

COMMENTS BEFORE A MEETING OF THE
UNITED STATES NUCLEAR REGULATORY COMMISSION

REGARDING AN INTEGRATED REVIEW
of
DECOMMISSIONING REQUIREMENTS
Improving Decommissioning Regulation For Nuclear Power Plants

A CITIZEN PERSPECTIVE

By

Raymond Shadis, Representing
New England Coalition on Nuclear Pollution, Inc
Brattleboro, Vermont
and
Friends of the Coast- Opposing Nuclear Pollution
Edgecomb, Maine

November 8, 1999
Rockville, Maryland

B/19

CONTENTS

- I. Introduction**
- II. Enhancing Clarity, Efficiency, and Effectiveness in Decommissioning Regulation**
- III. Public Confidence in Decommissioning Regulation**
- IV. Comments and Questions on Spent Fuel Pool Hazards and other Risks in Decommissioning**

I. Introduction

My name is Raymond Shadis. I am a resident of Edgecomb, Maine. I have served on the Maine Yankee Atomic power Company [MYAPC] Community Advisory Panel [CAP] on Decommissioning since its inception in August 1997. On that panel I represent a local environmental education and advocacy organization of which I am a founding member and spokesman, Friends of the Coast-Opposing Nuclear Pollution.

I am also employed by the Vermont-based, New England Coalition on Nuclear Pollution, serving as field representative and nuclear information coordinator.

From the unique vantagepoint of these dual roles I have reviewed the progress and documentation of decommissioning at Yankee Rowe, Haddam Neck, and Maine Yankee.

The Commission is well aware of the extraordinary regulatory, legal and public confidence obstacles encountered in the Yankee Rowe decommissioning, the radiological protection issues at Haddam Neck, the backfit controversy, as well as the radiological site release criteria and NRC public relations issues at Maine Yankee.

If the circumstances of decommissioning the New England nuclear plants have influenced the Commission's willingness to undertake decommissioning regulatory improvement, it is understandable.

I believe the most productive role of non-industry stakeholders, in particular informed laypersons, may be bounded by the following:

- **Help focus policy with regard to the public's need to have confidence in nuclear regulation.**
- **Help industry and regulators think through developing regulation from the perspective of affected parties (e.g., residents in the vicinity of nuclear facilities, or environmental advocates).**

- **Question assumptions and process, especially from a practical or layman's point of view.**
- **Help both industry and regulators to "think outside the box", that is, to consider those externalities which may be obscured by concentration on more narrowly focused disciplines.**
- **Share the perspective of experience and local knowledge**

(E.g., I have 20 years experience in dealing with Maine Yankee and NRC on safety issues. Few if any laypersons share the level of detail enclosed by my familiarity with the plant and its history.¹ My associate Peter James Atherton, who has also participated in the NRC Risk-Informing Decommissioning meetings, brings a unique perspective in that he worked for the NRC at a time when much of the current body of regulation was being formulated.)

William Huffman, Decommissioning Section of NRR, NRC, described the goals of Decommissioning Regulatory Improvement in a May 5, 1999 meeting with the Nuclear Energy Institute:

- **To enhance the clarity, efficiency in decommissioning regulations while maintaining safety**
- **To improve public confidence in the regulatory process of decommissioning nuclear power reactors**
- **Staff encourages comments and questions from the industry and public stakeholders**

The remainder of my comments will loosely follow the format suggested in Mr. Huffman's set of goals.

I. Enhancing Clarity, efficiency, and effectiveness

If adapting regulations originally drafted for operating nuclear power stations has proved problematic for both regulators and the licensees, the disorienting effect on a public stakeholder's sense of place in the process is even more pronounced. The required labyrinth-like search for applicable regulations on almost any facet of decommissioning is frustrating, time-consuming, and burdensome. In some cases the intent or application of the regulations could not be better hidden if it were hidden intentionally.

¹ E.g., NRC has expressed a heightened level of confidence in PWR spent fuel pool integrity because of the assumption that PWR spent fuel pools are typically bedded below grade, often in solid rock. [see, Generic Safety Issue 82 and NUREGs 1530, CR-4982, also CR-6451] At an NRC meeting on risk-forming decommissioning held on March 17, 1999, it became apparent to me during the discussion of Maine Yankee vulnerabilities that the NRC personnel present were unaware that the Maine Yankee SFP shares a wall with the basement of the Primary Auxiliary Building and is therefore solidly bedded only on three sides. I was able therefore to inform them that the Maine Yankee SFP was vulnerable to at least partial rapid drain down

Security requirements to protect against radiological sabotage, for example, are spelled out in vivid detail for an operating nuclear plant but are not at all clear for a plant in de-fueled condition.

