RELEVANCE OF RADIATION PROTECTION

Commissioner Nils J. Diaz

Remarks Before the American Radiation Safety Conference and Exposition
(46th Annual Meeting of the Health Physics Society)
Cleveland, Ohio

June 11, 2001

Good morning. I am pleased to have the opportunity to participate in the American Radiation Safety Conference and provide my thoughts on the "Relevance of Radiation Protection," which is an issue I address every day, although normally under a different label. I hope that my perceptions of the regulatory challenges that we face in radiological protection, as well as suggestions for how to address them, will be of interest and of benefit to you. As practitioners of the health physics profession, you are, and will be, challenged by these issues, individually and as a Society. I will be presenting my personal views today, which do not necessarily represent the views of the U.S. Nuclear Regulatory Commission (NRC).

You and I both play a significant role in radiological protection in one or all of its three interconnected phases: assessment, regulation, and implementation. Protection is an encompassing, integral action that needs a defined purpose and boundaries. Radiological protection is a mature area of endeavor and, with the proper assessment, regulation, and implementation, we can reduce uncertainty and keep interpretation to a minimum. In this context, assessment is everything that needs to be known, weighed, and harmonized before you can regulate and/or implement. Regulation and implementation follow the assessment phase ... or do they?

Radiological protection needs to be exercised in a manner that provides the most benefit to society. It should not be too little or too much; it has to be prudent, well-based, equitable, and open. And it must be relevant. I am sure we all agree that

radiological protection per se is a practical undertaking that fulfills a special social responsibility. I want to focus on how we can make it more relevant.

Let me start with an overall picture, work into regulation and then step right into relevancy. In a simplified model of democracy at work, shown on Figure 1, regardless which are the drivers, we end up with regulated and non-regulated activities. Both are usable and useful. The perennial question is which way to go. In our case, that decision has mostly been made in favor of regulating radioactive risks, and especially those covered by the Atomic Energy Act. However, across the risk range, from NORM/NARM to everything else, is the regulation or lack of regulation prudent, well-based, equitable and open, and is it done as efficiently and effectively as it should be? This is where the present debate should be focused.

As established by the Atomic Energy Act and other statutes, the mission of the NRC is to ensure adequate protection of public health and safety, promote the common defense and security, and protect the environment by the licensing and regulation of radiation sources and nuclear energy. I believe that there might be some confusion about the NRC mandate. However, there should not be any confusion because our mandate is centered on radiological protection, not on the mere existence of a broken pump or a leaky line.

As one of the NRC's Commissioners, I must ensure that the radiological protection mission of the agency is being fulfilled in its policy decisions, regulations, and other actions, using all the information at our disposal. Regulation is an important component of society's infrastructure; it is a tool of society to implement what society needs, in an orderly, equitable and fair manner. Regulation is done for the people, with their best interests as the essential objective; it is done for the common good, with full consideration of the national interest.

Although all regulations restrict, regulations should not deter beneficial activities, but should frame them and guide them. I believe that the role of regulation of the peaceful uses of nuclear energy and radiation is to provide a meaningful and useful framework for the protection of rights, health, safety, and the environment from radiological risks. Regulations for radiological health and safety need to be based on facts and supported by the best available knowledge, which must be used within the boundaries defined by risks and benefits to society. Regulations need to be technically, socially, and economically sound, but not necessarily in equal proportions. Regulation of the use of radiation must result in a benefit or it will result in a loss. There are no benefit-neutral regulations. Regulation has to be relevant to the people it protects.

I believe that while there is significant agreement among practitioners on what is meant by "radiation protection," we do need an increasingly better understanding and explanation of the basis for either regulating or not regulating, as well as the basis for the activities that provide for radiological protection of the workers and the public. This is where you have a unique role and opportunity. The guiding legal principle of the

Atomic Energy Act for the regulation of nuclear energy and radiation is the envelope established for reasonable assurance of adequate protection. The principle is sound, it has worked, and is being implemented increasingly well. There is a Congressionally-recognized need for balance and reasonableness in developing the NRC's regulations for radiological protection. The regulation and the implementation of radiological protection must be a practical undertaking that fulfills a special social applicability; they have to make a difference.

Let me offer one example of how the Commission made relevance a priority and arguably placed the carriage before the horse. The new Reactor Oversight Progress was placed in service before the regulatory details were finished. Safety was placed ahead of verbatim compliance, risk was placed in focus, and the program is now leading regulatory reform.

As regulators, radiation protection practitioners, and users, we are responsible for assuring that radiation risk is understood, that it is managed, that it is low, and that it is effectively communicated. Please note that the emphasis is on low, not zero. Let me restate the established legal requirements for the NRC's radiological protection mission and its relationship to zero risk. It is clear that the courts, interpreting the law, have ruled: "The level of adequate protection need not, and almost certainly will not, be the level of 'zero risk.'" Furthermore, "the courts have long accepted the Commission's definition of its statutory mandate to 'provide adequate protection of public health and safety' as requiring not a risk-free environment, but a 'reasonable assurance'. . . ." NRC is not in the business of zero risk. I disapprove of the arbitrary imposition of a zero factor to narrowly selected radiological risks. I oppose it not only because it is contrary to the law governing the NRC, but also because it hampers debate on radiological protection, and gets in the way of good radiation protection. I believe that the zero factor needs to be eliminated and subsumed into reasonable assurance; this is relevant to society.

