October 18, 1990

NOTE TO: Jim

FROM: Janet

SUBJECT: TEXT OF YOUR REMARKS AT THE NAS SYMPOSIUM

I have transcribed, as best I can, your precise remarks made in response to questions received following your keynote address and as part of the panel discussion. Other speakers' comments and/or questions have been, to a large extent, paraphrased.

Questions following Keynote Address

Q: Bob Williams of EPRI. There was a lot of comment during the time the EPA criteria was (sic) in draft that it should be based on a system analysis approach. Do you think that would draw any water in the legal arena in terms of addressing one of the two issues you raised and is the need to link the criteria to public health and safety rather than to technical feasibility?

JRC: I guess I don't see that issue having the same bearing as the technical nexus issue. It is clear that whether or not the EPA standard is based upon a well-documented, disciplined analysis of the health risks that it's designed to address, set forth when the standard is published that the litigative challenge that one faces in demonstrating compliance with that standard derives from its inherent probabilistic nature more so than the question of whether it's based upon that clear nexus to what's necessary to protect the public heath and safety. It does seem to me in the approach that I've argued for here, that the significant concerns that exist [are] with our ability to litigate a probabilistic licensing framework in an NRC proceeding. Recall that we've had 30 years of experience in licensing nuclear power plants but by and large if not exclusively, certainly in the early years, in the context of a deterministic licensing framework. And it's that framework, with a considerable dose of engineering judgement, that we have had the greatest experience with. We have not, to any significant degree, in fact there are those who argue that even if we could we shouldn't, relied on a probabilistic framework for the licensing of the repos...of anything including, of course, the repository. The approach that I've propounded here has, as its principal advantage, it seems to me and where the principal necessity exists in my mind, the objective of establishing a firm technical nexus between the NRC criteria and the EPA standards. One can do that, it seems to me, without necessarily having a firm underpinning to the EPA standard and the kind of documented

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analysis that the Commission has asked for in its comments on draft #2. That certainly would be desirable for the purpose of permitting us to evaluate the stringency question or for those who might want to evaluate that in the context of what we do with other regulatory risks. But it doesn't seem to me that it's an essential prerequisite to establishing the technical nexus between the two standards. I do think that what we have today reflects, I think, sound technical conclusions that there is some nexus between the two. And in fact, the NUREG that I referred to establishes that indeed it is, as I indicated in my remarks, more likely that if you meet the NRC regulation you have complied with the EPA standard. We've described that as 'close, but no cigar' in a legal context because it seems to me that one is still faced, even if that general technical nexus exists, with litigating both approaches in the absence of a clear technical basis--technical nexus, if you will--between the two standards. In answer to your question, I don't think it's essential to have that health-based analysis for the EPA standard for purposes of this question and the difficulties of litigating a probabilistic standard in our proceeding but I certainly think it's desirable for other reasons.

Q: A deterministic standard might be very difficult to apply in the law for geology. It seems like if you favor only deterministic standards you're really emphasizing, then, the engineered barriers.

JRC: Well, the principle of this approach is really twofold. Number 1, it wouldn't be strictly a deterministic standard from a standpoint of what the licensing framework is based upon. Indeed, it would, as I indicated, statutorily, I think, have to establish a nexus between the standard of EPA and the regulation of the Commission. It does seem to me that a deterministic standard, on its own, A) is an approach that we have been more familiar with in the past and B) we know will provide us a good deal of confidence. In fact, if one examines the subsystem performance criteria in §60.113 on their own, we do have a high degree of confidence that that approach can, in fact, satisfy many of the concerns that have been raised. What we don't have at this point is a nexus between the deterministic standard--the deterministic approach--and the EPA standard. I am troubled by the prospect that we face today, which, quite frankly, as I indicated in my remarks seems to me to pose, at least at this point, the challenge that we will have to today litigate both a probabilistic and a deterministic approach to licensing this repository. It's not clear which of those two proceedings would take longer. As I indicated, we have significant difficulties in litigating probabilistic questions, but I suspect that there are also are several

aspects of our deterministic regulations--the groundwater travel time is the one that I have in mind--that may make the deterministic framework difficult to litigate as well. I can say with some confidence that it will almost certainly take longer to litigate both licensing standards.

