

## SESSION 5

### PANEL DISCUSSION ON ECONOMICS VS. EXCELLENCE

**Chair: John W. Baum**

**JOHN BAUM** is a Senior Scientist at Brookhaven National Laboratory where he is Division Head of Radiological Sciences and manager of the ALARA Center. Dr. Baum has several years of experience in applied health physics, and for four years, was lecturer in Radiological Health at the University of Michigan. He has been at BNL for the past 29 years doing research in radiation protection and dosimetry. He is a certified health physicist, a member of the NCRP, and has worked with NCRP, ICRP, ICRU, ANSI, and ASTM committees. He chairs an NCRP Committee on ALARA at Nuclear Power Plants.

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### EXPERT PANELISTS

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**HARVEY J. CYBUL** is presently serving as the manager of the Radiological Protection Department at the Institute of Nuclear Power Operations (INPO). Since joining INPO in September 1986, Mr. Cybul has served as an evaluation team manager, manager of the Technical Development Department, manager of the Training Assistance Department, and Coordinator for the Senior Nuclear Plant Management Course offered by INPO. He assumed his current position in 1991. Since March of this year, he has served as assistant to the Vice President at LaSalle County Station, Commonwealth Edison Company, on loan from INPO. Prior to coming to INPO, Mr. Cybul served in the U.S. Navy for 24 years and commanded a nuclear attack submarine.

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**JACQUES LOCHARD** is the Director of CEPN (Nuclear Protection Evaluation Center). CEPN is a nonprofit organization, founded in 1976, for research and consulting in the area of optimization of radiological protection and comparative assessment of health and environmental risks associated with energy system. Mr. Lochard's main contribution in radiation protection has been in the development of methodologies and implementation tools in the field of optimization of radiological protection. Mr. Lochard is currently the Secretary of the French Society of Radiation Protection. He is also widely involved in the international radiation protection scene. He is a member of the Executive Council of the International Radiation Protection Association; a member of the Committee on Radiation Protection and Public Health of the Nuclear Energy Agency of the OECD, and Secretary of Committee 3 of the International Commission on Radiological Protection.

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## PANEL DISCUSSION ON ECONOMICS VS. EXCELLENCE

**Baum:** We have a very interesting and distinguished group of panelists. We have not only health physicists, but economists, chemists, and other specialists on our panel. Jacques Lochard is an economist, and one of our panelists has a degree in business administration. It should be a very interesting discussion. I would like to briefly introduce the subject, which is "Economics vs. Excellence," and perhaps that is a misnomer because in my mind, ALARA equals optimization equals excellence. This is the goal. The various speakers during the previous sessions have talked about goals, dose goals, and so on. There is always a question in my mind, are those goals seeking an optimum or is it just dose reduction? We are interested, of course, in the optimization process. It will be very interesting to see what our panelists have to say on this subject.

We have with us, beginning on your left, Brian Richter, who is a Senior Cost Analyst in the Division of Regulatory Application with the NRC's Office of Nuclear Regulatory Research.

Next, we have Harvey Cybul, who is presently serving as the Manager of the Radiological Protection Department at the Institute of Nuclear Power Operations.

Robert Giordano, is currently the General Electric Nuclear Energy Radiation Protection/ALARA Senior Program Manager.

Next is Floyd Spivey, who is currently the ALARA Manager at the Tennessee Valley Authority's Browns Ferry Nuclear Plant.

Jacques Lochard, who you are well acquainted with, is the current Director of CEPN, which stands for Nuclear Protection Evaluation Center.

Christopher Wood, you all know well from EPRI, is the Senior Program Manager in the Nuclear Power Division at the Electric Power Research Institute.

Finally, Alan Homyk is the Radiation Protection Manager at Con Edison's Indian Point 2 Nuclear Power Station. Alan is the man with the master's degree in business administration.

Welcome, panelists. I would like to open the session with a brief talk from each of the panelists, and then we will open it for questions and discussion. Brian would you like to begin?

