

NOTATION VOTE

RESPONSE SHEET

TO: Annette Vietti-Cook, Secretary
FROM: Commissioner Baran
SUBJECT: SECY-18-0055: Proposed Rule: Regulatory Improvements for Production and Utilization Facilities Transitioning to Decommissioning (RIN 3150-AJ59)

Approved Disapproved Abstain Not Participating

COMMENTS: Below Attached None

Entered in "STARS"

Yes

No

SIGNATURE

8/9/21

DATE

**Commissioner Baran's Comments on SECY-18-0055,
"Proposed Rule: Regulatory Improvements for Production and Utilization Facilities
Transitioning to Decommissioning"**

When I voted to initiate this rulemaking in 2014, I had two goals. One was to establish explicit rules of the road for shutdown nuclear power plants so that we could move away from the existing practice of regulating by exemption in this area. Issuing a shutdown plant dozens of exemptions from the requirements governing operating plants is not efficient and does not provide for any public participation. Second, I felt strongly that we needed to take a fresh look at the basic contours of the current decommissioning process. That is still my view. Seven years after this rulemaking began, I remain convinced that we need a rule. But it needs to be the right rule.

Over the years, NRC has adopted two very different visions of the decommissioning process. In one paradigm, NRC plays a central role in key decisions and a broad range of stakeholders have an opportunity to participate meaningfully in the regulatory process. This approach is represented by the original decommissioning rule, which was issued in 1988. In the other paradigm, the licensee makes the key decisions with a minimal role for NRC and almost no role for any other stakeholders. This approach is embodied by the current regulation, which was issued in 1996, and the draft proposed rule, which goes even further down this path.

We need to change course and produce a balanced rule that respects the interests of a broad range of stakeholders, including states and local communities. The current regulatory requirements established in 1996 are not balanced, and the draft proposed rule would make the situation even worse, further skewing the regulation towards the interests of industry. Right now, NRC is pretty hands off when it comes to decommissioning. NRC conducts safety inspections but allows licensees to make virtually all of the major decisions.

The basic justification offered for the present arrangement and for the draft proposed rule is that shutdown nuclear reactors pose less radiological risk than operating reactors. As the staff accurately observes, "[c]ompared to an operating power reactor, the risk of an offsite radiological release is significantly lower, and the types of possible accidents are significantly fewer."¹ Because "the reactor, reactor coolant system, and reactor support systems are no longer in operation ... postulated accidents involving a failure or malfunction of these systems are no longer applicable."²

However, radiological risks remain at shutdown nuclear power plants that must be taken seriously. The NRC staff acknowledges that, in the early months after a shutdown, "the consequences resulting from an accident at a decommissioning reactor ... can be similar to an accident at an operating reactor" because "the offsite consequences of a zirconium fire [in the spent fuel pool] may be comparable to those from operating reactor postulated severe accidents."³ Even after the initial shutdown period, scenarios involving a draindown of the spent fuel pool and resulting zirconium fire could pose consequences characterized by the staff as "unacceptable."⁴ And, as the International Atomic Energy Agency (IAEA) notes,

¹ Draft *Federal Register* Notice, Proposed Rule at 3 (ADAMS Accession Package No. ML18012A019).

² *Id.* at 63.

³ Draft Regulatory Analysis, Proposed Rule (May 2018) at 42 (ADAMS Accession Package No. ML18012A019).

⁴ Draft *Federal Register* Notice, Proposed Rule at 210.

decommissioning “activities such as decontamination, cutting and handling of large equipment, and the progressive dismantling or removal of some existing safety systems ... have the potential for creating new hazards.”⁵ But the draft proposed rule does little to grapple with these risks.

The draft proposed rule is too focused on reducing industry “burdens” and providing licensees even more “flexibility” – and not focused enough on the interests of other stakeholders. In the staff’s regulatory analysis, licensee cost savings and reducing the regulatory “burden” on licensees are a key basis for most of the rule’s provisions, including those related to emergency preparedness, insurance, and spent fuel management planning.⁶ And the impacts of the rule’s provisions on non-industry stakeholders are repeatedly downplayed. For example, while the proposed rule would shift emergency planning costs away from licensees and onto the Federal Emergency Management Agency (FEMA) and state and local responders, the regulatory analysis does not mention this added cost to government entities.⁷ Similarly, the only recognized impact on state and local governments of a provision expanding the applicability of the backfit rule to decommissioning activities is the cost to them of commenting on the proposed rule.⁸ I hardly think our state and local counterparts would see it that way. Even the staff’s analysis of the impacts of a decommissioning funding shortfall is entirely focused on the hardship to licensees, including “interference with licensees’ business planning or negative tax consequences”; there is no mention at all of the risk that a site would not be fully remediated or the impacts of a delayed clean up on other stakeholders.⁹ In short, while the “NRC staff has attempted to calculate all potential benefits and costs to the NRC and to industry, it has failed to evaluate significant potential benefits and costs to host communities and states.”¹⁰

NRC asserts broad jurisdiction over nuclear power plant decommissioning, to the exclusion of state and local governments. And NRC’s mission is focused on radiological safety. But to make good decommissioning decisions, NRC must understand and consider the non-radiological impacts of its decisions. The people who live in communities around a decommissioning plant can help us do that. But the draft proposed rule would leave these communities and their state and local governments with no real voice in the process. It does nothing to increase public involvement in decommissioning decisionmaking.

There are other big gaps in the draft proposed rule. There are, for instance, no provisions to strengthen decommissioning funding assurance or reconsider the 60-year timeframe allotted for decommissioning a plant. As several stakeholders pointed out, industry priorities are reflected in the rule, while suggestions offered by states “were not addressed at

⁵ International Atomic Energy Agency, *Decommissioning of Nuclear Power Plants and Research Reactors* (1999) at 5 (<https://www.iaea.org/publications/5778/decommissioning-of-nuclear-power-plants-and-research-reactors>).

