: I don't follow that logic.

COMMISSIONER AHEARNE: The barrier that I just ran into is that there is a law.

COMMISSIONER GILINSKY: Lawyers don't seem to know about this law.

COMMISSIONER AHEARNE: Which law is it?

MR. ALEXANDER: It was originally in the Child Labor Act when it was enacted. It has been changed now to another law and I can't remember which one it is.

COMMISSIONER AHEARNE: I guess I would ask OGC to do a little bit of legal research to track that down.

COMMISSIONER GILINSKY: I want to ask something about notification. I wonder if it wouldn't make more sense to have the notification apply when someone receives more than two, three or four or however many rems in a particular year, for him to be aware that he is increasing his accumulated dose at a rate which if continued would get him up to pretty high levels. If you set it at some accumulative value then, as mentioned earlier, it comes at a rather late point. It is not clear that it makes a lot of difference.

COMMISSIONER AHEARNE: The choice a person may at that stage have, you are being told now if you stay in this job which you have been in for 20 years it is really going to be hazardous.

COMMISSIONER GILINSKY: Yes, and the grim reaper is coming after you pretty fast.

MR. ARSENAULT: If that comment was addressed to me, it is in fact the position I hold.

COMMISSIONER GILINSKY: Well, I was addressing it to Bob Alexander actually. I wonder if you have any

thoughts on that?

MR. ALEXANDER: I think that would be acceptable. The alternative I suggested is nothing more than an alternative. It is just based on the feeling that I believe that these workers, and I particularly believe it after traveling around the country and talking to people in the course of these hearings, that these workers who are high dose workers are not being informed. They are in a different category than others who get low doses and I would like to see our agency do something to turn that around. Your idea is just as good as mine.

COMMISSIONER GILINSKY: You see, in order for someone to reach the dose that you are talking about you would have had to have gotten five or four or at least three rems per year for many, many years and he would then have been notified continually and also at an earlier point when if he wants to he might want to become a test pilot or become an iron worker or something way up in the sky.

MR. ARSENAULT: I would point out, if I may, that since this is a matter of procedure and administration of a radiation protection system, that the staff feels that it should be a matter for regulation rather than guidance. It need not be an EPA guidance. We would prefer to see the opportunity reflected in the regulation.

COMMISSIONER GILINSKY: How is that again?

MR. ARSENAULT: That the matter of notifying the worker concerning his level of exposure, whether it is some threshold or routinely is ---

COMMISSIONER GILINSKY: Well, if we accept it we would put into a regulation.

MR. ARSENAULT: --- a matter of procedure and administration. It was a matter for regulation rather than guidance was my point.

COMMISSIONER GILINSKY: Well, but on the basis of their guidance we would write a regulation if we agreed with it.

COMMISSIONER AHEARNE: Frank, the point I would probably disagree with you on is that there are a number of people that this guidance may speak to who may not feel as you do. If we are providing comments I think it might be useful for us to provide the comments at least in such a useful way as to make it clear that we think that is really a good thing to have in the implementing regulations of whatever agency it is.

MR. ARSENAULT: Accepted.

CHAIRMAN HENDRIE: Peter?

COMMISSIONER BRADFORD: No.

CHAIRMAN HENDRIE: I guess the Commission ought to indicate to the staff the direction.

COMMISSIONER AHEARNE: This is a letter for you to

sign.

CHAIRMAN HENDRIE: I must say my own inclination is to go with the staff view. The majority view, I think is overall a more rationally based system to try to sort out the dose and exposure limits and their concentrations and so on. Our best estimate of risk is to have the ALARA and other considerations in another area where you can distinguish between the two. I think there are a considerable number of advantages to using the system which is being reasonably consistent.

John?

COMMISSIONER GILINSKY: I have one more question.

COMMISSIONER AHEARNE: You have another question?

COMMISSIONER GILINSKY: Yes. One of the recommendations that I think Bob Alexander made was that in applying the system we now increase approved air concentrations where there would otherwise be increased by the ICRP guidance. What sort of problems would that pose if we had a, so to speak, slightly mixed system? In other words, if we kept the concentrations at present levels where they would otherwise be increased and otherwise accept the ICRP levels.