Q: I'd like to ask two questions. First of all it seems to me that you're objection to probabilistic standards in the litigation part of the license application is based upon the experience of the NRC in using deterministic standards for reactors. Indeed, it seems to me, and I was involved in the early stages of the development of the NRC regulation, there was a strong preponderance of views in the staff at the time that we should treat the repository very much like a reactor...that philosophy still persists. I am not persuaded by your argument that because we've had experience in regulating a reactor, reactors with deterministic standards, we would therefore automatically say we are better off using deterministic standards in the relationship of regulating a repository. As a previous speaker said, I think, in fact many components--not the least, to 10,000 years that alone, for that goes far beyond our experience as engineers, that in itself almost demands that there is probabilistic standard. So, my question to you is: Is that the only reason why you oppose, that you foresee the difficulties in probabilistic standards in the legal framework? Because the bar takes them now--where cases have been fought in court using probabilistic techniques, including subjective probabilities and things like that. So it seems to me whilst I recognize that such is an adventure and difficult, I am not persuaded that the deterministic is necessarily better. I also think about your point of doing both of them is unnecessarily restrictive.....

JRC: Good question. Let me be quite clear here. I'm not proposing that we abandon altogether the information or the methodology of probabilistic assessment. Indeed, I think we've seen over the course of the last several years significant advancements in that field in the context of applying that methodology to assessments of repository performance. It seems to me that it is a different thing to say that that approach ought not to serve as an independent licensing basis for the repository which I fear we are facing today. The argument is really twofold. One, we have, I think, seen over the course of the past 5 years a continuing debate within our agency and between the two agencies over our ability to implement the probabilistic standard. And what I am reflecting here, I think, is an assessment of some within the agency including some within the legal community that as a practical matter it will be very difficult to implement that standard if it is the sole basis for licensing the repository. I can envision a

situation where a licensing board member scratches his head looking at a curve that crosses those two steps and wondering where the curve, or an alternative curve, might come below or above both of those steps, what result ought to be reached. The second observation that I guess I'd make (and it's a comment that I think Drs. Okrent and Kouts have raised over the years and most recently in their comments to the Commission), it does seem to me that as we have done with reactors that the role for probabilistic assessment is one that provides supplemental information, it provides some insight, some useful insight, and ought to be used in that context. Even with the significant advancements that we've made in probabilistic terminology and in the reactor context as well, the basic licensing framework and the basic framework for reaching regulatory decisions remains a deterministic, engineering judgement framework with the probabilistic information vote most valuable in helping one reach a conclusion but not as an independent and separate set of requirements that must be met. And it is that fact, that concern that it seems to me places so much emphasis on meeting two independent sets of licensing criteria that I fear is going to overwhelm the program.

Q: [Questioner questions JRC characterization of Part 60 as deterministic, citing 1000 year pre-emplacement groundwater travel time and 300-1000yr substantially complete containment criteria]

JRC: Yea, I've used that terminology in a very general way to refer to what I think has been recognized as the basic difference between the licensing framework of the two agencies. Probabilistic is best defined in the EPA standard and I don't propose to go into all the details of that but I guess, in my judgement we view that, I view that as a probabilistic licensing framework. Deterministic, I guess is best characterized perhaps by the 300 to 1000 year package lifetime--issues that lend themselves to engineering judgement to a greater degree, although not to the exclusion of reliance on probabilistic judgments or probabilistic information.

Q: [PARAPHRASE] Jim, the NRC, as you pointed out started in 1978 to take on EPA for using a very rigid and probabilistic approach. And then they seemed to back off and indeed they suggested that if EPA would qualify the language it would be alright. EPA did so. Now there is an inconsistent standard--Parts A and B. However, it seems that NRC has not specifically said to EPA that standards are inconsistent or even not achievable. Any activity within NRC to take a more direct approach?