**Richter:** I am providing a synopsis of what the NRC is doing with respect to its effort at revaluing the unit of radiological exposure. For approximately the last two decades, the NRC and its predecessor agency, the Atomic Energy Commission, have used a conversion factor of \$1,000/person-rem as the monetary valuation of the consequences associated with radiological exposure. That is, an increase or decrease of person-rem is valued at \$1,000/person-rem in order to allow a quantitative comparison of the values and impacts associated with a proposed regulatory decision. As an aside, I might add that regulatory actions needed to insure adequate protection of the public health and safety are not subject to a value-impact assessment and thus the \$1,000/person-rem value is not operative

in these circumstances except in assessing possible alternative approaches to achieve the necessary level of protection. Nevertheless, this value has been used as a reference point in value-impact based regulatory decision making involving routine emissions, accidental releases, and, of course, 10CFR20 ALARA programs. Over the years, the NRC has become increasingly aware of alternative estimates and mythological approaches for arriving at a conversion factor. In addition, questions have surfaced on the continued validity of the \$1,000/person-rem conversion factor because basic parameters such as the value of the dollar and risk factors have changed dramatically over this period. Such factors have potentially significant effects on the value of this conversion factor. In the NRC's view, a thorough reassessment of the \$/person-rem value and its application in NRC regulatory decision-making is needed. Therefore, the NRC is going to introduce for public consideration a proposed revision to the dollar valuation of radiation exposure that would be used by the NRC as a reference point to guide regulatory decision making affecting the public health and safety. It is expected that a Federal Register notice will be sent to the Commission this fall to seek public comment on the revised dollar value per person-rem and its supporting analysis. I might mention that John Baum's recent report, Value of Public Health and Safety Actions and Radiation Dose Avoided (NUREG/CR-6212), is going to be a key component of that action. While the Commission has not seen the proposed revision, it contains a key change from the present policy that the \$1,000 value covers all off-site impacts. The proposed Federal Register notice calls for the revised value to cover health effects only. Of course, off-site non-health effects will also be addressed with several options presently under consideration. Also, the Commission appears to be changing its course in the handling of the monetary worth of the unit of radiation exposure in another way. The Commission published regulatory analysis guidelines of the U.S. Nuclear Regulatory Commission, Draft Report for Comment, that's NUREG/BR-0058, Revision 2, in August 1993. These draft guidelines call for a present worthing, or discounting, to be used for all values and impacts including radiation exposures. Lastly, it should be noted that, in order to be consistent with the Commission's policy on metrication, it is planned that the revised value when published in the final Federal Register notice will be expressed in \$/person-cSv with the value in standard units following parenthetically. However, for purposes of continuity, \$/person-rem shall be the unit used throughout the paper seeking public comment.

Baum: Thank you, Brian. Harvey, would you like to say a few words?

Cybul: When we talk about achieving excellence in radiological protection, namely in dose reduction, how much is good enough? What can we afford? These are the questions that are facing the U.S. nuclear utilities today. Increased competition caused by deregulation and the emergence of the independent power producers has caused utilities to look very seriously at where they can cut costs. The biggest single area of focus is operating and maintenance costs. That equates really to staff reductions. If we start reducing the staffs, we have the same or more work to be accomplished with fewer people. Potential exists, therefore, for higher individual exposures. We must live with the existing plant designs that we were given. We can look to the Europeans and the Japanese who have newer plants and are achieving excellent results in dose reduction, but for the U.S. plants with the older designs, there are certain limitations that are driven by economics. For example, can an older BWR afford \$1 million/year for zinc injection? Does the dose saving realized allow them to compete economically with an independent power producer for their megawatts? Accelerated changeout of control rod blades, for example, is another area where, if money were not an issue, it would certainly be a dose reduction. But is it affordable? Full system decontamination certainly offers an attractive alternative to some of the other methods we are using now, including shielding, but can we afford it? What