CHAIRMAN HENDRIE: Then you have done this mixing of standards based on a equivalent risk level for various isotopes and methods and types of exposure with other

considerations and you no longer have a system in which you can neatly separate the equal risk elements in the places you are hold them down just because it is reasonable and practical to hold them down beyond the level with the equivalent risk you suggest. That is why the majority view, as I understand it, is not to do that but rather to separate those two sorts of regulatory controls.

COMMISSIONER GILINSKY: Well, I understand that. I am trying to get a feeling for just how bad that sort of an approach would be. I mean, how much would it mess up the neatness of just going with the ICRP?

CHAIRMAN HENDRIE: My impression is considerably. It is going to lead to the kind of thing that Kreger was talking about about a need to ask licensees for an assortment of additional exposure condition data so you can back calculate and come around to the risk equivalent analysis.

COMMISSIONER GILINSKY: The other side of it is I think you are going to be upsetting a lot of people who are now subject to levels which would be increased. I guess I don't know just how extensive this problem is or how many in fact would be subject to higher levels.

CHAIRMAN HENDRIE: It is not clear that the levels would be increased.

COMMISSIONER GILINSKY: I thought some of them

would be.

CHAIRMAN HENDRIE: What would be increased would be limiting values in a NRC table. When you get into a particular plant and they say now what is going to work here, why then the ALARA side at least in principle could very well hold you down where you were below.

COMMISSIONER GILINSKY: Well, you are saying the doses may not increase.

CHAIRMAN HENDRIE: Yes.

COMMISSIONER GILINSKY: There is a letter in one of the attachments that we have been seeing that expresses some concern about this. Anyway, how big a problem is it?

MR. ARSENAULT: I do want to emphasize that the staff's position does not imply that it is in favor of increasing either limits or exposure.

COMMISSIONER GILINSKY: Well, you would be increasing limits.

MR. ARSENAULT: Yes, you would be increasing the limits that are applied by the radiation protection guides. There are additional limitations that arise out of the application of ALARA. I think, as Chairman Hendrie has pointed out, both are applied and the application of a system that results in increased radiation protection guides limits on occupational exposure doesn't necessarily mean that the experience in the work place would change. So that

is important.

COMMISSIONER GILINSKY: Right, but it might.

MR. ARSENAULT: But it might.

Now to address more explicitly the question you asked. Introducing limitations that are not based on risk equivalents would, and I may ask for more detailed technical assistance on this one as well, but it would result in a change in the significance of the exposure as recorded for a particular worker. This arises out of the way in which the doses are calculated from the exposure of the worker to the concentrations of the radionuclide in the air. It is a matter of the way in which these ---

COMMISSIONER GILINSKY: Well, I realize there will be some change, but given the isotopes that are involved in what you know of the various industries do you have any sense of how big an impact they would be and how much it would upset the neatness of our scheme because, on the one hand, you know, there is something to be said for having sort of a neat match with the rest of the world and, on the other hand, we are trying to protect workers in this country and it is not small thing to relax the standards to subjectives.

MR. ARSENAULT: Well, it impacts the coherence of the system. Maybe saying that it destroys the coherence of the system might carry too big an impact. It does

significantly impact the coherence of the system.

COMMISSIONER GILINSKY: You don't like the idea I gather.

(Laughter.)

MR. ARSENAULT: I don't. We went into this at some length when we discussed exactly the same problem in connection with the EPA limitation. Having established a coherent system for calculating limits they then imposed a totally arbitrary system on top of that which says the lower of two values will be chosen. This impacts your ability to use that system in the way it was designed to be applied.

COMMISSIONER GILINSKY: Could we hear from Mr. Alexander on that point.

MR. ALEXANDER: The only think I could like to say is I think I have been influenced quite a lot by the labor union people that I have talked to. As a health physicist the ICRP system based on a summation of risks is very appealing and I would like very much to see it established and I wish we had had it all of these years.

On the other hand, a fellow who is going to be asked to breathe more radioactivity uses terms like ridiculous in connection with our desires. So I am afraid I lean toward the fellow that has to breathe the radioactivity. I have breathed quite a bit of it myself. I think that the price that we have to pay to adopt the ICRP

system in total is too great.

MR. ARSENAULT: I can only add to that that if we believe the level of radioactivity being breathed by the worker is unjustified, then it is up to us to achieve a lower level based on the application of the principles embedded in our current regulations. If those levels are too high then the condition at that particular licensee is not ALARA.

COMMISSIONER GILINSKY: Everything is for the best.