One of the fundamental reasons to have regulation is to decrease uncertainty in the implementation of a nation's interests, without undue burden to society. This is particularly applicable to the use of nuclear energy and radiation in our nation, today. In today's environment, we need to know how to mix and match deterministic and probabilistic regulation, how to add requirements, and how to decrease the unnecessary ones--and we must have the will to do it. We have to learn how to define adequate protection in more precise terms and to apply it wherever is needed. And we should define it in terms that make sense to the American people.

Radiological protection activities have the same prerequisites as its regulation: they need to be based on facts and figures that are placed carefully in the proper context and supported by the best available knowledge and experience. As we all know, the best efforts can produce misleading results if not placed in the proper context, balanced and checked by the body of knowledge and experience. Users of radiation, regulators, and health physicists, therefore, must be mindful of the need to

make decisions based on unbiased, substantiated and fully-informed state-of-the-art information. Moreover, the need for action in radiological protection often requires decisions based on justifiable conclusions at particular points in time. In that regard, we have the responsibility to put into practice what is sufficiently known. In particular, the basis and practice of radiation protection for low doses in this country, and hopefully globally, should become an asset for decision-making and not fuel for controversy. The national need is to have a working and functional framework that ensures an adequate level of protection from low-level radiation, whatever the radiation's origin or reason for existence.

I said a few minutes ago that I will work my way directly into the relevance of radiation protection. I have been dancing around it. Now I am going to tackle it and hope you can help me choreograph the dance.

Today, in the United States of America, it is far more important that we establish and implement a radiological protection road map for low doses than to resolve, to the last decimal place, every controversy and every effect.

I would like to expand on a practical statement mentioned earlier: "We are responsible for assuring that radiation risk is understood, that it is managed, that it is low, and that it is effectively communicated."

I believe that most of us are doing a very good job understanding, managing, and making risks low. However, we could do a better job of communicating. Even when the work and studies are done well, and we communicate the conclusions well, the full significance of the results might not be realized when discussions are trapped at opposite ends of the spectrum. Regardless of our individual opinions, we need to focus on being relevant, in achieving solutions that benefit society, even as the search for knowledge continues. It appears that we occasionally forget for whom we really work and to whom we should eventually demonstrate sufficient knowledge to make decisions –the American people. We should be able to communicate our knowledge, as well as factual assessments, in a manner that benefits society. For example, I have seen a radiation dose of much less than .01 millirem (mrem) described as "not posing a significant health and safety hazard." I believe it would be correct to say "it is an insignificant health and safety hazard." Would someone dare to say ".01 mrem is not a health hazard?" Another recurring issue is the use of caveats. Caveats, which we all find the need to use, should not detract from drawing useful and applicable conclusions. For example, we would not be surprised to hear that studies reveal no detectable effects from ionizing radiation below 500 mrem per year <u>but</u> more studies are needed to . . . . This could be good science, but, apart from the caveat, we may be required to find a more immediate benefit to society.

In the realm of low-level radiation, say below 100 mrem per year (1 millisievert per year):

- Do we understand every effect of ionizing radiation on every cell of the body? No, but can the same be said about the water we drink, the air we breathe, the food we eat, ... ?
- Can it be stated that there is or there is not some very minimal radiation effect at 100 mrem above average background, or that there could even be some small, difficult to ascertain benefits? No, but can the same be said about hundreds of other environmental factors?

Today, I am bypassing discussion of the validity of the linear non-threshold or threshold models for predicting health effects from low-level doses. First, I know that this could consume the rest of your conference. Second, we have the responsibility to establish now those levels of radiological protection that we can openly defend, with mind and heart, for society's benefit.

This is why I drafted one of the major conclusions that came out of the Airlie House Conference on "Bridging Radiation Policy and Science." I quote:

> The effects of low-level radiation below 1 mSv (100 mrem) per year above background radiation cannot currently be distinguished from those of everyday natural health hazards.

This conclusion was broadly supported by the participants, is supported by the state-of-the-art science and technology, and takes into account dose levels at which there is confidence that health effects from radiation are indistinguishable from existing everyday health effects. I believe it can stand as a fundamental baseline conclusion for the regulation of low levels of radiation. I also believe that an overwhelming majority of health physicists, radiation biologists, epidemiologists, and informed citizens will agree with that statement. Let me preach to the choir: there is no way to distinguish the effect of 100 mrem per year from the effects of your hot shower or hot food or . . . whatever you do everyday. That does not mean that there is no effect; it means the effect is just one of the myriad of everyday biological and chemical responses that are assimilated by the human body. But, what if science improves, and the effect can be isolated at a particular instant? What if low-level radiation-induced genomic instability can be measured, however small? Like many other cellular responses, I believe that it will likely be assimilated and become indistinguishable the next instant.

The Airlie House conclusion quoted above is clear, it is usable, it can be communicated, and it is relevant. How relevant? It is relevant to radiological protection of the general public, site termination limits, exposures from medical diagnostics, and many other issues. It can be very helpful for the new global debate on the consideration of the scope of regulatory controls over very low-level radiation.

I am going to take the liberty of expressing what I believe is the essence of what you do as health physicists:

Radiological protection is the practice that ensures radiation risks are understood, managed, maintained acceptably low, and well communicated to the people. It allows for the safe use of radiation sources and nuclear energy for the benefit of society.

Therein lies the relevance of radiation protection.

I have a knack for using - or misusing - slightly changed versions of wonderful writings to summarize my messages. For example, I believe St. Paul would probably complain about how I will mangle his profound statements about the greater gift. Here it comes -

If I have the gift of prophecy
and comprehend all mysteries
and all knowledge
but
do not use my knowledge for the benefit of people
I am nothing.