⁶ Draft Regulatory Analysis, Proposed Rule at 101-108.

⁷ See *id.* at 23-24, 68.

⁸ *Id.* at 53.

⁹ *Id.* at 100.

¹⁰ Comment of Vermont, Massachusetts, New York, and Connecticut (June 13, 2017) at 5 (ADAMS Accession No. ML17165A385).

all,” “were minimized,” or were “swept aside to be addressed through regulatory guidance.”¹¹ I agree that “[a] rebalancing is in order.”¹²

For these reasons, I disapprove the draft proposed rule. The NRC staff should re-craft the proposed rule to include the elements discussed below and submit a revised draft proposed rule to the Commission within six months.

Decommissioning Plan

NRC’s current regulations require a licensee to submit a post-shutdown decommissioning activities report (PSDAR) within 2 years of shutdown. A PSDAR includes “the licensee’s proposed decommissioning activities and schedule through license termination, a discussion of the reasons for concluding that the environmental impacts associated with the proposed site-specific decommissioning activities will be bounded by appropriate previously issued environmental impact statements, and a decommissioning cost estimate.”¹³ NRC takes public comment on the PSDAR but “does not approve the PSDAR and the submission of the PSDAR and its review by the NRC does not require the licensee to request a license amendment or any other approval.”¹⁴ As one stakeholder explains:

NRC staff exerts no regulatory authority on the document other than acknowledging its existence and its receipt. The NRC neither approves nor disapproves any of the industry’s decisions or plans for decommissioning the reactor sites. And to the extent the details of the decommissioning plan are specified or outlined in the document, the NRC takes no action and has no authority to require more of anything, less of anything, or something altogether different as a consequence of the arrival of the PSDAR.¹⁵

Besides leaving NRC with no real decisionmaking role with respect to decommissioning activities on the site, the lack of agency approval of the PSDAR has two significant consequences. First, no National Environmental Policy Act (NEPA) environmental review is required before decommissioning activities commence. Second, there is no opportunity for stakeholders to challenge the activities outlined in the PSDAR in an agency adjudicatory hearing. In fact, the current process was designed to postpone the licensing action, NEPA review, and opportunity for a hearing until the License Termination Plan is submitted at the very end of the decommissioning process – potentially decades later – when all of the key decisions have already been made, the vast majority of the decommissioning work has been completed, and the decommissioning trust fund may have been entirely expended.

The draft proposed rule would leave this bizarre framework in place and take it even further. It would water down the already limited environmental information in the PSDAR by no longer requiring licensees “to make the definitive conclusion that impacts will be bounded” by previous environmental impact statements.¹⁶ The rule also would eliminate NRC approval of a

¹¹ *Id.* at 3; Comment of New York State Energy Research and Development Authority (June 13, 2017) at 1 (ADAMS Accession No. ML17165A386).

¹² Comment of Vermont, Massachusetts, New York, and Connecticut (June 13, 2017) at 2.

¹³ Draft *Federal Register* Notice, Proposed Rule at 19-20.

¹⁴ *Id.* at 20.

¹⁵ Comment of Natural Resources Defense Council (June 13, 2017) at 6 (ADAMS Accession No. ML17165A333).

¹⁶ Draft *Federal Register* Notice, Proposed Rule at 146.

licensee's irradiated fuel management program and drop the requirement that the PSDAR's site-specific cost estimate include the projected cost of managing spent fuel.¹⁷

This laissez-faire regulatory scheme has been fairly described as "passive" and an abdication of regulatory authority.¹⁸ It barely qualifies as a regulatory scheme at all. Collecting a PSDAR without substantively assessing its content does next to nothing to protect public health and safety. And taking public comment on the PSDAR is a "hollow gesture" when NRC does not make a determination on the adequacy of the report.¹⁹

In fact, NRC is an international outlier in not approving a decommissioning plan. IAEA's "safety standards reflect an international consensus on what constitutes a high level of safety for protecting people and the environment from harmful effects of ionizing radiation."²⁰ And IAEA has explicitly stated that licensees "should submit an application containing the final decommissioning plan for review and approval by the regulatory body."²¹ IAEA makes it clear that the responsibilities of a nuclear safety regulator include "approval of the final decommissioning plan and supporting documents," which must include the "selected decommissioning strategy" that "shall be justified by the licensee," the "timeframe for decommissioning," and "financing for the completion of decommissioning."²² According to IAEA, to prepare the plan, "the extent and type of radioactive material at the facility ... shall be determined by means of a detailed characterization survey and on the basis of records collected during the operational period."²³

NRC's regulations should reflect this commonsense, global consensus. The revised draft proposed rule should require a licensee of a permanently shutdown plant to submit a detailed decommissioning plan that must be approved by NRC before decommissioning work can begin. The decommissioning plan must include a description and schedule of proposed activities, an overall timeframe for decommissioning, and a site-specific decommissioning cost estimate based in part on a full site characterization. As part of its review, NRC will evaluate and decide on the validity of the site-specific cost estimate. NRC will also evaluate and make a decision about the appropriate timeframe for decommissioning on a site-specific basis instead of allowing a licensee to pick any timeframe less than 60 years.

Rather than submitting a License Termination Plan at the end of the decommissioning process, the rule should require a licensee to submit an application for license termination as part of the detailed decommissioning plan. Once decommissioning is complete, the agency will terminate the license without a separate licensing action if it determines that (1) the decommissioning has been performed in accordance with the approved decommissioning plan

¹⁷ *Id.* at 163.

¹⁸ See, e.g., Comment of New York State Energy Research and Development Authority (June 13, 2017) at 3, 8.

¹⁹ See Comment of Andrew Kugler (June 13, 2017) at 3 (ADAMS Accession No. ML17165A332); see also Comment of State of Ohio (June 13, 2017) at 5-6 (ADAMS Accession No. ML17165A206); Comment of Windham Regional Commission (June 8, 2017) at 8 (ADAMS Accession No. ML17165A204).

