



# NRC NEWS

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## DECOMMISSIONING THE UNCERTAINTY

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**Remarks Before the NEI/EPRI Decommissioning,  
Planning, and Technology Forum  
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Decommissioning of nuclear power plants, or any facility contaminated or containing radioactive components, is today one of the most demanding and taxing industrial undertakings. This is not only because of the complexity of the operations and the painstaking care that must be exercised for the protection of workers and the public; it is because the regulatory and legal issues are tangled in a myriad of fronts, where multiple interests are at play -- and not necessarily converging. Convergence on acceptable solutions is not occurring because uncertainty still prevails in "how to" decommission radioactive installations, and uncertainty is a Medusa. Uncertainty tries to gobble up what is known and to contaminate what it touches.

Uncertainty is the common enemy of the regulator, the industry and of the people. Uncertainty delays solutions and, consequently, it does not provide finality. It feeds on itself and propagates into areas where it does not belong. And, it certainly can be used to confuse, destabilize and create more uncertainty. Reducing, bounding or minimizing uncertainty, whenever possible, is an important generic need facing the civilian uses of nuclear energy and radiation.

One of the fundamental reasons to have regulation is to decrease uncertainty in the implementation of a nation's interests. Regulation must be a convergent process directed at order, balance, equity, and fairness. But, what is regulation? When I am at a loss for words, I go to Webster's dictionary. I found that "to regulate is to govern or direct according to law, to bring activities under control, to reduce to order in a disciplined manner".... Another thing I do when I can not find words is to create a picture (See Figure 1).

Before I focus on the issue of nuclear decommissioning, I will touch on a couple of fundamental considerations and where regulation fits in our society. A democratic society and a free market provides the most powerful combination for achieving fairness, equity, and the protection of rights, property, health and safety. Moreover, I strongly believe that the free flow of information is crucial in a

democracy. I also believe that the free flow of information is crucial for a free market to operate for the benefit of all. If used well, information anchors democracy, even if you don't like what you're hearing or seeing. Democracy needs checks and balances. The free flow of information shines light on the checks and balances. Along with the democratic and free market cornerstones sits a force that feeds on information and that can be used to build or to destroy, to add checks and balances or to skew, to advance democracy and improve quality of life or to arrest the democratic and the free market forces. It is called regulation. ...And what a good thing it can be to enhance democracy and its benefits! ...And what a bad thing it can be if misguided, if uncontrolled, or if it is driven by anything other than the common good.

Regulation is a tool of society to implement what society needs, in an orderly, equitable, and fair manner. It must minimize uncertainty.

I believe that the role of proper regulation is fully compatible with the goals and objectives of our democracy and our free market economy. Therefore, regulation has to provide a meaningful and useful framework for the protection of rights, health, safety, and the environment.

Going back to Webster's for another definition for regulation, it also states that regulation is "to prescribe or control by regulations" (See Figure 2). Perfect. We have done a lot of prescribing and a lot of controlling... and it worked reasonably well but not as well as it should. For about three and a half years, the Nuclear Regulatory Commission has been upgrading the prescribing and controlling factors in regulation, to decrease uncertainty in the exercise of our mandate for protection of public health, safety and the environment, thus increasing predictability and transparency (See Figure 3).

Regulation exists, therefore, to provide an effective framework that allows for the conduct of individual, industrial, commercial, financial, and other activities in a disciplined manner. Although all regulations restrict, good regulations should not deter beneficial activities, but frame them and guide them.

Regulatory actions need to be based on facts, but facts and figures that are placed carefully in the proper context and supported by the best available knowledge and experience. Regulators, therefore, must be mindful of the need to make policy decisions based on unbiased, substantiated and fully-informed state-of-the-art information. As we all know, the best intended efforts can produce misleading results if not placed in the proper context, balanced and checked by the body of knowledge and experience. Let me give you a fictitious example.

A government agency decided, after a favorable poll, to focus its resources on increasing the life span of its citizens. Rulemaking was expected, so two totally independent studies, conducted in isolation, were commissioned with the expectation that some convergence of results would make decision-making achievable within the life span of the agency. To everyone's surprise, the studies arrived at two drastically different conclusions, based on the same mortality data. Here are the results:

(See Figure 4)

Study 1: Everyone that does not receive medical attention eventually dies.