are acceptable dose limits? We talked yesterday and today about different methods of reducing dose. We have talked about the prospect of changing regulations to reduce the allowed dose, but what is the number, what is the target that we need to have in the back of our minds when we are making these critical decisions? The alternative to reducing dose is *not* reducing dose. The alternative also means do we remain economically competitive, and if we don't remain economically competitive, we shut down. We can have the greatest dose-reduction program going, but if we can't sell electricity cheaply enough, we are out of business. That really is the limit that faces most of our utilities today. Don't let me paint all negative pictures. There are still improvements to be achieved. A lot of people talk about ALARA reviews. I try to present it in the opposite respect. I say, "Let's look at how we can plan work smartly. Let's do a good job of pre-job planning, let's look at all the things we can do to improve the productivity of the worker, let's use mock-ups, make sure our procedures are good. When we go in and do the job, let's do the job right the first time. We do it quickly, efficiently, and we get out." That equates to increased productivity and increased capacity factor -- and we save dose in the process. That's the thinking with which we have to approach most of our work. I also think that in looking at how we can save dose and be economically competitive, we have to recognize that we have a work force that is very intelligent. We have to challenge that work force. We have to ask them to get out of their box -- their comfort zone -- and look at new and innovative ways. Certainly technology affords us many opportunities. All too frequently when you find how the jobs are planned, workers doing the job are not involved in the planning and they are just told to go out and do the job. They have some good ideas. Another thing I think we have to do is change our paradigm as far as contamination is concerned. In the U.S. industry, we put so much emphasis on avoiding contamination, and every time a contamination event occurs, we spend so much time documenting it, that we have created a perception that getting contamination is more significant than picking up extra dose. We do a job and we will get 25-30 mrem more than we should have, nothing is documented and nothing is said. The worker gets contamination on his hands and he has to go to the plant manager and explain why he fouled up. So that it is an important consideration. I think in the future we are going to have to look very hard at do we even put people in contaminate-protective clothing? Do we put rubber gloves on to do delicate work, when maybe we should let them take the rubber gloves off and work with their bare hands and maybe get a little contamination? These are new thoughts for a lot of people, but in order to be economically competitive, that's the kind of thinking that has to be brought to the forefront.

Baum: Thank you, Harvey. Robert, how does G.E. look at these matters?

Giordano: We have seen how things are done in the radiation protection aspects in plants all over the world. We have had to live with the requirements of the specific utilities. We certainly will do that because that's part of our contract. But as Harvey was mentioning, looking at the competitive costs and the competitive nature of our business these days, the industry generating electricity business, we have to keep down the operation and maintenance (O&M) costs. Harvey alluded to a number of different items. When I go to one utility in Europe and simply see the size of their parking lot, and see the size of the parking lots at some of the locations in the United States, they are both generating power, some of them are doing a better job from the dose reduction value, some of the them are doing a better job from the capacity factor value. What's the difference? Certainly culture is some of it, the union situation is some of it, but there's room. With the pressures coming down to reduce the O&M costs, I would certainly not be surprised to see the VP or the plant manager say to the rad protection department, why are you so much overhead? What can you do at that utility that had to have a radiation control

technician escort a worker into the drywell and watch him go up a ladder while decontamination was being performed holding a meter and then walk out? Then that worker, when he was done, had to call down so that the same radiation control technician who was on standby outside the drywell would walk back in to make the same surveys while the man climbed down the ladder and walked out the path. I think that is an area where there would be some challenges as to how the money is actually being spent. We are doing things in the operating plant area to reduce the number of surveillances and frequency of surveillances to assure the plant's safety. Margaret Bennett's paper had a neat little bullet "to direct effort and expenditure efficiently." We have to take more of a look at this area. As I've seen at a number of different places, we can do better with the resources that we have. We are going to be challenged in that area to understand what's best. Why am I doing surveys every shift? Why do I go up to 80-120 additional contract radiation control technicians in preparation for an outage? That money could better be applied to the zinc injection opportunities, to the long-term source reduction activities, to the things that are preserving my plant to be generating the megawatts to keep it going. In the interest of time, I will stop there. Maybe that will be enough to stimulate some other thoughts.

Baum: Thank you, Robert. Floyd, TVA has had a lot of economic challenges in the last few years. Would you like to comment?