²⁰ International Atomic Energy Agency, *Decommissioning of Facilities* (2014) (<https://www.iaea.org/publications/10676/decommissioning-of-facilities>).

²¹ International Atomic Energy Agency, *Decommissioning of Nuclear Power Plants and Research Reactors* (1999) at 14.

²² International Atomic Energy Agency, *Decommissioning of Facilities* (2014) at 9, 12, 15-16.

²³ *Id.* at 16.

and (2) the final radiation survey and associated documentation demonstrates that the site is suitable for release for unrestricted use.

To give states a meaningful role in the development and review of the decommissioning plan, the rule should require the licensee to provide a draft decommissioning plan to the host state for its comments prior to submitting the plan to NRC. For each host state comment, the plan submitted to NRC should explain what changes, if any, were made and why. To ensure that all stakeholders have an effective opportunity to express their views on the proposed decommissioning plan, the rule should also require NRC to provide a public comment period and public meeting on the proposed plan before NRC makes a decision about whether to approve it.

Environmental Review

NRC's approval of a decommissioning plan will be a major federal action. As a result, the agency must perform its NEPA environmental review to inform that licensing decision. A NEPA review at this early stage of the decommissioning process makes much more sense than at the time of license termination, when the major decisions would already have been made and nearly all the impacts of decommissioning would have occurred. Conducting the environmental review before decommissioning begins is also necessary to ensure that the site-specific NEPA reviews contemplated by the 2002 Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities and the consultations required by the Endangered Species Act and National Historic Preservation Act occur. These important consultations and site-specific environmental reviews are currently falling through the cracks.²⁴ Scoping meetings and other public interactions on the NEPA review will have the added benefit of giving interested stakeholders another timely opportunity to express their views.

Hearing Rights

Because NRC approval of a decommissioning plan will constitute a licensing action, stakeholders will have an opportunity to request an adjudicatory hearing at that time. Like the NEPA review, the opportunity for a hearing will be most beneficial at the beginning of the decommissioning process rather than at the end. A hearing also offers another chance for states, local governments, and other interested stakeholders to raise safety or environmental concerns with the decommissioning plan.

Community Advisory Panels

Community advisory panels have been established for several decommissioning sites and can provide a useful forum for stakeholders to share their perspectives and get their questions answered. However, I do not propose requiring licensees to form community advisory panels for decommissioning plants because state or local governments may prefer to create their own panels. The revised draft proposed rule should require NRC to respond to information requests from any community advisory panel established by a host state.

Timeframe for Decommissioning

Instead of allowing licensees to complete decommissioning anytime within 60 years, the revised draft proposed rule should require decommissioning to be completed "as soon as

²⁴ See Comment of Andrew Kugler (June 13, 2017).

technically and financially feasible.” This standard establishes an expectation of prompt decontamination. NRC will determine whether a licensee’s proposed timeframe for decommissioning a particular plant meets this standard when NRC reviews the decommissioning plan. The revised draft proposed rule should preserve the 60-year deadline as a backstop and specifically seek public comment on whether the 60-year backstop should be shortened and, if so, by how much.

There are several reasons to adopt the prompt decontamination approach. First, the historic safety case for a 60-year timeframe does not reflect the improved radiation protection practices that have developed over time, new technologies for decommissioning, or recent experience and trends. Multiple sites have decommissioned much faster. For example, Big Rock Point, Fort St. Vrain, Haddam Neck, Maine Yankee, Rancho Seco, Trojan, and Yankee Rowe decommissioned in substantially less time. LaCrosse and Zion are also on course to do so. And the licensees of most recently shutdown or soon-to-be shutdown plants intend to proceed with decommissioning on a timeframe significantly shorter than 60 years. Second, the international consensus strongly favors prompt decontamination. IAEA safety standards state that “[t]he preferred decommissioning strategy shall be immediate dismantling” unless it is not practicable.²⁵ Third, states, local communities, and plant workers have expressed a strong interest in prompt decommissioning because of the employment and land redevelopment benefits it provides.²⁶ IAEA agrees that local economic development and employment factors should be considered when deciding on a decommissioning strategy.²⁷ Fourth, prompt decontamination can take advantage of the first-hand knowledge of the workers who recently operated the plant. Finally, longer decommissioning timeframes can increase overall costs as a result of maintenance, security, and other long-term expenses.

Decommissioning Strategies

Under current NRC guidance, licensees can choose from three general decommissioning strategies: DECON, which involves active cleanup and decontamination, SAFSTOR, which involves deferred dismantling, and ENTOMB, which consists of encasing contaminated facilities in concrete rather than cleaning them up.²⁸ With an “as soon as technically and financially feasible” standard, decommissioning timeframes will be site-specific based on NRC-approved decommissioning plans.

The ENTOMB option should be eliminated from guidance. As IAEA explains, “Entombment ... is not considered a decommissioning strategy and is not an option in the case of planned permanent shutdown. It may be considered a solution only under exceptional circumstances (e.g. following a severe accident).”²⁹

²⁵ International Atomic Energy Agency, *Decommissioning of Facilities* (2014) at 12.

²⁶ See, e.g., Comment of California Energy Commission (June 13, 2017) at 11 (ADAMS Accession No. ML17165A378); Comment of New York State Energy Research and Development Authority (June 13, 2017) at 2; Comment of Windham Regional Commission (June 8, 2017) at 6, 13; and Comment of Conference of Radiation Control Program Directors, Inc. (March 17, 2016) at 23 (ADAMS Accession No. ML16077A279).

²⁷ International Atomic Energy Agency, *Decommissioning of Nuclear Power Plants and Research Reactors* (1999) at 9-10, 17.

²⁸ See NRC, *Decommissioning Nuclear Power Plants*, NUREG/BR-0521, Rev. 1 (June 2017) ADAMS Accession No. ML17177A253).

²⁹ International Atomic Energy Agency, *Decommissioning of Facilities* (2014) at 3.