MR. ALEXANDER: Commissioner Gilinsky, if I might make one more point. I believe if the Commission had a good tight way of making the ALARA concept inspectable and enforceable that I wouldn't have this concern.

COMMISSIONER GILINSKY: What you are saying is if in practice one could keep the doses down even though some of the limits were relaxed it would be an acceptable scheme?

MR. ALEXANDER: Yes, because if these plants are operating at the levels they are right now and have been in an economically acceptable manner for many years then they have proven by experience that is ALARA to do so.

So if we had an inspectable and enforceable ALARA program then they wouldn't be allowed to increase. With what we have right now I don't think we can do that. I don't think we can count on what we are doing about occupational ALARA to keep these concentrations down.

COMMISSIONER AHEARNE: We had a proposed rule that was being worked over the last six months or so. What is the status of that? That would be to put in place an ALARA program, an inspectable ALARA program.

MR. ALEXANDER: Well, we have run onto some difficulty with respect to staff resources in implementing what we had originally proposed and we are meeting with NMSS personnel right to try to develop a slightly alternative regulation than we one we had proposed in SECY 81-86. It should be ready within a few weeks.

COMMISSIONER AHEARNE: If that were to be put in place would that be the kind of a program that you were talking about?

MR. ALEXANDER: No.

COMMISSIONER AHEARNE: That is not right enough.

CHAIRMAN HENDRIE: Go ahead, Bill.

MR. KREGER: Could I have a rebuttal for a minute. I think the implication that Bob made that we don't have an inspectable and enforceable ALARA program is a false implication.

COMMISSIONER AHEARNE: It wasn't an implication. It was a statement.

MR. KREGER: Is a false statment. We have made great strides in the last five years. We issued recently NUREG 0761 which proposes the radiation protection plan that

will be implemented for reactor licensees by insertion into the technical specification. That plan will be going forth. The comment period ends on the 30th of June. We expect to issue that plan as a final statement this summer with letters to all licensees in accordance with the Commission's indication that they felt that was an appropriate way to go for reactors.

I do believe that with that in place and with the things that have been imposed because of the health physics appraisal program at all operating reactors that there will be a great deal of improvement in the ALARA implementation at operating reactors.

I don't believe that any worker has to fear that he is going to be exposed because of one raise or several raises in a particular ELI or whatever that he will be forced, as Bob implied, to breathe more radiation.

COMMISSIONER AHEARNE: I&E rises in defense of the inspection program.

MR. THORNBURG: I think I would intend to agree with Bill. ALARA at this point is not the easiest concept in the world to enforce because the limits aren't rigid. I think that we have made a lot of strides in our health physics appraisal program and generally in the rest of our inspection program. We have been inspecting the standard for the last several years.

We haven't had major conflicts with everyone we have dealt with. We have had some problems. Generally I wouldn't say that it is a toothless thing. I think that there has been some positive impact.

MR. ARSENAULT: I just wanted to point out in connection with this issue that in the ICRP 26 and the EPA proposed guidance ALARA is treated in the sense of it becoming a requirement and that is likely to lead to a somewhat more rigorous approach to the issue as well.

I don't want to suggest that all of the problems that we have been discussing will be resolved by that, but it will be a mandatory requirement at that point.

CHAIRMAN HENDRIE: For an ALARA program.

MR. ARSENAULT: For an ALARA program.

We do have also a second minority viewpoint ---

CHAIRMAN HENDRIE: We had better hear that.

MR. ARSENAULT: --- which is perhaps less complex than this one. If I might summarize it, I think Charlie Willis is with us and could address it in detail, if you wish.

His point is that the change to any new system at this point involves significant costs for the licensee and that there is no justification and benefits to be derived for the workers in this change.

In view of the fact that the new limitations are

likely to impact only a few workers, and most now are covered by ALARA programs are receiving exposures well below either the new or the old limits, his argument at least represents a valid point of view, that the benefits overall don't necessarily justify the costs involved. That is as succinct as I can summarize his position.

The majority staff position has been made clear in the discussion so far. As it plays up against this viewpoint I would add one more observation, and that is that the evolution of the regulatory process appears to be in the direction of using risk as a more explicit basis for its decision making, and that a system which allows for comparative assessments of risk is going to be one that serves the purposes of that system better than the one that now exists.

