

THE NRC IS MAKING PUBLICLY AVAILABLE THE STAFF'S PRELIMINARY DRAFT REGULATORY BASIS FOR THE DECOMMISSIONING POWER REACTORS RULEMAKING TO FACILITATE DISCUSSIONS DURING THE 2017 REGULATORY INFORMATION CONFERENCE, IN PARTICULAR, A MARCH 15, 2017, SESSION ON DECOMMISSIONING. THE NRC WILL BE ACCEPTING PUBLIC COMMENTS ON THIS DOCUMENT ONLY DURING ITS OFFICIAL COMMENT PERIOD, WHICH WILL BEGIN UPON PUBLICATION OF A FEDERAL REGISTER NOTICE IN THE NEAR TERM. THIS PRELIMINARY DRAFT DOCUMENT HAS NOT BEEN SUBJECT TO ALL LEVELS OF NRC MANAGEMENT APPROVAL.

Regulatory Improvements for Power Reactors Transitioning to Decommissioning

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Acronyms

10 CFR	Title 10 of the <i>Code of Federal Regulations</i>
ACRS	Advisory Committee on Reactor Safeguards
ADAMS	Agencywide Documents Access and Management System
AEA	Atomic Energy Act
AEC	Atomic Energy Commission
ALARA	As low as reasonably achievable
AMP	Aging management program
ANPR	Advance notice of proposed rulemaking
ASM	Additional security measure
BWR	Boiling water reactor
CAS	Central alarm station
CDA	Critical digital asset
CEMP	Comprehensive emergency management plan
CER	Cumulative effects of regulation
CFH	Certified fuel handler
CFR	<i>Code of Federal Regulations</i>
COL	Combined license
CP	Construction permit
CS	Critical system
CSP	Cyber security program
DBA	Design basis accident
DBT	Design basis threat
DC	Design certification
DCE	Decommissioning cost estimate
DCSS	Dry cask storage system
DOE	Department of Energy
DP	Decommissioning plan
DTF	Decommissioning trust fund
EA	Environmental assessment
EAB	Exclusion area boundary
EAL	Emergency action level
ECCS	Emergency core cooling system
ECL	Emergency classification level
EIS	Environmental impact statement
EOF	Emergency operations facility
EP	Emergency preparedness
EPA	U.S. Environmental Protection Agency
EPZ	Emergency planning zone
ERDS	Emergency Response Data System
ERO	Emergency response organization
ESA	Endangered Species Act
ESF	Engineered safety feature
ETE	Evacuation time estimate
FES	Final environmental statement
FCF	Fuel cycle facilities
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission

FFD	Fitness for duty
FOF	Force-on-force
FRN	<i>Federal Register</i> notice
FSAR	Final safety analysis report
FY	Fiscal year
GDC	General Design Criteria
GE	General emergency
GEIS	Generic Environmental Impact Statement
Gpm	Gallons per minute
GWd/MTHM	Gigawatt days per Metric Ton of Heavy Metal
IAEA	International Atomic Energy Agency
ICM	Interim compensatory measures
IFMP	Irradiated fuel management program
IMP	Insider mitigation program
IRS	Internal Revenue Service
ISFSI	Independent spent fuel storage installation
ISG	Interim Staff Guidance
LAR	License amendment request
LOCA	Loss of coolant accident
LTP	License termination plan
MOU	Memorandum of understanding
MOX	Mixed oxide
MRS	Monitored retrievable storage
MWt	Megawatt thermal
NEI	Nuclear Energy Institute
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NLO	Non-licensed operator
NMSS	Office of Nuclear Materials Safety and Safeguards
NOUE	Notification of Unusual Event
NRC	Nuclear Regulatory Commission
NRR	Office of Nuclear Reactor Regulation
OCA	Owner controlled area
OMB	Office of Management and Budget
OL	Operating license
ORO	Offsite response organization
OSC	Operational support center
OOU	Official use only
PAA	Price-Anderson Act
PAG	Protective action guide
PAR	Protective action recommendation
PDEP	Permanently defueled emergency plan
PSDAR	Post shutdown decommissioning activity report
PSP	Physical security plan
PUC	Public Utilities Commission
PWR	Pressurized water reactor
QA	Quality assurance
RAI	Request for additional information
RCRA	Resources Conservation and Recovery Act
RCS	Reactor coolant system

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REM	Roentgen equivalent man
REP	Radiological emergency preparedness
RG	Regulatory Guide
RIS	Regulatory Information Summary
SAE	Site area emergency
SAS	Secondary alarm station
SAT	Systems approach to training
SC	Structure and component
SEC	Securities and Exchange Commission
SER	Safety evaluation report
SFP	Spent fuel pool
SGI	Safeguards information
SNL	Sandia National Laboratories
SOC	Statement of considerations
SONGS	San Onofre Nuclear Generating Station
SRM	Staff requirements memorandum
SSC	Structure, system, and component
SSCE	Site-specific cost estimate
SSEP	Security and emergency preparedness
SSNM	Strategic special nuclear material
STA	Shift technical advisor
TS	Technical specifications
TSC	Technical support center
UFSAR	Updated final safety analysis report
VY	Vermont Yankee

1. Executive Summary

In its staff requirements memorandum (SRM) for SECY-14-0118, "Request by Duke Energy Florida, Inc., for Exemptions from Certain Emergency Planning Requirements," dated December 30, 2014 (Agencywide Documents and Management System (ADAMS) Accession No. ML14364A111), the Commission directed the U.S. Nuclear Regulatory Commission (NRC) staff to proceed with an integrated rulemaking on decommissioning. The Commission further stated that this rulemaking should address: issues discussed in SECY-00-0145, "Integrated Rulemaking Plan for Nuclear Power Plant Decommissioning" (ADAMS Accession No. ML003721626), such as the graded approach to emergency preparedness; lessons learned from the plants that have already gone or are currently going through the decommissioning process; the advisability of requiring a licensee's Post-Shutdown Decommissioning Activities Report (PSDAR) to be approved by NRC; the appropriateness of maintaining the three existing options for decommissioning and the timeframes associated with those options; the appropriate role of State and local governments and non-governmental stakeholders in the decommissioning process; and any other issues deemed relevant by the NRC staff.

The NRC has not identified any significant risks to public health and safety in the current regulatory framework for decommissioning power reactors. Consequently, the need for a power reactor decommissioning rulemaking is not based on any identified safety or security concerns. When compared to potential accidents at an operating reactor, the risk of an offsite radiological release is significantly lower, and the types of possible accidents are significantly fewer, at a decommissioning nuclear power reactor. Although the need for a power reactor decommissioning rulemaking is not based on safety or security concerns, the NRC understands that the decommissioning process can be improved and made more efficient, open, and predictable by reducing its reliance on licensing actions (i.e., license amendment and exemption requests) to achieve a long-term regulatory framework.

The NRC staff issued an advance notice of proposed rulemaking (ANPR) in November 2015 to obtain stakeholder feedback on the regulatory issues included in SECY-14-0118. As stated in the ANPR, the primary objective of the decommissioning rulemaking is to implement appropriate regulatory changes that reduce the burden of licensing actions on NRC staff and licensees during decommissioning. The NRC received input from stakeholders in every area under consideration in the power reactor decommissioning rulemaking. The NRC received the most stakeholder input regarding the current regulatory approach to decommissioning, emergency preparedness, and decommissioning trust funds. The staff reviewed the comments received in each regulatory area, and used input received from stakeholders to develop the options presented in this report.

The NRC staff's draft regulatory basis concludes that there is sufficient basis to fulfill the Commission's explicit direction in SRM-SECY-14-0118 and to proceed with rulemaking to address regulatory requirements associated with power reactors transitioning to decommissioning. However, through development of its draft regulatory basis, the NRC staff has determined that some areas within the scope discussed in SECY-14-0118 can be addressed using other regulatory alternatives.

The areas in which the NRC staff has determined that there is sufficient regulatory basis to continue with rulemaking are:

- Emergency preparedness
- Physical security
- Decommissioning trust funds
- Offsite and onsite financial protection requirements and indemnity agreements
- Application of Backfit Rule

Further, the NRC staff is recommending rulemaking to:

- Require that the PSDAR contain a description of how the spent fuel stored under a general independent spent fuel storage installation (ISFSI) license will be removed from the reactor site in accordance with the regulatory requirements in Title 10 of the Code of Federal Regulations (10 CFR), Section 50.82, 10 CFR 50.54(bb), 10 CFR 52.110, and/or 10 CFR 72.218
- Amend 10 CFR 51.53 and 10 CFR 51.95 to clarify that the requirement for a license amendment before decommissioning activities may commence applies only to non-power reactors, as specified in 10 CFR 50.82(b), in accordance with the 1996 changes to the decommissioning regulations

The NRC staff's draft regulatory basis suggests that alternatives other than rulemaking, such as the development of regulatory guidance, can be pursued to address the following regulatory areas:

- The appropriate role of State and local governments in the decommissioning process
- The level of NRC review and approval of the PSDAR
- Revising the 60-year limit for power reactor decommissioning

The NRC staff's draft regulatory basis indicates that additional stakeholder input is needed prior to finalizing recommendations in the following regulatory areas:

- Cyber security
- Drug and alcohol testing
- Minimum staffing and training requirements for certified fuel handlers (CFHs)
- Aging management
- Fatigue management

As discussed in this regulatory basis, the NRC's assessment of insights from the recent licensing actions associated with decommissioning power reactors leads the NRC to conclude that changes to existing requirements are necessary for efficiency, clarity, and openness during the decommissioning process.

The NRC staff is publishing this draft regulatory basis for public comment prior to developing its final regulatory basis for the power reactor decommissioning rule. The NRC staff will provide final recommendations in all of these regulatory areas in its final regulatory basis. Neither senior NRC management nor the Commission has approved any specific elements of the power reactor decommissioning rulemaking framework at this time, and as such, any conclusions regarding the elements of the power reactor decommissioning rulemaking are subject to

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change. The NRC plans to conduct a public meeting during the public comment period regarding this draft regulatory basis.

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2. Introduction

This section discusses the evolution of the current regulatory framework and recent experience with power reactor decommissioning.

2.1 Evolution of the Current Regulatory Framework for Power Reactors Transitioning to Decommissioning

Current and future holders of operating licenses under Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, “Domestic Licensing of Production and Utilization Facilities,” and current and future holders of combined licenses (COL) under 10 CFR Part 52, “Licenses, Certifications, and Approvals for Nuclear Power Plants,” are required to comply with a variety of regulatory requirements related to decommissioning. As discussed above, the NRC staff’s draft regulatory basis concludes that there is sufficient basis to fulfill the Commission’s explicit direction in SRM-SECY-14-0118 and to proceed with rulemaking to address regulatory requirements associated with power reactors transitioning to decommissioning. A detailed description of the current regulatory requirements, as well as additional regulatory requirements that the staff is considering for each of these areas is provided in Appendices A, B, C, D, E, F, G, H, J, and K of this document. Appendix I of this document discusses the application of backfitting provisions to decommissioning power reactors.

1988 Decommissioning Rule

The NRC published a final rule, “General Requirements for Decommissioning Nuclear Facilities,” in the *Federal Register* on June 27, 1988 (53 FR 24018), which established decommissioning requirements for various types of licensees. In this rule, the NRC amended its regulations to provide specific requirements for the decommissioning of nuclear facilities. Specifically, the final rule established regulations regarding acceptable decommissioning alternatives, planning for decommissioning, decommissioning timeliness, assurance of the availability of funds for decommissioning, and environmental review requirements related to decommissioning. The 1988 final rule amended the regulations that applied to 10 CFR Parts 30, 40, 50, 70, and 72 applicants and licensees.

Decommissioning was defined in the 1988 final rule as “removal of nuclear facilities safely from service and reduction of residual radioactivity to a level that permits release of the property for unrestricted use and termination of the license.” The NRC also stated in the 1988 final rule that decommissioning activities do not include the removal and disposal of spent fuel, which is considered to be an operational activity, or the removal and disposal of nonradioactive structures and materials beyond that necessary to terminate the NRC license.

The purpose of the 1988 rule, in part, was to assure that reactor decommissioning would be carried out with minimal impact on public and occupational health and safety and the environment. The Commission's objective was that decommissioned facility sites would ultimately be available for unrestricted use for any public or private purpose. The amended rules provided a regulatory framework for more efficient and consistent licensing actions related to decommissioning.

The NRC noted in the 1988 rule, "Although decommissioning is not an imminent health and safety problem, the number and complexity of facilities that will require decommissioning is expected to increase... Inadequate or untimely consideration of decommissioning, specifically in the areas of planning and financial assurance, could result in significant adverse health, safety and, environmental impacts" (53 FR 24019). The regulations promulgated in the 1988 rule made it clear that the licensee is responsible for the funding and completion of decommissioning in a manner that protects public health and safety. The NRC stated, "With the increased number of decommissionings expected, case-by-case procedures would make licensing difficult and increase NRC and licensee staff resources needed for these activities" (53 FR 24019).

The 1988 final rule required that, within 2 years after a licensee permanently ceases operation of a nuclear reactor facility, a licensee must submit a detailed decommissioning plan to the NRC for approval, along with a supplemental environmental report that addresses environmental issues that have not already been considered. Based on these submittals, the NRC reviewed the licensee's planned activities, prepared a safety evaluation report (SER) and an environmental assessment (EA), and either made a finding of no significant impact (the usual case) or prepared an environmental impact statement (EIS). Upon NRC approval of the decommissioning plan, the Commission issued an order under 10 CFR 2.202, "Orders," permitting the licensee to decommission its facility in accordance with the approved plan. As part of the approval process for the decommissioning plan, the public had the opportunity for a hearing under 10 CFR Part 2, "Agency Rules of Practice and Procedure." The NRC would terminate the license once the decommissioning process was completed and the NRC was satisfied that the facility had been radioactively decontaminated to an unrestricted release level. If the licensee chose to place the reactor in storage and dismantle it at a later time, the initial decommissioning plan submittal was not required to be as detailed as a plan for prompt dismantlement.

However, before the licensee could begin dismantlement, the NRC required that the licensee submit a detailed plan and environmental report to the Commission for approval. Before the decommissioning plan was approved, the licensee could not perform any major decommissioning activities. If a licensee desired a reduction in requirements because of the permanent cessation of operations, it had to obtain a license amendment for possession-only status. This was usually granted after the licensee indicated that the reactor has permanently ceased operations and fuel has been permanently removed from the reactor vessel.

The 1988 rule required licensees to provide assurance that at any time during the life of the facility, through termination of the license, adequate funds will be available to complete decommissioning. For operating reactors, the 1988 rule prescribed the required amount of decommissioning funding in 10 CFR 50.75, "Reporting and Recordkeeping for Decommissioning Planning." The 1988 rule also imposed the requirement that 5 years before license expiration or cessation of operations, a preliminary decommissioning plan containing a site-specific decommissioning cost estimate (DCE) must be submitted and the financial assurance mechanism must be appropriately adjusted. The 1988 rule also required that licensees submit a decommissioning plan within 2 years after permanent cessation of operations, and that the decommissioning plan must provide a site-specific cost estimate for decommissioning and a correspondingly adjusted financial assurance mechanism. For delayed dismantlement of a power reactor facility, the 1988 rule required that an updated decommissioning plan be submitted with the estimated cost covering the delay of decommissioning, and that the licensees appropriately adjust the financial assurance mechanism. Before approval of the decommissioning plan, the 1988 rule specified that licensee

use of the decommissioning funds would be determined on a case-specific basis for premature closure, when accrual of required decommissioning funds may be incomplete.

1996 Decommissioning Rule

On July 29, 1996, the NRC amended its regulations for reactor decommissioning to clarify ambiguities, codify procedures that reduce regulatory burden, provide greater flexibility, and allow for greater public participation in the decommissioning process in a final rule, "Decommissioning of Nuclear Power Reactors" (61 FR 39278). The 1996 decommissioning rule made fundamental changes to power reactor decommissioning by streamlining the process and reducing both licensee and NRC resource expenditures while maintaining safety, protecting the environment, and encouraging public involvement.

In the 1996 final rule, the NRC explained that the degree of regulatory oversight required for a nuclear power reactor during its decommissioning stage is considerably less than that required for the facility during its operating stage. The NRC presented several reasons that support this position on pages 39278-79 of the 1996 final rule *Federal Register* notice (FRN):

During the operating stage of the reactor, fuel in the reactor core undergoes a controlled nuclear fission reaction that generates a high neutron flux and large amounts of heat. Safe control of the nuclear reaction involves the use and operation of many complex systems. First, the nuclear reaction must be carefully controlled through neutron absorbing mechanisms. Second, the heat generated must be removed so that the fuel and its supporting structure do not overheat. Third, the confining structure and ancillary systems must be maintained and degradation caused by radiation and mechanical and thermal stress ameliorated. Fourth, the radioactivity resulting from the nuclear reaction in the form of direct radiation (especially near the high neutron flux areas around the reactor vessel), contaminated materials and effluents (air and water) must be minimized and controlled. Finally, proper operating procedures must be established and maintained with appropriately trained staff to ensure that the reactor system is properly operated and maintained, and that operating personnel minimize their exposure to radiation when performing their duties. Moreover, emergency response procedures must be established and maintained to protect the public in the event of an accident.

During the decommissioning stage of a nuclear power reactor, the nuclear fission reaction is stopped and the fuel (spent fuel assemblies) is permanently removed and placed in the spent fuel pool until transferred offsite for storage or disposal. While the spent fuel is still highly radioactive and generates heat caused by radioactive decay, no neutron flux is generated and the fuel slowly cools as its energetic decay products diminish. The spent fuel pool, which contains circulating water, removes the decay heat and filters out any small radioactive contaminants escaping the spent fuel assemblies. The spent fuel pool system is relatively simple to operate and maintain compared to an operating power reactor. The remainder of the facility contains radioactive contamination and is highly contaminated in the area of the reactor vessel. However, because the spent fuel is stored in a configuration that precludes the nuclear fission reaction, no generation of new radioactivity can occur. Safety concerns for a spent fuel pool are greatly reduced regarding both control of the nuclear fission process and

the resultant generation of large amounts of heat, high neutron flux and related materials degradation, and the stresses imposed on the reactor system.

Contaminated areas of the facility must still be controlled to minimize radiation exposure to personnel and control the spread of radioactive material. This situation is now similar to a contaminated materials facility and does not require the oversight that an operating reactor would require.

The amendments promulgated in the 1996 final rule provided licensees with simplicity and flexibility in implementing the decommissioning process, especially with regard to premature closure. The amendments clarified ambiguities in the regulations existing at the time, codified procedures and terminology that had been used in a number of specific cases, and increased opportunities for the public to become informed about the licensee's decommissioning activities. The amendments established a level of NRC oversight commensurate with the level of safety concerns expected during decommissioning activities. The 1996 final rule established requirements with regard to initial decommissioning activities, major decommissioning activities, and license termination criteria.

With regard to initial decommissioning activities, the 1996 final rule established requirements that were similar in approach to those in the 1988 decommissioning rule, but included flexibility in the type of actions that could be undertaken without NRC approval. For example, the 1996 final rule established that once a licensee permanently ceases operation of the power reactor, no major decommissioning activities could be undertaken until the public and the NRC were provided additional information by the licensee. The NRC required that licensees submit this information in the form of a PSDAR, which consists of the licensee's proposed decommissioning activities and schedule through license termination, a discussion of the reasons for concluding that the proposed activities are bounded by existing analyses of environmental impacts, and a general DCE for the proposed activities. The PSDAR is made available to the public for comment.

The 1996 final rule also established that, 90 days after the NRC receives the PSDAR submittal and the certifications under 10 CFR 50.82(a)(1) that operations have permanently ceased and fuel has been permanently removed from the reactor vessel, the licensee could begin performing major decommissioning activities if the NRC does not offer an objection. After the NRC receives the PSDAR submittal, a public meeting is held in the vicinity of the reactor site to discuss and solicit feedback on the PSDAR. Once the 10 CFR 50.82(a)(1) certifications are docketed by the NRC, the licensee is no longer authorized to operate the reactor. The 1996 final rule also amended certain 10 CFR Part 50 technical requirements to cover the transition of the facility from operating to permanent shutdown status. Specifically, the 1996 final rule removed the necessity for a licensee who has permanently ceased operation and removed fuel from the reactor vessel to obtain a license amendment prior to proceeding with certain decommissioning activities within established regulatory constraints (i.e., in accordance with 10 CFR 50.59, "Changes, tests, and experiments").

With regard to major decommissioning activities, the 1996 final rule implemented a major change from the 1988 final rule in that power reactor licensees would no longer be required to have an approved decommissioning plan before being permitted to perform major decommissioning activities. The 1996 final rule allowed licensees to perform activities that meet the criteria in 10 CFR 50.59, which was amended to include additional criteria to ensure that concerns specific to decommissioning are considered by the licensee. Based on NRC

experience with licensee decommissioning activities at the time, the Commission recognized that the 10 CFR 50.59 process used by the licensee during reactor operations encompassed routine activities that were similar to those undertaken during the decommissioning process. The Commission concluded that the 10 CFR 50.59 process could be used by the licensee to perform major decommissioning activities if licensing conditions and the level of NRC oversight required during reactor operations continued during decommissioning, commensurate with the status of the facility being decommissioned. The 1996 final rule also required the licensee to provide written notification to the NRC before performing any decommissioning activity that is inconsistent with, or makes significant schedule changes from, the actions and schedules described in the PSDAR.

With regard to license termination, the 1996 final rule required that a licensee wishing to terminate its license would submit a license termination plan for NRC approval. The approval process for the termination plan provides for a hearing opportunity under 10 CFR Part 2. A supplemental environmental report is required from the licensee that considers new and significant environmental changes associated with license termination activities. The 1996 final rule imposed an additional requirement for the purpose of keeping the public informed, which is that a public meeting, similar to the one held after the PSDAR submittal, be held after the licensee submits the license termination plan to the NRC.