Stages of a Graded Approach

The draft proposed rule lays out a 4-level graded approach for emergency preparedness, physical security, cyber security, and insurance requirements. Because radiological risks decline after a reactor permanently shuts down and as the site advances through different stages of decommissioning, a graded approach generally makes sense. I agree with the NRC staff that the milestones for Level 1 (shutdown), Level 3 (all fuel in dry cask storage), and Level 4 (all fuel offsite) are appropriate. However, for the reasons discussed below in the sections on emergency preparedness, cyber security, and insurance, the graded approach in the revised draft proposed rule should not include the milestone for Level 2, which is based on the number of months it would take for the spent fuel to cool enough that it would take at least 10 hours without cooling to reach a temperature where the fuel cladding would ignite.

Emergency Preparedness

Under the draft proposed rule, emergency preparedness requirements would be significantly reduced when a plant reached Level 2. Based on current fuel burnup and enrichment levels, this would take approximately 10 months after shutdown for boiling water reactors and 16 months for pressurized water reactors. At this point, the rule would eliminate the requirements for dedicated radiological offsite emergency planning, emergency planning zones (EPZs), and public alert and notification systems, among others. In the absence of dedicated offsite radiological emergency planning, emergency responders would be left with more generalized, all-hazards planning. The staff's rationale for reduced emergency preparedness at this stage is the very low probability of beyond-design-basis events that could initiate a zirconium fire in the spent fuel pool and the staff's conclusion that, if such an event occurred, ten hours from the loss of spent fuel pool cooling "provides ample time to take appropriate actions without the extensive preplanning and other requirements of the [emergency preparedness] framework for operating plants."³⁰

Although the events that could trigger a zirconium fire in a spent fuel pool of a shutdown reactor are fewer and less likely to occur than accident scenarios involving an operating nuclear power plant, radiological emergency planning has never been exclusively based on the likelihood of an accident occurring. The joint NRC-EPA task force that introduced the emergency planning zone (EPZ) concept in 1978 specifically stated: "Emergency planning is not based upon quantified probabilities of incidents or accidents."³¹ Its foundational task force report, referred to as NUREG-0396, explained that "[r]adiological emergency planning is not based upon probabilities, but on public perceptions of the problem and what could be done to protect health and safety."³² NRC and EPA understood that beyond-design-basis accidents were unlikely, but they also knew that EPZs should be in place to provide defense-in-depth because "the probability of an accident involving a significant release of radioactive material, although small, is not zero."³³

More than forty years later, stakeholders are emphasizing these same points in the specific context of decommissioning. For example, the Committee on Emergency Response Planning of the Conference of Radiation Control Program Directors (CRCPD) notes that

³⁰ Draft *Federal Register* Notice, Proposed Rule at 73.

³¹ NUREG-0396/EPA 520/1-78-016 (December 1978) at I-2.

³² *Id.*

³³ *Id.* at II-1.

“[a]lthough the risk is greatly reduced for a reactor during decommissioning, it does not go to zero.”³⁴ CRCPD argues that probabilistic risk assessment and “new risk studies should not be the sole basis for emergency planning policy with respect to spent fuel accidents.”³⁵ Similarly, the State of Ohio focuses on the importance of being prepared for low-probability, high-consequence events, stating: “How can you not have an offsite emergency response plan? Until you can say there is no evacuation potential, then the offsite response capability is still needed.”³⁶ Massachusetts, Vermont, Connecticut, and New York agree that “even if NRC Staff is correct that the probability of such an incident is ‘low,’ the consequences are so significant that the NRC cannot permit licensees to eliminate these straightforward but important emergency preparedness activities.”³⁷

FEMA and the states also dispute the NRC staff’s premise that all-hazards planning would be adequate in responding to a spent fuel pool accident. According to FEMA, “Radiological [emergency planning] is not sufficiently addressed within the All Hazards framework – radiological [emergency planning] is unique. In a Worst-Case Scenario, our [offsite response organizations] could be challenged to effectively protect the health and safety of the public using an ad hoc [emergency planning] construct.”³⁸ FEMA explains that “[a]dvanced planning – such as provided by an EPZ – reduces the complexity of the decision-making process during an incident.”³⁹ And FEMA “stress[es] that the proven best way to ensure offsite readiness is to develop, exercise, and assess [offsite response organization] radiological capabilities, as is now done throughout the offsite EPZ.”⁴⁰ While a radiological emergency plan could be “scaled up” to address a more severe accident than what was planned for, FEMA notes that it is “unrealistic” to scale up “non-existent plans” and that the resulting “lack of necessary equipment, and shortage of trained emergency personnel could have unfortunate consequences.”⁴¹ Similarly, Massachusetts, Vermont, Connecticut, and New York contend that “[b]ecause EPZs are what ensure that prompt and effective actions occur, the elimination of EPZs removes that assurance.”⁴² And CRCPD notes that “[t]here is no supporting evidence that an all-hazards plan would have the same effect” of reducing the risk of early fatalities as a dedicated radiological emergency plan would.⁴³

In short, there is broad agreement that all-hazards planning would not be as effective as dedicated radiological emergency planning in an actual radiological emergency. As FEMA explains:

³⁴ Comment of CRCPD Committee on Emergency Response Planning (June 13, 2017) at 1 (ADAMS Accession No. ML17165A200). CRCPD’s membership includes many state and local radiation professionals.

³⁵ *Id.* at 1-2.

³⁶ Comment of State of Ohio (June 13, 2017) at 1.

³⁷ Comment of Vermont, Massachusetts, New York, and Connecticut (June 13, 2017) at 7.

³⁸ Letter from Michael S. Casey, Director, Technological Hazards Division, FEMA to NRC (July 8, 2019) (ADAMS Accession No. ML19189A318).

³⁹ *Id.*

⁴⁰ *Id.*

⁴¹ Letter from Michael S. Casey, Director, Technological Hazards Division, FEMA to NRC (Aug. 24, 2019) (ADAMS Accession No. ML19240A938).