On the basis of that viewpoint, it seems to be that the adoption of a system with characteristics like either the EPA or the ICRP system is inevitable and it is bound to be cheaper to adopt it earlier.

COMMISSIONER AHEARNE: Does Mr. Willis agree with your summary description?

MR. ARSENAULT: Well, unless I have garbled it since last I talked to him, I think he believes it is a fair but succinct statement.

COMMISSIONER BRADFORD: His hand is up.

MR. WILLIS: I am Charlie Willis, NRR. What Frank as said is pretty well a restatement of my position. There are a couple of amplifications I would like to make.

One that goes kind of counter to several of the asides that we have heard today is the idea that if one wanted to transfer from radiation work to a more hazardous profession he might become a test pilot or a farm machinery operator or something that is really dangerous. I think that is counter to all the data that we have.

As far as we know if a man transferred from radiation work to the average job in the United States his exposure to carcinogens would increase. In other words, we have controlled radiation better than we have the average carcinogen rate. The exposure of a politician to a smoke-filled room, if you will, could be more dangerous than the radiation. So I am starting from a position that if it ain't broke don't fix it.

The other corollary here is that the ICRP 26 position is not quite as solid in my view as it has been presented. Most countries of the world can pay and do pay lip service to this without actually doing it.

We heard from our British friends a comment yesterday that I thought I was instructive talking about the requirement for measuring very low systemic burdens of actinides. Yes, we know it probably can't be done, but that

is no reason for not requiring it. Well, I think that would be a reason for not requiring it in this country.

The fundamental approach of basing your limits on risk is a difficult one, not because the ICRP hasn't spelled out their risk estimates, but because risk estimates change with every new measurement. We certainly don't change the speed limits every time we get another measurement of the coefficient of friction of rubber on concrete and this is what we are doing.

You are talking about the question about the doses at Hiroshima and Nagasaki. That is just one indication of the kind of problem we have with changing risk estimates. They will change every few years.

We had a running risk estimate that we used finally and the Beir Committee in '71 or something came out with a refined set of risk estimates. Very shortly thereafter the NRC staff came out with the GESMO. We felt that we had to develop new risk estimates because things had been learned and now we have come out with Beir Three. They have a new set of risk estimates which don't agree with the ICRP. We now have the flap about the doses that the risk estimates were based on.

So if we do this, if we base our regulations on risk, we are going to have a highly unstable industry and that does not seem like good business to me.

Finally, if you report things in terms of risk rather than doses to specific organs, you lose a great deal of information. It makes a tremendous difference from a epidemeological standpoint whether a person received "X" rem to the bone or whether he received "Y" rem to the whole body even though they turn out to give you the same total risk. So basing regulation on risk is not an unquestionable virture.

Finally, my concern is, and really the concern of the whole thing and why I am embarrassing myself is that I feel that the Commissioners are being placed in a position of being asked to sign a letter that says we buy ICRP 26 without getting a full evaluation of ICRP 26.

If this happens and we the staff start working on this problem next week, then the acceptance of ICRP 26 is a given. That is no longer debatable. The Commissioners have approved and this does not seem like the wisest way to do business in my opinion.

Thank you.

COMMISSIONER GILINSKY: Before you leave let me ask you a question. In saying that you don't want to tie the regulatory requirements to risk, you seemed to be concerned about varying requirements. Now, clearly there is something to be said for keeping them stable and not changing them every year. But at the time you do fix

them ---

CHAIRMAN HENDRIE: Or set them originally.

COMMISSIONER GILINSKY: Right, or set them originally, I would think you do want to relate them to risk.

MR. WILLIS: The limits that we have now are in a sense related to risk, or at least related to the estimates of risk that we had in '58. But the way we require things to be reported now in terms of body doses and external doses, et cetera, is such that we can revise the risk estimate each time the basis for risk evaluations change. If we simply had one number there wouldn't be anything we could do with it. As the risk estimates change now the limits do not change.

So far all of our risk estimate changes have been in a fairly narrow range so that changing limits probably isn't justified, at least not on the basis of protecting the workers in my opinion anyway, and I think that is consistent with what the NCRP people tell me and so forth.

The NCRP, by the way, as you well know, is the national organization whose job it is to clarify and endorse the ICRP recommendations as they would like to see them apply to this country. The NCRP has not endorsed ICR. 26, and in fact the NRCP is busy working up their own set of risk estimates that will be different again.