Spivey: Mr. Cybul mentioned several of the items that we go through daily at TVA, so I will not repeat them. As an ALARA Supervisor at a 3-unit BWR, in the last 2-3 years, economically I have had the tunnel-vision blinders of "man-rem savings, man-rem savings" taken off substantially. The items that Harvey Cybul and Bob Giordano have both talked about are very active at TVA. When I went in to justify a job, a chemical decontamination project for our last outage, for example, I probably spent at least 80 man-hours justifying to the plant manager why we had to do something that, without question, everyone on site knew had to be done to save man-rem. But I still had to spend 80 to 100 hours to justify it because it had to be cost effective. I think the biggest key, the thing that has changed in the last 2 to 3 years that interests me is the meaning of the words "reasonably achievable." Indeed, we do want to do every job with the least amount of man-rem that we can, but it can't be just man-rem- reduction-driven only. My comments are utility-driven without question. I will give you an example. Recently we had a power reduction. We wanted to go in and clean water boxes in our condensers. We agreed to go to 70% power. For that it was "X" number of man-rem to clean those boxes. My boss, being ALARA proactive, wanted to go to 50% power for that 48-hour period. It was hard for me to go to upper management and be against my radiation control manager. When I went in it was 1.6 man-rem savings at 50% vs. 70%. That was like \$24,000 TVA ALARA dollars. The loss of megawatt production dollars was \$254,000 lost in megawatts. So the 1.6 man-rem was a trade that I had to support -- and that's something different for an ALARA Supervisor -- to support not going down to 50% power. That's the reality we deal in every day. If it was a \$25,000 savings and a \$50,000 megawatt, then you may argue. But it is hard for me to argue against a \$230,000 net savings, earnings that we can make in megawatt production. Everything is not driven from the dollar sense, but you must be competitive as Harvey and Bob said, or people like me and some of you other folks that are at utilities will be unemployed, because if we don't make megawatts competitive, we won't make megawatts.

Baum: Thank you, Floyd. That relates very closely to what Jacques Lochard was saying earlier about the relationship between radiation protection and the costs of production, which incidentally I referred to as the gamma factor in alpha, beta, gamma dollar/rem values in

the NUREG report to which Brian referred. That NUREG is out on the ALARA Center table in case anyone wants a pre-publication copy of it. Jacques, would you like to say a few words?

Lochard: I will be very brief, because I think I already delivered my message. I don't want to abuse the time. I think the potential synergy between improvement of radiological protection and improvement of production activities is a key issue for the whole industry. We have to look for new ways of integrating radiological protection within the production process and to stop to see radiation protection like the fireman's station. Living in a nuclear power station or any nuclear installation is living with radiation, and we have to integrate this dimension in the project planning of the installation. I think the right way is to adopt a management approach, a management perspective in dealing with doses as we deal with money, keeping in mind that we have the problem of communicating with the operators and also the public, which is a very important point.

Baum: Thank you, Jacques. Chris?

Wood: I'd like to follow up on Harvey's and Floyd's comments. We are very concerned that, with the pressure to reduce O&M costs, ALARA is going to suffer. We are going to see that, with fewer staff on site, individual exposures are going to increase, and total exposures may increase as well. I'd like to take one of the last slides that Jacques showed in his presentation this morning (see paper 4-6). This curve here, exposure savings against cost. The point about ALARA is that the first things you do are undoubtedly going to be cost effective, they are going to produce savings. An example there is that perhaps a part system decontamination is going to cost \$400,000 and save 300 rem. It is obviously cost effective. Now, if you go to the full system decontamination in Harvey's example, for some plants, you know the French plants that can replace a generator for 130 man-rem, that's going to be to the right of the curve. It's expensive and not going to give a great deal of savings. For other plants it will be cost effective. My role at EPRI is to develop tools to help utilities optimize and try to get to that point -- the inflection on the curve here. In my presentation yesterday, I showed a cartoon for hydrogen water chemistry advisor, and that was done for a different reason. It was working out the most cost-effective way of tackling a stress corrosion cracking problem. We are applying the same approach now to radiation protection, and we will be looking at things like cobalt replacement. What is the optimum amount of cobalt replacement? Obviously, it is not cost effective to change out the stellite in valves that are operating perfectly well, but it is cost effective to use cobalt-free alloys if you are going to change out valves anyway because they need replacing. So that is the approach that we are going to be adopting to develop a very user-friendly computer tool that will allow the utilities to plug in their own plant-specific numbers and work out the optimum course of action.