The 1996 final rule continued the same degree of decommissioning financial assurance that was previously required, but provided more flexibility by allowing licensee's limited early use of decommissioning funds. This provision was presented in a February 3, 1994, draft policy statement entitled, "Use of Decommissioning Trust Funds before Decommissioning Plan Approval" (59 FR 5216), which was published by the Commission for comment and eventually incorporated into the 1996 rule. Prior to the 1996 final rule, licensee use of these funds was determined on a case specific basis for prematurely shutdown plants. However, the 1996 final rule eliminated the requirement for a decommissioning plan and instead required a PSDAR submittal, which requires a DCE. The 1996 final rule permitted 3 percent of the generically prescribed decommissioning funds be available to the licensee for planning purposes before permanent cessation of power reactor operations. Moreover, to permit the licensee to accomplish major decommissioning activities promptly, an additional 20 percent of the generic funding amount would be made available 90 days after submission of the PSDAR. The use of any funds above those amounts required the submittal of a site-specific cost estimate, which must be submitted to the NRC within 2 years after permanent cessation of operations.

2.2 Power Reactor Decommissioning Activity since the 1996 Decommissioning Rule

In a series of Commission papers issued between 1997 and 2001, the NRC staff provided options and recommendations to the Commission to address regulatory improvements related to power reactor decommissioning. In SRM-SECY-99-168, "Improving Decommissioning Regulations for Nuclear Power Plants," dated December 21, 1999 (ADAMS Accession No. ML003752190), the Commission directed the NRC staff to proceed with a single, integrated, risk-informed decommissioning rule, addressing the areas of emergency preparedness (EP), insurance, safeguards, staffing and training, and backfit protection for decommissioning power reactors. The objective of the rulemaking was to clarify and remove certain regulations for decommissioning power reactors based on the reduction in radiological risk compared to operating reactors.

Spent Fuel Pool Studies

Following removal of spent fuel from the reactor, the principal radiological risks are associated with the storage of spent fuel onsite. Generally, a few months after the reactor has been permanently shut down, there are no possible design-basis events that could result in a radiological release exceeding the limits established by the U.S. Environmental Protection Agency (EPA) early-phase Protective Action Guides (PAGs) of 1 roentgen equivalent man (rem) at the exclusion area boundary. The only accident that might lead to a significant radiological release at a decommissioning reactor is a zirconium fire. The zirconium fire scenario is a postulated, but highly unlikely, beyond-design-basis accident scenario that involves a major loss of water inventory from the SFP, resulting in a significant heat-up of the spent fuel, and culminating in substantial zirconium cladding oxidation and fuel damage. The significance of spent fuel heat-up scenarios that might result in a zirconium fire depends on the decay heat of the irradiated fuel stored in the SFP. Therefore, the probability of a zirconium fire scenario continues to decrease as a function of the time that the decommissioning reactor has been permanently shut down.

The risk of a SFP accident was examined in the 1980s as Generic Issue 82, “Beyond Design Basis Accidents in Spent Fuel Pools,” in light of increased use of high-density storage racks and laboratory studies that indicated the possibility of zirconium fire propagation between assemblies in an air-cooled environment (Section 3 of NUREG-0933, “Resolution of Generic Safety Issues,” <https://www.nrc.gov/sr0933/Section%203.%20New%20Generic%20Issues/082r3.html>). The risk assessment and cost-benefit analyses developed through this effort, Section 6.2 of NUREG-1353, “Regulatory Analysis for the Resolution of Generic Issue 82, Beyond Design Basis Accidents in Spent Fuel Pools” (ADAMS Accession No. ML082330232), concluded that the risk of a severe accident in the SFP was low and appeared to meet the public health objectives of the Commission’s Safety Goal Policy Statement (51 FR 30028; August 21, 1986) and that no new regulatory requirements were warranted.

The risk of a SFP accident was re-assessed in the late 1990s to support a risk-informed rulemaking for permanently shutdown, or decommissioned, nuclear power plants in the United States. The staff’s assessment provided in NUREG-1738, “Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants” (ADAMS Accession No. ML010430066), conservatively assumed that if the water level in the SFP dropped below the top of the spent fuel, an SFP zirconium fire involving all of the spent fuel would occur, and thereby bounded those conditions associated with air cooling of the fuel (including partial-drain down scenarios) and fire propagation. Even with this conservative assumption, the study found the risk of an SFP fire to be low and well within the Commission’s safety goals.

Although NUREG-1738 did not completely rule out the possibility of a zirconium fire, it did demonstrate that storage of spent fuel in a high density configuration in SFPs is safe, and that the risk of accidental release of a significant amount of radioactive material to the environment is low. The study used simplified and sometimes bounding assumptions and models to characterize the likelihood and consequences of beyond-design-basis SFP accidents. Subsequent NRC regulatory activities and studies (described in more detail below) have reaffirmed the safety and security of spent fuel stored in pools and shown that SFPs are effectively designed to prevent accidents and minimize damage from malevolent attacks.

In the wake of the terrorist attacks of September 11, 2001, the NRC took several actions to further reduce the possibility of a SFP fire. The NRC issued immediately effective, non-public orders (cover letter available in ADAMS Accession No. ML020510637) that required licensees to implement additional security measures, including increased patrols, augmented security forces and capabilities, and more restrictive site-access controls to reduce the likelihood of a SFP accident, resulting from a terrorist initiated event. The NRC's regulatory actions after the terrorist attacks of September 11, 2001, have significantly enhanced the safety of SFPs. A comprehensive discussion of these actions, some of which specifically address SFP safety and security, is provided in the memorandum to the Commission titled, "Documentation of Evolution of Security Requirements at Commercial Nuclear Power Plants with Respect to Mitigation Measures for Large Fires and Explosions," dated February 4, 2010 (ADAMS Accession No. ML092990438).

New requirements to mitigate the potential loss of SFP water inventory were also implemented following the terrorist attacks of September 11, 2001, which result in enhanced spent fuel coolability and the potential to recover SFP water level and cooling prior to a potential SFP zirconium fire. Based on the implementation of these additional strategies, the probability and, accordingly, the risk, of an SFP zirconium fire initiation has decreased and is expected to be less than previously analyzed in NUREG-1738 and previous studies. Concerning SFP safety and the potential of plane impacts, this issue was previously addressed through orders issued after the events of September 11, 2001, that required licensees to have mitigating strategies for large fires or explosions at nuclear power plants. The Nuclear Energy Institute (NEI) provided detailed guidance in "NEI 06 12: B.5.b Phase 2 & 3 Submittal Guideline," Revision 2, dated December 2006 (ADAMS Accession No. ML070090060). The NRC endorsed this guidance on December 22, 2006 (ADAMS Accession No. ML063560235 (not publicly available)). Through NRC's issuance of the "Power Reactor Security Requirements" final rule on March 27, 2009 (74 FR 13926), the requirements in the orders were made generically-applicable. In that final rule, the NRC added 10 CFR 50.54(hh)(2) to require licensees to implement mitigating measures to maintain or restore SFP cooling capability in the event of loss of large areas of the plant due to fires or explosions, which further decreases the probability of a SFP fire.

Under 10 CFR 50.54(hh)(2), power reactor licensees are required to implement strategies such as those provided in NEI-06-12. The NEI's guidance specifies that portable, power-independent pumping capabilities must be able to provide at least 500 gallons per minute (gpm) of bulk water makeup to the SFP, and at least 200 gpm of water spray to the SFP. Recognizing that the SFP is more susceptible to a release when the spent fuel is in a non-dispersed configuration, the guidance also specifies that the portable equipment is to be capable of being deployed within 2 hours for a non-dispersed configuration. The NRC found the NEI guidance to be an effective means for mitigating the potential loss of large areas of the plant due to fires or explosions.

Further, other organizations, such as Sandia National Laboratories (SNL), have confirmed the effectiveness of the additional mitigation strategies to maintain spent fuel cooling in the event that the pool is drained and its initial water inventory is reduced or lost entirely. The analyses conducted by the SNL (collectively, the "Sandia studies") are sensitive security-related information and are not available to the public. The Sandia studies considered spent fuel loading patterns and other aspects of a pressurized-water reactor (PWR) SFP and a boiling water reactor (BWR) SFP, including the role that the circulation of air plays in the cooling of spent fuel. The Sandia studies indicated that there is a significant amount of time between the initiating event (i.e., the event that causes the SFP water level to drop) and the spent fuel assemblies becoming partially or completely uncovered. In addition, the Sandia studies

indicated that for those hypothetical conditions where air cooling may not be effective in preventing a zirconium fire, there is a significant amount of time between the spent fuel becoming uncovered and the possible onset of such a zirconium fire, thereby providing a substantial opportunity for event mitigation.

The Sandia studies, which account for relevant heat transfer and fluid flow mechanisms, also indicated that air-cooling of spent fuel could be sufficient to prevent SFP zirconium fires at a point much earlier following fuel offload from the reactor than previously considered (e.g., in NUREG-1738).

In NUREG-2161, "Consequence Study of a Beyond-Design-Basis Earthquake Affecting the Spent Fuel Pool for a U.S. Mark I Boiling Water Reactor," dated September 2014 (ADAMS Accession No. ML14255A365), the NRC evaluated the potential benefits of strategies required in 10 CFR 50.54(hh)(2). As explained in NUREG-2161, successful implementation of mitigation strategies significantly reduces the likelihood of a release from the SFP in the event of a loss of cooling water. Additionally, the NRC found that the placement of spent fuel in a dispersed configuration in the SFP, such as the 1 x 4 pattern, would have a positive effect in promoting natural circulation, which enhances air coolability and thereby reduces the likelihood of a release from a completely drained SFP. An information notice (IN) titled, "IN-2014-14: Potential Safety Enhancements to Spent Fuel Pool Storage," dated November 14, 2014 (ADAMS Accession No. ML14218A493) was issued to all licensees informing them of the insights from NUREG-2161. This information notice describes the benefits of storing spent fuel in more favorable loading patterns, placing spent fuel in dispersed patterns immediately after core offload, and taking action to improve mitigation strategies.

In 2014, the NRC documented a regulatory analysis in COMSECY-13-0030, "Staff Evaluation and Recommendation for Japan Lessons Learned Tier 3 Issue on Expedited Transfer of Spent Fuel" (ADAMS Accession No. ML13329A918), which considered a broad history of the NRC's oversight of spent fuel storage, SFP operating experience (domestic and international), and relied on information compiled in NUREG-2161, "Consequence Study of a Beyond-Design-Basis Earthquake Affecting the Spent Fuel Pool for a U.S. Mark I Boiling Water Reactor" (ADAMS Accession No. ML14255A365). In COMSECY-13-0030, the NRC staff concluded that SFPs are robust structures with large safety margins and recommended to the Commission that possible regulatory actions to require the expedited transfer of spent fuel from SFPs to dry cask storage were not warranted. The Commission subsequently approved the staff's recommendation in the SRM to COMSECY-13-0030 (ADAMS Accession No. ML14143A360).

In addition, in response to the Fukushima Dai-ichi accident, the NRC is currently implementing regulatory actions to further enhance reactor and SFP safety. On March 12, 2012, the NRC issued Order EA-12-051, "Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation" (ADAMS Accession No. ML12054A679), which requires that licensees install reliable means of remotely monitoring wide-range SFP levels to support effective prioritization of event mitigation and recovery actions in the event of a beyond-design-basis external event. Although the primary purpose of the order was to ensure that operators were not distracted by uncertainties related to SFP conditions during the accident response, the improved monitoring capabilities will help in the diagnosis and response to potential losses of SFP integrity. In addition, on March 12, 2012, the NRC issued Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events" (ADAMS Accession No. ML12054A735), which requires licensees to, among other things, develop, implement, and maintain guidance and strategies to maintain or restore SFP cooling capabilities, independent of normal alternating current power

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systems, following a beyond-design-basis external event. Further, the NRC staff provided the Mitigation of Beyond-Design-Basis Events final rule to the Commission in December 2016, which, among other things, will make these two orders generically applicable. These requirements ensure a more reliable and robust mitigation capability is in place to address degrading conditions in SFPs resulting from certain significant but unlikely events. As discussed above, the additional mitigation strategies implemented subsequent to the terrorist attacks of September 11, 2001, such as the promulgation of 10 CFR 50.54(hh)(2) and the NRC review and endorsement of NEI-06-12, and the issuance of Orders EA-12-049 and EA-12-051 following the Fukushima Dai-ichi accident, enhance spent fuel coolability and the potential to recover SFP water level and cooling prior to a potential SFP zirconium fire. The Sandia studies also confirmed the effectiveness of additional mitigation strategies to maintain spent fuel cooling in the event the pool is drained. Based on this more recent information, and the implementation of additional strategies, the probability of a SFP zirconium fire initiation in a drain down event is expected to be less than that reported in NUREG-1738 and previous studies.

SECY-00-0145, “Integrated Rulemaking Plan for Nuclear Power Plant Decommissioning”

On June 28, 2000, the NRC staff submitted SECY-00-0145, “Integrated Rulemaking Plan for Nuclear Power Plant Decommissioning” (ADAMS Accession No. ML003721626), to the Commission, which proposed an integrated decommissioning rulemaking plan. In SECY-00-0145, the NRC staff requested Commission approval to proceed with developing an integrated rulemaking for nuclear power plant decommissioning in accordance with the recommendations detailed in the rulemaking plan. The regulatory areas addressed in SECY-00-0145 were EP, insurance, safeguards, staffing and training, and backfit protection for decommissioning power reactors. The rulemaking plan was contingent on the completion of a zirconium fire risk study, discussed below, and which was issued on February 28, 2001.

On June 4, 2001, the NRC staff submitted to the Commission SECY-01-0100, “Policy Issues Related to Safeguards, Insurance, and Emergency Preparedness Regulations at Decommissioning Nuclear Power Plants Storing Fuel in Spent Fuel Pools” (ADAMS Accession No. ML011450420). However, given the security implications of the terrorist attacks of September 11, 2001, and the results of the zirconium fire risk study that showed the risk of an SFP fire to be low and well within the Commission’s safety goals, the NRC redirected its rulemaking priorities and resources to focus on programmatic regulatory changes related to safeguards and security. In a memorandum to the Commission, “Status of Regulatory Exemptions for Decommissioning Plants,” dated August 16, 2002 (ADAMS Accession No. ML030550706), the NRC staff justified this redirection in part by observing that no additional permanent reactor shutdowns were anticipated in the foreseeable future, and that no immediate need existed to proceed with the decommissioning regulatory improvement work that was planned. The NRC staff concluded that if any additional reactors permanently shut down after the rulemaking effort was suspended, establishment of the decommissioning regulatory framework would continue to be addressed through the license amendment and exemption processes.

Recent Experience with Power Reactor Decommissioning

Between 1998 and 2013, no additional power reactors permanently ceased operation. Between 2013 and 2016, six power reactors permanently shut down, defueled, and entered decommissioning. Notably, in 2013, four power reactor units permanently shut down without significant advance notice or pre-planning: Crystal River Unit 3 Nuclear Generation Plant (Duke

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Energy Florida); Kewaunee Power Station (Dominion Energy); and San Onofre Nuclear Generating Station (SONGS), Units 2 and 3 (Southern California Edison).

In addition, on December 29, 2014, Entergy Nuclear Operations, Inc. (Entergy), permanently ceased operations at the Vermont Yankee Nuclear Power Station (VY), and on October 24, 2016, the Omaha Public Power District permanently ceased operations at Fort Calhoun Station, Unit 1. Both facilities are transitioning to decommissioning.

Several licensees have notified the NRC of their intent to permanently cease operations at other power reactors.¹

- By letter dated January 7, 2011 (ADAMS Accession No. ML110070507), Exelon notified the NRC that it plans to permanently cease operations at Oyster Creek Nuclear Generating Station no later than December 31, 2019.
- By letter dated November 10, 2015 (ADAMS Accession No. ML15328A053), Entergy notified the NRC that it plans to permanently cease operations at Pilgrim Nuclear Power Station no later than June 1, 2019.
- By letter dated June 21, 2016, Pacific Gas and Electric Company notified the NRC that it will not pursue license renewals for Diablo Canyon Power Plant, Units 1 and 2, but will continue to operate the units until the current licenses expire in 2024 and 2025, respectively (ADAMS Accession No. ML16173A454). Both units would permanently cease operations at that time and transition to decommissioning.
- On January 4, 2017, Entergy notified the NRC staff that it plans to permanently cease operations at Palisades Nuclear Plant by October 1, 2018 (ADAMS Accession No. ML17004A062).
- On January 9, 2017, Entergy announced that the State of New York and Entergy had entered into an Indian Point (IP) plant closure agreement, dated January 8, 2017, in which Entergy agreed to cease plant operations at IP Unit 2 no later than April 30, 2020, and at IP Unit 3 no later than April 30, 2021, unless both the State of New York and Entergy agree to extend plant operations, for cause, to no later than April 30, 2024, for Unit 2 and April 30, 2025, for Unit 3. By letter dated February 8, 2017 (ADAMS Accession No. ML17044A004), Entergy notified the NRC that it plans to permanently cease operations at IP Units 2 & 3 no later than April 30, 2020, and April 30, 2021, respectively.

Decommissioning reactor licensees and the NRC have expended substantial resources processing licensing actions for the power reactors during their transition period to decommissioning status. Consistent with the power reactors that permanently shut down in the 1990s, the licensees that are currently transitioning to decommissioning are establishing a long-term regulatory framework based on the low risk of an offsite radiological release posed by a decommissioning reactor. Specifically, the licensees are seeking NRC approval of exemptions

¹ James A. Fitzpatrick Nuclear Power Plant (FitzPatrick), Clinton Power Station (Clinton), and Quad Cities Nuclear Power Station (QCNPS) had announced intentions to permanently cease operations at these facilities; however, by letters dated December 14, 2016, and January 4, 2017 (ADAMS Accession Nos. ML16349A311, ML16349A314, and ML17012A280), these decisions have been reversed.

and license amendments to revise requirements to reflect the reduced operations and risks posed by a permanently shut down and defueled reactor.

December 2014 Commission Direction

In the SRM to SECY-14-0118, "Request by Duke Energy Florida, Inc., for Exemptions from Certain Emergency Planning Requirements," dated December 30, 2014 (ADAMS Accession No. ML14364A111), the Commission directed the NRC staff to proceed with rulemaking on reactor decommissioning and set an objective of early 2019 for its completion.

In SRM-SECY-14-0118, the Commission also stated that this rulemaking should address the following:

- Issues discussed in SECY-00-0145, such as the graded approach to emergency preparedness;
- Lessons learned from the plants that have already (or are currently) going through the decommissioning process;
- The advisability of requiring a licensee's PSDAR to be approved by the NRC;
- The appropriateness of maintaining the three existing options (DECON, SAFSTOR, and ENTOMB) for decommissioning and the timeframes associated with those options;
- The appropriate role of State and local governments and nongovernmental stakeholders in the decommissioning process; and
- Any other issues deemed relevant by the NRC staff.

In SECY-15-0014, "Anticipated Schedule and Estimated Resources for a Power Reactor Decommissioning Rulemaking," dated January 30, 2015 (ADAMS Accession No. ML15082A089 redacted), the NRC staff committed to proceed with a rulemaking on power reactor decommissioning and provided an anticipated schedule and estimate of the resources required for the completion of a decommissioning rulemaking. In SECY-15-0127, "Schedule, Resource Estimates, and Impacts for the Power Reactor Decommissioning Rulemaking," dated October 7, 2015 (not publicly available), the NRC staff provided further information to the Commission on resource estimates and work that would be delayed or deferred in fiscal year (FY) 2016 to enable the NRC staff to make timely progress consistent with Commission direction to have a final rule submitted to the Commission by the end of calendar year 2019.

Advance Notice of Proposed Rulemaking

To gather information for the power reactor decommissioning rulemaking, the NRC published an ANPR in the *Federal Register* on November 19, 2015 (80 FR 72358). The ANPR began the process for considering amendments to the NRC's regulations that address regulatory improvements for power reactors transitioning to decommissioning. The ANPR sought public comment on specific questions and issues with respect to possible revisions of the NRC's requirements. The NRC staff considered the ANPR comments in its formulation of this draft regulatory basis. A summary of public comments received on the ANPR is contained in Section 5 of this document.

Decommissioning Lessons Learned Report

The NRC staff recently completed and published the “Power Reactor Transition from Operations to Decommissioning Lessons Learned Report” on October 28, 2016 (ADAMS Accession No. ML16085A029). The purpose of the report is to document the lessons learned by the NRC staff and stakeholders associated with recent permanent power reactor shutdowns during the period from 2013 to 2016. In particular, the report focuses on the transition from reactor operations to decommissioning for the following nuclear power plants: Kewaunee Power Station; Crystal River Unit 3 Nuclear Generating Plant; SONGS Units 2 and 3; and VY. The NRC staff reviewed and approved the license amendment requests (LARs) for these plants to modify the operating reactors’ licensing bases to reflect those of decommissioning reactors, then transferred the project management and oversight responsibility from the Office of Nuclear Reactor Regulation (NRR) to the Office of Nuclear Material Safety and Safeguards (NMSS). Project management support for these decommissioning reactors will be provided by NMSS until termination of the respective licenses. The report also provides a number of best practices identified from recent experience with reactor shutdowns and the transition to decommissioning.

The report highlights some of the challenges experienced by the NRC staff during the decommissioning transition licensing reviews from 2013 to 2016 and NRC staff actions to address those challenges. The report also discusses external stakeholders’ interest in the NRC staff review of the decommissioning transition licensing activities, especially those associated with SONGS Units 2 and 3 and VY, as represented by requests for public hearings and meetings and questions to the NRC staff.

In addition to the lessons learned and best practices discussed above, the report provides detailed project management guidance, lessons learned, recommendations, and documentation of precedent related to the reviews and evaluations specific to the types of licensing actions that are expected to be processed during the decommissioning transition period, including oversight activities and communications. Many of the lessons learned and recommendations described in this report have been considered by the NRC staff during development of this draft regulatory basis.

2.3 Summary of Recent Licensing Experience with Decommissioning Power Reactors

The NRC staff notes that a number of licensing actions, including exemptions, license amendments, and other actions (e.g., order rescissions), have been processed for licensees that have recently or are currently undergoing the transition from operation to decommissioning.