One is reduced to asking the opinion of NRC staff who are themselves frequently unsure of the authority of their answers. Public confidence cannot be maintained if there is uncertainty from or within the agency on basic issues.

For example:

- What is the public's role in assuring safety and protection of the environment in decommissioning?
- What potential accident consequences exist at a de-fueled plant?
- Since more radioactive materials are being handled than in an operating plant, and under conditions more likely to lead to inadvertent exposures, why are licensees left without the supervision of resident inspectors, or at the least, NRC contract radiation protection personnel?

Citizens, who were for years assured that nuclear power reactors were nonpolluting, now find there are significant issues with radiological site remediation. They find that, in terms of risk, residual radioactive pollutants are not required by NRC to meet the same derived risk-standards as non-radioactive toxins in the environment.

A Commission which seeks to relieve the industry's regulatory burden (if possible) by embracing risk-information at the front of the decommissioning process, fights tooth and nail to avoid risk-basis at the end of the process.

The public has a right to be confused and therefore withhold its confidence. The agency wants to avoid the appearance of clinging to prescriptive regulation when it benefits the industry and risk-informing it away when it does not.

In reviewing the staff working papers presented in the several meetings held on risk-informing and/or improving decommissioning regulation, I find that one task the staff seems focused on is bringing together or bundling those regulations in Part 50 which continue to apply to de-fueled and decommissioning nuclear power plants. I believe this to be a laudatory first step in clearing an unnecessary regulatory morass.² And I believe this to exemplify an occasional meeting of the minds of regulator, industry, and public advocate. Although it should be noted, there is no reason to rush. Exemptions seem to be increasingly justified on the basis of previous exemptions granted. This should expedite

² The situation is laid out in an excellent article by John D. Haseltine and Stephen J. Milioti of the Connecticut Yankee staff, Doin' the D&D: Dancing to the Regulatory Tune in the January/February Issue of *Radwaste Magazine*, a publication of the American Nuclear Society.

the process somewhat while preserving case by case review to address individual plant differences.

Before moving to the obvious next step of writing a separate decommissioning code, under Part 50 or otherwise, I believe it would be wise to review the thinking that got us to this untenable situation in the first place. I would recommend that a contract be let to an unbiased party for the purpose of analyzing the why and how. I may be dead wrong but based only on a sketchy overview it appears that the application Part 50 was contorted to fit decommissioning reactors with the duck tape of 10CFR 50.82 in order to avoid larger formalized processes with potential adjudicatory "handles." It is clearly an unsatisfactory solution from the perspective of public confidence and likely does not optimally serve safety either.

I believe a distinct regulatory decommissioning protocol is required. It should be one that is front-loaded with objective checks and balances providing the industry, the regulators, and the public with a secure platform from which to enter the decommissioning process.

The new protocol should, I believe, have as its centerpiece a plant specific comprehensive charter or permit for decommissioning which would take the site from present state to end state. Plants that had shutdown with an accumulation of safety-related defects should be subject to a thorough inspection with a checklist for any conditions that might effect safety during decommissioning.

An adjudicatory process, with simple access for stakeholders, including members of the public, tribal units, interest groups, host municipalities, other local units of government, other federal agencies, and the state, should be afforded. So far as I know, there is no legal stumbling block to NRC holding joint hearings with other agencies or governmental entities. Utility executives have complained to me of the many regulatory stops on the path to decommissioning. Perhaps there could be fewer but more inclusive stops and stops with built-in accountability to satisfy both an industry and a public advocacy hunger for certainty.

By contrast the present scheme appears to completely satisfy no one. All but the most obtuse of public and media have been 'put off' by the trivial nature of the PSDAR and the attendant informal meetings. Public meetings are notorious for their poor handling by NRC staff, who appear to be tossed without adequate training, or in some cases it appears with no training, into dealing with a discerning, and sometimes suspicious, public.

Representations asserted by litigants to have been made during Yankee Rowe LTP public meetings by NRC staff were discounted by NRC counsel before the Atomic Safety and Licensing Board as simply personal opinions and not policy statements of NRC! It is plain that the inherent message is that the public can place no reliance on the statements of NRC staff in public meetings. From a public confidence perspective NRC's proposed move toward less formal processes, evidenced in a concurrent initiative, will go a long way toward completely wiping out the agency's remaining credibility.