Baum: Sounds good. Alan, I know that you have had a number of opportunities to do cost-benefit calculations in your work and you've had a lot of good applied experience in addition to your business administrative background. What do you have to say?

Homyk: I guess the point I want to make is that there's not a decision we make, at least at our utility and many others, that doesn't somehow involve the cost-benefit issue. It's really an attitude and a culture at our plant that we are really running a business. Not that we don't want to be safe and excellent, but the bottom line is to keep the plant running, and to keep nuclear power going we need to be cost effective. And that really permeates every decision we make in our life at the plant -- every ALARA decision and every operational type decision. But we need to remember that problems also pose

opportunities. I will give you an example. Last outage, I told my health physics manager, "I want to bring ten less techs on site this outage. I don't think we need that many. I think there are tools out there that will allow us to use less staff." So we looked at our present system for job coverage and remote worker wireless monitoring. He said, "I think I can save people through this new technology." I said, "Are you confident enough that you can guarantee me that? In other words, I want to go to the VP and say that we are going to pay for that system in one outage by the ten less techs you brought on site." Well, he had enough confidence to make the promise and deliver even more. We need to think about how funds can be re-targeted to other areas. If you are bringing 100 rental techs on site, maybe you can bring in only 80 and then use the difference to fund some technology for your people -- the remote continuous air monitors, the remote sensors for dose rates, and things like that. We also need less compartmentalization -- why do only chemists take oxygen samples of areas? Why can't the HPs do that? You can do a little bit of on-the-job training, put it on the qualification card, attend a half-hour of classroom training, and know as much as you really need to know to run an oxygen sensor. Why not save the extra man and dose associated with going inside containment under power. Again, Mr. Giordano talked about survey reduction. There are a lot of simple things that can be done. Why are we taking so many surveys? For example, our Unit 1 has been non-operational for 20 years, and if you never once have had any change in gamma rad levels well maybe you don't have to do monthly surveys. There are other obvious, common sense type things that we all can be doing. You may take thousands of air samples a year and never have had any airborne activity in the areas -- so work smart. Prioritize your efforts. There are many simple things we can do. We don't need more money, we just need to work smarter. I'll give you one final example. I used to talk to the maintenance manager about leaks. There would be a film of boric acid on a component and he'd say to me; "I don't want to fix it. It's not cost effective. Why don't you just wipe it off?" I said, "I'm getting dose wiping it off. I'm generating rad waste wiping it off. Because there's a film there, I have to post it as a contaminated area, so I'm generating laundry, anti-contamination clothing, and the film may eventually result in airborne activity -- it's a big cost." So don't think about the cost of doing things, think more about the cost of not doing things. I can't think of many leaks on the nuclear side of a plant that aren't cost effective to fix. That's what we've found, and we trend and track them. We put a drip catcher under every leak as many plants do. But we go beyond this and measure the leak rate. We take a chemist's graduated cylinder, we quantify the leak, and put it in terms of \$/year of not fixing that leak. We had a number of expensive leaks about five years ago that have been eliminated. You can get people's attention if you communicate effectively and use common sense. I guess the thought that I want to leave you with is that many of these things, as Mr. Giordano said, reduce cost, foster excellence, and make your job a little easier.

Baum: Thanks very much, panelists. Those were all very important thoughts and comments. Before opening it up for other questions and discussion, I would like to tell Alan that he doesn't realize how many hundreds of thousands of dollars he lost by not being here yesterday. This process may be the most cost-effective thing you can do. Does anyone have a question or a comment for the panel, or would the panelists like to question each other?

Aldridge: One of the costs that really drive ALARA is the public perception. What does the public think of the activities that we are doing. Within the DOE and the Health Physics Society, we are taking a lot of monies and a lot of dedicated time to get out and teach and educate the public. You folks in the commercial nuclear power industry, are you taking those kind of activities in a positive, proactive role? If so, what are you doing?