⁴² Comment of Vermont, Massachusetts, New York, and Connecticut (June 13, 2017) at 7.

⁴³ Comment of CRCPD Committee on Emergency Response Planning (June 13, 2017) at 2, 4-5.

The belief expressed by the NRC staff that State and local governments surrounding a decommissioning plant which are not involved in formal radiological emergency planning would nonetheless respond expeditiously and with optimum effectiveness to an actual radiological emergency in a coordinated fashion using its [all-hazards plan] is open to question. FEMA has no data that would indicate what State and local government reactions might be in such circumstances.⁴⁴

An emergency response to a spent fuel pool accident based on an all-hazards plan would be even more challenging within the 10-hour timeframe assumed by the NRC staff. The staff did not consult with FEMA about whether 10 hours would be a sufficient amount of time for such an offsite response.⁴⁵ According to FEMA, “NRC is believing that the ‘muscle memory’ of formal [radiological emergency planning] knowledge and skill will carry the day,” but “[e]mergency preparedness should not be based on the efficacy of residual knowledge.”⁴⁶ Several states share this concern. For instance, the California Energy Commission argues that the “overly optimistic 10-hour timeline ignores the full impact of a disaster event. An event that triggers a nuclear incident has a high probability of introducing significant barriers to transportation and communication.”⁴⁷

Based on these concerns, FEMA and states representing more than 96 million Americans recommend that NRC require dedicated radiological emergency planning, including a 10-mile EPZ, until all spent nuclear fuel at a site is removed from the spent fuel pool and placed in passive, dry cask storage.⁴⁸ I support this approach, which would provide defense-in-depth to protect the public, while ensuring that FEMA will continue to play its vital role in assessing the adequacy of offsite emergency response plans at decommissioning nuclear power plants. In addition, this approach provides a strong incentive for licensees to expeditiously transfer spent nuclear fuel to dry cask storage, which reduces radiological risks and enhances safety. For these reasons, the revised draft proposed rule should postpone the

⁴⁴ Letter from Michael S. Casey, Director, Technological Hazards Division, FEMA to NRC (Feb. 20, 2019) (ADAMS Accession No. ML19057A234).

⁴⁵ Letter from Jonathan M. Hoyes, Director, Technological Hazards Division, FEMA to NRC (June 13, 2017) (ADAMS Accession No. ML17167A124).

⁴⁶ *Id.* at 5

⁴⁷ Comment of California Energy Commission (June 13, 2017) at 9.

⁴⁸ See, e.g., Letter from Jonathan M. Hoyes, Director, Technological Hazards Division, FEMA to NRC (June 13, 2017) at 4 (“Emergency preparedness in communities near decommissioning nuclear power plants should be based on the unique nature of the radiological hazard and the capabilities required to successfully mitigate, respond to, and recover from the offsite consequences of a possible zirconium fire as long as spent fuel remains in the spent fuel pool”); Comment of New York State Energy Research and Development Authority (June 13, 2017) at 6 (“until all fuel has been removed from spent fuel pools, NRC should require licensees to maintain emergency planning and evacuation protocols”); Comment of Vermont, Massachusetts, New York, and Connecticut (June 13, 2017) at 6 (“reductions in emergency preparedness ... should await a licensee’s transition to Level 3, when spent fuel has been removed from the spent fuel pools”); Comment of California Energy Commission (June 13, 2017) at 9 (“a 10-mile EPZ must remain in place while fuel is stored in a spent fuel pool”); Comment of State of Ohio (June 13, 2017) at 1 (“Offsite radiological emergency response capabilities should not be relaxed until fuel is in dry cask storage”); Comment of Illinois Emergency Management Agency (June 13, 2017) at 2 (“adequate emergency planning is necessary as long as there is fuel stored in spent fuel pools”) (ADAMS Accession No. ML17165A329).

Level 2 emergency preparedness reductions until all spent fuel at a site is transferred to dry cask storage.

Emergency Response Data System (ERDS)

ERDS “transmit[s] near-real-time electronic data directly between the licensee’s onsite computer system and the NRC Operations Center” to “allow the NRC to monitor critical parameters during an emergency.”⁴⁹ Under current regulations, ERDS is only required for operating reactors. The draft proposed rule would not change that but would require licensees with plants in Level 1 to “maintain a capability to provide meteorological, radiological, and [spent fuel pool] data (e.g., level, flow, and temperature data) to the NRC within a reasonable timeframe following an event.”⁵⁰ The NRC staff proposes to drop this requirement when a plant reaches Level 2.

Like the other emergency preparedness elements discussed above, ERDS would be a valuable tool in responding to a low-probability, high-consequence event at a shutdown nuclear power plant. As the NRC staff implicitly acknowledges, aspects of ERDS that transmit data on spent fuel pool conditions or meteorological and radiological data relevant to a potential spent fuel pool accident would help “offsite organizations to assess plant status and make public protective action decisions” if an accident were to occur.⁵¹ The revised draft proposed rule should require nuclear power plant licensees to maintain those aspects of ERDS until all spent fuel is removed from the pool and placed in dry cask storage.

Physical Security

Under the current regulations, the same physical security requirements apply to operating and permanently shutdown nuclear power plants. But site security plans change after shutdown because the number of target sets that need to be defended against attack goes down when the plant stops operating and some key safety systems are no longer in use.

In order to clarify when NRC needs to approve a change to the site security plan, the draft proposed rule includes new definitions. It also provides that, once all spent fuel is in dry cask storage, a licensee may follow the physical security requirements for specifically-licensed independent spent fuel storage installations. Other, fact-of-life changes are included in the rule, such as dropping the requirement to protect against significant core damage once all fuel has been removed from the reactor vessel and providing certain authorities to certified fuel handlers rather than senior licensed operators because there may no longer be a senior licensed operator at a decommissioning site.

In my view, these physical security provisions are reasonable and should be retained in the revised draft proposed rule.