Current Regulatory Process for Power Reactor Decommissioning Transition

Reactor decommissioning requirements are codified in 10 CFR 50.82, “Termination of License,” and 52.110, “Termination of license.” Associated decommissioning funding requirements are codified in 10 CFR 50.75, “Reporting and Recordkeeping for Decommissioning Planning.” A nuclear power reactor licensee formally begins the decommissioning process when it certifies permanent cessation of operation and permanent removal of fuel from the reactor vessel under 10 CFR 50.82(a)(1) or 52.110(a). Once these certifications are docketed by the NRC, the 10 CFR Part 50 or Part 52 license no longer authorizes operation of the reactor. Despite this withdrawal of authority to operate, a decommissioning nuclear power plant continues to retain a 10 CFR Part 50 or Part 52 license. As such, the decommissioning plant continues to be subject

to many of the requirements that apply to plants authorized to operate pursuant to 10 CFR Part 50 or Part 52.

Regulations that are designed to protect the public against reactor operation-related design-basis events that include conditions of normal operation, anticipated operational occurrences, and design-basis accidents (DBAs) are no longer applicable at a permanently shut down and defueled reactor. For example, accident sequences for a reactor that is operating, such as loss-of-coolant accidents and anticipated transients without scram, are no longer relevant to a permanently shut down and defueled reactor. In addition, some regulations may not be relevant to certain structures, systems, and components (SSCs) since the SSCs are no longer required to be maintained, to operate, or to mitigate certain accidents, events, or transients, whether they are safety-related or security-related. Other regulations, although based on power operation of the plant, may continue to be applicable to the permanently defueled facility until an exemption is granted, such as the need for offsite radiological emergency preparedness (REP) plans under 10 CFR Part 50 or Part 52. Typically, the scope of NRC requirements can be reduced to those regulations and requirements that primarily pertain to the safe storage of the spent fuel in the SFP, as described in the site's final safety analysis report.

Upon permanent cessation of reactor operation and removal of fuel from the reactor vessel, a significant number of requests for licensing actions are likely to be submitted to the NRC by the licensee based on reduced risk to public health and safety. As explained in Section 2.1 of this document, the types of potential accidents at decommissioning reactors are fewer and the risks of radiological releases are reduced when compared to those at an operating reactor. Therefore, to reflect this reduction in risk, licensees of decommissioning reactors will request certain amendments to their licenses and certain exemptions from the NRC's regulations for operating plants. These licensing actions, which are processed during the transition from operating to decommissioning, establish the long-term regulatory framework for reactors that have permanently shut down and defueled.

In addition to requesting license amendments and exemptions, licensees can make certain changes without prior NRC approval if the changes are permitted by an NRC regulation. Licensees primarily use a screening process with criteria in 10 CFR 50.59 to make changes in a facility (or procedures) as described in the final safety analysis report (FSAR), as updated, including changes to the decommissioning plan, without prior NRC approval. Changes to the decommissioning design-basis analyses, SSCs, and licensee organizations, processes, and procedures should be reflected in the licensee's updated FSAR. Licensees also use the provisions set forth in 10 CFR 50.12, 10 CFR 50.90, 10 CFR 73.5, 10 CFR 50.54(p), and 10 CFR 50.54(q), among others, to obtain NRC approval for changes to the facility licensing bases.

The timing and implementation for some decommissioning licensing actions are based on an approach that recognizes the reduction in risk after cessation of power operation and removal of fuel from the reactor vessel. These risk reductions can be tied to several factors, including, but not limited to: (1) reduction of the radiological source term after cessation of power operation and removal of fuel from the reactor vessel; (2) elapsed time after permanent shutdown; and (3) type of long-term onsite fuel storage. The two areas where these additional risk reductions are considered in the early decommissioning transition process are EP and facility insurance and indemnity. Exemptions from EP and insurance coverage requirements are not approved by the NRC until qualifying analyses confirm that there are no DBAs that would require protective actions for the public, due to a release of radioactive material with a

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dose exceeding the EPA PAGs at the exclusion area boundary (EAB). The qualifying analyses must also assess a postulated, very low probability, beyond-design-basis zirconium fire scenario.

Decommissioning Planning

The current 10 CFR Part 50 regulations for reactor decommissioning were designed for plants that were expected to be permanently shut down at the end of their operating license terms. The decommissioning planning process is expected to start 5 years before the end of the license term. Regardless of when the plant permanently shuts down, the certification of permanent cessation of operations and the certification of permanent fuel removal are required to be submitted to the NRC along with the PSDAR as the key means of communicating to the NRC, and the public, the licensee's decommissioning plan for the reactor. The following information provides a high-level summary of the anticipated licensing actions processed during reactor decommissioning transition. More detailed information on these topical areas is provided in the appendices to this draft regulatory basis.

Post-Shutdown Decommissioning Activities Report

Section 50.82(a)(4)(i) requires the licensee, prior to or within 2 years after permanent cessation of operations, to submit a PSDAR to the NRC and to send a copy to the affected State(s). Regulatory Guide (RG) 1.185, "Standard Format and Content for PSDAR," provides guidance on the contents of the PSDAR. The PSDAR must contain a description of the planned decommissioning activities, a schedule for the completion of these activities, an estimate of expected costs of these activities, and a discussion of the reasons for concluding that the environmental impacts associated with the site-specific decommissioning activities will be bounded by the previously issued environmental impact statements.

In accordance with 10 CFR 50.82, the NRC is required to notice the PSDAR in the *Federal Register* and make it available for public comment. In addition, the staff is required to hold a public meeting in the vicinity of the site. There is a 90-day waiting period from the date that a licensee submits both their certifications under 10 CFR 50.82(a)(1) and PSDAR until the date when the licensee can perform any "major decommissioning activities," as defined in 10 CFR 50.2, "Definitions," or have full access to the funds within the DTF. Although the current regulations do not require that the NRC approve the licensee's PSDAR, the NRC does review the PSDAR's content against the requirements in 10 CFR 50.82(a)(4)(i), as well as guidance and acceptance criteria in RG 1.202, "Standard Format and Content of Decommissioning Cost Estimates for Nuclear Power Reactors" (ADAMS Accession No. ML050230008), and NUREG-1713, "Standard Review Plan for Decommissioning Cost Estimates for Nuclear Power Reactors" (ADAMS Accession No. ML043510113), as they pertain to the estimate of expected costs contained in the PSDAR. The NRC staff also issues a PSDAR closeout letter that addresses, at a high level, any stakeholder comments received. The closeout letter is issued as soon as practical following the completion of the staff's review.

Irradiated Fuel Management Program

Another item related to decommissioning planning is the licensee's submittal of an irradiated fuel management program (IFMP) for preliminary staff approval as required in 10 CFR 50.54(bb). Specifically, 10 CFR 50.54(bb) requires licensees to submit an IFMP to the NRC for preliminary approval within 2 years following permanent cessation of operation of the

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reactor or 5 years before expiration of the reactor operating license, whichever occurs first. Licensees have satisfied this requirement by submitting the IFMP together with the preliminary DCE.

The purpose of the IFMP is to provide reasonable assurance that the licensee has a program or strategy to manage and fund the management of irradiated fuel during decommissioning in a manner that is consistent with NRC requirements and that will be timely implemented. In addition to the decommissioned plant submittals, licensees requesting to renew their operating licenses should have also submitted an IFMP within 5 years of the expiration date of the original operating license. While the IFMP may have been previously submitted by a decommissioning licensee and received preliminary approval five years before permanent shutdown (or during license renewal), the licensee will have to update the program upon permanent shutdown per 10 CFR 50.82(a)(8)(vii). The updated IFMP will be included as part of the information needed to support the PSDAR. The IFMP may also be used to support an exemption request to permit use of the DTF for irradiated fuel management expenses.

Decommissioning Cost Estimate

Another submission required 5 years prior to the end of projected operation is a “preliminary” DCE pursuant to 10 CFR 50.75(f)(3). The purpose of the preliminary DCE is to provide the NRC with an up-to-date estimate of decommissioning costs and identify major factors that may impact the cost to decommission a facility. In addition, the comparison of this estimate against the minimum DTF amount required in 10 CFR 50.75(b) and (c) provides reasonable assurance that the licensee’s decommissioning trust will have sufficient funding to accomplish radiological decommissioning of the facility. Guidance in RG 1.202 provides the standard format and content of DCEs for nuclear power reactors.

Financial Exemptions

Decommissioning Trust Fund Exemption Requests

The NRC regulations in 10 CFR 50.82, 10 CFR 50.2, and 10 CFR 50.75 restrict use of the DTF to legitimate decommissioning activities - removal of a facility or site from service and decontamination (or removal) of radioactivity to a level that permits restricted or unrestricted release for license termination. A DTF cannot be used for irradiated fuel management (commonly referred to as spent fuel management) costs or costs to restore the site to a green field condition. In instances where the DTF is projected to have more than enough money to complete radioactive decommissioning, licensees have requested exemptions to use the excess funds for spent fuel management and, in some cases, site restoration activities. The exemption usually requests that such withdrawals from the trust be done without prior notification to the NRC.

The NRC staff reviews the licensee’s DTF, the decommissioning approach and costs in the PSDAR and DCE, as well as the licensee’s updated IFMP, in order to determine whether there is reasonable assurance that adequate funds will be available in the trust to complete decommissioning and license termination. In previously granted exemptions, the NRC has concluded that using a portion of the trust for spent fuel management would not prevent the licensee from completing radiological decontamination and cleanup of the decommissioning reactor site through license termination.

Some licensees have also requested and been granted exemptions to use DTFs for spent fuel management to support the accelerated transfer of spent fuel from the SFP to dry cask storage.

Granting of Exemption from Offsite Liability Insurance Requirements

Based on recent experience, the NRC expects that most permanently shut down reactor licensees will request exemptions from certain requirements in 10 CFR 140.11(a)(4) during the decommissioning transition period. The exemption reduces the required amount of primary offsite liability insurance coverage from \$450 million to \$100 million. In addition, the exemption allows the licensee to remove the facility from participation in the secondary insurance pool. Consistent with precedent, this exemption is also based on demonstrating that the spent fuel in the SFP is air coolable (typically by leveraging the same beyond-design-basis zirconium fire accident scenario analyses that are used to assess offsite EP exemptions).

Granting of Exemption from Onsite Property Damage and Cleanup Insurance Requirements

Most permanently shut down reactor licensees will request exemptions from certain requirements in 10 CFR 50.54(w)(1) to reduce the required level of onsite property damage insurance from \$1.06 billion to \$50 million. Consistent with precedent, this exemption is based on demonstrating that the spent fuel in the SFP is air coolable (typically by leveraging the same beyond-design-basis zirconium fire accident scenario analyses that are used to assess offsite EP exemptions).

Staffing Considerations

Approval of Certified Fuel Handler Training Program

Pursuant to 10 CFR 50.54(m)(2)(ii), each licensee must have at its site one or more persons holding senior operator licenses for all fueled units at the site. When a power reactor licensee permanently ceases operations and defuels the reactor and is no longer authorized to load fuel into the reactor vessel under 10 CFR 50.82(a)(2), it is in a configuration in which the reactivity or power level of the reactor is no longer meaningful and there are no conditions where the manipulation of apparatus or mechanisms can affect the reactivity or power level of the reactor. Therefore, under the language of 10 CFR 50.54(m) and 10 CFR Part 55, "Operators' Licenses," licensed operators are not required at decommissioning reactors.

In lieu of licensed operators, a CFH is the senior on-shift operations representative on site at a decommissioning reactor. The CFH is a non-licensed operator position that was established as part of the 1996 rulemaking for power reactors that have permanently shut down and transitioned to decommissioning. The CFH will be the on-shift management representative responsible for supervising and directing the monitoring, storage, handling, and cooling of irradiated nuclear fuel, as well as responding to facility emergencies, in a manner consistent with ensuring adequate protection of the health and safety of the public. As specified in 10 CFR 50.2, CFH means, for a nuclear power reactor facility, a non-licensed operator who has qualified in accordance with a fuel handler training program approved by the Commission. The NRC staff reviews the training program to verify that it contains the necessary training elements to qualify the CFH with the requisite knowledge and experience to protect the health and safety of the public, provide appropriate oversight of decommissioning activities, and respond to plant emergencies.

Besides approval of the fuel handler training program, implementation of the CFH staffing position for decommissioning reactors typically requires an amendment to the staffing requirements in the Administrative Controls section of the licensee's technical specifications (TSs).

Changes to the License

Defueled Technical Specifications—Comprehensive Amendment to All Technical Specifications

All of the licensees of recently permanently shut down reactors have proposed comprehensive amendments to their facilities' TSs to reflect their permanently shut down and defueled status. Power reactor licensee TSs specify modes of applicability that correspond to conditions of operation for the reactor or apply only when fuel is in the reactor vessel. For a permanently shut down and defueled reactor, these modes refer to conditions that are no longer possible because the reactor cannot be operated and fuel cannot be placed in the reactor vessel. In such cases, TSs with modes of applicability can be removed from the license without affecting the safety of the facility. In addition, substantial changes can also be made to the Administrative Controls section of the TSs, including changes to facility staff responsibilities, staffing organization, and staffing levels. Some program and reporting requirements only applicable to operating reactors are also deleted or modified.

In addition to decommissioning-related amendments to the operating reactor TSs described above, two narrow-in-scope TS license amendments may be requested early in the decommissioning transition process. One involves the use of the CFH, as discussed above. Another amendment may be needed to support irradiated fuel handling.

License Conditions

All 10 CFR Part 50 reactor licenses contain license conditions that the NRC has imposed on licensees when appropriate and necessary, in accordance with 10 CFR 50.50, "Issuance of Licenses and Construction Permits." When the reactor is permanently shut down and defueled, many of the license conditions are no longer relevant and can be modified or removed from the license.

In most circumstances, the Fire Protection Program license condition can be removed because it is intended to ensure protections are in place to reach safe shutdown in the event of a fire. The fire protection requirements for decommissioning reactors specified in 10 CFR 50.48 require the licensee to maintain fire protection capabilities for the rest of the plant to address fire events that may have radiological consequences. Therefore, removal of the operating reactor fire protection license condition should not impact fire protection at a decommissioning reactor. Currently, the Mitigation of Beyond- Design-Basis Events (MBDBE) draft final rule is with the Commission for approval. If the MBDBE rule is approved by the Commission, the rule would remove the license conditions associated with mitigating strategies for large fires and explosions and licensees would retain requirements for mitigating strategies until all fuel is removed from the SFP. Based on recent experience with this license condition, licensees have elected to leave the condition unchanged and implement it as appropriate for site-specific conditions. It should be noted that the NRC staff's evaluation of the exemptions related to EP regulations relies heavily on the licensee's prompt implementation of the mitigating strategies license condition for the SFP. For reactors that have received renewed operating licenses, there may

be some license conditions that need modification or removal depending on site-specific conditions.

Emergency Preparedness

During the decommissioning transition period, licensees typically request several EP licensing actions to address the reduced risk associated with a permanently shut down and defueled facility, including: an initial post-shutdown amendment to the emergency plan modifying the licensee's on-shift and emergency response organization (ERO) staffing under the existing regulatory requirements of 10 CFR Part 50; an exemption from many of the EP regulations; and an amendment approving a permanently defueled emergency plan (PDEP) and emergency action level (EAL) scheme implementing the EP regulatory exemptions. Subsequently, the licensee may also submit a license amendment reflecting a further reduction in ERO staffing under the EP requirements, as exempted, to reflect the transfer of spent fuel from the SFP to an independent spent fuel storage installation (ISFSI).

Changes in the On-Shift and Emergency Response Organization Staffing upon Permanent Shutdown and Defueling

Early in the decommissioning transition period, licensees may request an amendment to their emergency plans to remove certain on-shift and augmented ERO positions, based on the permanently shut down and defueled condition of the facility, which no longer requires certain positions (e.g., core or thermal-hydraulic engineers) to respond to an event at an operating facility. These on-shift and augmented ERO positions would no longer be necessary after the licensee has certified under 10 CFR 50.82(a)(1) that the reactor has permanently ceased operation and fuel has permanently been removed from the reactor vessel, and the licensee has determined that credible accidents no longer exist that would require these functions. However, adequate on-shift and augmented ERO staffing must be maintained to support the prompt implementation of SFP mitigation strategies and the timely and effective communication and coordination with offsite response organizations.

EP Exemptions and PDEP and EAL Scheme Amendment

For some period of time after the licensee permanently ceases reactor operations (normally 15–18 months), offsite REP plans are required to be maintained under 10 CFR 50.47, "Emergency plans." This period of time depends on the decay time of spent fuel stored in the SFP, as well as site-specific considerations to meet the EP exemption criteria, which include: (1) a postulated radiological release would not exceed the EPA PAGs at the exclusion area boundary for DBAs applicable to a permanently shut down and defueled reactor and (2) sufficient time would exist to take prompt mitigative actions in response to a postulated zirconium fire accident scenario in the SFP and, if warranted, for officials to take appropriate response actions to protect public health and safety using a comprehensive emergency management plan (CEMP)². Once the EP exemption is granted, the NRC no longer requires a

² A CEMP in this context, also referred to as an emergency operations plan (EOP), is addressed in the Federal Emergency Management Agency's (FEMA's) Comprehensive Preparedness Guide (CPG) 101, "Developing and Maintaining Emergency Operations Plans." CPG 101 is the foundation for State, territorial, Tribal, and local EP in the United States. It promotes a common understanding of the fundamentals of risk-informed planning and decisionmaking and helps planners at all levels of government in their efforts to develop and maintain viable, all hazards, all-threats emergency plans. An EOP is flexible enough for use in all emergencies. It describes how people and property will be protected; details who is responsible for carrying out specific actions; identifies the personnel, equipment, facilities, supplies and other resources available; and outlines how all actions will be coordinated. A CEMP is often referred to as a synonym for "all hazards planning."

formal determination by the Federal Emergency Management Agency (FEMA) of the adequacy of offsite REP plans.

Permanently shut down and defueled power reactor licensees typically request regulatory exemptions from certain standards in 10 CFR 50.47 and requirements in Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities," to 10 CFR Part 50. Decommissioning licensees submit site-specific analyses supporting requested exemptions from emergency plan regulations, based on the criteria above. The licensees have also submitted a corresponding LAR to revise their emergency plans to implement the exemptions listed above, as part of a PDEP. In conjunction with, or as part of the PDEP amendment, licensees also submit changes to EAL schemes.

The PDEP, once implemented, would no longer require under 10 CFR 50.47 that State and local authorities maintain formal FEMA-approved, offsite REP plans, including the 10-mile Plume Exposure Pathway and 50-mile Ingestion Pathway emergency planning zones (EPZs). Licensees continue to maintain an onsite emergency plan and response capabilities, including the notification of local government officials of an emergency declaration. If needed, offsite authorities may implement protective measures for the public using a CEMP (all-hazard) approach. Licensees also continue to notify the NRC and designated offsite agencies following the declaration of an emergency classification and maintain communications and interface responsibilities with offsite response organizations that may be called upon to provide assistance on-site in the event of an emergency declaration. Provisions for fire, ambulance, and medical services continue to be agreed upon via letters of agreement with local entities.

An important consideration in processing the EP exemption request is the need to prepare a Commission paper requesting approval of the staff's proposed exemptions from the EP regulations, following Commission direction in SRM-SECY-08-0024, "Delegation of Commission Authority to Staff to Approve or Deny Emergency Plan Changes That Represent a Decrease in Effectiveness" (ADAMS Accession No. ML081400510). Specifically, in SRM-SECY-08-0024, the Commission directed the staff to "request Commission approval for any reduction in the effectiveness of a licensee's emergency plan that requires an exemption from the requirements of 10 CFR 50.47(b) and Appendix E to 10 CFR Part 50."

Termination of the Emergency Response Data System

Appendix E to Part 50 requires that operating reactor licensees maintain the Emergency Response Data System (ERDS) data link to the NRC. Licensees are not required to maintain ERDS when the licensee has permanently ceased operation and has permanently removed fuel from the reactor vessel. Therefore, once these conditions are met, the licensee may remove ERDS from service without prior NRC approval under 10 CFR 50.54(q). However, the licensee is required under 10 CFR 50.54(q)(5) to retain a record of each change to its emergency plan made without NRC approval for a period of three years.

Following notice from the licensee of its intent to terminate the ERDS data link, the NRC staff will issue a letter to the decommissioning reactor licensee acknowledging termination of the ERDS data link. In some cases, the NRC has established a memorandum of understanding with the State, pursuant to which the NRC provides the State with access to the information that the NRC receives via ERDS in support of offsite protective action decision-making. In this situation, the NRC will issue a letter to the State informing it of the licensee's intent to terminate ERDS.

Physical Security

The physical security requirements of 10 CFR 73.55, “Requirements for physical protection of licensed activities in nuclear power reactors against radiological sabotage,” and Appendix B, “General Criteria for Security Personnel,” and Appendix C, “Licensee Safeguards Contingency Plans,” to 10 CFR Part 73, “Physical Protection of Plants and Materials,” continue to apply to a nuclear power reactor after permanent cessation of operation and removal of fuel from the reactor vessel. The NRC’s regulations governing physical security requirements applicable to a nuclear power reactor do not distinguish between an operating power reactor and a power reactor that is in a decommissioning status. These security requirements are designed to protect against the design basis threat (DBT) of radiological sabotage as stated in 10 CFR 73.1. Licensees have sought NRC approval of exemptions to reduce physical security requirements for permanently shutdown reactors because the security-risk profile presented by a decommissioning plant is much less than when it was operating. The physical security-related exemptions that were requested by the recent licensees transitioning to decommissioning include areas such as authority of CFHs to suspend security measures during severe weather or emergencies, communications between the central alarm station (CAS) and control room, the number of armed responders, requirements for force-on-force (FOF) exercises, and combination of the CAS and secondary alarm station (SAS). All of these exemptions were granted or continue to be in the NRC review process. Several of these exemptions requested by a decommissioning licensee were site-specific and may not have been generically applicable.

Many of the physical security program changes at decommissioning reactor sites can be accomplished without NRC approval under the provisions of 10 CFR 50.54(p), provided the changes do not decrease the effectiveness of the licensee’s security plans. Experience has shown that, although the physical security program changes may not require NRC approval, exemption, or a license amendment, NRC staff effort is expended in the review and verification that the security plans remain effective.