- Unknown: Just one comment. In every decision we make, we have to weigh, in addition to the true radiological consequences the perception consequences, and many times that is what drives the decision. It's a very important part of our decision process.
- Wood: I guess the industry's official response will be that the USCEA that was which is now part of the Nuclear Energy Institute did put out the educational information. My reaction is that it almost completely fails. It is regarded as propaganda and is not accepted by the public. My wife says that I would do much better spending a portion of my time going around to the high schools and trying to educate the kids, which I did after the Chernobyl accident. I went to my daughter's class to talk about Chernobyl and what it meant. I have some sympathy for what you are saying.
- Homyk: There are a couple of things I am aware of that are being done. Again, at Indian Point 2, we just try to get people into the plant. Sometimes people have the notion that nuclear plants are evil, and if they can just come up and visit the plant, a lot of times that can diffuse fears that they have. We have a steady stream of visitors at our plant. I saw a couple of nice things going on at other utilities. One is that GPU has a tape aimed at not only the workers, but the families of the rad workers, because if you think about it, every one of us touches many people who know that we work at a plant. Their philosophy is to use a tape and a nice little manual to communicate the risks of radiation. The questions people might have are communicated to the workers so they can communicate the answers to their families. Again, think about the contacts all the family members have. So it's a good effective way to communicate. You can almost think about it in terms of disciples getting the information out. The other idea is that Chris Wood is heading up through EPRI is a radiation worker handbook that addresses basic questions people might have. Such as, what is the risk of bringing contamination home? Really simple questions that might be asked by family members. Those are the two things I think would be effective.
- Lochard: I would also like to comment on this issue, because globally we have been quite bad within the last decades about communicating about radiological risk. For example, during yesterday's debate about the limits, I mentioned that the majority of the people, not only the public, but workers, are living with the idea that the limit is something like -- you are safe if the limit is respected, and unsafe if it is not respected. This is because the key ideas driving radiation protection management have not been really explained to the public at large and also to the workers. For a few months in France we have this experience where we do extensive training of workers to commit all the operators in French power stations to the new ALARA program which has been launched by EDF and was presented this morning. For most of those who attend the courses, they are just discovering this idea of dealing with radiological risk, the idea of allocation of resources, the problem of risk transfers. If you really explain all the issues in very simple ways, operators become aware that the problem is not just reducing limits and claiming being safe at any cost. We are living in an unsafe environment, and we have to deal with it and manage it in the best way. I think this is a real challenge. If we are publishing ALARA techniques, ALARA models, and all these alpha values, and so on, without communicating with the public and the workers, it will fail.
- Baum: You are coming from France, you don't know what an unsafe environment is!
- Giordano: I've seen several of the utilities have speakers' bureaus. These are low-cost, highly effective communication activities that members of the utilities take up on their own. As Chris was saying, to go talk to the schools and to get the message out that way. There are open houses at some of the utilities. When I was associated with the DOE world and the

Shippingport decommissioning project, we actually had an Explorer scout troop that came on site, with their parents on occasion, but certainly by themselves, where they had a project that was associated with construction and dismantling and these scouts learned things. But they also, subliminally if you will, understood a little bit more about what was actually happening. It's not something unique to the commercial world. There may be some things that the commercial world is able to do because they don't have some of the governmental restraints on them, or how they are speaking for the government. There is a lot going on in that area. I know that the Health Physics Society has a session on communication with the public that you may also want to look into.

**Borst:** I wonder if you could expand on these two items. First, if we ask any of the rad workers in our plant, "What is ALARA," you'll get "time, distance, and shielding." When we talk to management about ALARA practices, exposure savings, they want to hear dollars. In almost every case, if we could do the job for less exposure, that means we've done it more efficiently, and that's the dollars that management can really relate to. As a utilities industry, we need to drive our presentations to management in the dollars aspect more so than in straight exposure, which is kind of intangible to begin with. Secondly, a couple of years ago, all the U.S. utilities said that their goals are to be best quartile. Well, obviously, not everybody can be in the best quartile. Some of those have backed off and said "Let's shoot for better than average and go from there" when they realized they couldn't make that. One thing that management failed to pass on to the program managers is that they want us to be best quartile, reduce our exposure by a half, but we don't get anything to do it with. So I hope we can ask our management, when they give us that direction, "how badly do you want me to be best quartile, and how much money are you going to give me to do the kinds of things that we really need to do?" We've all gone through the efficiency phase, reaching our bottoming out point of what we can do with nothing. We need some extra help in automation, remote technology, and things like that.