JRC: Well, as I indicated, and you've summarized the history somewhat accurately, the NRC did raise this question in 1978 in the context of and after the comments of the ACRS and others within our staff raised the question about the feasibility of applying a probabilistic standard to this facility. That discussion went on, best as I can tell, of course, before my time on the Commission, for a number of years culminating in the language that I quoted in my remarks and that was included in the supplementary information of the EPA standard in 1985. The language is generally referred to as "we don't expect proof in the ordinary sense of the word" meaning in the engineering judgement sense and "reasonable expectation" is what we're looking for in the licensing of this repository. Having said that, it does seem to me, based upon the comments that we have recently submitted to EPA on draft #2 and with the analyses that have been done in house by the staff, there continues to be, even with the language from the 1985 standard, a concern over whether we can implement the EPA standard. I wouldn't go so far as to say that I've reached an irrevocable conclusion that one cannot do that. Of course, as I've argued in my remarks, one need not do that if there's a clear nexus that can be established between the NRC's regulations and the standard so that, as we do in other areas where this division of responsibility exists, we license the repository, the facility based upon NRC regulations. But it does seem to me, as I indicated in my remarks, that this issue, the implementability of a probabilistic standard, if it is in fact as I view it an independent licensing basis under the current framework, is one that we need to clarify. The EPA and the Commission in their discussion as the standard is developed need to have a clear sense, it seems to me, now as to whether this standard can, in fact, be implemented in the kind of licensing framework in which we would have to apply it.

Q: Jim Tourtellotte of Eckhart and Siemens (?) [PARAPHRASE] NRC's regs re: engineered barriers, specifically waste package have been widely interpreted to mean that one can't take credit for package lifetimes > 1000 years. Recently, staff issued a little policy statement stating that "we really only meant that to be a minimum". Distinction between the staff policy paper and Commission policy? Intent of Commission to further clarify?

JRC: Yes, the staff has issued the position that you've referred to and because of the manner in which it is issued it does reflect, I think, the current thinking of the staff but they understand that it's not binding on the parties or on the board itself. It is not a General Counsel interpretation, if you will, of the regulations or an amendment to the regulations. That's an issue that it seems to me is

deserving of attention. I'd like to take a look at what the staff's proposed policy actually allows. But, it does seem to me that the more difficult question, and I touched on this in my remarks, in the context of evaluating alternatives, that presupposes, it seems to me, that an overall performance objective--in fact the regulation itself specifically says that in order to approve alternatives, the approach proposed must satisfy the same overall performance objective--It is unclear to me if the nexus that I've described between the EPA and the NRC standard[s] does not exist, or at least not in as firm a manner as I think is legally required, it's unclear to me looking at the regulations in Part 60 what it is that that "overall performance" means. What is the safety objective that one is seeking to achieve with the 3 subsystem performance criteria? And in order, it seems to me,to permit an evaluation of an alternative approach that would rely, let's say, to a greater extent on the package and to a lesser extent on other criteria, it seems to me you have to have that sense of what the overall safety objective is in the regulation itself--either as an inherent part of the regulation or through the nexus that I have described to the EPA standard. That's the first problem. The second problem, as a practical matter, it seems to me that the affirmative action that's required by the Commission to implement that provision and approve alternatives, unless I miss my bet, is going to be very difficult to actually implement. It will be perceived, although the standard is not drafted with this specific language in mind, it will be perceived as the Commission exempting the applicant from one of the subsystem performance criteria. And in the context of criteria that were developed to reflect what is feasible to achieve, that seems to me to be a difficult thing to do in the context of the public reaction that might come to pass--allowing the applicant to do something on any one of the criteria that is less than what is feasible to achieve. Those are two questions that it seems to me are worth pursuing. I will evaluate carefully the position that has been drafted. It does seem to me that it moves in the direction of clarifying this issue. It may or may not be inconsistent with the language of the regulation itself. I haven't examined it that carefully. But it does seem to me that the staff is thinking along the same lines in terms of the flexibility that the Academy and I have been arguing ought to be reflected in the application of the subsystem performance criteria.

Q: Rich Van Konynenberg of LLNL. Just as a point of clarification, its my understanding that when EPA promulgated 40 CFR 191, in the explanation before the regulation they stated as their goal to establish a

regulation that would produce no more than 1000 premature cancer deaths over 10,000 years from disposal of the waste from 100,000 metric tons of spent reactor fuel. You were talking about the basis of the regulation being what was doable, what was achievable. I think they also stated a health and safety goal there. Whether they were actually able to do that is another issue but I think that that was their objective.