COMMISSIONER GILINSKY: Thank you very much.

MR. WILLIS: Thank you.

COMMISSIONER AHEARNE: I guess I will probably want to at least think through a little of this for a day. I will file a vote sheet with my comments. I would hope that if the Commission itself can't reach a decision on the comments to send that EDO would send comments at least because as I understand it July 6th is the deadline. I think that since the NRC is such a major participant in this we ought to get our comments, either hopefully the Commission's comments but at least EDO's comments, sent.

CHAIRMAN HENDRIE: I certainly agree with that. If you want to hold off and give an indication by notation, why that is fine with me.

Vic?

COMMISSIONER GILINSKY: I want to think about it.

CHAIRMAN HENDRIE: Okay.

Any final comments?

(No response.)

CHAIRMAN HENDRIE: Thank you very much.

(Whereupon, at 4:15 p.m., the meeting adjourned.)

NUCLEAR REGULATORY COMMISSION

This is to certify that the attached proceedings before the

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in the matter of: BRIEFING ON SECY-81-232 - COMMENTS ON THE EPA-PROPOSED GUIDANCE FOR OCCUPATIONAL EXPOSURES

Date of Proceeding: June 10, 1981

Docket Number: _____

Place of Proceeding: Washington, D.C.

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

Mary C. Simons

Official Reporter (Typed)

Mary C Simons

Official Reporter (Signature)

SUMMARY OF DIFFERENT OCCUPATIONAL RADIATION PROTECTION GUIDANCES

	A	B	C	D	E	F	G
	EPC 1960 Current Guidance	EPA Proposed Guidance	ICRP-26 Recommendations	NRC Current 10 CFR Part 20	Staff Majority SECY-81-232	Staff Minority (1) SECY-81-232	Staff Minority (2) SECY-81-232
1.	Justification	required	required (plus consider alternatives)	required	does not address	accept new guidance	not addressed	Retain D *
	ALARA	required	required including collective dose	required including optimization	hortatory rule (non-specific)	accept ICRP-26	not adddressed	Retain D *
2.	Dose limitations (a) Whole body	3 rems/qtr plus 5(N-18)	5 rems/yr (combined external and internal on risk equivalent basis)	5 rems/yr (combined external and internal on risk equiv basis)	1.25 rems/qtr. or 3 rems/qtr plus 5(N-18) (External radiation; internal doses not additive)	same as ICRP-26	5 rems/yr 3 rems/qtr.	Retain D *
	(b) Partial Body	critical organ limits	limit on sum of organ risks, plus 10-rem cap; excludes gonads (W_1 values different from ICRP-26)	limit on sum of organ risks, plus 50 rem cap; includes gonads (W_1 defined)	limits on intake; critical organ limit basis	same as ICRP-26	same as new guidance	Retain D *
	(c) Combined Ext. and Internal	independent limits	combined limits	combined limits	independ . limits	combined limits	combined limits	Retain D *
4.	Radiation Protection Requirements	not specified	limits given in three ranges, would include 100 rem lifetime limit.	reference levels given in three ranges, no lifetime limit.	specified in Part 20 or licenses, no lifetime limit.	omit from new guidance; but reflect in revised Part 20 (opposes career limitation)	notification of high-dose workers when risk reaches pre-set level.	Retain D *
5.	Concentration Values lower than DAC's or MPC's	does not address	would select lower of old or new values for existing or similar operations	ALARA issue	does not address	ALARA issue; delete from guidance; use ICRP-26 and ICRP-30	same as new guidance	Retain D *
6.	Limits lower than RPG's for Specific Job Categories	does not address	recommended	ALARA issue	does not address	ALARA issue; omit from new guidance	omit from new guidance	Retain D *
7.	Minors	1/10 RPG's	1/10 RPG's	no specific guidance	1/10 adult limits	1/10 adult limits	1/10 adult limits	Retain D *
8.	The Unborn	not addressed	four alternatives given for comment	fertile: 5 rems/yr, pregnant: 1.5 rems/yr	not addressed (Reg. Guide recommends informed consent)	informed consent	informed consent	same as majority
9.	Exceeding RPG's	permitted at at discretion of regulatory agency	permitted, public disclosure required	twice the annual limit per event, five times this limit in a lifetime	no provision other than 5(N-18) rule	same as ICRP-26	same as ICRP-26	Retain D *