If the agency finds that emphasis was somewhat misplaced in its decision to retain regulation of decommissioning activities under Part 50, then the agency ought to consider, with the input of stakeholders, figuratively connecting the bundle of applicable regulations to the foreseeable end state of the site. It should not retain the mindset that seeks ways to find similarities with regulating an operating reactor.

A decommissioning reactor represents different challenges in entirely different proportions than those presented by an operating reactor. Very little of what an operator or inspector learned in reactor school is needed here. NRC needs personnel specifically trained in and dedicated to decommissioning. New ballgame.

Licensees have told me that they are puzzled that they have more public awareness and interest in decommissioning than they had of operations. It should be no mystery. Having gotten past the acceptance or rejection of perceived operating accident and emissions risks, the public wants to know with a degree of certainty what they will be left with, what the risks of getting through decommissioning are to themselves, to workers, and to the environment. They want to know with a degree of certainty what risks to themselves and the environment remain. At this point the single candidate with the stature, expertise, and resources to provide that degree of certainty, the US Nuclear Regulatory Commission, does not appear as if it will, maintaining its present course, measure up.

Changes are needed not only in the regulations, but also in the manner in which the organization conducts itself.

II. Public Confidence in Decommissioning Regulation

NRC behavior in the public arena further undermines public confidence already dampened by the lack of clarity, certainty, and accessibility in the decommissioning regulations. NRC personnel interacting with the public are the best expression of NRC regulation. If improving public confidence in the regulatory process is of high priority, then it is essential that NRC personnel maintain openness and absolute candor in communicating with the public. This is sadly, in my experience, not always the case. Please keep in mind, that it when it comes to credibility, as in the case of bad checks, exceptions do make the rule.

There follows a few excerpts from my experience with decommissioning regulation that in my view exemplify disingenuous and discrediting behavior.

- Shortly after Maine Yankee Atomic Power Company (MYAPC) announced that the plant would be decommissioned, an NRC team came to the plant area to hold a press conference announcing an impending NRC public meeting. With a singular lack of sensitivity, the site chosen for the press conference was MYAPC corporate headquarters. Notable quotes from that press conference included NRC counsel Anne Hodgdon responding to concern about the lack of a formal process to initiate

decommissioning with a breezy assurance that, "members of the public can ask for a hearing at any time."

The message appears to have a long shelf life. On July 20, 1999, Dr. Carl J. Paperiello, director of the Office of Nuclear Materials Safety and Safeguards, echoed assurance of the ease of obtaining a public hearing. Before a public audience in Wiscasset, Maine, Dr. Paperiello, stated the following regarding final site release,

The public has hearing rights, they can demand a full adjudicatory hearing over whether or not the licensee meets the limit...If you, the public, disagree that they meet the limit, all you have to do is send a letter, " We want a hearing." You don't have to hire an attorney. You may wish to. Many people do. We provide the hearing board. There is an element of this process, which is incredibly rigorous...

Dr. Paperiello is more of a scientist than an administrator, and he is certainly no attorney, so he probably believes this twaddle. However as a staff member of an organization which had to spend upwards of \$30,000 on attorney's fees just to get standing with regard to the Yankee Rowe License Termination Plan, I could not rank NRC's representation on the ease of getting a hearing very high in truth or candor.

- On April 29, 1999, an NRC Region I Branch Chief promised to open the decommissioning inspection process by permitting me and other members of our CAP to audit weekly conference calls with NRC and the licensee. He then, responding by letter to a frustrated follow-up inquiry, reneged. The reader will notice that his letter avoided the all-important question of industry contact on the issue. The licensee later independently confirmed contact on the issue of access to the calls. On October 13, 1999 in a public meeting in Meriden, Connecticut, the Branch Chief compounded the contradiction by insisting that NRC site inspections are never announced in advance. This assertion was roundly refuted within a few hours, contradicted by two executives of companies engaged in decommissioning. It was again contradicted by Mark Roberts, a representative of NRC Region I before the MYAPC CAP on October 21, 1999.

When I raised the issue with the CAP, several members recalled the offer to take part in the conference calls clearly. The CAP then voted to honor my request to send the Branch Chief the following excerpt from the MYAPC Community Advisory Panel on Decommissioning meeting minutes of April 29, 1999 (Adopted June 10, 1999):

NRC Quarterly Update

Ronald Bellamy, Chief of the Decommissioning and Laboratory Branch of the Division of Nuclear Materials Safety, NRC Region I, updated the panel on NRC activities related to Maine Yankee decommissioning...