Recommendation: Establish a plan to require that everyone receives mandatory health care at a significantly increased frequency. Monitor improvements for 100 years and report to the Secretary.

Confirmatory Note: A PRA study calculated the risk of death at one.

(See Figure 5)

Study 2: Everyone that receives medical attention eventually dies.

Recommendation: Establish a plan to require that all health care systems be eliminated.

Monitor improvements for 100 years and report to the Secretary.

Confirmatory Note: A PRA study calculated the risk of death at one.

It should not go unnoticed that, for the first time in history, two PRA studies got the same result.

These divergent recommendations were based on facts, although it should be noted that the panels did not address the minor issue of quality of life. This would be the objective of a follow-up study. It should also be pointed out that the substantial cost of the two plans were comparable: more health care on Plan 1 and a lot more lawyers on Plan 2 (See Figure 6).

Caught in the ensuing controversy, the Secretary had to announce to the nation that: (See Figure 7) “It is not possible, generically, to rule out the possibility of death.” Seriously, if you set out to find the impossible, you will not find it, and what you do find could lead you to the wrong conclusions.

In the nuclear arena, whether done by regulated or regulator, the analysis and results regarding safety need to be comprehensive and, today, they need to be integral. Many licensee activities and regulatory activities today need the additional know-how intrinsic in risk-informed regulation. And, what is risk-informed regulation? Webster’s failed me on this one, so I have to present you with my own definition of risk-informed regulation:

(See Figure 8)

Risk-informed regulation is an integral, increasingly quantitative approach to regulatory decision-making that incorporates deterministic, experiential and probabilistic components to focus on issues important to safety, which avoids unnecessary burden to society.

This definition can also be used for risk-informed operations, risk-informed maintenance, risk-informed engineering, risk-informed decommissioning....

One of the added values of risk-informed regulation is the reduction of uncertainty in decision-making. Today, we are learning how to mix and match deterministic, experiential and probabilistic results to improve the predictability of safety considerations and of regulatory requirements. Risk-informed regulation is a systematic upgrade of a functional regulatory system that became outmoded. Risk-informed regulation, slowly and often painfully, replaces the not-so-well-founded prescriptions with what is better known, and preferably quantified. It is not a probabilistic recipe, but a comprehensive methodology that uses state-of-the-art know-how. Risk-informed regulation employs a mix of components to achieve an improved approach to regulating. No one component is perfect nor does it need to be; the whole is much better than any of the parts.

Both the NRC and the industry have made significant progress in reducing uncertainty and improving predictability in the nuclear power reactor area. However, the same progress has not been made in the decommissioning area. I believe it is time, and the Commission is well aware of the need, to ensure predictability and consistency in the decommissioning area, and all the associated activities. I mean, we need predictability and consistency in the existing decommissioning methodologies and upcoming options, as well as in transportation and waste disposal. Of course, we also need predictability in the regulatory requirements. For example, there may be advantages to entombment for specific sites, and I

mean public health and safety advantages. All of the issues I mentioned, and a few others, are an important part of what I referred to earlier as generic needs facing the civilian uses of nuclear energy and radiation.

Last, but not least, I believe you might have an interest in what policy decisions lie ahead for decommissioning, so let me give you a quick update.

The Commission is currently considering a proposed rule for revising its transportation regulations in Part 71 to make them more compatible with the International Atomic Energy Agency (IAEA) standards and to codify other applicable requirements. At least one of the changes under consideration has a direct application to decommissioning of nuclear facilities. As older facilities are decommissioned, the Department of Transportation and the NRC are being asked to approve the shipment of large components, including reactor vessels and steam generators. These components may contain significant quantities of radioactive material, but they are so large that it is not practical to fabricate authorized packagings for them. Section 71.8 provides that NRC may grant an exemption from the requirements of the regulations in Part 71 that it determines is authorized by law and will not endanger life or property nor the common defense and security. For example, the NRC used the exemption approach when it approved the Trojan Reactor Vessel Package for transport to the disposal facility on the Hanford Reservation.