JRC: Yes, I recognize that that reflects the history of the development of the rule. It does seem to me that its quite evident in looking at the administrative record that, including the A.D. Little study that was prepared at the time, the standard does indeed reflect perhaps an effort at the outset to establish what was feasible to achieve. At that same time, or following the development of the standard, the focus shifted or included a discussion of things like the risk that would be associated with an unmined uranium ore body, the 1000 cancer fatalities in 10,000 years. The point here that I'm making, and understand that I do not take a personal position at this stage on the stringency question, the point that I've made here and that's made in the Commission's letter of comment on draft #2 is that that continues to be a subject of considerable discussion. Of course, the SAB raised it back in 1984. There were earlier discussions of that with our own Advisory Committee on Reactor Safeguards. Most recently the ACNW, the Technical Review Board and, in an indirect way, the DOE in its comments late last year have continued to raise the question about the stringency of the standard. What I've suggested here, without, at this point, taking a position on whether I think personally those standards are overly stringent, is that it appears to me that a thorough and documented and disciplined analysis of the basis for the standard would be helpful from EPA as they move forward with the development of that. We may well disagree within the community here as to whether their conclusion reflects an approach that is overly stringent. And indeed, as I suggested, I think there probably will be some disagreement when you get to questions of this kind, regulatory policy, if you will, as opposed to technical questions. We may well disagree on whether the approach that they've taken is overly stringent, but it seems to me that it would be helpful at this point to have that kind of analysis. We've asked for that in our comments on their draft #2 and I hope it's forthcoming.

Panel Discussion

Q: I have a question for Commissioner Curtiss. I learned this "technical nexus" expression quite well and I see exactly what you mean there, but I didn't grasp from what you said

this morning who's responsibility is it to provide that? And who will provide that?

JRC: I guess in my judgement its the joint responsibility of the two agencies that have established the standards beginning, first, and presumably earliest in time, with initiative at EPA. As I indicated in my remarks, the historical development of this issue, of course, involved the NRC standards preceding the EPA's thereby complicating the issue. But it does seem to me that the question of the relationship of the EPA standard to the NRC regulation and vice versa is important for us since it is in fact the licensing requirement in NRC regulation of the repository itself but I do not believe that we at the Commission can address that issue in isolation. It seems to me its a joint effort that the two agencies that, in this country, are responsible jointly for the establishment of the health and safety framework and the corresponding implementing regulations have to work closely together on resolving.

Q: (to the panel as a whole) [paraphrased] What kind of regulations should we devise to accommodate the eventual discovery of a cure for cancer?

JRC: Let me start off with maybe the lawyer's perspective here and then I'll toss it to the others who have the technical background. As with so many of these issues it seems to me that there may well be a technical consensus or at least the mainstream of technical opinion could well reach some understanding and agreement on the possibility of that happening but as I do viewing these issues from what will ultimately be the legal perspective of <u>proving</u> that to be the case, it seems to me the important question there is who you put the burden of proof on because I can't imagine who can prove that in the context of a legal proceeding even though it may be something that one can project from a technical perspective may well come to pass.

Q: Robin McGuire, with Risk Engineering. Let me address a question to Commissioner Curtiss. I've heard a conflict today between your comments which, on the one hand, say that the only way, and from a legal aspect, that the we could license a repository is through deterministic procedures because of our experience and precedents and, on the other hand, speakers who say that the best way to evaluate a repository and determine the health effects is to account for uncertainties and use probabilistic procedures. I think that the board on radioactive waste management report reflects that also. So how do we resolve this conflict? How do we get on with a process that allows us to evaluate a site, accounting for uncertainties, and also be successful

if that site is acceptable from a safety viewpoint and license it [Besides shooting the piano player]?

