SESSION 15

WORKING LUNCHEON

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Co-Chairmen: L. Soffer
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Invited Speaker: The Honorable Kenneth C. Rogers, Commissioner

CLEAN AIR AND CLEAR RESPONSIBILITY
Commissioner Kenneth C. Rogers

CLEAN AIR AND CLEAR RESPONSIBILITY

PRESENTED BY

COMMISSIONER KENNETH C. ROGERS
U. S. NUCLEAR REGULATORY COMMISSION

AT THE

23RD DOE/NRC
NUCLEAR AIR CLEANING AND TREATMENT
CONFERENCE

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Good afternoon ladies and gentleman. I am pleased to have this opportunity to talk with you today about an issue that could have a significant effect on the future of nuclear air cleaning treatment and technology.

In this conference, you have been focussing on a variety of technological considerations related to nuclear air cleaning and treatment. I would encourage you to step back from the "how-tos" of this technology for the moment and to reflect instead on the regulatory framework in which you work and, more importantly, on the foundation of that framework. There are important changes that may be coming and, as professionals, your understanding and input will be needed to help guide these changes.

Today, I will discuss the regulatory regime for controlling emissions of radioactivity into the air. I will start with a brief review of the statutory basis for regulating radioactive air emissions. I will then discuss the NRC's regulatory approach to controlling such emissions, the principles which underlie that approach, and, in particular, what I believe to be the great value of the "as low as is reasonably achievable" or ALARA principle. Finally, I will talk about the current regulatory regime, some potential changes to it, and the issues that relate to how they are made.

Statutory Basis

Various acts and their amendments provide the statutory basis for regulating emissions of radioactivity into the air. Both NRC and the Environmental Protection Agency (EPA) are given regulatory authority by these acts. Under the Atomic Energy Act of 1954 (AEA) and Title II of the Energy Reorganization Act of 1974, NRC is authorized to license and regulate a range of activities connected with the use of source material, byproduct material, and special nuclear material. This authority includes the regulation of air emissions of these materials. Under the Clean Air Act and its amendments, EPA was given the authority to

regulate air emissions of radioactive materials including those that are covered by the Atomic Energy Act. Thus, two agencies have regulatory authority over the same air emissions. The statutory bases are different, however, and the two agencies exercise their authority in different ways. I would now like to review some important features of the NRC's approach.

The NRC's Regulatory Approach

NRC's approach for protecting people from radioactivity applies radiation protection principles that are used worldwide. It is based on the radiation protection recommendations of the International Commission on Radiation Protection, the ICRP and its U.S. counterpart, the National Council on Radiation Protection and Measurements. NRC's radiation protection standards are codified principally in 10 CFR Part 20 although some dose limiting requirements for particular classes of licensees are codified in other parts of Title 10. For example, Appendix I to 10 CFR Part 50 contains numerical guides for power reactor design objectives that are intended to keep radioactive effluents as low as is reasonably achievable.

Three basic principles underlie NRC's approach and these same principles govern radiation protection in most of the world. The first of these principles is that any activity that causes people to be exposed to ionizing radiation must have sufficient benefit to justify the exposure. This is the principle of "justification". The second principle is that exposures should be kept as low as is reasonably achievable -- the ALARA or "optimization" principle. The third principle is that the maximum dose to any individual should be limited so that an acceptable level of risk is not exceeded -- the "limitation" principle.

The principle of justification is not explicitly stated in NRC's regulations. Instead it is manifest in the choice of activities for which NRC grants licenses. The principles of limitation and optimization have explicit expression in Part 20, the standards for protection against radiation that apply to all licensees.

10 CFR Part 20 -- Standards for Protection Against Radiation

It is not my intent today to give you a detailed description of the requirements of 10 CFR Part 20; however, I would like to mention briefly some of its key features. I believe that you are familiar with them and I am confident that you will recognize their connection with the basic principles that I spoke about just a few moments ago. First of all, Part 20 includes occupational limits in Section 20.1201. These limits establish

the acceptable level of risk for those people who work with materials controlled by the Atomic Energy Act.