	A	B	C	D	E	F	G
Notes Clarifying EPA Proposed Guidance	NRC 1960 Current Guidance	EPA Proposed Guidance	ICRP-26 Recommendations	NRC Current 10 CFR 20	Staff Majority SECY-81-232	Staff Minority (1) SECY-81-232	Staff Minority (2) SECY-81-232
1 Exclude background and medical radiation	comparable provision	comparable provision	comparable provision	comparable provision	comparable provision	not addressed	Retain D *
2 Summation of internal effective dose commitment (risk equivalent basis)	not addressed	required (weighting factors different from ICRP 26)	required	not required	same as ICRP-26	modified	Retain D *
3 Current ICRP quality factors and dosimetric conventions	old ICRP values	accept current values	accept current values	old ICRP values	accept current values	accept current values	Retain D *
4 Numerical emergency limits	not provided	not provided	not provided	not provided	not provided	not provided	not provided
5 Procedures for handling overexposure	not provided	not provided	recommends establishment of provisions	addressed in 10 CFR 20 Statement of consideration	same as ICRP-26	not addressed	not addressed
6 Dose limits for periods other than one year	3 rems/qtr. plus 5(N-18) (External)	not provided	not addressed	1.25 rem/qtr. or 3 rems/qtr. plus 5(N-18) External exposure	not addressed	quarterly limits	Retain D *
7 Existing guides for limiting exposure of uranium miners	addressed (FRC report No. 8, 1967)	not changed	RPG apply to all workers	not addressed (NRC does not regulate miners)	not addressed	not addressed	not addressed

* Retain present limits and regulation unless justification (cost/benefit) is provided

PROPOSED EPA GUIDANCE

1. JUSTIFICATION OF EXPOSURES BY NET BENEFIT. CONSIDERATION OF NON-RADIATION ALTERNATIVES

2. ASSURE THAT COLLECTIVE DOSES ARE ALARA

PROPOSED EPA GUIDANCE

3. DOSES TO CONFORM TO RADIATION PROTECTION GUIDES (RPG's)

   A. EFFECTIVE DOSE EQUIVALENT FROM INTERNAL AND EXTERNAL EXPOSURE -

      5 REM PER YEAR.

   B. NON-UNIFORM EXPOSURE (ORGAN) ALSO HAS TO SATISFY THE ABOVE CONDITION

      ON RISK EQUIVALENT BASIS.

      ADDITIONAL LIMIT - 30 REM TO SINGLE ORGAN (GONADS - 5 REM)

RECOMMENDED ORGAN WEIGHTING FACTORS DIFFERENT FROM ICRP-26

PROPOSED EPA GUIDANCE

4. 3-TIER SYSTEM OF GRADED RADIATION PROTECTION ACTIONS

4A. 100REM LIFETIME DOSE LIMIT

5. ESTABLISH "RADIOACTIVITY INTAKE FACTORS" (RIF'S) TO MEET RPG'S

5B. IF RIF HIGHER THAN CURRENTLY IN USE (MPC) ADOPT CURRENT VALUE

PROPOSED EPA GUIDANCE

6. ESTABLISHMENT OF LIMITS BELOW RPG'S AND RIF'S

7. LIMIT OF 1/10 RPG FOR MINORS

8. EXPOSURE LIMITS FOR THE UNBORN (4 ALTERNATIVES FOR COMMENT)

9. SPECIAL PLANNED EXPOSURES EXCEEDING RPG - DISCLOSURE REQUIREMENT

COMPARISON OF EPA'S PROPOSED GUIDANCE WITH
1960 FRC GUIDANCE AND CURRENT 10 CFR PART 20

EPA - COMBINED EXTERNAL AND INTERNAL DOSE LIMIT - 5 REM/YR

VS POSSIBLE 12 REM/YR EXTERNAL PLUS 15 REM (OR 30) FROM
INTERNAL EXPOSURE TO INDIVIDUAL ORGANS

EPA - 100 REM LIFETIME LIMIT

VS 5(N-18)