Cyber Security

Under current regulations, cyber security requirements only apply to nuclear power plants that are operating. The draft proposed rule would extend cyber security requirements to

⁴⁹ Draft *Federal Register* Notice, Proposed Rule at 70; ERDS Final Rule, 56 Fed. Reg. at 40,178.

⁵⁰ Draft *Federal Register* Notice, Proposed Rule at 70.

⁵¹ Comment of Conference of Radiation Control Program Directors, Inc. (March 17, 2016) at 10.

shutdown plants in Level 1. The number of critical digital assets to be protected would decline though as safety systems are removed from service.

The NRC staff has a strong basis for applying cyber security requirements to shutdown nuclear power plants. The draft proposed rule explains:

attacks on the [spent fuel pool] are credible and have the potential to lead to an unacceptable impact to common defense and security. Specifically, a physical attack by either an external force or malicious insiders could directly lead to a draindown scenario and subsequent zirconium fire ... [A] cyber attack can be combined with a physical attack on the [spent fuel pool] to improve the physical attack's likelihood of success.⁵²

For example, a cyber attack could potentially disable perimeter detection, disrupt security communications, or disable access control doors and gates.⁵³

Although I agree with the NRC staff that cyber security requirements should apply to Level 1 plants, I believe it would be prudent to apply these requirements until the spent fuel pool no longer contains spent fuel. The revised draft proposed rule should extend cyber security requirements to a shutdown nuclear power plant until all its spent fuel is transferred to dry cask storage.

Insurance

The draft proposed rule would reduce the amount of required offsite liability insurance (from \$450 million to \$100 million) and onsite property insurance (from \$1.06 billion to \$50 million) for shutdown nuclear power plants once they reach Level 2. Because the storage of spent nuclear fuel in spent fuel pools poses credible risks of onsite and offsite contamination in the event of a zirconium fire, the revised draft proposed rule should maintain the existing level of required insurance until a plant's spent fuel is transferred to dry cask storage. Even without a change in the amount of insurance required while spent fuel remains in the pool, premiums paid by licensees would decrease to reflect the declining risks of liability over time.

Decommissioning Trust Fund and Financial Assurance

To satisfy NRC that there will be adequate funds to decommission a nuclear power plant, the agency's regulations currently require operating reactor licensees to set aside enough assets in a decommissioning trust fund to meet or exceed the amount established by NRC's generic decommissioning funding formula. Once a plant permanently shuts down, the licensee must prepare a site-specific cost estimate and demonstrate that the assets in the decommissioning trust fund are sufficient to cover the estimated decommissioning costs. However, licensees are not required to perform a full site characterization until just before license termination. NRC's regulations state that decommissioning trust fund assets can only be used for radiological decommissioning, but the NRC staff routinely grants exemptions to allow assets to be used for spent fuel management and other, non-radiological purposes. Decommissioning funding status reports must be submitted every two years for an operating plant and annually for a permanently shutdown plant.

⁵² Draft *Federal Register* Notice, Proposed Rule at 210.

⁵³ *Id.* at 210-211.

The draft proposed rule would make three main changes to the existing financial assurance regime. First, operating reactors would be permitted to submit decommissioning funding status reports triennially instead of biennially. Second, the rule would make it explicit that a licensee must identify additional financial assurance to cover any funding shortfall by the time of the next status report. Together, these two changes would allow an operating reactor licensee three years to correct a funding shortfall instead of the current two years. Finally, the rule would allow decommissioning trust fund assets to be used for spent fuel management as long as the trust fund (with an assumed rate of growth) exceeds the amount of the site-specific cost estimate. Trust fund assets could not be used for non-radiological site restoration unless an exemption is obtained.

Overall, the draft proposed rule would weaken NRC's financial assurance requirements. I do not support reducing the frequency of the decommissioning funding reports because this change would have the effect of providing an additional year to correct a shortfall, which heightens the risk that there would ultimately be insufficient funds to complete radiological decommissioning. As IAEA notes, "safe performance of decommissioning activities is dependent on adequate funds to complete the work without risk to public and worker health and safety, and the environment."⁵⁴ Therefore, I support an explicit requirement that any funding shortfall must be rectified by the time of the next funding status report. For a permanently shutdown reactor, this would clearly require that any funding shortfall must be corrected promptly, before the next annual report is due.

Instead of weakening funding assurance for operating reactors, NRC should reconsider its reliance on the existing generic decommissioning funding formula. The formula, which has not been updated for more than 30 years, has been severely criticized by the Government Accountability Office (GAO) and the NRC Inspector General. Both have questioned whether the formula provides a reliable, realistic estimate of the minimum funds needed to decommission a plant.⁵⁵

The formula clearly underestimates the actual costs of decommissioning. In fact, the formula does not even purport to account for the full costs of decommissioning, only the "bulk of funds" necessary for radiological decontamination. The NRC staff admits that "the minimum formula represents the low end of the range of decommissioning costs" and that it is difficult for the formula to reflect site-specific cost drivers.⁵⁶ As IAEA explains, "In every case the costs are site-specific, and generalizations or approximations from other facilities are usually inappropriate to use as a basis to establish a funding base ... A reasonable degree of reliability and accuracy can only be achieved by developing decommissioning cost estimates on a case-by-base site-specific basis."⁵⁷ The NRC staff acknowledges that a site-specific cost estimate "is a more accurate representation of the licensee's cost to decommission" than the generic formula, which is based on limited data from the late 1970's.⁵⁸ There is ample support for this conclusion. Funding status reports from recent years show that site-specific decommissioning

⁵⁴ International Atomic Energy Agency, *Financial Aspects of Decommissioning* (2005) at 3 (<https://www.iaea.org/publications/7337/financial-aspects-of-decommissioning>).

⁵⁵ Government Accountability Office, *NRC's Oversight of Nuclear Power Reactors' Decommissioning Funds Could Be Further Strengthened* (2012) (<https://www.gao.gov/products/GAO-12-258>); NRC Inspector General, *Audit of NRC's Decommissioning Funds Program* (2016) (ADAMS Accession No. ML16160A208).