**Baum:** Frank Rescek, you also have a degree in business administration. What words of wisdom can you give us?

**Rescek:** I just had a comment or a follow-on. Commonwealth Edison recently has built the Powerhouse, up by the Zion Station, which is open to the public and scout troops. The public went through there and it's been a tremendous success -- one of the bigger drawing attractions for that type of center in Chicagoland. There are visitors from all over who come there and get to see and learn about various forms of energy and energy production. That's one thing that Commonwealth has done to educate the public. Also, though, I wanted to hear your thoughts on the NRC's role in this area. I think it's very important that, I understand, the regulations are first to ensure that you've met a level of protection that's safe, but then the regulations also don't want to convey a misconceptions of the risk to the public as well. Could you comment on that as well?

**Richter:** Are you referring to adequate protection and that role vs. when \$/person-rem comes into play?

**Rescek:** I'm not referring to \$/person-rem, but, for example, the decommissioning and decontamination rule-making process with the public and the EPA. The first draft that came out on that rule focused on goals going to zero dose and then using the 3 mrem as maybe the standard to show that you are close enough to zero. The whole way that it was written would give the public a misperception that it makes sense to try to go to zero.

I think that the slant of the language may confuse the public that one could achieve zero risk.

Richter: Unfortunately, I have not been involved in that action. I wish that Don Cool were still here. I'm not sure if any of my colleagues from the NRC might have something to add on that.

Baum: Frank Congel is going to say a few words.

Congel: The words that you pointed out that were indeed in the earlier draft have been changed. In fact, one of the reasons Don is not here is because we are going through another review process. The proposals for decommissioning standards have changed, but it is a number, it is measurable. The values, whether they will be approved or not, I can't say, because they haven't gone to the Commission yet. The way the values are going to be stated is a target value of 3 mrem would be a de facto compliance with an ALARA standard. However, the standard that you would have to meet above that before you did an ALARA analysis, is going to probably be on the order of 15 mrem. This is carefully coordinated with EPA. I can't emphasize enough that this is preliminary and is a staff proposal that has not been formally approved. The point is that your comment is important and is being regarded by the NRC in the same light, and that the word changes are being proposed right now.

Baum: John Connelly from DOE has a question, and I have to make sure to let him ask it, because he is our project manager on the DOE ALARA Center effort, and he has been very good about not asking questions a couple of times because we were getting near the end of a session. Please, John, go ahead.

Connelly: Actually, this is a comment, and something some of the people may not know. A lot of money is being spent because of public perceptions. About 10 years ago, I was called in by a local middle school teacher to teach a class to 7th and 8th graders because a TV show about "the day after the bomb was dropped" scared his students. When I looked at his textbook, I could see why he was disturbed about trying to teach his students. The school text book was anti-nuclear. It showed a mushroom cloud and discussed the LD-50 (lethal dose to 50% of the population). The book then showed a nuclear power plant and indicated, "well, it's safe -- maybe." The only thing I had going for me was that I was a health physicist, and that I had worked at that particular plant for 10 years, so I could stand up there and talk with some credibility to his students. I brought a portable frisker (contamination monitor), a sealed source, and some instructional slides. I turned the students around by telling and demonstrating to them what was real. I also told them about the positive uses of radioactive material in various fields. I think a lot of the school books are stacked against the nuclear industry, and the schools are training these young people to be anti-nuclear because of a lack of accurate text books. There have been studies done that show the press to be typically anti-nuclear. Some of the press act this way because they are dealing with a technical subject that they' don't know anything about. If you read the average article in the newspaper, they will misuse the information supplied to them.

Secondly, I took the Myers-Briggs Type Indicator test at a Health Physics Society meeting. What I learned is that health physicists are typically introverts, and only 1% of the population matches this profile. Since we don't match with the average person, we don't click on this level. Therefore, it's no wonder that health physicists have difficulty

communicating with the general public, especially when they are talking about an emotionally charged subject.