JRC: Well, let me clarify my position so you understand that deterministic licensing is not the only way to evaluate the suitability of a repository. What I have indicated A) is that if the probabilistic framework is indeed to serve as an independent licensing basis, or perhaps the only licensing basis, we need to have a clear understanding up front as to the feasibility of implementing that approach in the licensing process. I submit to you that the experience that we've had over the course of the past 10 years and the most recent indications that we still don't have that clear indication attest to the difficulty, the continued difficulty, of implementing a probabilistic standard. Secondly, it seems to me that what's implied in the framework that's been established in this country, perhaps uniquely, with two federal agencies sharing the regulatory responsibility, as I indicated in my remarks, is that one establishes the general standard and the other establishes the implementing requirements that will serve as the basis of licensing and will specifically be the focus of the licensing proceeding. Today that happens to be deterministic criteria and it seems to me, if that's the case, and if that nexus exists to the EPA standard, my preference, quite frankly, today is that we proceed with the deterministic standards. Not to say that the probabilistic standard will ultimately prove to be unimplementable in a licensing proceeding, but we haven't seen a clear path as to how we get there yet.

Q: My name is Lokesh Chatturvedi. I'm with the Environmental Evaluation Group in New Mexico working on the WIPP project. I'd like to join the discussion on the probabilistic vs. deterministic criteria. It seems to me that the only way to predict natural events or future geologic events is by assigning probabilities to them. Otherwise in doing performance assessment we will have to assume that a volcanic eruption will take place at Yucca Mountain site or if one drills a hole into the repository at WIPP that one will definitely encounter a brine reservoir. The best way, the most realistic way to approach that is to assign probabilities....but, without probabilistic analysis it will be more difficult to license any repository if one has to make assumptions of hazardous natural events absolutely taking place rather than assigning probabilities for them taking place.

[Comment by Wirt and others]

JRC: Let me add to that. I have two comments. In particular I don't think anybody's arguing that probabilistic risk

assessment will not play any role in the process for evaluating the suitability of a repository. Indeed, I think everyone recognizes, including the ACRS where they were critical of that approach at the outset, that some reliance will be placed upon PRAs to provide insight into the suitability of a repository. It seems to me that the question is the degree. Do you establish as an independent, as I think it is, licensing framework an approach that requires a demonstration that goes beyond simply drawing upon the insights that PRAs provide and use that as a basis for determining what it is that you will deem to be suitable. Secondly, it does seem to me, and I've talked about this to some extent today, that ultimately the suitability of Yucca Mountain will be evaluated in an adjudicatory context at the Commission. That may or may not suggest that the outcome would be different and the questions that one is asked, the applicant is asked, might differ from what Wendell faces with the WIPP site. It does seem to me that that, at least from my perspective, poses perhaps some unique challenges that may make it more difficult to apply a probabilistic approach and rely on that as the basis for licensing in an adjudicatory context.

Q: [PARAPHRASE] In an effort to put urgency behind all your interests, what efforts are being made to quantify the risks, exposures of indefinite, near-surface storage?

[Wirt responded re: DOE efforts to estimate the comparative risks of leaving already buried TRU undisturbed vs. exhuming it and transporting it for burial at WIPP]

JRC: Let me say that on the commercial side, we at the Commission are under an obligation to reevaluate, under a court order of a number of years ago, the confidence that we have that waste can be stored safely pending the development of a final disposal option, the so-called "Waste Confidence Proceeding". We have recently reevaluated our initial Waste Confidence Proceeding, which we committed to do every 5 years, and have concluded--Bob, correct me if I'm wrong on the years--that we have confidence that the waste can be stored safely at the reactor sites until the year 2025 as I recall. [Bernero: At least 100 years, and our expectation is that a geologic repository will be available by 2025] I do want to emphasize a point though there and its one that we haven't discussed directly today, even though it seems to me from our perspective we can, in fact, say with a good deal of confidence, particularly with the new dry cask storage technologies, that waste can be safely stored onsite, it does seem to me in the context of evaluating the risk question and the question of the stringency of the EPA standards that one of the factors that ought to be taken

into account is the alternative to no geologic repository whatsoever. There is a very real and present risk, albeit a small one today, that, with the spent fuel pools at 110 sites, you could probably quantify to some degree that certainly ought to be factored into the calculation as one considers the approach to setting the standards for geologic disposal. [END TAPE]

Q: [PARAPHRASE] Have the regulators considered special treatment of the human intrusion scenario, i.e. taking into account its action discriminant consequences?

JRC: Well, I don't have a response to that. It's an issue that obviously this conference and the discussion over the course of the last couple of years has indicated is of increasing concern. I know it's an issue that the DOE has raised with EPA in its comments on draft #2--how to treat human intrusion--but beyond that I do not have any further comments.