Second, Part 20 includes limits for exposures of members of the public by activities which use Atomic Energy Act materials. These are codified in Section 20.1301 and the principal requirement is that, with certain exceptions, exposures of members of the public may be no greater than 100 mrem per year. These limits establish the acceptable level of risk for members of the public and are fully consistent with the recommendation of the ICRP.

An essential aspect of radiation protection for members of the public is the control of radioactivity released in liquid and gaseous effluents. This control is addressed in Section 20.1302 which allows a licensee two approaches for demonstrating that its operation does not exceed the annual dose limit. The more commonly used approach involves a demonstration that concentrations of radioactivity in effluents do not exceed values specified in Table 2 of Appendix B to Part 20. These values assure that doses to an individual from radioactive emissions to the air do not exceed 50 mrem per year.

Finally, I would mention that Part 20 explicitly requires that licensees implement the ALARA principle as part of their radiation protection program. This requirement appears in Section 20.1101 and is to be applied for both occupational and public exposures. An important feature and a great strength of the ALARA principle is that it gives explicit recognition to real world factors that must be faced in providing radiation protection.

As used in Part 20, ALARA means, "making every reasonable effort to maintain exposures to radiation as far below the dose limits in this part as is practical consistent with the purpose for which the licensed activity is undertaken, taking into account the state of technology, the economics of improvements in relation to state of technology, the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, and in relation to utilization of nuclear energy and licensed materials in the public interest."

In the next few minutes I would like to share my thoughts about the value of the ALARA principle and the great benefits that I believe it has brought and can continue to bring to radiation protection.

ALARA -- A Win-Win-Win Principle

ALARA encourages reductions in exposures to radioactivity by weighing the value of such reductions against several countervailing, but equally important considerations. As such, I believe it should hold an important place in any licensee's radiation protection program.

At a workshop, about which I will say more in a few minutes, one participant suggested that the role of ALARA in regulation is troublesome because it has different meanings to different people. To him, one meaning involved the formal cost-benefit balancing and weighing of alternatives that is used in establishing regulatory limits. The other involved the less formal, good-judgement, good-faith implementation of technology and procedures that is used by licensees to reduce exposures. He believed it difficult for a regulator to rely on the latter.

I must say that I see things a bit differently. I see these as manifestations of the ALARA principle that represent opposite ends of a spectrum. At one end is a formal cost-benefit balancing of alternatives. Certainly, it can be used by regulators to establish limits. But, I would hasten to add that it can also be used by licensees. In complex situations, involving costly technology or practices, a licensee might well choose to do a formal ALARA analysis. Our regulations certainly allow for this.

More often though, the formal analysis itself would be more costly than implementation of a better technology or practice. In such situations, the licensee skips the analysis and "just does it". I see this as the other end of the same spectrum. Moreover, I do not see a lack of formality as troublesome. In NRC's regulatory approach, ALARA is used to achieve reductions below the radiation protection limits that establish an already acceptable level of risk. Rather than characterize licensees' implementation of ALARA as troublesome for a regulator, I would characterize it as realistic, flexible, and effective.

Let me be more specific. I would call it realistic because it does not make reduction of exposures the end-all and be-all of a licensee's operation. True, it recognizes the importance of such reductions, but it also recognizes the importance of the technical, social, and economic factors that a licensee must confront. I would call it flexible because it allows licensees broad discretion in determining how to achieve reductions. This offers licensees the opportunity to use their creativity and intimate knowledge of their own operations to get the best possible reduction in exposures given the other factors they must also consider.

I would call it effective because its practice results in doses that are generally lower than the allowable limits and often much lower. Our regulations require that licensees measure and record occupational exposures. NUREG-0713 is an annual NRC publication that compiles statistics for these exposures. When I look at these statistics, I am struck by a downward trend in occupational exposures over the years. ALARA may not be the only explanation, but I am confident that it has been a significant factor in creating this trend.