However, NRC's policy is to avoid the use of exemptions for recurring licensing actions. Therefore, as a lesson learned from the Trojan approval, the NRC staff has identified large component package authorizations as an issue for consideration in the proposed rule. Based on previous experience and public comments, the staff is proposing a "special package authorization" for packages for which compliance with the other provisions in the regulations is impracticable. Such an authorization would be issued on a case-by-case basis, and would apply only in limited circumstances, and only to one-time shipments of large components.

The NRC has been considering new regulations that would reduce requirements for emergency planning, onsite and offsite insurance, and safeguards for permanently shutdown plants in a step-wise fashion as the potential for offsite releases decreases with time after plant shutdown. The new regulations would address staffing, training, and backfit applicability to decommissioning. As many of you may know, the NRC staff recently issued a technical report addressing spent fuel pool accident risk at decommissioning plants. This report is intended to support rulemaking in the decommissioning area. There are a lot of details in this report and these details must be taken in the proper context.

The principal technical finding of the report is that the risk from spent fuel pools at decommissioning nuclear power plants is low and well within the Commission's safety goals. However, the spent fuel pool risk study also mentions that the possibility of reaching the zirconium ignition temperature could not be precluded on a generic basis. This brings up once again what I have previously called the "zero factor."

As you know, I believe that the zero factor needs to be eliminated and subsumed into reasonable assurance.

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'...."

Radiation is radiation, yet radioactive risks are often treated quite differently depending on the source. The risks from radiation need to be scrutinized and given equal treatment under the law. If different treatment of the same radiation risk were of benefit to this country, I would be its strongest advocate. But it is not beneficial and I disapprove of the arbitrary imposition of a zero factor to narrowly selected radiological risks with no importance to public health and safety. I oppose it not only because it is contrary to the law governing the NRC, but also because it hampers debate and gets in the way of good regulation.

Back to decommissioning and the spent fuel pool risk study. I personally would not impose a zero risk requirement on decommissioning activities. However, there is some discussion about additional work that may need to be done on this risk study to support potential regulatory changes for emergency planning, onsite and offsite insurance, and safeguards for permanently shutdown plants. The staff is to present a paper to the Commission on May 31, 2001, which I expect to be a truly risk-informed analysis. This paper will present policy issues with respect to exemptions and regulations for the decommissioning of nuclear power plants. The Commission has stated that we will also consider the comments and recommendations of stakeholders when we receive the staff's paper. The Commission will have to decide whether or not the spent fuel pool risk study needs to be expanded and whether we have adequate information to proceed with rulemaking.

Rulemaking for partial site release is also being developed. Current rules provide adequate protection of the public and the environment from radioactivity remaining at a reactor site when the reactor license is terminated following decommissioning. However, it is possible for a reactor licensee to sell land that would reduce the size of its site before the license termination criteria would specifically apply to the release of the property. The proposed rulemaking would standardize the process for allowing a licensee to release part of its reactor facility or site for unrestricted use (partial site release) before receiving NRC approval of its license termination plan (LTP). A proposed rule is scheduled to be published in 2002.

There are lessons to be learned from our decommissioning experience. One lesson that we have learned is that you cannot set aside a problematic issue in the hope that it will resolve itself in time. Unresolved issues create uncertainty because the final solution is unclear. It is seldom the case that difficult issues will resolve themselves in time. Challenging issues should be resolved when they arise or they can multiply, causing additional uncertainty. Delays in long-term solutions have also caused additional issues to arise, such as the capabilities of spent fuel pools to hold additional fuel, and the regulatory requirements that should be in place for decommissioned reactors that still have spent fuel on site. We are attempting to address these issues now.

In summary, the NRC has a good process in place -- still in need of improvement -- to conduct the decommissioning of nuclear power plants. I recommend that you actively participate as stakeholders as we evaluate the needed regulatory changes in this area to help reduce uncertainty. You should be providing solutions or somebody else will. By taking advantage of the experience gained by those undergoing decommissioning you should be able to anticipate the issues that may be raised by the regulator and other stakeholders. The lesson in decommissioning, as in all regulatory actions, is always to be aware of and address the uncertainty -- the Medusa.