Order Rescissions

Licensees may request rescissions to orders related to the Fukushima Dai-ichi facility accident, including:

- EA-12-049, “Issuance of Order to Modify Licenses With Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events,” (ADAMS Accession No. ML12054A735), March 12, 2012. The staff notes that the MBDBE final rule was sent to the Commission in December 2016, and, among other things, will make this order generically applicable.
- EA-12-051, “Order Modifying Licenses With Regard to Reliable Spent Fuel Pool Instrumentation,” (ADAMS Accession No. ML12056A044), March 12, 2012. The staff notes that the MBDBE final rule was sent to the Commission in December 2016, and, among other things, will make this order generically applicable.
- EA-13-109, “Issuance of Order to Modify Licenses With Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions,” (ADAMS Accession No. ML13143A321), June 6, 2013.

Currently, the MBDBE draft final rule is with the Commission for approval. If the MBDBE rule is approved by the Commission, the MBDBE rule would rescind Orders EA-12-049 and EA-12-051.

In addition, licensees may request that the NRC rescind security-related orders that are no longer applicable to those licensees.

Miscellaneous Licensing Actions

Exemption from Certain Recordkeeping Regulations

Licensees that are transitioning to decommissioning may request exemptions from certain parts of the following recordkeeping requirements that require records to be retained until termination of the license: Appendix B to 10 CFR Part 50, Criterion XVII, "Quality Assurance Records," 10 CFR 50.59(d)(3), and 10 CFR 50.71(c), which require records to be retained until termination of the license. Licensees that have previously been granted these exemptions used the justification that, when the associated SSCs are removed from the licensing basis documents, the SSCs will no longer serve any function regulated by the NRC. Therefore, the need to retain the records will be, on a practical basis, eliminated.

Records associated with SSCs that maintain compliance and protect public health and safety during the decommissioning process are excluded from exemptions from certain recordkeeping regulations. Examples of these SSCs include those associated with programmatic controls, such as controls pertaining to residual radioactivity, security, and quality assurance (QA), and SSCs associated with spent fuel assemblies or the SFP (while assemblies are still in the pool) and ISFSIs.

Approval of Changes to the Licensee's Quality Assurance Program

A reactor licensee transitioning to decommissioning may elect to simplify and revise its current QA program commensurate with the permanently shut down and defueled status of the reactor, given the fewer number of SSCs for a decommissioning facility and the fewer number of quality standards that would apply. There are two types of changes: those that do not reduce commitments in the program description as accepted by the NRC and those that do reduce commitments.

Changes to the QA program that do not reduce commitments must be submitted to the NRC, but do not require prior approval. Such changes include administrative improvements and clarifications; spelling corrections, punctuation or editorial corrections; the use of a QA standard approved by the NRC that is more recent than the QA standard in the licensee's current QA program; the use of a quality assurance alternative or exception approved by a previous NRC safety evaluation; and others. All such changes are described in 10 CFR 50.54(a)(3).

Changes that do reduce the commitments must be submitted to the NRC and receive approval prior to implementation, in accordance with 10 CFR 50.54(a)(4). Changes to the QA program description are considered accepted by the Commission upon receipt of a letter to this effect from the appropriate reviewing office of the Commission or 60 days after submittal to the Commission, whichever occurs first.

Summary of Current Licensing Approach

Overall, the NRC staff experience confirms that the current exemption and amendment processes for transitioning plants are sufficient to ensure reasonable assurance of adequate protection of public health and safety, and are consistent with the common defense and security. Most of the licensee exemption and amendment requests do not involve safety issues and are based, instead, on efficiencies gained and the associated reduction of staff and licensee resources required for a plant that is being decommissioned. As discussed above, the NRC staff completed and published the lessons learned report in November 2016. A summary of the current regulatory requirements, licensing actions, and recent regulatory activity is provided in Table 3-3, “Key Licensing Action Evaluations for Future Reference,” of that report.

3. Technical Basis for a Power Reactor Decommissioning Rulemaking

Consistent with the power reactors that permanently shut down in the 1990s, licensees that are currently transitioning to decommissioning are establishing a long-term regulatory framework based on: (1) the lower risk of an offsite radiological release posed by a decommissioning reactor as compared to an operating reactor; (2) the operational realities (e.g., staffing changes and knowledge management challenges) of a plant that is no longer operating and will be dismantled and decontaminated; and (3) the guidelines established by the current decommissioning regulations contained in 10 CFR 50.82 and 10 CFR 50.83, which were revised in 1996 to reflect lessons learned during the last set of decommissioning facilities.

As discussed in Section 2.3 of this document, decommissioning licensees have sought and been provided NRC approval of exemptions and amendments to reduce regulatory requirements no longer needed or no longer relevant for permanently shut down and defueled reactors because the hazard presented by a decommissioning plant is significantly reduced from the time when the plant was operating, as well as to streamline and add efficiencies to the overall licensing basis that reflect the decommissioning status of the plant. Decommissioning reactor licensees and the NRC staff have expended substantial resources processing these licensing actions for power reactors during and after their transition period to a decommissioning status. As such, the current regulatory process is not an efficient use of NRC staff or licensee resources and introduces unnecessary regulatory burden.

Accordingly, rulemaking is necessary in several regulatory areas to clarify the process for the appropriate implementation of requirements while continuing to provide reasonable assurance of adequate protection of public health and safety for decommissioning plant licensees. Rulemaking in these areas will eliminate the need for licensees to apply for numerous license amendments and exemptions from the operating nuclear power plant regulations, eliminate the need for the staff to process such applications, and eliminate the need for the Commission to review and approve certain exemptions and other actions.

In addition to those areas in which licensees have pursued licensing actions, the Commission, in SRM-SECY-14-0118, directed the NRC staff to consider “any other issues deemed relevant by the staff.” Appendices A through K of this document contain the issues deemed relevant for inclusion in the power reactor decommissioning rulemaking. These appendices contain the NRC staff’s detailed technical basis related to EP, physical security, cyber security, drug and alcohol testing, training requirements for CFHs, DTFs, offsite and onsite liability protection requirements and indemnity agreements, timeframe for decommissioning, application of backfitting protection, the advisability of requiring a licensee’s PSDAR to be approved by the NRC, the appropriateness of maintaining the three existing options (DECON, SAFSTOR, and ENTOMB) for decommissioning, the appropriate role of State and local governments and nongovernmental stakeholders in the decommissioning process, aging management, and fatigue management.

Appendices A through K also contain a description of the options that were considered by the NRC staff, and the NRC staff’s recommended option in each area. The NRC staff’s recommended options in Appendix C, “Cyber Security,” Appendix G, “Onsite and Offsite Insurance and Indemnity Agreements,” and Appendix K, “Fatigue Management,” rely on the timing of the phased approach to EP presented in Appendix A, “Emergency Preparedness.”

The NRC staff is publishing the draft regulatory basis for public comment to obtain stakeholder feedback on the options considered in Appendices A through K.

3.1 Regulatory Scope of a Power Reactor Decommissioning Rulemaking

This section discusses the planned scope for a power reactor decommissioning rulemaking. The Commission provided the NRC staff with an initial scope for the decommissioning rulemaking in SRM-SECY-14-0118. The NRC staff issued an ANPR to request stakeholder input on the scope of the power reactor decommissioning rule. Based on the content of the ANPR, the technical evaluation provided in Appendices A through K of this document, and the NRC staff's consideration of public comments on the ANPR, the NRC staff concludes that there is sufficient basis to fulfill the Commission's explicit direction, as documented in SRM-SECY-14-0118, to proceed with rulemaking in certain areas to address regulatory requirements associated with power reactors transitioning to decommissioning. However, the NRC staff has determined that some areas discussed in SECY-14-0118 can be addressed using other regulatory alternatives.

The areas in which the staff has determined that there is sufficient regulatory basis to continue with rulemaking are:

- Emergency preparedness
- Physical security
- Decommissioning trust funds
- Offsite and onsite financial protection requirements and indemnity agreements
- Application of Backfit Rule

Further, the staff is recommending rulemaking to:

- Require that the PSDAR contain a description of how the spent fuel stored under a general independent spent fuel storage installation (ISFSI) license will be removed from the reactor site in accordance with the regulatory requirements in 10 CFR 50.82, 10 CFR 50.54(bb), 10 CFR 52.110, and/or 10 CFR 72.218 and
- Amend 10 CFR 51.53 and 10 CFR 51.95 to clarify that the requirement for a license amendment before decommissioning activities may commence applies only to non-power reactors, as specified in 10 CFR 50.82(b), in accordance with the 1996 changes to the decommissioning regulations

The NRC staff's draft regulatory basis suggests that alternatives other than rulemaking, such as the development of regulatory guidance, can be pursued to address the following regulatory areas:

- The appropriate role of State and local governments in the decommissioning process
- The level of NRC review and approval of the PSDAR
- Revising the 60-year limit for power reactor decommissioning

The NRC staff's draft regulatory basis indicates that additional stakeholder input is needed prior to finalizing recommendations in the following regulatory areas:

- Cyber security

- Drug and alcohol testing
- Minimum staffing and training requirements for CFHs
- Aging management
- Fatigue management

The NRC received public comments both for and against limiting the scope of the decommissioning rule. As discussed in Section 5 of this document, some stakeholders advocated that the NRC limit the scope of the decommissioning rule to those areas in which the NRC has approved license amendments or exemptions. At the March 15, 2016, Commission meeting, stakeholders discussed the potential “bifurcation” of the rulemaking, which would split the rulemaking into two separate rulemakings. In this approach, the first rule would focus on those areas in which the NRC has approved license amendments or exemptions, and the second rule would address the remaining Commission-directed scope in SECY-14-0118. The NRC staff received input from other stakeholders that the decommissioning rule should proceed as an integrated effort. These stakeholders argued that delaying consideration of portions of the rule would hamper the NRC's proper goal of comprehensively reviewing and revising the rules that govern the decommissioning process.

In SECY-14-0118, the Commission directed the NRC staff to proceed with an integrated rulemaking on decommissioning. The Commission further stated that this rulemaking should address: issues discussed in SECY-00-0145, such as the graded approach to emergency preparedness; lessons learned from the plants that have already (or are currently) going through the decommissioning process; the advisability of requiring a licensee's PSDAR to be approved by NRC; the appropriateness of maintaining the three existing options for decommissioning and the timeframes associated with those options; the appropriate role of State and local governments and non-governmental stakeholders in the decommissioning process; and any other issues deemed relevant by the NRC staff. This draft regulatory basis considers the scope provided by the Commission in an integrated manner. At this time, the NRC staff's recommendation is to continue with an integrated decommissioning rule. The NRC staff's recommended scope for the power reactor decommissioning proposed rule will be documented in the final regulatory basis.

3.2 Regulatory Objectives

The NRC is developing a proposed rule that would amend the current requirements for power reactors transitioning to decommissioning. Experience has demonstrated that licensees for decommissioning power reactors seek several exemptions and license amendments per site to establish a long-term licensing basis for decommissioning. By issuing a decommissioning rule, the NRC would be able to establish regulations that would maintain safety and security at sites transitioning to decommissioning, without the need to grant specific exemptions or license amendments in certain regulatory areas. Specifically, the decommissioning rulemaking would have the following goals: (1) continue to provide reasonable assurance of adequate protection of the public health and safety and common defense and security at decommissioning power reactor sites; (2) ensure that the requirements for decommissioning power reactors are clear and appropriate; (3) codify those issues that are found to be generically applicable to all decommissioning power reactors and have resulted in the need for similarly-worded exemptions or license amendments; and (4) identify, define, and resolve additional areas of concern related to the regulation of decommissioning power reactors.

Applicability to NRC Licenses and Approvals

The NRC would apply these updated requirements to power reactors that permanently shut down and defuel and enter into decommissioning after the effective date of the final rule.

Accordingly, the NRC envisions that the requirements would apply to holders of licenses for the following:

- Nuclear power plants currently licensed under 10 CFR Part 50;
- Nuclear power plants currently being constructed under construction permits (CPs) issued under 10 CFR Part 50, or whose CPs may be reinstated;
- Future nuclear power plants whose CPs and operating licenses are issued under 10 CFR Part 50; and
- Current and future nuclear power plants licensed under 10 CFR Part 52.

3.3 NRC Guidance, Policy, and Implementation Issues

This section describes the NRC guidance that would need to be revised, as well as the relevant policy and implementation issues associated with a proposed rulemaking.

NRC Guidance

A proposed rulemaking would require the revision of existing guidance documents and the creation of new regulatory guidance documents to support the proposed rule. Detailed information on the need to revise or create regulatory guidance in each technical area is provided in Appendices A through K of this document.

Policy Issues

The policy issues associated with each area under consideration in this regulatory basis are also described in Appendices A through K of this document.

Implementation Issues

A description of implementation issues in each regulatory area is provided in Appendices A through K of this document. However, an overarching implementation issue for this rulemaking is the expected transition of multiple operating power reactors to decommissioning status prior to publication of the final rule. Licensees who are transitioning facilities to decommissioning during the implementation period may need specialized implementation provisions. The staff will consider implementation issues in more detail during the development of the final rule.

4. Impacts of the Rulemaking

Impact on Reactor Licensees

A summary of impacts on reactor licensees for each technical area is provided in Appendices A through K of this document.

In several regulatory areas, the staff has already identified options that may constitute backfitting. These areas include physical security, certified fuel handler minimum staffing and training requirements, current regulatory approach to decommissioning, aging management, and fatigue management. The staff will complete its analysis to show whether any of these areas would be necessary for adequate protection or constitute a cost-justified substantial increase in the protection of public health and safety or common defense and security. In addition to the analyses contained in this report, the NRC staff is in the process of performing a draft preliminary regulatory analysis, "Preliminary Draft Regulatory Analysis for Regulatory Basis: Regulatory Improvements for Decommissioning Power Reactors," to determine the impacts of this rulemaking on NRC staff and reactor licensees, and to support this regulatory basis. The preliminary draft regulatory analysis will contain the staff's initial analysis of the costs and benefits associated with each regulatory option considered in the draft regulatory basis. The staff intends to request public comment on the draft preliminary regulatory analysis in the near term, after issuance of this draft regulatory basis and will provide an updated preliminary regulatory analysis when the final regulatory basis is published. The full extent of the impacts of this rulemaking, for both current and new reactor licensees, is not known at this time.

Impact on the NRC

Overall, this rulemaking would result in significant one-time cost to the NRC followed by ongoing savings.

- Initially, there would be incremental costs to the NRC to undertake the rulemaking process. These costs include the preparation of the regulatory basis, the proposed and final rules, and accompanying guidance. The costs would include both staff and contractor time to prepare proposed rule language, draft guidance, supporting analyses (e.g., a regulatory analysis and Office of Management and Budget (OMB) Paperwork Burden analysis), and a *Federal Register* notice, and conduct public outreach efforts during rule and guidance development. After publishing the proposed rule, the NRC would incur costs associated with public comment resolution and preparation of the final rule, guidance, and supporting documentation for the rulemaking.
- By changing the decommissioning exemption and amendment process, the NRC will reduce both the number and complexity of the requests. These changes would result in a more efficient process and save the staff time and resources.
- By establishing a graded approach for EP for decommissioning reactors, the NRC staff would incur administrative burden associated with reviewing updated emergency plans for decommissioning reactors transitioning between levels.

Impact on Public Health and Safety

As stated in the ANPR, the need for a power reactor decommissioning rulemaking is not based on safety or security concerns. A power reactor decommissioning rule would have no impact on public health and safety.

Several ANPR comments requested that the NRC consider any environmental impacts to changes in EP requirements. An EA will be prepared for the rulemaking that will address any environmental impacts of changes to EP requirements for decommissioning reactors. The EA will be available for public comment with the proposed rule.

Impact on State, Local, or Tribal Governments

This rulemaking may impact State, local, or tribal governments. Specifically, with regard to the current regulatory approach for decommissioning reactors, the NRC staff was tasked with evaluating the appropriate role of State and local governments in the decommissioning process. The NRC staff's evaluation is contained in Appendix H of this report. As stated in Appendix H, the NRC staff is considering additional enhancements or overall improvements to the role of the States and local governments, members of the public, or other external stakeholders in the decommissioning process. As described in detail in Appendix H, the NRC staff recommends several enhancements to guidance that may increase public participation in the decommissioning process. However, based on an initial evaluation of the authority and jurisdiction given to the NRC by the Atomic Energy Act of 1954, as amended, there is no basis for the NRC to mandate participation in the decommissioning process by any external stakeholders.

Additionally, the NRC staff has received several public comments from State and local governments regarding all aspects of this rulemaking. The draft regulatory basis is being published for public comment. The NRC staff will consider public comments received on the options presented in Appendices A through K during the development of the final regulatory basis, including those concerns regarding the potential impacts on State, local, and tribal governments.

5. Stakeholder Involvement

The NRC staff published an ANPR in the *Federal Register* on November 19, 2015, to gather public comment to inform the NRC effort to draft a proposed rule addressing issues associated with power reactor decommissioning (80 FR 72358). The NRC staff also held a public meeting on December 9, 2015, to afford external stakeholders an opportunity to ask the NRC staff clarifying questions about the ANPR. The results of this public meeting are detailed in a meeting summary (ADAMS Accession No. ML15362A099).

The NRC staff held several meetings with industry and other stakeholders related to decommissioning power reactors. The staff held a Regulatory Information Conference session on decommissioning on March 10, 2016, which included a panel of various stakeholders who expressed their views on the decommissioning process and potential rulemaking. During this session, the staff engaged the public with a question and answer session. In addition, on March 15, 2016, the Commission held a public meeting on the power reactor decommissioning rulemaking. This meeting comprised three panels (i.e., staff, State and local government representatives, and industry and other stakeholders), and covered a wide range of perspectives from the staff and interested stakeholders.

5.1 NRC Observations on Stakeholder Feedback

The public comment period for the ANPR closed on March 18, 2016, and the NRC received 162 comment submissions, which are identified below and available for detailed review in ADAMS under Accession No. ML16229A277 (package). The NRC staff reviewed the stakeholder feedback received on the ANPR to inform the development of this draft regulatory basis. The NRC staff received stakeholder feedback in every technical area included in the scope of the ANPR, and in many cases this was a direct result of the NRC staff's questions that were posed in the ANPR. The distribution of public comments received on the ANPR, by source, is provided in Figure 1.

Detailed observations regarding stakeholder feedback in each regulatory area are provided in Appendices A through K. The NRC staff notes that, at this time, neither senior NRC management nor the Commission has approved any specific elements of the power reactor decommissioning draft regulatory basis; therefore, any conclusions regarding the elements of the power reactor decommissioning rulemaking are subject to change. The NRC staff's observations and positions on these topics will be updated as necessary and documented in the final regulatory basis.

Figure 1: Sources of Public Comments Received on ANPR

Distribution of Public Comment Submissions by Source

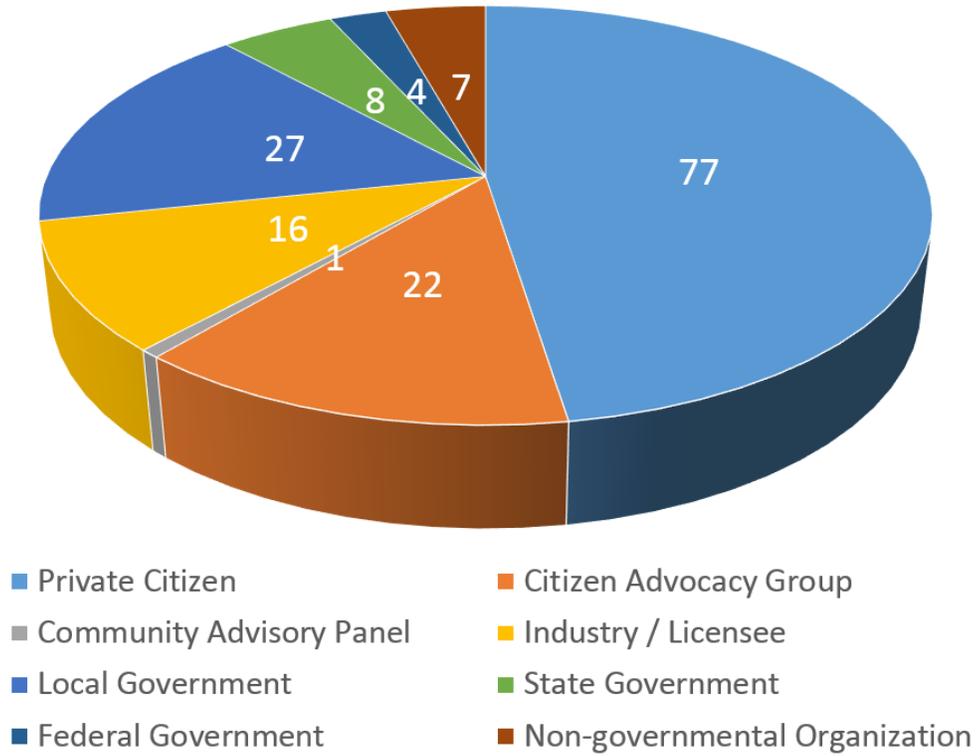


Table 2 provides references to the public comments received on the ANPR. The public comments can also be accessed in the package at ADAMS Accession No. ML16229A277.