DIFFERENCES BETWEEN EPA GUIDANCE AND ICRP-26 RECOMMENDATIONS

1. DIFFERENT ORGAN WEIGHTING FACTORS

2. NON-STOCHASTIC ORGAN DOSE LIMIT: EPA - 30 REM
ICRP = 50 REM

3. GONADS: EPA - SEPARATE LIMIT - 5 REM/YR
ICRP - INCLUDED IN CALCULATIONS
OF EFFECTIVE DOSE EQUIVALENT

4. LIFETIME LIMIT: EPA - 100 REM
ICRP - NO LIFETIME LIMIT

RECOMMENDED ORGAN WEIGHTING FACTORS

TISSUES	WEIGHTING FACTORS (WT)	
	EPA	ICRP
GONADS	-	0.25
BREAST	0.20	0.15
RED BONE MARROW	0.16	0.12
LUNG	0.16	0.12
THYROID	0.04	0.03
BONE SURFACES	0.03	0.03
SKIN	0.01	-
REMAINDER (OTHER ORGANS)	0.40	0.30

STAFF RECOMMENDATIONS (MAJORITY)

1. ACCEPT ICRP-26 SYSTEM OF DOSE LIMITATION

2. NO CAREER DOSE LIMIT

3. OMIT ALARA ISSUES FROM GUIDANCE

4. PROTECTION OF THE UNBORN BASED ON INFORMED CONSENT

STAFF RECOMMENDATION (MAJORITY)

RADIOACTIVITY INTAKE FACTORS - ANNUAL LIMITS OF INTAKE (ALI)

ACCEPT ICRP-26, ICRP-30 ALI'S

1. ICRP SYSTEM GENERALLY MORE RESTRICTIVE THAN CURRENT STANDARDS

2. SOME DERIVED AIR CONCENTRATIONS (DAC'S) HIGHER THAN CURRENT MPC'S IN 10 CFR PART 20

3. DAC'S AND MPC'S NOT DIRECTLY COMPARABLE

4. DAC'S BASED ON CONTEMPORARY SCIENTIFIC DATA AND EQUIVALENCY OF RISK

5. DERIVED LIMITS RESULTING FROM SCIENTIFICALLY BASED COHERENT SYSTEM SHOULD BE USED, WHETHER THEY ARE HIGHER OR LOWER

6. ALARA CONSIDERATION MIGHT DICTATE OPERATION BELOW DAC'S

IMPLEMENTATION OF ICRP-26 SYSTEM OF DOSE LIMITATION

1. SIMPLIFIED EXTERNAL AND INTERNAL SUMMATION PROCEDURES FOR LICENSEES MEETING SPECIFIED EXPOSURE CONDITIONS

2. SPECIFIC GUIDANCE RE: SUMMATION TO BE PROVIDED BY NRC FOR OTHER LICENSEES

3. 50 YEAR COMMITTED DOSE FROM INTERNAL EXPOSURE CHARGED TO PERIOD OF INTAKE - NO CHANGE FROM CURRENT 10 CFR PART 20

SIGNIFICANCE OF IMPLEMENTATION COSTS

ISSUE	EPA GUIDANCE	STAFF MAJORITY
1. JUSTIFICATION	MINOR	MINOR
2. ALARA	SIGNIFICANT	SIGNIFICANT
3. DOSE LIMITATION	SIGNIFICANT ON IMPLEMENTATION AND IN THE FUTURE (DIFFERENT SYSTEM FROM THE REST OF THE WORLD)	SIGNIFICANT BUT MUCH LESS THAN EPA GUIDANCE
4. RADIATION PROTECTION REQUIREMENTS	SIGNIFICANT	MINOR
5. LIMITS LOWER THAN DAC'S	SIGNIFICANT	MINOR
6. LIMITS LOWER THAN RPG'S FOR SPECIFIC JOBS	SIGNIFICANT	MINOR
7. MINORS	NONE	NONE
8. THE UNBORN	???	MINOR
9. EXCEEDING RPG'S	MINOR	MINOR

REVISED DOSE ESTIMATES,

HIROSHIMA AND NAGASAKI

1. DATA PRELIMINARY - PREMATURE TO DRAW QUANTITATIVE RISK ESTIMATES

2. IF REVISED DOSE ESTIMATES CORRECT, MINOR IMPACT (ON THE ORDER OF TWO) ON ESTIMATES OF RISK FROM LOW LET RADIATION

   A. RISK ESTIMATES BASED NOT ONLY ON JAPANESE DATA

   B. LINEAR DOSE RESPONSE RELATIONSHIP APPLIED TO ESTIMATE RISK FACTORS USED IN RADIATION PROTECTION STANDARDS