⁵⁶ SECY-13-0066 at 3, 6-7 (ADAMS Accession No. ML13127A234).

⁵⁷ International Atomic Energy Agency, *Financial Aspects of Decommissioning* (2005) at 3, 12.

⁵⁸ SECY-18-0078 at 3 (ADAMS Accession No. ML18096B523).

cost estimates dwarf the minimum amount required by the formula. For example, at the end of 2016, Beaver Valley Unit 1 had a site-specific cost estimate of \$711 million, while Unit 2 reported a formula amount of \$482 million.⁵⁹ By the end of 2018, both Beaver Valley Units had site-specific cost estimates of \$748 million and \$756 million. Moreover, in 2018, Diablo Canyon Unit 2 accumulated more than \$1.7 billion in its decommissioning trust fund even though the NRC formula required less than a third of that amount.⁶⁰ Similarly, GAO found that, for five of the twelve reactors it examined, the formula captured just 57-76% of the costs reflected in the site-specific cost estimates.⁶¹ With these massive funding gaps, it is hard to see how one could conclude that the formula even provides for the “bulk” of decommissioning costs. That matters because if an operating plant is not setting aside enough funds each year, there could be a large deficiency at the time of shutdown, which raises the risk of insufficient funding to decommission the plant if the licensee is struggling financially at that time.

The revised draft proposed rule should seek public comment on the pros and cons of moving away from relying on the existing generic formula. The rule should present and take comment on two potential alternative approaches: (1) update the formula to reflect recent data and to cover all estimated radiological decommissioning costs rather than the bulk of the costs; and (2) eliminate the formula and require a site-specific cost estimate during operations.

With respect to how decommissioning trust fund assets can be used, the revised draft proposed rule should strengthen the standards to provide a higher level of assurance that adequate funds will be available for decommissioning. To accomplish this, the rule should modify the regulations in three ways.

First, the revised draft proposed rule should require a full site investigation and characterization at the time of shutdown to improve the accuracy and completeness of the site-specific cost estimate. This approach is consistent with IAEA safety standards and supported by numerous stakeholders.⁶² A full site investigation reduces the risk that significant, unexpected contamination will be discovered later in the process. It also takes advantage of the experience and historical knowledge of the plant operations staff. In short, an enhanced site-specific cost estimate informed by a full site investigation and characterization will better ensure that licensees set aside sufficient funds to cover the actual costs of radiological decommissioning. To ensure their accuracy over time, NRC should require the site-specific cost estimate and full site characterization to be periodically updated.

Second, the revised draft proposed rule should allow decommissioning trust fund assets to be used for spent fuel management only if (1) there is a projected surplus in the fund based on a comparison to the expected costs identified in an enhanced site-specific cost estimate and (2) the assets are returned to the fund within six years. This six-year timeframe provides the

⁵⁹ *Id.* at Table 1 (ADAMS Accession No. ML18096B543).

⁶⁰ SECY-20-0001 at Table 1 (ADAMS Accession No. ML19346E376).

⁶¹ Government Accountability Office, NRC’s Oversight of Nuclear Power Reactors’ Decommissioning Funds Could Be Further Strengthened (2012) at highlights, 13-14.

⁶² See International Atomic Energy Agency, Decommissioning of Facilities (2014) at 16; International Atomic Energy Agency, Financial Aspects of Decommissioning (2005) at 7; Comment of Vermont, Massachusetts, New York, and Connecticut (June 13, 2017) at 12; Comment of Vermont, Massachusetts, Connecticut, and New York (Mar. 18, 2016) at 43-46 (ADAMS Accession No. ML16085A310); Comment of Windham Regional Commission (June 8, 2017) at 14; Comment of Conference of Radiation Control Program Directors, Inc. (March 17, 2016) at 28.

licensee an appropriate period to be essentially reimbursed by the federal government for its spent fuel management expenses through Court of Federal Claims litigation. NRC should avoid a rule that allows trust fund assets to be used for something other than radiological decommissioning and not returned to the fund when licensees are later reimbursed for these activities.

Third, the revised rule should prohibit the use of decommissioning trust fund assets for non-radiological site restoration until all radiological decommissioning is complete. This properly prioritizes the need for adequate funding to cover the full cost of radiological decommissioning.

Backfit

The draft proposed rule would revise the Backfit Rule “in its entirety” to “clarify” that it applies to both operating and permanently shutdown reactors.⁶³ However, the Backfit Rule does not – and should not – apply to decommissioning plants.

The plain language of the Backfit Rule makes it clear that it “applies to a licensee designing, constructing, or operating a nuclear power facility.”⁶⁴ For more than twenty years, the NRC staff has recognized that “the terms within the rule indicate application to operating reactors.”⁶⁵ As the staff acknowledges in the draft proposed rule, aside from the plain language of the Backfit Rule, there are other reasons to conclude that it does not apply to decommissioning reactors, including: (1) the “Backfit Rule was developed when the decommissioning of plants was not an active area of regulatory concern”; (2) “[t]wo of the factors used in evaluating a backfit—costs of construction delay/facility downtime, and changes in plant/operational complexity—are targeted to power operation and are ‘conceptually inappropriate in evaluating the impacts of a backfit on a decommissioning plant’”; and (3) the Statements of Consideration for the 1970, 1985, and 1988 final Backfit Rules “did not discuss any aspect of decommissioning, focusing instead on construction and operation.”⁶⁶ Moreover, in 1998, the staff believed it was necessary to amend the Backfit Rule through rulemaking to apply it to decommissioning nuclear power plants.⁶⁷

In the draft proposed rule, the NRC staff now relies on a tortured reading of the Backfit Rule to conclude that dismantling a power reactor or maintaining a spent fuel pool or dry cask storage pad qualifies as “operating” a nuclear power plant. This is disingenuous; a permanently shutdown reactor is obviously not an operating reactor. That’s the whole rationale for proceeding with a power reactor decommissioning rulemaking. In fact, a few pages later in the draft proposed rule, the staff defines “operate” in a totally contradictory way in its discussion of foreign ownership, control, or domination. In that section, the staff states that a permanently shutdown nuclear power plant “is no longer legally authorized to operate.”⁶⁸ This is the much more natural reading of the term “operate.”