Table 2: ADAMS references for ANPR public comment submissions

Comment Number	Commenter Affiliation	Accession Number
1	Private Citizen	ML15341A172
2	Private Citizen	ML15341A173
3	Private Citizen	ML15342A055
4	Private Citizen	ML15342A056
5	Private Citizen	ML15342A057
6	Private Citizen	ML15349A859
7	Private Citizen	ML15349A860
8	Private Citizen	ML15349A863
9	Private Citizen	ML15357A524
10	Private Citizen	ML15357A526
11	Private Citizen	ML15357A527
12	Local Government	ML15357A530
13	Private Citizen	ML15357A531
14	Local Government	ML15357A532
15	Local Government	ML15357A555
16	Citizen Advocacy Group	ML16004A192
17	Private Citizen	ML16004A244
18	Citizen Advocacy Group	ML16005A443
19	Private Citizen	ML16013A122
20	Non-governmental Organization	ML16013A124
21	Private Citizen	ML16013A381
22	Private Citizen	ML16013A383
23	Private Citizen	ML16013A385
24	Non-governmental Organization	ML16013A387
25	Private Citizen	ML16013A391
26	Private Citizen	ML16021A502
27	Private Citizen	ML16033A259
28	Local Government	ML16049A380
29	Local Government	ML16049A431
30	Local Government	ML16049A486
31	Local Government	ML16049A487
32	Local Government	ML16049A489
33	Local Government	ML16049A550
34	Private Citizen	ML16050A528
35	Local Government	ML16053A178
36	Local Government	ML16053A453
37	Private Citizen	ML16053A515
38	Private Citizen	ML16053A516
39	Local Government	ML16054A363
40	Private Citizen	ML16057A186
41	Private Citizen	ML16060A466
42	Local Government	ML16075A156
43	Local Government	ML16060A511
44	Local Government	ML16062A329
45	Citizen Advocacy Group	ML16062A358
46	Private Citizen	ML16067A107
47	Private Citizen	ML16067A108
48	Private Citizen	ML16067A109
49	Private Citizen	ML16067A110
50	Private Citizen	ML16067A111
51	Citizen Advocacy Group	ML16067A113

[ENTER MONTH AND YEAR HERE]

Comment Number	Committer Affiliation	Accession Number
52	Community Advisory Panel	ML16074A251
53	Local Government	ML16074A252
54	Local Government	ML16074A253
55	Citizen Advocacy Group	ML16075A324
56	Private Citizen	ML16075A158
57	Citizen Advocacy Group	ML16075A160
58	Private Citizen	ML16075A161
59	Private Citizen	ML16075A164
60	Local Government	ML16075A167
61	Private Citizen	ML16075A272
62	Private Citizen	ML16075A273
63	Private Citizen	ML16075A275
64	Citizen Advocacy Group	ML16076A193
65	Local Government	ML16076A194
66	Federal Government	ML16076A203
67	State Government	ML16076A205
68	Citizen Advocacy Group	ML16076A207
69	Non-governmental Organization	ML16077A279
70	Local Government	ML16077A280
71	Private Citizen	ML16081A464
72	Private Citizen	ML16081A465
73	Private Citizen	ML16081A466
74	Local Government	ML16081A467
75	Private Citizen	ML16081A468
76	Private Citizen	ML16081A469
77	Private Citizen	ML16081A470
78	Private Citizen	ML16081A471
79	State Government	ML16081A472
80	Industry / Licensee	ML16081A473
81	Private Citizen	ML16081A474
82	Private Citizen	ML16081A476
83	Private Citizen	ML16081A477
84	Private Citizen	ML16081A478
85	Private Citizen	ML16081A479
86	Private Citizen	ML16081A480
87	Private Citizen	ML16081A481
88	Private Citizen	ML16081A482
89	Federal Government	ML16081A483
90	Non-governmental Organization	ML16081A484
91	State Government	ML16081A485
92	Industry / Licensee	ML16081A486
93	Industry / Licensee	ML16081A488
94	Industry / Licensee	ML16081A489
95	Industry / Licensee	ML16081A490
96	Private Citizen	ML16081A491
97	Industry / Licensee	ML16081A492
98	Industry / Licensee	ML16081A493
99	Private Citizen	ML16081A494
100	State Government	ML16081A495
101	Citizen Advocacy Group	ML16081A496
102	Industry / Licensee	ML16081A497
103	Local Government	ML16081A498
104	Private Citizen	ML16082A000
105	State Government	ML16092A238
106	Federal Government	ML16082A001
107	Industry / Licensee	ML16082A002
108	Local Government	ML16082A003

[ENTER MONTH AND YEAR HERE]

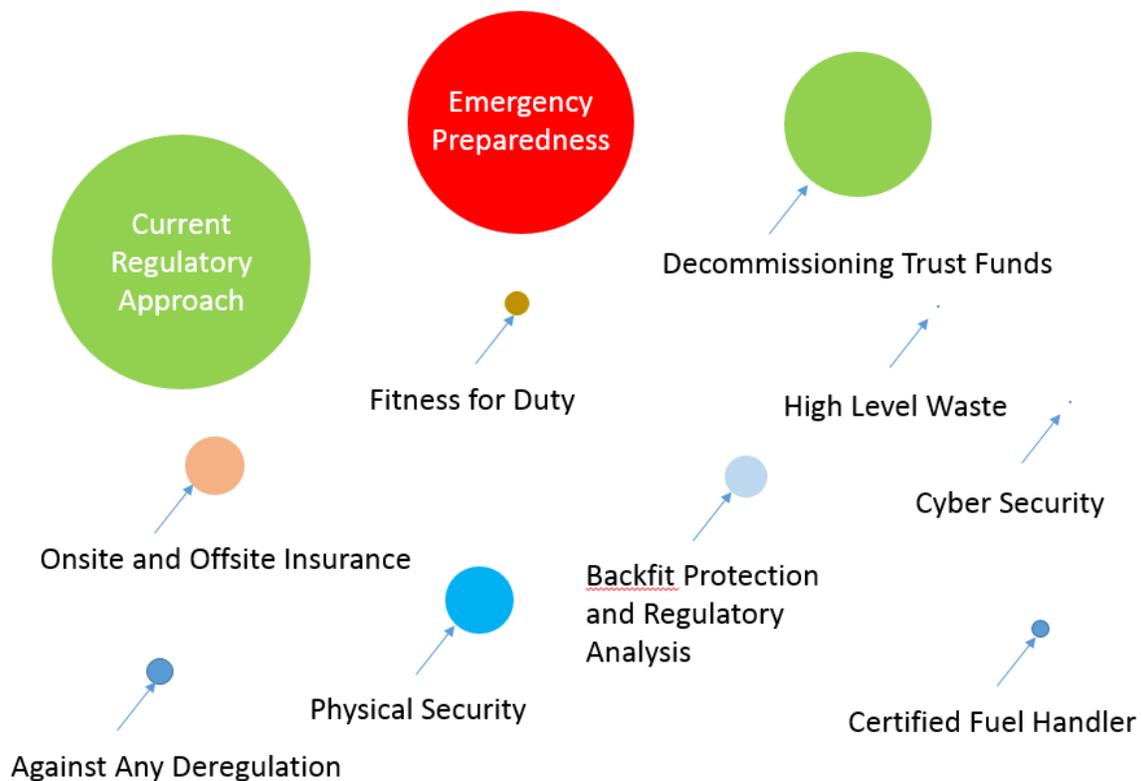
Comment Number	Committer Affiliation	Accession Number
109	Non-governmental Organization	ML16082A004
110	Industry / Licensee	ML16082A005
111	Industry / Licensee	ML16082A006
112	Citizen Advocacy Group	ML16082A007
113	Private Citizen	ML16082A008
114	Local Government	ML16082A009
115	Private Citizen	ML16082A010
116	Citizen Advocacy Group	ML16082A012
117	Citizen Advocacy Group	ML16082A013
118	Citizen Advocacy Group	ML16082A014
119	Citizen Advocacy Group	ML16082A015
120	Private Citizen	ML16082A016
121	Citizen Advocacy Group	ML16082A017
122	Local Government	ML16082A018
123	Industry / Licensee	ML16082A019
124	Industry / Licensee	ML16084A993
125	Industry / Licensee	ML16084A994
126	Non-governmental Organization	ML16084A995
127	Citizen Advocacy Group	ML16084A996
128	Private Citizen	ML16084A997
129	Industry / Licensee	ML16084A998
130	Private Citizen	ML16084A999
131	Citizen Advocacy Group	ML16084B000
132	Private Citizen	ML16084B001
133	Private Citizen	ML16084B002
134	State Government	ML16084B003
135	Local Government	ML16084B007
136	Industry / Licensee	ML16098A434
137	Private Citizen	ML16084B009
138	Private Citizen	ML16084B010
139	Private Citizen	ML16084B011
140	Private Citizen	ML16084B012
141	Private Citizen	ML16084B013
142	Citizen Advocacy Group	ML16084B014
143	Private Citizen	ML16084B015
144	Private Citizen	ML16084B016
145	Private Citizen	ML16084B017
146	Private Citizen	ML16085A000
147	Local Government	ML16085A001
148	Private Citizen	ML16085A002
149	Private Citizen	ML16085A307
150	Citizen Advocacy Group	ML16085A309
151	State Government	ML16085A310
152	Non-governmental Organization	ML16085A311
153	Citizen Advocacy Group	ML16085A312
154	Private Citizen	ML16085A313
155	Private Citizen	ML16085A367
156	Citizen Advocacy Group	ML16085A368
157	Private Citizen	ML16085A369
158	Private Citizen	ML16085A370
159	Private Citizen	ML16085A371
160	State Government	ML16088A340
161	Citizen Advocacy Group	ML16091A241
162	Federal Government	ML16263A415

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General Observations on Stakeholder Feedback

The NRC staff reviewed the public comment submissions referenced above to identify comments in each regulatory area discussed in Appendices A through K. Figure 2 depicts the distribution of public comments received in each regulatory area. The size of the circles in Figure 2 is normalized to the number of comments received regarding the current regulatory approach for decommissioning, which received the largest volume of comments. Figure 2 shows that the three areas of highest interest to stakeholders are the current regulatory approach to decommissioning (Appendix H), emergency preparedness (Appendix A), and decommissioning trust funds (Appendix F).

Figure 2: Regulatory Areas of Interest to External Stakeholders



The following lists summarize the general feedback received from each group of stakeholders.

Private Citizens and Citizen Advocacy Groups

In general, citizen advocacy groups and private citizens provided the following feedback:

- These stakeholders opposed any relaxation of EP, security, or insurance requirements while fuel is still in the SFP.

- These stakeholders were supportive of an increased role of the State and local governments and public groups in the decommissioning process, and many of these stakeholders advocated that the NRC require the formation of a community advisory panel to enhance the opportunity for public involvement in the decommissioning process.
- These stakeholders were generally against SAFSTOR, and expressed a desire for licensees to enter DECON as soon as possible.
- These stakeholders generally supported increased oversight on and additional funding of the DTFs. In addition, many commenters expressed a concern that the 60 year limit for decommissioning was being used primarily to grow sufficient funds for decommissioning rather than for the purpose of reducing worker exposure and waste disposal costs.
- Several stakeholders stated that the decommissioning process should not be excluded from National Environmental Policy Act (NEPA) reviews.
- Most of these stakeholders requested that the NRC require approval of the PSDAR.
- Many of these stakeholders requested that NRC require removal or transfer of fuel from the SFP to dry cask storage as soon as possible.
- Several stakeholders provided specific decommissioning related issues regarding specific licensees.

Non-Governmental Organizations

The NRC staff received varied feedback from non-governmental organizations. Some of the non-governmental organizations echoed the concerns expressed in comments received from private citizens and citizen advocacy groups. Other non-governmental organizations were generally supportive of changes to the regulatory framework for decommissioning reactors, and included specific suggestions on potential changes. Some non-governmental organizations provided detailed feedback regarding the issues considered in Appendices A through K of this document.

Local Governments

The NRC staff received significant comments from local governments. In general, local government stakeholders had the following concerns:

- These stakeholders generally opposed relaxation of EP until the spent fuel is removed from the SFP.
- These stakeholders expressed concern regarding the economic impacts of decommissioning, particularly when a facility enters SAFSTOR for an extended period of time.
- These stakeholders supported an increased role of the State and local governments and public groups in the decommissioning process, and many of these stakeholders advocated that the NRC require the formation of a community advisory panel. Some stakeholders also requested that licensees demonstrate reduced risk to local communities prior to exemptions being granted.
- These stakeholders suggested that the 60 year limit for decommissioning is too long and results in extended socioeconomic impacts throughout this period.
- These stakeholders expressed concern that local jurisdictions will face increased burden associated with emergency response and preparedness if staffing, insurance,

qualifications, and training requirements are reduced. These stakeholders requested that EP funding be maintained at current levels.

- These stakeholders supported the concept of a graded approach to EP but requested that site-specific characteristics such as geography, population, and infrastructure be considered in establishing each level.

State Governments

The NRC staff received significant feedback from State governments. In general, the feedback from State governments was as follows:

- The State governments echoed all of the concerns expressed by local governments, private citizens, and citizen advocacy groups.
- Several State governments provided specific input on the use of DTFs and suggestions for improving the regulatory framework for decommissioning power reactors.
- The State governments suggested that the NRC should provide other opportunities for meaningful public input and involvement in the decommissioning process.
- Several State governments suggested that the NRC should expressly recognize State authority over the non-radiological activities associated with the decommissioning process.
- Several State governments stated that the NRC should eliminate the 60-year delayed decommissioning option for single reactor sites, and should require all decommissioning to be complete within 10 years of the closure of the last operating reactor at each site.
- Several State governments suggested that the NRC should require a full radiological and non-radiological site investigation and characterization before, or immediately after, the plant stops generating power.
- Several State governments requested that any proposed regulatory changes should require site-specific analyses as part of any rulemaking proceeding.
- Several State governments also provided specific suggestions for the questions posed by the staff in the ANPR in many technical areas.
- Several State governments requested that ERDS data continue to be made available until all fuel is removed from the SFP.

Federal Government

The NRC staff also received input from Federal government stakeholders with the following input:

The EPA requested that the NRC and EPA hold discussions on the interplay between the Resource Conservation and Recovery Act, and possibly other environmental statutes, and the Atomic Energy Act, and explain this interplay to the public during the proposed rule stage of the Power Reactor Decommissioning rulemaking.

The FEMA requested that the NRC continue to coordinate with FEMA throughout the Power Reactor Decommissioning rulemaking process.

In a letter to the NRC, 15 members of the U.S. Congress submitted a letter requesting that the NRC ensure that the rulemaking process provides State and local stakeholders with a seat at

the table during the rulemaking through a transparent, authentic, and inclusive process, and that the final rule complies with the following:

- Enhances community involvement by requiring licensees of decommissioning reactors to include State and local officials' input into, and for the NRC to formally approve, licensees' decommissioning plans.
- Ensures that decommissioning funds are used strictly for statutorily-authorized purposes.
- Requires spent nuclear fuel to be removed from wet storage and placed into dry cask storage as quickly as possible.
- Ensures that the site of the plant is rapidly returned to beneficial use instead of decades after the plant ceases operations, and that licensees maintain or obtain the financial resources necessary to do so.
- Ensures that all emergency preparedness and response and security resources and licensing requirements remain in place until all the spent nuclear fuel is placed into dry cask storage.

The NRC received a second letter from 15 members of the U.S. Congress that opposed narrowing the scope of the decommissioning rulemaking by conducting a bifurcated rule. The letter argued that delaying consideration of these important issues into a second part of the rule would hamper the NRC's goal of comprehensively reviewing and revising the rules that govern the decommissioning process. The second letter reiterated that the power reactor decommissioning rule should comply with the list of considerations provided above.

Licensees and Industry Representatives

The NRC also received significant comments on the ANPR from licensees and industry representatives. In general, licensees and industry representatives stated that:

- The NRC should proceed with a rulemaking to modify the requirements applicable to reactors undergoing decommissioning in order to appropriately align the regulatory requirements with the reduced risk profile associated with those facilities.
- The industry indicated that the proposed changes to the current rules are generally consistent with licensing actions that have been approved by the NRC (i.e., license amendments and exemptions) and would achieve the NRC's primary objective stated in the ANPR "to implement appropriate regulatory changes that reduce the number of licensing actions needed during decommissioning."
- The rulemaking scope should be limited to those areas that have required licensing activity and are consistent with areas addressed in SECY-00-0145.
- Industry has concerns with the imposition of additional requirements related to DTFs, fitness for duty, and aging management.
- The NRC should consider rule language provided by industry in areas in which they recommend rulemaking.

As this rulemaking effort continues, the next opportunity for public comment will be when this draft regulatory basis is published.

5.2 Planned Interactions with the Advisory Committee on Reactor Safeguards

The NRC staff is providing the draft regulatory basis to the Advisory Committee on Reactor Safeguards (ACRS) at the time of publication. The staff will brief the ACRS regarding the draft regulatory basis if requested, and will follow normal rulemaking processes for ACRS engagement during the power reactor decommissioning rulemaking process.

6. Backfitting and Issue Finality, Regulatory Flexibility Analysis, Compliance with National Environmental Policy Act, Safety Goal Evaluation, and Peer Review of Regulatory Basis

Backfitting and Issue Finality

The power reactor decommissioning rulemaking may codify certain exemptions from regulatory requirements associated with EP, physical security, DTFs, and offsite and onsite financial protection and indemnity agreements for decommissioning power reactors. Further, through this rulemaking effort, the NRC will be considering the application of backfitting provisions to decommissioning power reactors.

At this time, the staff does not expect that a proposed rule would contain requirements in these areas beyond current requirements.

The staff is considering whether a proposed rule should also contain additional requirements in the areas of cyber security, drug and alcohol testing, minimum staffing and training requirements for CFHs for decommissioning reactors, current regulatory approach to decommissioning, aging management, and fatigue management. In these areas, a proposed rule may contain requirements that would exceed those that are already mandated by the Commission.

A proposed rulemaking could codify (in 10 CFR Part 50) some of these requirements such that they would become requirements for existing Part 50 power reactor licensees at the time the rule is completed, as well future nuclear plants licensed under 10 CFR Parts 50 and 52.

The NRC's backfitting provisions for holders of CPs and operating licenses are found in 10 CFR 50.109, "Backfitting" (the Backfit Rule). Issue finality provisions (analogous to the backfitting provisions in 10 CFR 50.109) for applicants and holders of combined licenses are in 10 CFR 52.83, "Finality of referenced NRC approvals; partial initial decision on site suitability," and 10 CFR 52.98, "Finality of combined licenses; information requests." The backfitting and issue finality considerations as applied to these entities and regulatory approvals are considered below.

Current and Future Applicants

Applicants and potential applicants (of licenses, permits and regulatory approvals such as design certifications) are not, with certain exceptions, protected by either the Backfit Rule or any issue finality provisions under Part 52. Neither the Backfit Rule nor the issue finality provisions under 10 CFR Part 52 – with certain exclusions discussed below – were intended to apply to every NRC action that substantially changes the expectations of current and future applicants, and applicants have no reasonable expectation that future requirements will not change (54 FR 15372, at 15385-86, April 18, 1989).

The exceptions to the general principle are applicable whenever a COL applicant references a 10 CFR Part 52 license (e.g., an early site permit) and/or NRC regulatory approval (e.g., a design certification rule) with specified issue finality provisions. The issues that are resolved in an early site permit or a design certification and accorded issue finality do not include decommissioning matters that would be the subject of a reactor decommissioning proposed

rule, and the proposed rule would not contain design requirements. Therefore, the proposed rule provisions that would be limited to reactor decommissioning would not be inconsistent with the issue finality provisions applicable to early site permits and design certifications. In addition, because the issues that are resolved in an early site permit or a design certification and accorded issue finality do not address power reactor decommissioning, a combined license applicant referencing either an early site permit or design certification would not be protected by the issue finality provision applicable to combined license applicants (10 CFR 52.83) with respect to compliance with a rule setting forth requirements for power reactor decommissioning.

Existing Design Certifications

The issues that are resolved in a design certification and accorded issue finality do not include decommissioning matters that would be the subject of a reactor decommissioning proposed rule. Therefore, a rulemaking limited to reactor decommissioning would not be applied to existing (or future) design certifications.

Existing Licensees

To the extent that a proposed rule would codify certain regulatory exemptions from regulatory requirements associated with EP, physical security, DTFs, and onsite and offsite insurance for decommissioning power reactors, a proposed rule, as applied to existing licensees would not constitute a new instance of backfitting under 10 CFR 50.109, or an inconsistency with the issue finality provisions applicable to holders of combined licenses in 10 CFR 52.98. A proposed rule that would codify these exemptions would not impose upon licensees in decommissioning any new or changed requirements because these licensees would already be acting under the exemptions. A rulemaking as described in the appendices to this draft regulatory basis could include certain regulations that would provide an alternative set of requirements for licensees transitioning to decommissioning and would not constitute backfitting or a violation of issue finality. For other changes, such as requirements that exceed those resulting from certain exemptions from regulatory requirements associated with EP, physical security, DTFs, and onsite and offsite insurance, the NRC staff would address the applicable backfitting and issue finality provisions with respect to the added requirements as part of the rulemaking.

Regulatory Flexibility Act

The Regulatory Flexibility Act, enacted in September 1980, requires agencies to consider the impact of their regulatory proposals on small entities, analyze alternatives that minimize small entity impacts, and make their analyses available for public comment.

None of the licensees or CP holders fall within the definition of “small entities” set forth in the size standards established by the NRC in 10 CFR 2.810, “NRC Size Standards.” Therefore, a proposed rulemaking would not have a significant economic impact on a substantial number of small entities.

Compliance with NEPA

This regulatory basis contemplates changes to the NRC's decommissioning regulatory framework. If the NRC determines to pursue rulemaking that would authorize activities not considered in the previous rule, such as EP requirements, the NRC will evaluate the environmental impacts of any newly authorized activities. The NEPA document will be available for public comment with the proposed rule.

Safety Goal Evaluation

Safety goal evaluations are applicable to regulatory initiatives considered to be generic safety enhancement backfits subject to the substantial additional protection standard in 10 CFR 50.109(a)(3).

Because the NRC staff expects that a power reactor decommissioning rule would codify certain regulatory exemptions to regulatory requirements associated with EP, physical security requirements, DTFs, and onsite and offsite insurance for decommissioning power reactors, which have all been well established, the NRC staff expects that there will be no additional backfits in these areas.

As stated above, if the proposed rule includes any requirements beyond these areas, then the NRC staff will address the applicable backfitting and issue finality provisions with respect to the added requirements as part of the rulemaking. Safety goal evaluations may be necessary to justify the proposed regulatory changes.

Peer Review of Regulatory Basis

The OMB's *Final Information Quality Bulletin for Peer Review* requires each Federal agency to subject "influential scientific information" to peer review prior to dissemination. The OMB defines "influential scientific information" as "scientific information the agency reasonably can determine will have or does have a clear and substantial impact on important public policies or private sector decisions." The regulatory basis document does not contain "influential scientific information." Therefore, there is no need for a peer review of the regulatory basis.