Thirdly, I took a risk management course and I learned that the average technical person that takes a risk test will come out pretty close to the correct risk. The more familiar they are with a particular subject, the more accurately they assess the associated risk. If you compare them to the general public, it's widely different. The general public changes the risk by orders of magnitude. If you give them a risk number associated with an activity, and there is some obvious benefit to them, such as driving a car, they automatically lower the risk by about 2 orders of magnitude. If they do not perceive an immediate benefit to themselves, such as the construction or operation of a nuclear facility, they increase the risk by about 2 orders of magnitude. Suddenly, there is a great divergence between actual and perceived risk that most of us don't realize. So, it doesn't matter how technically correct you are, the general public will change actual risk to their own perceived risk depending upon their own personnel needs.

Zodiates:

Nuclear Electric is nowadays facing the economic realities in the U.K., it is one of the daughter companies from CEGB. We are facing the same problem. We have to educate the public to understand the risks and the benefits of nuclear power. For quite a long time now, more so recently, each of our power plants have visitor centers which are geared mainly toward the younger people -- children and teenagers -- with a lot of touch screens and a lot of models, so schools from the area can visit the centers and they can become more familiar with our power plants. In addition to that, we have spent some time producing educational packs for primary schools to assist them with their curriculum on energy production, and therefore, try to educate the youngest generation. Recently, we started carrying out surveys of the public to find out which parts of the public react against nuclear power and therefore target other types of complaints and alleviate their fears. The most important item, at least in my opinion, is not doses to the operators, but discharges and our long-term waste disposal. You suffer from the same problem, because looking at yesterday's newspaper that was delivered in the hotel, there is a big article about waste disposal; if I remember correctly, it was Minnesota State. Those are the items that the public becomes aware of and fear from nuclear power. It is time for our politicians to solve this problem and therefore alleviate the fears of the public.

Haynes:

I would like to pick up a bit on some of my comments yesterday. Ontario Hydro is a large nuclear utility that has made a major investment in self-protection philosophy for a long, long time. It has a lot of experience in training its workers extensively in radiation protection, in the fundamentals, including ALARA, the biological basis of it, and the benefits of it. Our labor unions are very much involved in formulation of policy in radiation protection and ALARA specifically, in dose limitation, and I just want to reemphasize the importance of having buy-in from your work force. I think it is well worth the investment. I recall that a couple of years ago there was a public debate in the city of Toronto in which some politicians had some idea about declaring Toronto a nuclear-free zone or some such nonsense, and Ontario Hydro was front and center in that debate, both the management and the labor unions. Without a doubt, the most convincing advocate of the safety of nuclear power was the labor leaders. Clearly, the public much more readily identified with an individual like that speaking in favor of the nuclear option. They see him as a far more credible source than corporate management. Although sometimes it's very painful to deal with organized labor in formulation of policy on specific issues in radiation protection, overall I think it is well worth the investment.

**Baum:** We have just one or two more minutes. Would any of the panelists like to make a concluding comment?

**Giordano:** One thing that I did not hear that occurred to me was when I was listening to the animated dialogue at the 10CFR20 workshops, I was pleased to hear Jim Wigginton and company talk about the intended unified approach to administering this new regulation to avoid the things that have occurred in the past where well meaning, well intentioned local inspectors were establishing criteria at ground levels that grew into little cost-benefit types of actions that were implemented by the plant. I know that process is ongoing. My point is that we have to be careful, and we have to think about what is suggested, and to make sure that it is right for safety and right for the business. When I hear an ALARA individual tell me within the last couple of months that, "Yes, the law is that you don't have to badge someone if they are 10% of the limit or 500 mrem, but my local inspector wants that number to be 300," it makes me wonder how far we are headed down that path. In the continuous improvement verbiage, we have to keep a handle on ourselves and make sure that we are not ratcheting ourselves into increased costs to provide safety with very little benefit in that area. I'll pass that on as a concluding remark.

**Baum:** Thank you very much. The message that I'm getting from this is that it's not enough for us to be excellent, but we are going to have to educate the workers and the public to the fact of what is excellence, and how close are we to it. Thank you, panel.