Because doses to individual members of the public are generally not measured directly, discerning any effect that practice of the ALARA principle may have had is somewhat more problematic. However, I think there is evidence that the principle has been at work here too. EPA used its COMPLY code to calculate maximum individual doses for 367 randomly chosen NRC licensees. The input data were obtained by an EPA questionnaire. The sample included the full range of non-power-reactor licensees.

I find the results impressive. The calculated doses for all 367 licensees were less than 10 mrem. The highest calculated dose was 8 mrem and only 7 calculated doses were in the range of 1 mrem to 10 mrem. The rest, 360 out of 367, were less than 1 mrem. Considering that revised Part 20 had not yet gone into effect when EPA did its survey and that, at the time, the Part 20 dose limit was 500 mrem I have to think that ALARA was a significant factor here too.

The NRC's ALARA requirement has another very important characteristic. Specifically, it places the burden for a top-notch radiation protection squarely on the licensee -- where it belongs. I believe that what evidence we have shows that, in general, NRC licensees have done well at shouldering this burden. What is more, they also derive the satisfaction of a job well done.

In April 1993, I had the good fortune of observing one of the workshops that NRC sponsored in connection with its enhanced participatory approach to developing site decommissioning standards. This particular workshop was held at King of Prussia, Pennsylvania and included an extensive and stimulating discussion of ALARA. In listening to this discussion, I was quite impressed by the spirited defense that the industry participants made for the ALARA principle as an effective driver of their activities. Their defense was obviously heartfelt and they seemed to take real satisfaction from the accomplishment it compelled. However, they were insistent that ALARA's realistic, flexible nature was essential to their commitment.

I believe that the ALARA principle has served the NRC well, the nuclear industry well, and the public well. I think of it as

a Win-Win-Win principle and believe that it must remain a central part of NRC's approach to radiation protection.

The Regulatory Regime for Air Emissions

There is currently a dual regulatory regime for emissions of radioactivity into the air from Atomic Energy Act materials. NRC regulates these emissions under the Atomic Energy Act. Its regulations require that radioactivity in these emissions result in doses no greater than 50 mrem and require further that licensees attempt to reduce doses below that level consistent with the ALARA principle.

EPA regulates these same emissions under its Clean Air Act authority and has established a dose standard for members of the public of 10 mrem per year. Under current EPA rules, NRC licensees must meet this standard. EPA has also established a reporting requirement for operations which result in radioactive air emissions that result in calculated doses in excess of 1 mrem. NRC licensees are required by EPA to comply with this requirement too.

There are obvious advantages to having a single regulatory regime. Specifically, there would be one Federal interface for NRC licensees, one set of requirements to meet, and one set of inspections. These are advantages for both licensees and the government. Consequently, when the Clean Air Act Amendments of 1990 were passed, they included a provision known as the Simpson Amendment which allows EPA to rescind its authority for these emissions if it determines that the NRC program provides protection of the public health with an ample margin of safety.

Consistent with the Simpson Amendment, the two agencies have been working toward rescission. There have been some successes -- primarily in connection with radon emissions from uranium mill tailings. I believe we are also close to rescission for power reactors. However, there have been some difficulties in reaching agreement about rescission for materials licensees.

The outstanding issue centers around the 10 mrem standard in EPA's Subpart I to 40 CFR Part 61. NRC is reluctant to adopt this value as a dose limit. To do so would be inconsistent with our reasons for revising 10 CFR Part 20. Furthermore, speaking as one Commissioner, I would be very reluctant, indeed, to undermine, in any way, the ALARA principle that has served us so well.

Thank you for your attention. I would be pleased to address any questions or comments that you might have.

DISCUSSION

HULL: What is the value of EPA's involvement in this same area? I am going to ask a philosophic question, based on the fact that I have an increasingly uncomfortable feeling that we are operating in a vacuum of our own professional activity. I cannot help but wonder about a justification for expending the resources devoted to this activity, compared to the possibility that these same resources could be allocated to other areas. My own feeling is that they could be more effective in promoting the public health.