Dr. Bellamy indicated that additional NRC staff would be on site at Maine Yankee during the next couple of months due to upcoming decommissioning activities. The weekly NRC conference calls with the state and the licensee continue to provide an excellent source of information for the NRC and have served to confirm that information received is reliable. Mr. Shadis asked if the weekly conference calls had reduced to some extent the amount of written communication as he had not seen much in the public document room lately. Dr. Bellamy stated that inspection reports should appear with the same frequency in the public document room as they had for the last few years. Prior to that, the licensee might receive a couple of inspection reports in a quarter but about four years ago, the agency started rolling reports into a quarterly inspection report. Dr. Bellamy could not identify any correspondence that would have been replaced by the conference calls. Mr. Shadis asked if there were any way to make the content of the conference calls public; could an interested public member take part in the conference calls? Dr. Bellamy replied that yes, one could and extended an invitation to panel members to take part in a call, they generally last about 45 minutes.

After four months had elapsed, I wrote to Dr. Bellamy,

August 27, 1999

Dr. Ronald Bellamy
Chief, Decommissioning and Laboratory Branch
Division of Nuclear Materials Safety, NRC Region I
US Nuclear Regulatory Commission
Washington, D.C. 20555 - 0001

Dear Dr. Bellamy,

At an April 29, 1999 meeting of the Maine Yankee Atomic Power Company (MYAPC) Community Advisory Panel (CAP) on Decommissioning, I asked if, given the lack of resident inspectors and limited NRC-licensee review correspondence, I could take part in weekly NRC conference calls with the licensee.

The CAP minutes for the April 29th meeting read as follows,
...Mr. Shadis asked if there were any way to make the content of conference calls public; could an interested public member take part in the conference calls? Dr. Bellamy replied that yes, one could and extended an invitation to panel members to take part in a call, they generally last about 45 minutes...

Mr. Michael Meisner of MYAPC has since relayed to me concerns expressed by his staff that my presence on a conference phone call might have a chilling effect on the free flow of discussion. Please tell me if MYAPC has been in touch with you or NRC regarding this, "problem." If so, is this why you haven't given me notice or schedules of conference calls with MYAPC?

More Than three months have elapsed since you agreed to allow me to audit the NRC conducting the public's business with the licensee. I have been told that during this time, decommissioning contractors have, helter-skelter, cut a powerline trench across a contaminated yard area. If that is so, it will certainly be an issue we will raise when we intervene in the application for approval of the License Termination Plan. Where are free release exemptions filed for contaminated materials being shipped to Tennessee, or now possibly to Connecticut? Many troublesome issues could be resolved if NRC were not playing this decommissioning close with the licensee.

Please respond promptly and detail the steps you plan to remedy the lapse of the past three plus months. Please also include a schedule of conference calls and access protocols.

Sincerely,

Raymond Shadis

Dr. Bellamy responded on September 20, 1999,

Dear Mr. Shadis:

I am responding to your letter of August 27, 1999, concerning your possible involvement in weekly telephone calls the U.S. Nuclear Regulatory Commission staff has with Maine Yankee staff. I have not been afforded the opportunity to review the minutes of the April 29, 1999 meeting of the Community Advisory Panel (CAP), but my recollection of my statements at that meeting is not consistent with the statement in your letter that I agreed to allow you to audit the calls. Nonetheless, we have considered the matter and do not believe it is an efficient use of staff resources for the NRC staff to open these calls to members of the public or CAP. We consider these calls part of our inspection planning process, allowing us to gather information on Maine Yankee's schedule of activities. This information is important to allow us to appropriately plan our onsite inspections. This, however, should not be interpreted as "playing this decommissioning close with

the licensee", as you state in your letter. As you know, our inspection findings are a matter of public record, you are on distribution for our written inspection reports, and our findings are discussed at periodic CAP meetings.

I regret any confusion or misunderstanding concerning public involvement in these weekly inspection status calls.