7. Conclusion

The NRC staff finds that there is sufficient regulatory basis to proceed with rulemaking. Specifically, the NRC staff has extensive experience with power reactor decommissioning, and recent experience has shown that multiple exemptions, license amendments, and other licensing actions are needed to establish a long term regulatory framework for decommissioning power reactors. The power reactor decommissioning rulemaking may codify certain exemptions from regulatory requirements associated with EP, physical security requirements, DTFs, and onsite and offsite insurance for decommissioning power reactors. Therefore, this rulemaking may provide a predictable and stable set of regulations for future power reactor decommissioning, so as to avoid the need for approval of exemptions, license amendments, and related licensing actions. In addition, the rulemaking may address other issues important to the Commission and stakeholders, including cyber security, drug and alcohol testing, minimum staffing and training requirements for CFHs for decommissioning reactors, current regulatory approach to decommissioning (including the appropriate role of State and local governments in the decommissioning process, the level of NRC review and approval of the PSDAR, and revising the 60-year limit for power reactor decommissioning), aging management, and fatigue management.

A rulemaking would also fulfill the Commission's explicit direction to address power reactor decommissioning in a rulemaking, as documented in SRM-SECY-14-0118.

8. References

Date	Document	ADAMS Accession Number/ <i>Federal Register Citation</i>
Main Document References		
December 30, 2014	Staff Requirements – SECY-14-0118 - Request by Duke Energy Florida, Inc., for Exemptions from Certain Emergency Planning Requirements	ML14364A111
June 28, 2000	SECY-00-0145 - Integrated Rulemaking Plan for Nuclear Power Plant Decommissioning	ML003721626
June 27, 1988	Final Rule: General Requirements for Decommissioning Nuclear Facilities	53 FR 24018
July 20, 1995	Proposed Rule: Decommissioning of Nuclear Power Reactors	60 FR 37374
July 29, 1996	Final Rule: Decommissioning of Nuclear Power Reactors	61 FR 39278
February 3, 1994	Use of Decommissioning Trust Funds Before Decommissioning Plan Approval; Draft Policy Statement	59 FR 5216
December 21, 1999	Staff Requirements - SECY-99-168 – Improving Decommissioning Regulations for Nuclear Power Plants	ML003752190
February 28, 2001	NUREG-1738: Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants	ML010430066
June 4, 2001	SECY-01-0100 - Policy Issues Related to Safeguards, Insurance, and Emergency Preparedness Regulations at Decommissioning Nuclear Power Plants Storing Fuel in Spent Fuel Pools	ML011450420
August 16, 2002	Memorandum to Commission: Status of Regulatory Exemptions for Decommissioning Plants	ML030550706
February 4, 2010	Memorandum to Commission: Documentation of Evolution of Security Requirements with Respect to Mitigation Measures for Large Fires and Explosions	ML092990438
March 27, 2009	Final Rule: Power Reactor Security Requirements	74 FR 13926
December 2006	NEI-06-12: B.5.b Phase 2 & 3 Submittal Guideline, Revision 2	ML070090060
December 22, 2006	NRC Endorsement of NEI-06-12	ML063560235 (not publicly available)

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Date	Document	ADAMS Accession Number/Federal Register Citation
September 2014	NUREG-2161: Consequence Study of a Beyond-Design-Basis Earthquake Affecting the Spent Fuel Pool for a U.S. Mark I Boiling Water Reactor	ML14255A365
November 14, 2014	IN-2014-14: Potential Safety Enhancements to Spent Fuel Pool Storage	ML14218A493
March 12, 2012	Order EA-12-051 - Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation	ML12054A679
March 12, 2012	Order EA-12-049 - Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events	ML12054A735
June 24, 2016	Certification of Permanent Cessation of Power Operations for Fort Calhoun Station, Unit 1	ML16176A213
March 16, 2016	Certification of Permanent Cessation of Power Operations for James A. FitzPatrick Nuclear Power Plant	ML16076A391
June 20, 2016	Certification of Permanent Cessation of Power Operations for Clinton Power Station, Unit 1	ML16172A137
June 20, 2016	Certification of Permanent Cessation of Power Operations for Quad Cities Nuclear Power Station, Units 1 and 2	ML16172A151
November 10, 2015	Certification of Permanent Cessation of Power Operations for Pilgrim Nuclear Power Station	ML15328A053
January 7, 2011	Certification of Permanent Cessation of Power Operations for Oyster Creek Nuclear Generating Station	ML110070507
June 21, 2016	Certification of Permanent Cessation of Power Operations for Diablo Canyon Power Plant, Units 1 and 2	ML16173A454
January 30, 2015	SECY-15-0014 - Anticipated Schedule and Estimated Resources for a Power Reactor Decommissioning Rulemaking	ML15082A089
October 7, 2015	SECY-15-0127 - Schedule, Resource Estimates, and Impacts for the Power Reactor Decommissioning Rulemaking	ML15211A095 (not publicly available)
November 19, 2015	Advance Notice of Proposed Rulemaking: Regulatory Improvements for Decommissioning Power Reactors	80 FR 72358

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Date	Document	ADAMS Accession Number/ <i>Federal Register Citation</i>
October 28, 2016	Power Reactor Transition from Operations to Decommissioning Lessons Learned Report	ML16085A029
February 2005	RG 1.202 - Standard Format and Content of Decommissioning Cost Estimates for Nuclear Power Reactors	ML050230008
December 2004	NUREG-1713 - Standard Review Plan for Decommissioning Cost Estimates for Nuclear Power Reactors	ML043510113
May 19, 2008	Staff Requirements - SECY-08-0024 - Delegation of Commission Authority to Staff to Approve or Deny Emergency Plan Changes That Represent a Decrease in Effectiveness	ML081400510
March 12, 2012	Order EA-12-049 - Issuance of Order to Modify Licenses With Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events	ML12054A735
March 12, 2012	Order EA-12-051 - Order Modifying Licenses With Regard to Reliable Spent Fuel Pool Instrumentation	ML12056A044
June 6, 2013	Order EA-13-109 - Issuance of Order to Modify Licenses With Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions	ML13143A321
January 5, 2016	Summary of Public Meeting to Discuss Regulatory Improvements for Decommissioning Power Reactors: Advance Notice of Proposed Rulemaking	ML15362A099
August 19, 2016	Public Comments on the Advance Notice of Proposed Rulemaking: Regulatory Improvements for Decommissioning Power Reactors	ML16229A277
November 2002	NUREG-0586, Supplement 1, "Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities"	ML023470304 ML023470323
Appendix A, "Emergency Preparedness"		
May 1992	EPA 400-R-92-001, "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents"	link

Date	Document	ADAMS Accession Number/Federal Register Citation
October 27, 2014	Kewaunee Power Station – Exemptions from Certain Emergency Planning Requirements and Related Safety Evaluation (TAC No. MN2567)	ML14261A223
March 30, 2015	Crystal River Unit 3 – Exemptions from Certain Emergency Planning Requirements and Related Safety Evaluation (TAC No. MF2981)	ML15058A906
June 4, 2015	San Onofre Nuclear Generating Station, Units 1, 2, and 3 and Independent Spent Fuel Storage Installation – Exemptions from Certain Emergency Planning Requirements and Related Safety Evaluation (TAC Nos. MF3835, MF3836, and MF3837)	ML15082A204
December 10, 2015	Vermont Yankee Nuclear Power Station – Exemptions from Certain Emergency Planning Requirements and Related Safety Evaluation (CAC No. MF3614)	ML15180A054
December 1978	NUREG-0396, "Planning Basis for the Development of State and Local Government Radiological Emergency Response Plans In Support of Light Water Nuclear Reactors"	ML051390356
October 23, 1979	Policy Statement: "Planning Basis for Emergency Responses to Nuclear Power Plant Accidents"	44 FR 61123
July 31, 2013	"Kewaunee Power Station Request for Exemptions from Portions of 10 CFR 50.47 and 10 CFR 50, Appendix E"	ML13221A182
June 27, 2014	SECY-14-0066, "Request by Dominion Energy Kewaunee, Inc. for Exemptions from Certain Emergency Planning Requirements"	ML14072A257
September 26, 2013	"Crystal River Unit 3 – License Amendment Request #315, Revision 0, Permanently Defueled Emergency Plan and Emergency Action Level Scheme, and Request for Exemption to Certain Radiological Emergency Response Plan Requirements Defined by 10 CFR 50"	ML13274A584
October 29, 2014	SECY-14-0118, "Request by Duke Energy Florida, Inc. for Exemptions from Certain Emergency Planning Requirements"	ML14219A444

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Date	Document	ADAMS Accession Number/<i>Federal Register Citation</i>
March 14, 2014	“Request for Exemptions from Portions of 10 CFR 50.47 and 10 CFR 50, Appendix E, Vermont Yankee Nuclear Power Station”	ML14080A141
November 14, 2014	SECY-14-0125, “Request by Entergy Nuclear Operations, Inc. for Exemptions from Certain Emergency Planning Requirements”	ML14227A711
March 31, 2014	“Emergency Planning Exemption Request, San Onofre Nuclear Generating Station, Units 1, 2, and 3 and Independent Spent Fuel Storage Installation”	ML14092A332
December 17, 2014	SECY-14-0144, “Request by Southern California Edison for Exemptions from Certain Emergency Planning Requirements”	ML14251A554
May 11, 2015	NSIR/DPR-ISG-02, “Interim Staff Guidance: Emergency Planning Exemption Requests for Decommissioning Nuclear Power Plants”	ML14106A057
March 6, 2014	Notice of Public Meeting Between the U.S. NRC Staff, the NEI and Industry to Discuss Interim Staff Guidance NSIR/DPR-ISG-02, “Emergency Planning Exemption Requests for Decommissioning Nuclear Power Plants”	ML14030A446
April 3, 2014	Summary of Public Meeting Between the U.S. NRC, the NEI, and Industry on Power Reactor Decommissioning Transition Issues	ML14106A242
May 22, 2014	Summary of May 22, 2014, Public Meeting Between the U.S. NRC, the NEI, and Industry to Discuss Generic Emergency Plan-Related Decommissioning Transition Issues	ML14160A789
November 4, 2014	Summary of Public Meeting Between the U.S. NRC, the NEI, and Industry on Generic Emergency Plan-Related Decommissioning Transition Issues	ML14304A373

Date	Document	ADAMS Accession Number/ <i>Federal Register Citation</i>
May 31, 2016	Memorandum to B. Holian from M. Weber, "Transmittal of Reports to Inform Decommissioning Plant Rulemaking for User Need Request NSIR-2015-001" <ul style="list-style-type: none"> • Task 1 Report, "A Human Reliability Analysis of the Safety of the Spent Fuel in the Spent Fuel Pool of Decommissioning Nuclear Power Plants" • Task 2 Report, "Spent Fuel Assembly Heat Up Calculations in Support of Task 2 of User Need NSIR-2015-001" Task 3 Report 3, "Offsite Dose Accumulation Rates Following a Hypothetical Spent Fuel Pool Accident"	ML16110A416
August 1997	NUREG/CR-6451, "A Safety and Regulatory Assessment of Generic BWR and PWR Permanently Shutdown Nuclear Power Plants"	ML082260098
April 2016	NUREG/CR-7215, "Spent Fuel Pool Project Phase I: Pre-Ignition and Ignition Testing of a Single Commercial 17x17 Pressurized Water Reactor Spent Fuel Assembly under Complete Loss of Coolant Accident Conditions"	ML16112A022
April 2016	NUREG/CR-7216, "Spent Fuel Pool Project Phase II: Pre-Ignition and Ignition Testing of a 1x4 Commercial 17x17 Pressurized Water Reactor Spent Fuel Assemblies under Complete Loss of Coolant Accident Conditions"	ML16112A084
October 2013	Regulatory Guide 1.184, Revision 1, "Decommissioning of Nuclear Power Reactors"	ML13144A840
November 2010	Comprehensive Preparedness Guide 101 Version 2.0, "Developing and Maintaining Emergency Operations Plans"	link
November 1980	NUREG-0654/FEMA-REP-1, Revision 1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants"	ML040420012

Date	Document	ADAMS Accession Number/Federal Register Citation
May 2015	NUREG-0654/FEMA-REP-1, Revision 2, Draft, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants"	ML14246A519
January 2005	NUREG/CR-6864, Volume 1, "Identification and Analysis of Factors Affecting Emergency Evacuations Main Report"	ML050250245
November 2012	Nuclear Energy Institute (NEI) 99-01 Revision 6, "Development of Emergency Action Levels for Non-Passive Reactors"	ML12326A805
March 28, 2013	"U.S. Nuclear Regulatory Commission Review and Endorsement of NEI 99-01, Revision 6, Dated November, 2012 (TAC No. D92368)"	ML12346A463
May 1992	EPA 400-R-92-001, "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents"	link
June 22, 1995	Final Rule, "Emergency Planning Licensing Requirements for Independent Spent Fuel Storage Facilities (ISFSI) and Monitored Retrievable Storage Facilities (MRS)"	60 FR 32430
July 13, 1982	Final Rule, "Emergency Planning and Preparedness"	47 FR 30232
February 1981 (Final Report)	NUREG-0696, "Functional Criteria for Emergency Response Facilities"	ML051390358
November 23, 2011	Final Rule, "Enhancements to Emergency Preparedness Regulations"	76 FR 72560
November 2002	NUREG-0586, Supplement 1, Volume 1, "Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities: Regarding the Decommissioning of Nuclear Power Reactors"	ML023470304
March 29, 1999	Final Rule: Frequency of Reviews and Audits for Emergency Preparedness Programs, Safeguards Contingency Plans, and Security Programs for Nuclear Power Reactors	64 FR 14814
November 2011	Regulatory Guide (RG) 1.219, "Guidance on Making Changes to Emergency Plans for Nuclear Power Reactors"	ML102510626

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Date	Document	ADAMS Accession Number/ <i>Federal Register</i> Citation
	NRC Form 361 (Edition 12-2000), "Reactor Plant Event Notification Worksheet"	link
November 2011	NSIR/DPR-ISG-01, "Interim Staff Guidance Emergency Planning for Nuclear Power Plants"	ML113010523
April 19, 2011	Regulatory Issue Summary 2005-02, Rev. 1, "Clarifying the Process for Making Emergency Plan Changes"	ML100340545
January 2013	NUREG-1022, Rev. 3, "Event Reporting Guidelines 10 CFR 50.72 and 50.73"	ML13032A220
September 4, 2014	Inspection Procedure (IP) 82501, "Decommissioning Emergency Preparedness Program Evaluation"	ML14078A540
September 4, 2014	IP 82401, "Decommissioning Emergency Preparedness Scenario Review and Exercise Evaluation"	ML14078A529
June 12, 1961	<i>Power Reactor Development Co. v. International Union of Electrical Workers</i>	367 U.S. 396
December 22, 1975	<i>Citizens for Safe Power v. NRC</i>	524 F.2d 1291/8 ERC 1597/(D.C. Cir., 12/22/1975)
March 16, 1970	<i>Crowther v. Seaborg</i>	312 F.Supp. 1205 (D. Colo. 1970)
1983	Southern California Edison Co. (San Onofre Nuclear Generating Station, Units 2 and 3), ALAB-717, 17 NRC 346, 380	
March 10, 2016	NRC 2016 Regulatory Information Conference, Technical Session, "Reactor Decommissioning Rulemaking: Path to Regulatory Transparency"	link
March 15, 2016	"Briefing on Power Reactor Decommissioning Rulemaking"	ML16078A034
Appendix B, "Physical Security"		
October 9, 2013	SECY-13-0112 - Consequence Study of a Beyond-Design-Basis Earthquake Affecting the Spent Fuel Pool For a U.S. Mark 1 Boiling-Water Reactor	ML13256A339
February 25, 2002	Order EA-02-026, "Interim Safeguards and Security Compensatory Measures"	ML021350569
March 27, 2009	Final Rule: "Power Reactor Security Requirements" (RIN: 3150-AG63)	74 FR 13926

Date	Document	ADAMS Accession Number/Federal Register Citation
April 23, 2014	COMSECY-14-0015, "Security Inspections at U.S. Nuclear Regulatory Commission Decommissioning Power Reactors"	ML13347B178
May 28, 2014	SRM to COMSECY-14-0015, "Security Inspections at U.S. Nuclear Regulatory Commission Decommissioning Power Reactors"	ML14148A010
July 1998	NUREG-1619, "Standard Review Plan for Physical Protection Plans for the Independent Storage of Spent Fuel and High-Level Radioactive Waste"	ML020720453
August 1983	NUREG/CR-3330, "Vulnerability of Nuclear Power Plant Structures to Large External Fires"	ML062260290
June 2000	NUREG-1628, "Staff Responses to Frequently Asked Questions Concerning Decommissioning of Nuclear Power Plants"	ML003726190
May 1980	Regulatory Guide (RG) 5.7, "Entry/Exit Control for Protected Areas, Vital Areas, and Material Access Areas"	ML003739976
Oct 1, 1994	Regulatory Guide 5.68, "Protection Against Malevolent use of Vehicles at Nuclear Power Plants"	ML003739379
July 10, 2009	Regulatory Guide 5.75, "Training and Qualification of Security Personnel at Nuclear Power Reactor Facilities"	ML091690037
September 28, 2015	NSIR/DSP-ISG-03, "Interim Staff Guidance Review of Security Exemptions/License Amendment Requests for Decommissioning Nuclear Power Plants"	ML15106A737
Appendix C, "Cyber Security"		
January 2010	RG 5.71, Revision 0, "Cyber Security Programs for Nuclear Facilities"	ML090340159
April 2010	NEI 08-09, Revision 6, "Cyber Security Plan for Nuclear Power Reactors"	ML101180437
November 2015	NEI 13-10, Revision 4, "Cyber Security Control Assessments"	ML15338A276
June 25, 2012	SECY-12-0088, "The Nuclear Regulatory Commission Cyber Security Roadmap"	ML12135A050

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Date	Document	ADAMS Accession Number/ <i>Federal Register Citation</i>
October 1, 2015	San Onofre Nuclear Generating Station, Units 2 and 3 - Issuance of Amendments to Revise the Cyber Security Plan Milestone 8 Completion Date in the Facility Operating Licenses (TAC NOS. MF5191 AND MF5192)	ML15209A935
June 16, 2016	Docket No. 50-361 and 50-362 Amendment Applications 271 and 256 Proposed Changes to Cyber Security Plan · Implementation Schedule Completion Date San Onofre Nuclear Generating Station, Units 2 and 3	ML16172A075
October 26, 2006	Proposed Rule, "Power Security Requirements"	71 FR 62663
October 15, 2015	Dominion Energy Kewaunee, Inc. Kewaunee Power Station Request for Approval of the Kewaunee Power Station Security Plan	ML15294A072
Appendix D, "Drug and Alcohol Testing"		
August 18, 2004	Order EA-03-099, "Issuance of Order for Implementation of Additional Security Measures Associated with Access Authorization, Fitness for Duty and Behavior Observation"	ML042250002
March 31, 2008	Final Rule: "Fitness for Duty Programs"	73 FR 16966
September 3, 2014	Summary of Fitness for Duty Program Performance Reports for Calendar Year 2013	ML14246A440
March 2009	Regulatory Guide (RG) 5.77, "Insider Mitigation Program"	ML15219A609
June 1991	RG 5.66, "Access Authorization Program for Nuclear Power Plants"	ML003739354
Appendix E, "Certified Fuel Handlers"		
May 12, 2014	Kewaunee Power Station- Approval of Shift Manager / Certified Fuel Handler Training Program (TAC NO. MF2370)	ML14104A046
August 1, 2014	San Onofre Nuclear Generating Station, Units 2 And 3 - Approval of Safe Storage Shift Manager/Certified Fuel Handler Training Program (TAC NOS. MF2601 AND MF2602)	ML13268A165
Appendix F, "Decommissioning Trust Funds"		
August 1990	RG 1.159, Revision 0, "Assuring the availability of funds for decommissioning nuclear reactors"	ML003740066

Date	Document	ADAMS Accession Number/Federal Register Citation
December 24, 2002	Final Rule: "Decommissioning Trust Provisions"	67 FR 78332
October 2003	RG 1.159, Revision 1, "Assuring the availability of funds for decommissioning nuclear reactors"	ML032790365
January 8, 2009	RIS 2001-07, "CFR 50.75 Reporting and Recordkeeping for Decommissioning Planning," Revision 1	ML083440158
January 2013	NUREG-1307, "Report on Waste Burial Charges: Changes in Decommissioning Waste Disposal Costs at Low-Level Waste Burial Facilities"	ML13023A030
October 26, 2011	SECY-11-0149, "Summary Findings Resulting from the Staff Review of the 2010 Decommissioning Funding Status Reports for Operating Power Reactor Licensees"	ML112800468
June 20, 2013	SECY-13-0066, "Staff Findings on the Table of Minimum Amounts Required to Demonstrate Decommissioning Funding Assurance"	ML13127A234
May 16, 2002	SECY-02-0085, "Recent Issues with Respect to Decommissioning Funding Assurance that have Arisen as part of License Transfer Applications and other Licensing Requests"	ML013550423
January 3, 2003	SRM to SECY-02-0085, "Recent Issues with Respect to Decommissioning Funding Assurance that have Arisen as part of License Transfer Applications and other Licensing Requests"	ML030030539
Appendix G, "Offsite and Onsite Financial Protection Requirements and Indemnity Agreements"		
September 2, 1957	Price-Anderson Nuclear Industries Indemnity Act	71 Stat. 576
August 13, 1997	SECY-97-186, "Changes to the Financial Protection Requirements for Permanently Shutdown Nuclear Power Reactors, 10 CFR 50.54(w) and 10 CFR 140.11"	ML992930019
October 6, 1997	SRM to SECY-97-186, "Changes to the Financial Protection Requirements for Permanently Shutdown Nuclear Power Reactors, 10 CFR 50.54(w) and 10 CFR 140.11"	ML003753155