ROGERS: I certainly agree with you. We would be delighted to have the whole thing close down and just proceed along. I think that our experience has been that, for materials licensees that we are responsible for, we feel very comfortable that our regulations and applications, the ALARA principle, has worked extremely well. Nevertheless, a problem was created by Congress when it gave both organizations authority over the same kinds of materials. They approach them from quite different points of view, and now, trying to bring them together has been rather difficult. Our problem seems to be that EPA feels a lack of confidence with respect to enforceability issues, i.e., what tools do we have to enforce our point of view when we do not have an absolute number that must be met? Our point of view is that use of absolute numbers is not the best way to get the least exposure. When you have a single number that everybody must meet, you will get that number and that is all you will get. You will never get any less than that. The ALARA principle encourages, actively encourages, licensees to try to drive toward much lower levels. And, in fact, I think the data seem to show that it is being achieved, and I believe very strongly that it will continue to be achieved in the future under the ALARA principle. I quite agree with you; I too think the taxpayers' money for EPA's work and licensees' money for our work (because we get our whole budget from our licensees) could be better spent on other things.

KARHNAK: I am from EPA. I do not know where to start, but let me offer just one point regarding your last comment. If, indeed, the 10 mrem limit were the only one to be met, all the DOE facilities would be at 10 mrem. In fact, we find two or three of them are above. So, I am not sure that your last point is valid.

SHER: Maybe it is irrelevant now, but is there any real conflict between the ALARA principle and the 10 mrem limit? There would only be a problem if ALARA did not allow you to get down to 10 mrem, not to get up to it.

ROGERS: The problem is enforceability. The question is whether you can enforce an ALARA goal or not. With all of our licensees, our experience has been that NRC's point of view, when conveyed seriously to licensees, prevails, and that the legal argument about whether something is enforceable or not, plays much less of a role than licensees deciding that it is very much in their interest to try to follow NRC's lead on where to go on things. This certainly has been true in the power reactor area, and I am quite sure it can be true in the materials area.

KOVACH, B.: Since I am a health physicist, I would like to express my acclamation. I am very glad to hear that the radiation limits have been so low lately. I had the feeling that it was due to my good work that NUCON radiation limits dropped, but it seems to me

that everybody met the 10 mrem limit. When I started to work in the nuclear field, the limits were much higher, and I did not know how to do reduce them, while today it is possible and looks like everybody is successful in reducing the radiation limits.

As a matter of fact, we canceled all the x-ray checks for NUCON field test personnel, since the exposure of one single x-ray check was ten times higher than a yearly exposure from nuclear power plants. On the same subject, one single medical test with radioisotope application will deposit enough activity into your body to trigger the alarm on the entrance gates of most nuclear power plants for months. The time has come when we have to praise the nuclear industry for its safety records and explain to the public that the high radon level in houses was discovered on workers' clothing, while coming from home and entering into the nuclear reactors. We actually reached the natural background levels and I would not spend more money to reduce them, but would maintain this level of consciousness and inform the public properly.

ROGERS: I agree with you on the public needing to know about it. Nevertheless, it has been my experience as a regulator over the last seven years that regulatory attention is absolutely essential. I believe that it is easy to backslide, and situations change with licensees, managements change, economic circumstances change, personnel change. And what is now a very good program may not always be a good program unless there is outside attention checking on it from time to time. So, I have to say that I do believe that regulation is important and regulatory attention is important. But it should not get in the way of encouraging licensees to do the best they possibly can on their own. I think that is part of the issue that is being discussed here philosophically.

ANON: My question is, do you have insight to determine whether regulation is leaning toward NRC or toward the EPA side?