Sincerely,

Ronald R. Bellamy, Chief
Decommissioning and Laboratory Branch
Division of Nuclear Materials Safety

In the above example, it should be understood that my general impression of the professional competence and inspection arena integrity of Dr. Bellamy is highly favorable. In fact his initial acquiescence to my request to audit NRC/licensee conferences indicates to me a person of open and generous nature. The question then is why did a good man adopt a siege posture with an overly inquisitive member of the public? I would have to say that he took on, in the words of Harold Denton, "the coloration of the agency." When activists and other members of the public ask me for my assessment of NRC, I have to say that it appears to be a house divided. In this case, I think it is a man divided and I would have to lay the blame on something systemic in the agency.

Note: I regret the length of the above inclusions, over-documenting a minor complaint. However, in an April 13, 1999 NRC meeting on risk-informing decommissioning, I complained about two instances of delayed and non-responsive answers from NRC regarding safety concerns I had raised in the past. In a letter from NRC which followed my complaint I was incorrectly accused of misrepresenting the matter³.

³ Mr. John Zwolinski of NRR apologized on the spot, but then on June 11, 1999 wrote a letter critical of my accounts of events. Mr. Zwolinski wrote, "I have carefully looked into this matter and believe the circumstances are different than those you portrayed." Mr. Zwolinski then goes ahead to demonstrate that he could not have looked carefully at the content of my attempts at written communication with NRC by mis-characterizing both the communications and the responses. They were, in brief, a June 5, 1998 letter regarding SFP issues at Maine Yankee was not answered in writing until March 26, 1999. The answer was not responsive to several safety concerns raised. I also raised timeliness relative to a memorandum provided NRC on February 4, 1997. Suggestions stemming from lessons learned at Maine Yankee have never been addressed. After being strung along by a series of, "The check is in the mail," letters, I was finally informed by letter on January 20, 1999, that one of several issues had been resolved, the rest were dumped in the low-priority box as the plant had been shut down. In his letter Mr. Zwolinski asserts that my concerns were addressed in casual conversations with staff. They were not. He asserts that our February 4, 1997 memorandum presented issues raised by a concerned individual and that, over time those issues were addressed. The memorandum addressed many issues not raised by "a concerned individual". Those issues were never addressed. At least one issue still applies to operating plant in New England. The individual's issues were never properly addressed. I believe a search of the referenced correspondence by an unbiased individual will confirm my version of events.

The lesson I draw is that NRC management will defend poor practice by obfuscation and insult to the integrity of members of the public who question such practice. Therefore every assertion must be thoroughly documented as above. A transcript is in preparation of the October 13, 1999 Meriden, Connecticut NRC meeting. Referenced statements by Mr. Roberts and Dr. Paperiello, I have on audiotape and I can provide them on request.

Even given the presumption of good will, these few examples of apparent contradictions in NRC's representations to the public should serve to point out an obvious weakness in NRC's stated goal of obtaining public confidence in decommissioning regulation. If these examples do not serve, I have more and will be glad to provide them if I detect a serious interest in seeking a cure. It does not matter to the public confidence if the agency keeps tweaking its regulations and inviting shareholders to sit in. Neither interested stakeholders nor the general public can be expected to give the NRC their confidence when the agency's public face, rightly perceived or not, has the appearance of either manipulative slyness, or dishonesty, or ignorance, or multiple personality disorder.

The quality of public statements and correspondence from NRC is certainly not the only pillar on which public confidence in the process rests. Public confidence in the realm of information surrounding decommissioning also rests on communication from the licensees. It must be said that they are making a remarkable effort at presenting the industry's perspective. I would not care to judge candor, but Yankee Atomic Electric, Connecticut Yankee, and Maine Yankee have made a large advance toward openness that was not in my experience with nuclear utilities before the plants entered decommissioning. NRC has not kept pace. NRC will not have confidence in decommissioning regulation, or indeed any regulation, until it has the public's trust. It will not have the public's trust until it begins to more fully exhibit trust in the public. Opening the inspection process might be one such exhibit.

Timely action and response speaks volumes. For example, in June of 1998, MYAPC made a unilateral determination that security would not be compromised by reconfiguring its defenses against radiological sabotage and proceeded to make extensive changes. An NRC team of security specialists did not physically examine the changes until nine months later. Nine months is a long time in which malefactors can take notice that vehicle barriers and guard towers have been removed, then lay plans and take action.

Comments and Questions on Spent Fuel Pool Hazards and other Risks in Decommissioning

Although the staff should be planning for reviewing and risk-informing the entire decommissioning process, I believe the present priority of examining spent fuel pool accident risks to be correct.