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Date	Document	ADAMS Accession Number/Federal Register Citation
May 10, 1993	SECY-93-127, "Financial Protection Required of Licensees of Large Nuclear Power Plants During Decommissioning"	ML12257A628
July 13, 1993	SRM to SECY-93-127 – "Financial Protection Required of Licensees of Large Nuclear Power Plants During Decommissioning"	ML003760936
December 17, 1996	SECY-96-256, "Changes to the Financial Protection Requirements for Permanently Shutdown Nuclear Power Reactors, 10 CFR 50.54(w) and 10 CFR 140.11"	ML15062A483
January 28, 1997	SRM to SECY-96-256, "Changes to the Financial Protection Requirements for Permanently Shutdown Nuclear Power Reactors, 10 CFR 50.54(w) and 10 CFR 140.11"	ML15062A454
August 15, 2002	Memorandum from William D. Travers (NRC) to the NRC Commission, "Status of Regulatory Exemptions for Decommissioning Plants"	ML030550706
September 29, 2004	SECY-04-0176, "Exemption Request to Reduce Liability Insurance Coverage for Decommissioning Reactors After Transfer of All Spent Fuel From a Spent Fuel Pool to Dry Cask Storage"	ML040850518
October 29, 2004	SRM to SECY-04-0176, "Exemption Request to Reduce Liability Insurance Coverage for Decommissioning Reactors After Transfer of All Spent Fuel From a Spent Fuel Pool to Dry Cask Storage"	ML043030459
April 1989	NUREG-1353, "Beyond Design Basis Accidents in Spent Fuel Pools"	ML082330232
December 1990	NUREG-1150, "Severe Accident Risks: An Assessment for Five U.S. Nuclear Power Plants"	ML120960691
November 2012	NUREG-1935, "State-of-the-Art Reactor Consequence Analyses (SOARCA) Report"	ML12332A057

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Date	Document	ADAMS Accession Number/Federal Register Citation
April 27, 2015	Crystal River Unit 3 Nuclear Generating Plant- Exemption from the Requirements of Title 10 of the Code Of Federal Regulations, Part 140, Section 140.11(a)(4) Concerning Primary and Secondary Liability Insurance (TAC No. MF3588)	ML14183B338
March 16, 2016	Exemption from 10 CFR 50.54(w) (1) for Crystal River, Unit 3	ML16020A432
March 16, 2015	Kewaunee Power Station - Exemption from the Requirements of Title 10 of the Code Of Federal Regulations, Part 140, Section 140.11(a)(4) Concerning Primary and Secondary Liability Insurance (TAC No. MF3916)	ML15026A522
April 3, 2015	Kewaunee Power Station - Exemption from the Requirements of Title 10 of the Code of Federal Regulations, Part 50, Section 50.54(w)(1) Concerning Insurance for Post-Accident Site Decontamination (TAC No. MF3915)	ML15033A245
April 15, 2016	Vermont Yankee Nuclear Power Station - Exemption from the Requirements of Title 10 of the Code Of Federal Regulations, Part 140, Section 140.11(a)(4) Concerning Primary and Secondary Liability Insurance (TAC No. MF3980)	ML16012A144
April 15, 2016	Vermont Yankee Nuclear Power Station - Exemption from the Requirements of Title 10 of the Code of Federal Regulations, Part 50, Section 50.54(w)(1) Concerning Insurance for Post-Accident Site Decontamination (TAC No. MF3981)	ML16012A193
September 16, 2015	Request for Exemption from 10 CFR 140.11 (a)(11), San Onofre Nuclear Generating Station Units 1, 2, and 3	ML15260B188
October 22, 2015	Request for Exemption from 10 CFR 50.54(w)(1), San Onofre Nuclear Generating Station Units 1, 2, and 3	ML15299A220

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Date	Document	ADAMS Accession Number/ <i>Federal Register</i> Citation
October 30, 1997	Proposed Rule: "Financial Protection Requirements for Permanently Shutdown Nuclear Power Reactors"	62 FR 58690
Appendix H, "Current Regulatory Approach to Decommissioning"		
June 2013	RG 1.185, Revision 1, "Standard Format and Content for PSDAR"	ML13140A038
November 2002	NUREG-0586, Supplement 1, "Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities"	ML023470304
June 2013	NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants"	ML13106A241
September 2006	NUREG-1757, "Consolidated Decommissioning Guidance," Volume 1	ML063000243
August 1988	NUREG-0586, "Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities"	link
October 2013	RG 1.184, "Decommissioning of Nuclear Power Reactors"	ML13144A840
June 1978, Addendum 1, August 1979, Addendum 2, July 1983, Addendum 3, September 1984, and Addendum 4	R.I. Smith, G.J. Konzek, and W.E. Kennedy, Jr., "Technology, Safety, and Costs of Decommissioning a Reference Pressurized Water Reactor Power Station," NUREG/CR-0130, Prepared by Pacific Northwest Laboratory for the U.S. Nuclear Regulatory Commission	link
June 1980, Addendum 1, July 1983, Addendum 2, and September 1984, Addendum 3	H.D. Oak et al., "Technology, Safety, and Costs of Decommissioning a Reference Boiling Water Reactor Power Station," NUREG/CR-0672, Prepared by Pacific Northwest Laboratory for the U.S. Nuclear Regulatory Commission	link
June 2008	RG 4.21, "Minimization of Contamination and Radioactive Waste"	ML080500187
December 2012	RG 4.22, "Decommissioning Planning During Operations"	ML12158A361
April 2003	NUREG-1700, "Standard Review Plan for Evaluating Nuclear Power Reactor License Termination Plans"	ML031270391
September 2000	NUREG-1727, "NMSS Decommissioning Standard Review Plan"	ML003761169
June 2013	NUREG-1555, "Environmental Standard Review Plan"	ML13106A246

Date	Document	ADAMS Accession Number/ <i>Federal Register</i> Citation
July 1997	NUREG-1496, "Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities"	ML042310492
Appendix I, "Application of Backfit Rule"		
November 4, 1998	SECY-98-253, "Applicability of Plant-Specific Backfit Requirements to Plants Undergoing Decommissioning"	ADAMS Legacy No. 9806110221
February 12, 1999	SRM to SECY-98-253, "Applicability of Plant-Specific Backfit Requirements to Plants Undergoing Decommissioning"	ML12311A689
October 9, 2013	Management Directive 8.4, "Management of Facility-Specific Backfitting Information Collection"	ML12059A460
Appendix J, "Aging Management"		
May 8, 1995	Final Rule, "Nuclear Power Plant License Renewal; Revisions"	60 FR 22461
July 1999	NEI 99-04, "Guidelines for Managing NRC Commitment Changes"	ML003680088
November 24, 2014	Reissuance of Dominion Nuclear Connecticut, Inc., Millstone Power Station Unit 1 - NRC inspection report number 05000245/2014010	ML14328A190
October 7, 2015	Vermont Yankee Nuclear Power Station - Issuance of Amendment for Defueled Technical Specifications and Revised License Conditions for Permanently Defueled Condition (CAC No. MF3714)	ML15117A551
Appendix K, "Fatigue Management"		
February 18, 1982	Policy on Factors Causing Fatigue of Operating Personnel at Nuclear Reactors	47 FR 7352
June 15, 1982	Generic Letter 82-12, "Nuclear Power Plant Staff Working Hours"	link
June 7, 1989	Final Rule: "Fitness-for-Duty Programs"	54 FR 24468
July 18, 1988	SRM to SECY-88-129, "Proposed Rulemaking Fitness for Duty Programs"	ML010930151
June 22, 2001	SECY-01-0113, "Fatigue of Workers at Nuclear Power Plants"	ML010180188
January 8, 2002	SRM to SECY-01-0113, "Fatigue of Workers at Nuclear Power Plants"	ML020080309

Date	Document	ADAMS Accession Number/Federal Register Citation
April 29, 2003	Order EA-03-038, "Issuance of Order for Compensatory Measures Related to Fitness-for-Duty Enhancements Applicable to Nuclear Facility Security Force Personnel"	ML030940198
September 1, 2004	SRM to COMSECY-04-0037, "Staff Requirements: Fitness-For-Duty Orders to Address Fatigue of Nuclear Facility Security Force Personnel," (Agencywide Documents Access and Management System (ADAMS) Accession No.)	ML042450533
March 2009	RG 5.73, "Fatigue Management for Nuclear Power Plant Personnel"	ML083450028
October 2008	NEI 06-11, Revision 1, "Managing Personnel Fatigue at Nuclear Power Reactor Sites"	ML090360158
September 3, 2010	Petition to Amend 10 CFR Part 26, "Fitness-for-Duty Programs"	ML102590440
October 22, 2010	Anthony R. Pietrangelo on Behalf of the Nuclear Energy Institute; Receipt of Petition for Rulemaking	75 FR 65249
December 13, 2010	Summary of Public Meeting to Discuss Part 26, Subpart I Implementation to Understand Unintended Consequences of the Minimum Day Off Requirements	ML103430557
February 3, 2011	Summary of Public Meeting Regarding Part 26, Subpart I Minimum Day Off Requirements and Options Licensees May Implement to Receive Enforcement Discretion From These Requirements	ML110280446
January 14, 2011	Notice of Public Meeting To Discuss Alternatives to the Part 26, Subpart I, Minimum Day Off Requirements	ML110140315
February 8, 2011	Commission Meeting - Briefing on Implementation of Part 26	link
March 24, 2011	SRM to SECY-11-0003 – Status Of Enforcement Discretion Request And Rulemaking Activities Related To 10 CFR Part 26, Subpart I, "Managing Fatigue" And Secy-11-0028 - Options For Implementing An Alternative Interim Regulatory Approach To The Minimum Days Off Provisions Of 10 CFR Part 26, Subpart I, "Managing Fatigue"	ML110830971
April 26, 2011	Proposed Rule, "Alternative to Minimum Days Off Requirements"	76 FR 23208

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Date	Document	ADAMS Accession Number/<i>Federal Register</i> Citation
July 21, 2011	Final Rule, "Alternative to Minimum Days Off Requirements"	76 FR 43534
November 3, 2015	NEI 15-08, Draft Revision 0, "Managing Personnel Fatigue at Decommissioning Reactors"	ML15350A153

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Appendix A - Emergency Preparedness

The emergency preparedness (EP) requirements contained in Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.47, “Emergency plans,” and Appendix E, “Emergency Planning and Preparedness for Production and Utilization Facilities,” to 10 CFR Part 50 continue to apply to a nuclear power reactor after permanent cessation of operations and removal of fuel from the reactor vessel. Currently, there are no explicit regulatory provisions distinguishing EP requirements for a power reactor that has permanently ceased operations from those for an operating power reactor. To address this, the U.S. Nuclear Regulatory Commission (NRC) is considering several changes to the EP requirements in 10 CFR Part 50, “Domestic Licensing of Production and Utilization Facilities,” including 10 CFR 50.47; 10 CFR 50.54(q), (s), and (t); and Appendix E to 10 CFR Part 50.

The NRC has previously approved exemptions from the emergency planning regulations in 10 CFR 50.47 and Appendix E to 10 CFR Part 50 (see Table 1 in Section 2.3 of the draft regulatory basis, “Summary of Recent Licensing Experience with Decommissioning Power Reactors”) at permanently shutdown and defueled power reactor sites. These exemptions were granted based on the NRC’s determination that there are no applicable design-basis events at a decommissioning licensee’s facility that could result in an offsite radiological release exceeding the limits established by the U.S. Environmental Protection Agency’s (EPA’s) early phase protective action guides (PAGs) of 1 rem at the exclusion area boundary (available at EPA 400-R-92-001; May 1992).

The NRC also relied on analyses that showed that a beyond-design-basis zirconium fire in the spent fuel pool (SFP) is highly unlikely. This conclusion was based on the amount of time before spent fuel could reach the zirconium ignition temperature during a SFP draindown event (NUREG-1738, “Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants,” available under Agencywide Documents Access and Management System (ADAMS) Accession No. ML010430066). Based upon reasonably conservative adiabatic heatup calculations, a minimum of 10 hours for the time to heatup to zirconium ignition temperature has been used to support approved exemptions from portions of the EP regulations. The 10 hours allows for onsite mitigation measures to be taken by the licensee or, if necessary, appropriate response actions to be taken by offsite authorities utilizing an all-hazards type emergency management plan.

In the four most recent EP exemptions granted, the licensees were required to have sufficient trained personnel on-shift, and equipment and procedures to implement their site-specific preplanned mitigation strategies within a two-hour timeframe; these mitigation strategies are required by a license condition until such time as the spent fuel is removed from the SFP. Licensees that have been granted EP exemptions must maintain an onsite emergency plan addressing the classification of an emergency, notification of emergencies to licensee personnel and offsite authorities, and coordination with designated offsite government officials following an event declaration so that, if needed, offsite authorities may implement appropriate response actions. The EP exemptions relieve the licensee from the requirement to maintain formal offsite radiological emergency preparedness (REP), including the 10-mile plume exposure pathway and the 50-mile ingestion pathway emergency planning zones (EPZs).

Existing Regulatory Framework

The regulations governing EP for nuclear power reactors are set forth in 10 CFR 50.47; 10 CFR 50.54(q), (s), and (t); and Appendix E to 10 CFR Part 50. Every nuclear power reactor licensee must establish and maintain emergency plans and preparedness in accordance with these regulations. The regulations include standards for both onsite and offsite³ emergency response plans. These regulations and the planning basis for EP are based upon an anticipated prompt response to a wide spectrum of events. But for a decommissioning site, the spectrum of accidents that can have significant offsite consequences is greatly reduced and dominated by the zirconium fire scenario – a postulated, but highly unlikely, beyond-design-basis accident that involves a major loss of water inventory from the SFP, resulting in a significant heatup of the spent fuel, and culminating in substantial zirconium cladding oxidation and fuel damage. The current regulations also do not reflect a reduction in EP requirements for decommissioning sites, even though considerably more time is available to respond to a postulated zirconium fire incident than is available for many postulated operating reactor accidents.

There are no explicit regulatory provisions distinguishing EP requirements for a power reactor that has permanently ceased operating from those for an operating reactor. To establish a level of EP commensurate with the risk at a decommissioning site, exemptions from the current regulatory EP requirements are typically requested early in the decommissioning process and granted on a case-by-case basis after a thorough review. Historically, given the significant reduction in radiological risk from a decommissioning site, the NRC has approved exemptions from EP requirements based on site-specific evaluations and the objectives of the regulations. Between 1987 and 1999, the NRC issued exemptions from EP requirements for ten licensees. More recently, exemptions from EP requirements have been granted for Kewaunee Power Station, Crystal River Unit 3 Nuclear Power Station, San Onofre Nuclear Generating Station Units 2 and 3, and Vermont Yankee Nuclear Power Station (ADAMS Accession Nos. ML14261A223, ML15058A906, ML15082A204, and ML15180A054, respectively). For each of these exemption requests, the NRC staff verified the licensee's site-specific supporting analyses.

Technical Basis for Amending EP Requirements for Decommissioning

The purpose of rulemaking in this regulatory area is to establish an appropriate level of emergency planning and preparedness for a nuclear power plant site at which all reactors have been permanently shut down and defueled. The following sections consider the technical basis for options to enhance the effectiveness and efficiency of the regulatory framework for both licensees and the NRC while providing assurance of public health and safety. The rulemaking option considered (i.e., Option 2 in the "Rulemaking Options" section below) would define the level of EP appropriate for a decommissioning nuclear power plant site from the time of permanent cessation of operations until such time as no EP would be required. This rulemaking would provide regulatory certainty and reduce the need for licensees to request exemptions from regulations and the associated regulatory burden on the licensees and the NRC.

³ The offsite standards are reproduced in the Federal Emergency Management Agency (FEMA) regulations at 44 CFR Part 350, "Review and Approval of State and Local Radiological Emergency Plans and Preparedness."

In preparing this technical basis, the NRC staff consulted a number of references, including:

- “Kewaunee Power Station Request for Exemptions from Portions of 10 CFR 50.47 and 10 CFR 50, Appendix E” (ADAMS Accession No. ML13221A182);
- SECY-14-0066, “Request by Dominion Energy Kewaunee, Inc. for Exemptions from Certain Emergency Planning Requirements” (ADAMS Accession No. ML14072A257);
- “Crystal River Unit 3 – License Amendment Request #315, Revision 0, Permanently Defueled Emergency Plan and Emergency Action Level Scheme, and Request for Exemption to Certain Radiological Emergency Response Plan Requirements Defined by 10 CFR 50” (ADAMS Accession No. ML13274A584);
- SECY-14-0118, “Request by Duke Energy Florida, Inc. for Exemptions from Certain Emergency Planning Requirements” (ADAMS Accession No. ML14219A444);
- “Request for Exemptions from Portions of 10 CFR 50.47 and 10 CFR 50, Appendix E, Vermont Yankee Nuclear Power Station” (ADAMS Accession No. ML14080A141);
- SECY-14-0125, “Request by Entergy Nuclear Operations, Inc. for Exemptions from Certain Emergency Planning Requirements” (ADAMS Accession No. ML14227A711);
- “Emergency Planning Exemption Request, San Onofre Nuclear Generating Station, Units 1, 2, and 3 and Independent Spent Fuel Storage Installation” (ADAMS Accession No. ML14092A332);
- SECY-14-0144, “Request by Southern California Edison for Exemptions from Certain Emergency Planning Requirements” (ADAMS Accession No. ML14251A554);
- NSIR/DPR-ISG-02, “Interim Staff Guidance Emergency Planning Exemption Requests for Decommissioning Nuclear Power Plants,” which provides guidance to NRC staff for conducting the technical review of requests for exemptions from EP requirements for nuclear power reactors that have been permanently shut down and defueled or are planning to transition to a decommissioning state (ADAMS Accession No. ML14106A057);
- Public comments on the Advance Notice of Proposed Rulemaking (ANPR) (ADAMS Accession No. ML16229A277);
- Stakeholder feedback from public meetings on EP exemption requests and NSIR/DPR-ISG-02 (e.g., meetings held on March 6, 2014 [ADAMS Accession No. ML14030A446], April 3, 2014 [ADAMS Accession No. ML14106A242], May 22, 2014 [ADAMS Accession No. ML14160A789], November 13, 2014 [ADAMS Accession No. ML14304A373]);
- Memorandum to B. Holian from M. Weber, “Transmittal of Reports to Inform Decommissioning Plant Rulemaking for User Need Request NSIR-2015-001,” May 31, 2016 (ADAMS Accession No. ML16110A416);
 - Task 1 Report, “A Human Reliability Analysis of the Safety of the Spent Fuel in the Spent Fuel Pool of Decommissioning Nuclear Plants”
 - Task 2 Report, “Spent Fuel Assembly Heat Up Calculations in Support of Task 2 of User Need NSIR-2015-001”
 - Task 3 Report, “Offsite Dose Accumulation Rates Following a Hypothetical Spent Fuel Pool Accident”
- NUREG-1738, “Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants” (ADAMS Accession No. ML010430066);
- NUREG/CR-6451, “A Safety and Regulatory Assessment of Generic BWR and PWR Permanently Shutdown Nuclear Power Plants,” which provided recommendations on operationally-based regulations that could be partially or totally removed with respect to

- decommissioning power reactor licensees without impacting public health and safety (ADAMS Accession No. ML082260098);
- NUREG-2161, “Consequence Study of a Beyond-Design-Basis Earthquake Affecting the Spent Fuel Pool for a U.S. Mark I Boiling Water Reactor,” which found that a radiological release is not expected to occur at the operating power reactor site studied for at least 72 hours following a postulated beyond design-basis seismic event occurring more than 60 days after shutdown (ADAMS Accession No. ML14255A365);
 - NUREG/CR-7215, “Spent Fuel Pool Project Phase I: Pre-Ignition and Ignition Testing of a Single Commercial 17x17 Pressurized Water Reactor Spent Fuel Assembly under Complete Loss of Coolant Accident Conditions” (ADAMS Accession No. ML16112A022);
 - NUREG/CR-7216, “Spent Fuel Pool Project Phase II: Pre-Ignition and Ignition Testing of a 1x4 Commercial 17x17 Pressurized Water Reactor Spent Fuel Assemblies under Complete Loss of Coolant Accident Conditions” (ADAMS Accession No. ML16112A084);
 - NUREG-0396, “Planning Basis for the Development of State and Local Government Radiological Emergency Response Plans in Support of Light Water Nuclear Power Plants” (ADAMS Accession No. ML051390356);
 - NUREG/CR-6864, Volume 1, “Identification and Analysis of Factors Affecting Emergency Evacuations,” (ADAMS Accession No. ML050250245); and
 - EA-12-051, “Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation” (ADAMS Accession No. ML12056A044).
 - SECY-16-0142, “Draft Final Rule – Mitigation of Beyond-Design-Basis Events (RIN 3150-AJ49,” (Final Rule Package ADAMS Accession No. ML16301A005)

Rulemaking Options

OPTION 1: NO ACTION

This option would maintain the current EP regulations in effect. Relief from regulatory requirements during decommissioning would continue to be granted on a case-by-case basis through the license exemption process.

ASSESSMENT OF OPTION 1

The no-action option would retain the current EP provisions in 10 CFR Part 50. Because certain operating reactor EP requirements impose unnecessary regulatory burden on licensees undergoing decommissioning, licensees generally request EP exemptions. Under the current exemption process (NSIR/DPR-ISG-02, “Interim Staff Guidance Emergency Planning Exemption Requests for Decommissioning Nuclear Power Plants”), exemptions to offsite EP requirements must be supported by a site-specific analysis demonstrating that fuel stored in the SFP would not reach the zirconium ignition temperature in fewer than 10 hours. Despite both generic analyses and site-specific regulatory experience that supports the appropriateness of this 10-hour timeframe, as described for Option 2 below, this option would continue to require site-specific analysis by the licensee and review by the NRC for each application. Option 1 would not relieve the burden imposed on both licensees and the NRC resulting from the case-by-case exemption process. In addition, while the exemption process could be further enhanced, this process would not result in the efficiency gains possible through Option 2. By continuing to assess EP exemptions on an individual licensee basis, licensees and the NRC would continue to expend resources on preparing and processing exemption requests. Regulatory Guide (RG) 1.184, Revision 1, “Decommissioning of Nuclear Power Reactors,”

October 2013, provides an overview of the current decommissioning process and illustrates that the majority of the administrative burden incurred by licensees and the NRC is in the first several years of decommissioning.