ROGERS: At NRC, we are working very closely with EPA on this to try to decide what will be sufficient for them to agree that NRC can take authority here; that they can rescind their oversight and allow us to apply our own regulations to our licensees. We have not come to an agreement yet with the EPA. It is something we are working on, and we hope that we can come to an agreement on it in the near future. But, it has been a sticky issue for us, and I really cannot predict when or how it will come about. It is conceivable that we cannot come to an agreement, and dual regulation will persist for material licensees. I hope that is not the case. The President has issued directives to reduce regulatory burdens as much as possible. I think that we have had direction from the White House that we should try to avoid things like dual regulation. Congress passed the Simpson amendment to the act that I mentioned to encourage the two agencies to get together and find some way to avoid dual regulation. But at the moment, we have not come to a meeting of minds on this between NRC and EPA, because the approach that EPA would like us to take would pose some very serious problems for us in a number of ways. I'd rather not try to go into all of them one by one, but we are hopeful that we will be able to come together. We have worked with EPA quite well on a number of other issues and have come to agreements. This particular one, I think, is more difficult because it has specifically received a considerable amount of attention from some Congressional committees. And when you get into something like that, everybody gets a little antsy. We have not been able to come to an agreement yet. I hope that it

will take place, but I think we must face the possibility that we won't be able to agree.

LAWTON: My question is, how do NRC and EPA work together with materials that are mixed with radioactivity and chemicals?

ROGERS: Mixed waste situations?

LAWTON: Yes.

ROGERS: I really cannot say much about mixed waste. It is a very difficult area for us. We are much relieved when we find that we are dealing with just radioactive waste. Mixed waste, toxic chemicals mixed with radioactive waste, has given us all some very, very difficult problems to deal with. And I would say, at the moment, I do not really have anything very helpful to say. It is an area that NRC is working on, but I must say I cannot offer anything constructive on this very tough problem area.

KARHNAK: In regard to your question about dual regulation, I just want to add that the 1990 Simpson amendment had certain requirements and certain findings that the EPA has to make in order to be able to withdraw their rule. We face a legal challenge in the courts if we are not able to make those findings successfully. Those are the things the Commissioner has mentioned as things we are trying to work out, but we are both bound by them. The EPA is bound by having to meet the findings before we can go forward with the rescission. We would certainly like to do that. Exactly how to meet those findings, or an agreement in terms of what is sufficient to meet those findings, is part of what we are discussing right now.

WREN: I have not kept up with all the changes in the regulations in Canada, but I do not think that we have the ALARA principle in our regulation. Because Canada is a neighboring country, I am wondering whether there is a broad agreement between these two governments regarding nuclear regulations?

ROGERS: Not that I am aware of. We have informal exchanges quite frequently with Canadian regulators. I am not familiar with the materials area in Canada as much as I am with the power reactor area. I know that we do have a somewhat different approach to safety regulation of nuclear power reactors. Canada's reactor designs are quite different from any that we have in the United States, so their approach is somewhat different. Some of the problems we have, with respect to physical security questions and things of this sort, they do not have. But in the materials area, I am not familiar enough with the entire program. As you know, we have a rather special situation in the United States in that the Nuclear Regulatory Commission regulates only a very limited class of sources of radiation. We do not regulate x-ray machines or linear accelerators. We do not regulate naturally occurring radioactive products. We really regulate a very narrow class of materials. It is quite a few, but it isn't everything. In other countries, that is usually not the case. In many countries, health and safety regulation tends to be all radiation, whatever the sources are. We have the absurd situation in the United States that a cobalt source that produces a gamma ray of a certain energy is regulated by the NRC. The same kind of radiation, the same wave length and quantum energy radiation coming from, say, a linear accelerator or some other source, is not regulated. The health

effects of this radiation, when it finds its way into living material, are exactly the same, and yet we regulate the cobalt source, but we do not regulate other sources of the same kind of radiation. That is typically done at the state level, not at the federal level. It is a very complex situation in the United States with respect to regulation of radiation. The sources of radiation, if they are not reactor-produced materials, are regulated by the states, rather then the federal government.