The staff is correct in undertaking an in-depth review rather than simply relying on the conclusions of the few existing studies of accident risks. The staff should have accurate

plant specific design information. The US General Accounting Office in its March 1999 Report, Strategy Needed to Regulate Safety Using Information on Risk⁴ has it:

Effective regulation, whether traditional or risk informed, needs to be anchored in information that adequately describes the design and safety parameters of a plant, changes to the plant's design and operations that affect safety, and assessments that define the structures, systems, or components that are safety significant. **Yet NRC does not have assurance that this information is available and accurate.**

The staff's Task Action Plan for Spent Fuel Storage Pool Safety of July 26, 1996 detailed some site specific vulnerabilities on ten specific issues. It was found, for example, that several plants had fuel transfer tubes that entered the SFP with openings below the level of the top of the spent fuel thus providing a drain path with the potential to expose stored fuel to air. In determining risk probabilities from human error or sabotage, this design feature has to be taken into consideration. Seismic fragility of the transfer tubes is also an issue of concern.

I am concerned that the move to a risk-informed decommissioning rule not become so weighted toward risk-base that analysis for prescriptive based contributions to the rule are slighted. I believe it is important to the protection of the environment, and to the public health and safety, to continually ask, "What if? It is important to examine any tenable question that is raised before dismissing it based on a casually assigned probability. The following scenarios are offered as examples:

- **Accidental Backflush During Piping Decontamination**

Many reactors share spent fuel pool cooling with reactor primary side systems. Prudence would dictate engineered physical isolation of the SFP cooling system before any corrosive scrub of the hot side piping. Should this fail to occur and a licensee rely on administrative limits, it is not possible to misalign valves to send a volume of corrosive chemicals into the spent fuel pool? Would a caustic solution flash precipitate SFP boron? Is there then a potential for criticality? Is there the potential for fuel damage?

- **Kindling a Zirconium Cladding Fire**

Once the "zirc fire" window has closed, be it at 100 days or five years, is all risk of a SFP fire resulting from a seismically initiated draindown eliminated? Maybe not. If materials with ignition temperatures lower than the maximum decay heat of the spent fuel are added to the fuel, the combined heat of foreign materials combustion and spent fuel decay heat could raise fuel cladding to rapid oxidation temperatures. As the zirconium oxidation reaction is strongly exothermic, is it possible for a local "hot spot" to propagate

⁴ GAO/RCED-99-95 Report to Congressional Requesters, Nuclear Regulation- Strategu Needed to Regulate Safety Using Information on Risk

to involve significant quantities of fuel? I think so. How likely is it the relatively low ignition temperature material can get introduced onto, or down in among, fuel assemblies during a seismic event? What sorts of materials might they be? Power cables, wooden blocking, clothing, water-hoses, cans of paint and solvents are among the possibilities.

I do not believe an accurate risk analysis can be accomplished without a careful, updated review, both site-specific and generic, of **external factors** that are apt to affect assumptions about risks and consequences. For example, the National Severe Storm Center is predicting more frequent severe weather phenomena and more intense severe weather phenomena. Assumptions regarding the size and velocity of wind-driven missiles and the maximum height of storm surges are based on obsolete data and need to be reassessed.

The vulnerability and probable risk of spent fuel pools to aircraft crashes should take into consideration changes in local aircraft traffic as represented by flight control logs of local airports and military airbases.

I am concerned about what we think we know. For example, the staff has identified no materials aging or degradation issues in examining SFP issues. However type 304 stainless steel alloy employed in fuel racks and assemblies, also in other SFP components, such as the SFP liner, is subject to stress corrosion cracking in oxygenated or stagnant borated water, as evidenced in IE Information Notice No. 79-19 and elsewhere. SFP liners are quite thin for their size and, likely due to unrelieved fabrication stresses, are subject to buckling at temperatures well below boiling. Any material or system failure apt to affect assumptions about another material or component in reviewing accident sequences and effects, should be taken into consideration. In a half-empty pool, for example, if a SFP liner presses racks together, if fuel racks or assemblies, or boral plates fail, what then? Are there new localized heat and criticality issues to be considered?

While the impatience of industry with what appears to a slow process is understandable from a time is money perspective, the effect on a license being required to submit individual analysis and applications for exemptions can be mitigated through preparation for the process. Individual SFP heat up and vulnerability analysis can and should be done as soon as possible and can be done well in advance of decommissioning.

A failure to adequately provide for the public safety, however, should an accident occur, is without remedy.