The stated reasons for establishing the Backfit Rule were focused on operating reactors, and it should not be arbitrarily expanded to cover other facilities. Although the plain language

⁶³ Draft *Federal Register* Notice, Proposed Rule at 167-172, 194.

⁶⁴ *Id.* at 167.

⁶⁵ SECY-98-253 (ADAMS Accession No. ML992870107).

⁶⁶ Draft *Federal Register* Notice, Proposed Rule at 167-168; *id.*

⁶⁷ SECY-98-253.

⁶⁸ Draft *Federal Register* Notice, Proposed Rule at 174.

and historical context of the Backfit Rule conclusively demonstrate that it does not apply to permanently shutdown reactors, the revised draft proposed rule should include a provision that explicitly affirms this limited scope.

Foreign Ownership, Control, or Domination

The draft proposed rule would clarify that the prohibition on foreign ownership, control, or domination does not apply to the licensee of “a facility that no longer meets the definition of a utilization or a production facility.”⁶⁹ The prohibition would not apply if two criteria are met: (1) the facility must not be legally authorized to operate; and (2) the facility is physically modified to be incapable of making use of special nuclear material without significant facility alterations. Because this is a reasonable approach based on a natural reading of the term “operate,” this provision should be retained in the revised draft proposed rule.

Fitness for Duty

The draft proposed rule is intended to clarify that Part 26 fitness-for-duty requirements do not apply to permanently shutdown power reactors, regardless of whether they were licensed under Part 50 or Part 52. It also provides more detail than the current regulations about which Part 26 elements are required for an insider mitigation plan at a shutdown plant. For example, the draft proposed rule states that an insider mitigation plan should contain all but two elements of Part 26 (fatigue management and fitness-for-duty programs for construction) for individuals who have unescorted access to the vital areas of a decommissioning plant, perform security-related functions, or administer the drug testing program.

I find the staff’s approach to be generally reasonable. The revised draft final rule should include a few adjustments. Because of their key safety role with respect to spent fuel, certified fuel handlers should also be subject to an insider mitigation plan with all but the two elements of Part 26. Random drug and alcohol testing should continue for those performing fuel handling activities. The rule should also apply appropriate fatigue management requirements to employees performing fuel handling activities during the periods when such activities are being conducted.

Other Provisions

The draft proposed rule includes several straightforward provisions that I support retaining in the revised draft proposed rule. These are the provisions addressing criminal penalties,⁷⁰ the definition of Certified Fuel Handler and elimination of the Shift Technical Advisor,⁷¹ record retention,⁷² low-level waste transportation,⁷³ and Part 72 license termination,⁷⁴ as well as the clarification that the requirement for a license termination plan does not apply to nuclear power plants that never enter operation.⁷⁵

⁶⁹ *Id.* at 178.

⁷⁰ *Id.* at 125.

⁷¹ *Id.* at 126-129.

⁷² *Id.* at 150-157.

⁷³ *Id.* at 157-160.

⁷⁴ *Id.* at 165-166.

⁷⁵ *Id.* at 182-184.

Exemptions

One of the main purposes of this rule is to move away from regulation by exemption. Establishing detailed requirements for permanently shutdown nuclear power plants through a multi-year rulemaking that includes multiple rounds of public comment should make exemption requests far less common. The Statement of Considerations for the rule should establish a clear expectation that exemptions from the new regulation will be granted rarely and only in cases that present unique circumstances not considered in this rulemaking process.

In order to prevent exemptions from swallowing a rule promulgated under the Administrative Procedure Act, the revised draft proposed rule also should include new exemption provisions. The rule should require the NRC staff to (1) seek public comment on any requests for an exemption from the provisions of the decommissioning regulations and (2) respond to any comments received in a written, publicly-available decision document. In addition, the rule should require any requests for an exemption from the decommissioning regulations to be granted or denied by the Commission rather than the NRC staff.

Applicability of New Requirements

Because permanently shutdown nuclear power plants will be at different stages of decommissioning when the new decommissioning regulation becomes effective and will have previously received varying regulatory exemptions, the requirements of the revised draft proposed rule cannot be uniformly applied to differently-situated sites. The applicability of the updated requirements should be tailored to three categories of sites.

For sites for which the certification that fuel has been permanently removed from any reactor vessel onsite is submitted after the effective date of the final rule, all of the updated requirements of the final rule will apply on the effective date of the rule.

For sites for which the certification that fuel has been permanently removed from the reactor vessel was submitted before the effective date of the final rule and decommissioning work is not complete, licensees will be required to submit a decommissioning plan (rather than a PSDAR) within two years of the effective date of the final rule for NRC review and approval. However, to avoid interrupting progress on ongoing decommissioning work, the licensee may proceed with dismantlement and decontamination activities prior to NRC approval of the decommissioning plan. Any regulatory exemptions previously granted to these licensees will remain in effect unless they are modified by the approved decommissioning plan.

For sites for which the certification that fuel has been permanently removed from the reactor vessel was submitted before the effective date of the final rule, decommissioning work is complete, and all spent fuel is in dry cask storage or has been transported offsite, none of the updated requirements of the final rule will apply.

Conclusion

Every current and future nuclear power plant will eventually be decommissioned. It is therefore essential that NRC establish specific requirements for decommissioning reactors. Unlike NRC's existing decommissioning framework, these new requirements must be balanced – not skewed in favor of one group of stakeholders or designed to sideline NRC. The draft proposed rule misses the mark. NRC needs a course correction to strike the right balance. We can and must do better.