OPTION 2: GRADED APPROACH TO EMERGENCY PREPAREDNESS

In this option, the NRC would pursue rulemaking to propose a graded approach to EP that is commensurate with the reductions in radiological risk at four stages (or levels) of decommissioning: (1) permanent cessation of operations and removal of all fuel from the reactor vessel, (2) fuel in the SFP has sufficiently decayed such that it would not reach ignition temperature within 10 hours under adiabatic heatup conditions, (3) all fuel is in dry storage, and (4) all fuel is removed from the site. Many ANPR commenters expressed support for a risk-based graded approach to EP. Conversely, numerous ANPR comments opposed any revisions or reductions in EP requirements or expressed concerns that the NRC's proposal would reduce the level of offsite REP at decommissioning facilities.

A graded approach to EP has a longstanding regulatory history. The 16 EP planning standards for operating reactors, outlined in 10 CFR 50.47(b) and the associated evaluation criteria in NUREG-0654/FEMA-REP-1, Revision 1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants" (ADAMS Accession No. ML040420012), are one part of a wider continuum of radiological planning standards for EP. The EP regulations for research and test reactors, fuel cycle facilities, and independent spent fuel storage installations (ISFSIs) are also part of a graded approach to EP that is commensurate with the radiological risk.

In 1978, the NRC and EPA established the planning basis for EP for nuclear power accidents in NUREG-0396, "Planning Basis for the Development of State and Local Government Radiological Emergency Response Plans In Support of Light Water Nuclear Power Plants" (ADAMS Accession No. ML051390356). A combined NRC and EPA Task Force recognized the large range of possible selections for a planning basis, starting with a zero point of requiring no planning at all because significant offsite radiological accident consequences are unlikely to occur, to planning for the worst physically possible accident regardless of its extremely low likelihood. The Task Force chose to base the rationale for the planning basis on a spectrum of accident consequences, informed by probability considerations. The planning basis elements needed to scope the planning effort included the distance within which planning is warranted, the type of radioactive materials that may be released, and the time dependent characteristics of potential releases in relationship to the time needed to implement protective actions. This rationale and the planning basis elements can also be applied to light water reactors after permanent cessation of operations and permanent removal of fuel from the reactor vessel to scope the planning effort.

Spectrum of Accidents

As previously discussed, the NRC has granted exemptions to EP requirements based on site-specific analyses demonstrating quantified reductions in radiological risk. The NRC staff recognizes that the risk of a significant radiological release offsite at a decommissioning facility storing irradiated fuel in the SFP is lower than the risk from an operating power reactor and associated SFP. This is based on the consideration of initiating reactor events associated with normal and abnormal operations, design basis accidents (DBAs), and certain beyond-design-basis events applicable to a decommissioning site. In NUREG-1738, the NRC

staff found that the event sequences important to risk at decommissioning sites are limited to large earthquakes and cask drop events. For EP assessments, this is an important difference relative to operating power reactors where typically a large number of different sequences make significant contributions to risk. In NUREG-1738, the NRC stated, “for comparison, at operating reactors additional risk-significant accidents for which EP is expected to provide dose savings are on the order of 1×10^{-5} per year, while for decommissioning facilities, the largest contributor for which EP would provide dose savings is about two orders of magnitude lower (cask drop sequence at 2×10^{-7} per year).” The NUREG-1738 study found that: (1) the risk at decommissioning plants is low and well within the Commission’s safety goals; the risk is low because of the very low likelihood of a zirconium fire even though the consequences from a zirconium fire could be serious, and (2) relaxation of offsite radiological emergency preparedness a few months after shutdown resulted in only a small increase in risk; the overall low risk in conjunction with important differences in dominant sequences relative to operating reactors, results in a small change in risk at decommissioning plants even if offsite emergency planning is relaxed.

Time Dependency

Shortly after the operating power reactor EP regulations were established and implemented in 1980, the NRC amended its regulations to clarify EP requirements for issuing a “low power license” (47 FR 30232; July 13, 1982). At that time, the Commission did not differentiate as to which EP requirements would be applicable during the period of fuel loading and low power testing. In order to establish the appropriate level of EP, the Commission focused on the radiological risks associated with operation at low power and chose a level of preparedness to assure adequate protection of the health and safety of the public at that stage of operation. The resulting regulation, 10 CFR 50.47(d), states that for issuance of an operating license for fuel loading and low power operation (up to 5 percent of rated thermal power), no NRC or FEMA review, findings, or determinations concerning the state or the adequacy of and capability to implement offsite emergency plans are required. One of the factors considered in the basis for this regulation was that the time available for taking actions to identify and mitigate an accident is sufficient to allow adequate protective actions to be taken to protect the public near the site. In the most limiting case, the additional time available was at least 10 hours.

The recent Commission-approved exemptions from EP regulations for decommissioning sites were based, in part, on supporting analyses including site-specific determinations that in a SFP draindown event, the fuel would not reach clad ignition temperature for at least 10 hours. This period of time was judged to be conservative; it provides a sufficient amount of time for mitigation actions to be taken, or, if necessary, for local authorities to take appropriate response actions to protect the public. The 10-hour timeframe was adequately justified for site-specific conditions in the recent exemption applications, and has been justified in the past for other regulations, to provide a regulatory basis for a graded approach to EP for decommissioning power reactors. To support a graded approach to EP for the transition to decommissioning, the NRC staff further examined the certitude and margin provided by a 10 hour time frame for the fuel to heatup and for taking mitigation measures and appropriate response actions.

Timeframe for Spent Fuel Decay and Mitigation Measures

In the Low Power rule (47 FR 30232; July 13, 1982), the worst-case, postulated low-likelihood event leading to fuel failure after a period of 10 hours was a small break loss of coolant accident (LOCA) with loss of the emergency core cooling system (ECCS). For a decommissioning power

reactor, the worst-case, postulated low-likelihood, beyond-design-basis event is a rapid draindown of the SFP and subsequent heatup of the fuel to ignition temperature.

To strengthen the justification of the 10-hour timeframe for regulatory purposes, the NRC staff conducted an applied research study (ADAMS Accession No. ML16110A416) to: (1) perform a task analysis that includes a timeline of responder actions at representative SFP configurations to mitigate a draindown event and determine its likelihood of success; (2) perform analyses of representative spent fuel to determine the decay time necessary for the fuel to remain below clad ignition temperature for at least 10 hours assuming adiabatic heatup conditions; and (3) perform an analysis of the dose rate from the radionuclides released during a hypothetical spent fuel clad ignition accident.

This applied research study resulted in the publication of three reports:

- Task 1 Report – Task Analysis of Mitigation Actions:** The NRC conducted a task analysis of mitigation actions at a BWR and a PWR to: (1) determine the time the representative licensee’s on-shift decommissioning organization would take to implement procedures to mitigate a SFP draindown event, and (2) estimate the likelihood of successful deployment of the mitigation measures to prevent fuel overheating. The task analysis was designed to be representative of all decommissioning nuclear power plants. Analyses were performed for the nine initiating events identified in NUREG-1738. The results show that the representative plant staff can reliably implement mitigation strategies to mitigate cask-drop events in a timely manner and prevent spent fuel heatup damage. This study identified that only the events causing a rapid SFP water draindown (e.g., extreme earthquake and large aircraft impact) would challenge the successful mitigation of fuel heatup.
- Task 2 Report – Spent Fuel Decay Time:** The purpose of this analysis was to provide information on a cooling time that would give reasonable assurance that spent fuel would not reach ignition temperature within 10 hours under adiabatic heatup conditions, and thus negate the need for site-specific analyses. The analysis addressed spent fuel parameters that bound the commercial nuclear fleet and conservatisms were applied to simplify the analysis. The report analyzed pressure water reactor (PWR) and boiling water reactor (BWR) assemblies in three configurations in the SFP (uniform, checkerboard, and 1x4) and both with and without the mass of the storage racks. Adiabatic heatup calculations were performed by hand and validated with a MELCOR⁴ analysis. The analysis is mainly based on the assumption of adiabatic heatup for limiting conditions wherein the benefit of radiative and convective heat transfer and a favorable fuel configuration is not realized. This represents a worst case scenario when the most recently discharged fuel is surrounded by similar assemblies limiting the benefit of radial

Table 1: Cooling time (years) required for 10-hour heat up time (to 900°C)

	BWR assembly	PWR assembly
Adiabatic (w/o racks)	1.06 – (1.21) – 1.39	1.48 – (1.64) – 2.12
Adiabatic (w racks)	0.61 – (0.80) – 0.92	1.27 – (1.37) – 1.77
Checkerboard or 1x4 (for 60 GWD/MTHM burnup)	< 0.8 (MELCOR estimate)	< 1.37 (based on BWR insights)

⁴ MELCOR is a fully integrated, engineering-level computer code developed by Sandia National Laboratories for the NRC to model the progression of severe accidents in nuclear power plants.

heat transfer, and the SFP leak elevation and/or debris blockage prevents natural circulation air cooling. The following table summarizes the cooling time (in years) required for a 10 hour heatup to 900 degrees C for the hottest BWR and PWR assemblies. In this table, the range of cooling times needed to provide assurance that fuel would not reach 900 degrees C in under 10 hours is dependent upon the fuel burnup, ranging from 45 to 72 gigawatt-days per metric ton of heavy metal (GWd/MTHM). The number in parenthesis represents a burnup of 60 GWd/MTHM.

The study also includes an analysis of the degree of benefit that could be achieved by relaxing the adiabatic heatup assumption based on realistic benefits gained from including radiative heat transfer to surrounding colder assemblies and the presence of the racks in the adiabatic calculation. The results show that including the mass of the racks in the adiabatic calculation can decrease the fuel cooling time by 50 percent and 20 percent for the BWR and PWR assemblies, respectively. Additionally, if the hot fuel is placed in a favorable fuel loading pattern where the hottest assemblies are next to assemblies from the previous offload in a checkerboard or 1x4 pattern, the cooling times required will be even less than the adiabatic heatup values with the racks.

- **Task 3 Report – Dose Rate of Accidental Radiological Release from SFP:** The purpose of this analysis was to examine offsite doses and dose rates for potential SFP accidents using SFP source terms developed for the consequence study in NUREG-2161. The report analyzed whether the offsite dose rates following a SFP accident are sufficiently low to provide any additional time margin (beyond the 10 hours for heatup) before offsite exposures become excessive. The report used the MELCOR Accident Consequence Code System (MACCS)⁵ to analyze cumulative dose (equivalent acute bone marrow dose and lifetime committed effective dose) as a function of elapsed time (from release and from first plume arrival) and distance from the site for two source terms. The analysis results provide information on the time available before offsite exposures become excessive as a result of a zirconium fire. The results were generated in terms of cumulative dose received as a function of both elapsed time (either since the initial plume release or plume arrival) and distance from the site. Regarding exceedance of EPA PAGs offsite, for the larger source term studied, PAGs would be exceeded within the first hour of release at a distance of 0.3 miles, which is typically within the owner controlled area (OCA) of the plant. At 1 mile, PAGs would be expected to be exceeded within 2 to 3 hours, and at 5 miles, PAGs would be expected to be exceeded 8 to 9 hours after release. These times do not include the time associated with the SFP assembly draindown and heatup and initiation of an offsite release, but are meant to provide an assessment of the time margin available after a release begins before PAGs are exceeded. The results also indicate that acute fatal effects offsite appear to be unlikely from either source term evaluated provided that individuals can be relocated within a reasonable time after plume arrival; in most cases this time was longer than 24 hours.

⁵ The U.S. Nuclear Regulatory Commission developed MACCS to evaluate offsite consequences from a hypothetical release of radioactive material into the atmosphere. The code models atmospheric transport and deposition, emergency response and other protective actions, exposure pathways, health effects, and economic costs.

Timeframe for Taking Protective Actions

Previous rulemakings and the more recent exemption requests approved for decommissioning sites have determined that 10 hours is a reasonable amount of time for implementing appropriate response actions offsite. This assumption is further supported by evacuation studies as well as the analyses provided in the evacuation time estimates (ETEs) required by Section IV, "Content of Emergency Plans," of Appendix E to 10 CFR Part 50.

- NUREG/CR-6864, "Identification and Analysis of Factors Affecting Emergency Evacuations," examined the efficiency and effectiveness of 230 evacuations due to natural or man-made events during a 13-year period from 1990 to 2003. Command, control, and coordination of evacuations were preplanned in 74 percent of the case studies and ad hoc in 26 percent. A regression analysis conducted in that study showed no statistical association between the type of command, control, and coordination process (i.e., ad hoc or preplanned) and evacuation efficiency. The study concluded that all the evacuations studied were successful in saving lives. Volume II of this report contains data on 50 case studies. Excluding 4 hurricane evacuations, the other 46 case study evacuations (due mostly to technological hazards) were effectively completed in under 10 hours, with an average evacuation time of 2 hours 10 minutes. Additionally, it took on average only 45 minutes from the time of notification for decision-makers to order an evacuation.
- Section IV of Appendix E to 10 CFR Part 50 requires licensees to develop and maintain an analysis of the time required to evacuate various sectors and distances within the plume exposure pathway EPZ, referred to as an ETE study. An analysis of the most recent ETE data shows that under a variety of normal and adverse conditions, the average time to evacuate 100 percent of the population is about 4 hours for the 2-mile area surrounding the site and about 5 hours for the full 10-mile EPZ (ADAMS Accession No. ML16054A042). The range and distribution of evacuation times provided in the ETE analyses are also comparable to real-world evacuations of similar scope. The data also show that the vast majority of evacuations of the full 10-mile plume exposure pathway EPZ can reasonably be expected to be completed within 10 hours.

The conclusion that can be drawn from these studies is that 10 hours is a sufficient amount of time for taking protective actions offsite, and that extensive pre-planning, while beneficial, is not a necessary prerequisite for public safety officials to be able to decide upon and implement protective measures for the health and safety of the public.

Assessment of 10-hour Timeframe for Permanently Defueled Emergency Plans

The NRC staff's analyses support a graded approach to EP for decommissioning sites and establish a generic basis for the timeframes and conditions within which spent fuel heatup, mitigation measures, or protective actions, if necessary, may take place. The Task 1 Report demonstrates that 10 hours provides sufficient time to implement mitigation measures for design-basis events at decommissioning sites. The Task 2 Report provides a basis for selection of a spent fuel decay time beyond which the fuel can reasonably be expected to take longer than 10 hours to heatup to ignition temperature and the conservatism associated with the adiabatic assumption. The Task 3 Report provides additional understanding of the amount of time available for taking action in response to beyond-design-basis events, including the margin of time beyond 10 hours that offsite agencies have to implement actions to protect the

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health and safety of the public. In the worst case beyond-design-basis event leading to a rapid draindown of the SFP and subsequent zirconium fire, there exists additional time margin on the order of 1 to 8 hours beyond the 10 hour heatup time in which protective actions can be taken to protect the public before PAGs would be exceeded offsite (Task 3 Report).

Graded Standards for Emergency Preparedness

Consistent with the concept of a graded approach to EP, the NRC staff is proposing emergency planning standards that will involve four stages, or levels, that coincide with significant milestones in the reduction of the radiological risk: Level 1 – Post Shutdown Emergency Plan, Level 2 – Permanently Defueled Emergency Plan, Level 3 – ISFSI Only Emergency Plan, and Level 4 – No Emergency Planning. These emergency plans will be required to meet a set of regulatory standards commensurate with the risk for a site in these various stages of decommissioning.

In developing the regulatory basis, the NRC staff considered the appropriateness of the EP requirements in 10 CFR Part 50 and Part 72 for decommissioning sites, including those that have been historically addressed in exemptions and those that have not. The proposed standards within the levels are based on the current set of operating reactor EP standards informed by the NRC staff's supporting analyses, the basis developed to support the recent EP exemptions approved by the Commission, applicable research studies, and public comments on the advance notice of proposed rulemaking (ANPR).

The NRC staff also considered the following criteria: safety, economic impacts, efficiency, transparency, flexibility, and responsiveness. The NRC staff had no basis to consider new or novel approaches in providing for an adequate state of emergency preparedness (e.g., performance-based approach). The following discussion addresses EP requirements that would be necessary to provide for adequate protection of public health and safety at decommissioning facilities. The basis for the graded EP regulatory requirements is described for each level. This section also describes the proposed regulatory process for transitioning between regulatory standards and revising emergency plans. Public comments received on the ANPR are addressed where appropriate.

Licensee Supporting Analyses and Commitments

Transitioning to a Post-Shutdown Emergency Plan (PSEP), a Permanently Defueled Emergency Plan (PDEP), or an ISFSI Only Emergency Plan (IOEP) would be contingent upon the conduct of site-specific analyses demonstrating, or commitments to, the following:

- For PDEPs and IOEPs: Any radiological release for applicable DBAs (e.g., fuel handling accident in the spent fuel storage facility, waste gas system release, and cask handling accident if the cask handling system is not licensed as single-failure-proof) would not exceed the limits of EPA PAGs at the exclusion area boundary (EAB).
- For PSEPs and PDEPs: Mitigation strategies and guidelines exist to provide an integrated response capability for beyond-design-basis events.
- For PDEPs: an optional⁶ site-specific analysis demonstrating that in the event of complete loss of SFP water inventory with no heat loss (adiabatic heatup), a minimum of

⁶ As discussed in the Level 2 discussion below, this analysis could be conducted to justify a timeframe for transition to Level 2 that is less than 10 months for BWRs and less than 16 months for PWRs.

10 hours would be available before any fuel cladding temperature reaches 900 degrees Celsius from the time all cooling is lost.

The NRC staff anticipates that the analysis of applicable DBAs would be performed by licensees using the 10 CFR 50.59 process and would be reflected in the licensee's updated final safety analysis report (UFSAR). Details of the licensee's commitment to mitigation strategies are expected to be contained in the licensee technical specifications or retained as a license condition. The NRC staff also anticipates that these mitigation strategies will be incorporated into the requirements for an integrated response capability for the Mitigation of Beyond-Design-Basis rulemaking (Final Rule Package ADAMS Accession No. ML16301A005). For the heatup analysis, the NRC staff has already performed analyses of representative PWR and BWR spent fuel to determine the decay time necessary for the fuel to remain below clad ignition temperature for at least 10 hours assuming adiabatic heatup conditions. This particular analysis supports a transition to Level 2 EP requirements, as discussed below. The NRC staff is also considering an option to allow licensees to develop their own site-specific analysis for this transition time; however, such an analysis would need to be submitted to the NRC for review and approval. This process would be detailed in the proposed rule.

These site-specific analyses and commitments are needed because they confirm that the licensee satisfies part of the technical basis for the proposed EP regulations for decommissioning sites, however, the NRC staff considers these analyses and commitments to be part of the licensing basis and not part of the licensee emergency plan. The NRC staff is considering the need to have licensees certify to the NRC that these conditions have been met to support the transition between levels. This would likely involve amendments to 10 CFR 50.82, "Termination of license," and 10 CFR 50.4, "Written communications," to provide requirements for a written certification.

If supported by these site-specific analyses and commitments, then after certification of permanent cessation of operations and permanent removal of fuel from the reactor vessel, a licensee would be able to transition to a PSEP, PDEP, or IOEP. The regulatory options for this process are described later in this appendix. Unless otherwise specified below, these emergency plans will be subject to many of the same general documentation requirements as an operating reactor emergency plan (e.g., describe provisions for maintaining EP, describe recovery criteria following an accident).

Level 1: Post Shutdown Emergency Plan

Licensees would enter Level 1 after the NRC's docketing of certifications of permanent cessation of operations and permanent removal of fuel from the reactor vessel pursuant to 10 CFR 50.82 or 10 CFR 52.110, "Termination of License." For a decommissioning site, the spectrum of accidents that can have significant offsite consequences is greatly reduced early on and dominated by the unlikely occurrence of a zirconium fire. The primary consideration for the planning basis for EP in Level 1 (NUREG-0396) is then the potential consequences and timing of this narrow spectrum of accidents. As such, for Level 1, the NRC staff considered the time-dependent characteristics of potential releases in relationship to the time needed to implement protective actions.

The purpose of Level 1 is to provide a transition period in which to ensure an appropriate level of EP is maintained to respond to applicable DBAs and to ensure a prompt response to the low-likelihood possibility that a rapid draindown of the SFP and subsequent zirconium fire and

release occurred in less than 10 hours. The NRC staff anticipates licensees will remain in Level 1 for a period of 10 (BWR) or 16 (PWR) months. During this time, the licensee may be relieved of the regulatory burden of requirements that are not needed to support an appropriate level of EP as preparations are made to implement a Level 2 PDEP. Level 1 is a transition period for both onsite and offsite emergency planning in which the regulatory requirements for periodic updates, reviews, and audits that were necessary to support operating reactor EP programs should not interfere with efforts to establish an appropriate level of EP for Level 2. It is not the intent of the NRC staff to require significant changes to the emergency plan during the Level 1 transition period. The following discussion addresses current requirements that could be amended in Level 1 to support a transition to a Level 2 PDEP while still providing for adequate protection of public health and safety during this transition period.

Staffing and Emergency Response Organization

Staffing of the Emergency Response Organization (ERO) is governed by the regulations in 10 CFR 50.47 and Appendix E:

- 10 CFR 50.47(b)(1) states, in part, “Primary responsibilities for emergency response by the nuclear facility...have been assigned...and each principal response organization has staff to respond and to augment its initial response on a continuous basis.”
- 10 CFR 50.47(b)(2) states, in part, “...adequate staffing to provide initial facility accident response in key functional areas is maintained at all times, timely augmentation of response capabilities is available...”
- Section IV.A of Appendix E to 10 CFR Part 50 states, in part, “The organization for coping with radiological emergencies shall be described, including definition of authorities, responsibilities, and duties of individuals assigned to the licensee’s emergency organization...”

The NUREG-0654/FEMA-REP-1, Revision 1, provides specific acceptance criteria for complying with the standards set forth in the regulations. In NUREG-0654, Section II, “Planning Standards and Evaluation Criteria,” evaluation criteria II.B.1 and II.B.5 address the adequacy of ERO staffing, including guidance on licensee minimum on-shift and augmented staffing levels, augmentation times, and emergency functions as provided in Table B-1 of NUREG-0654.

Section IV.A.9 of Appendix E to 10 CFR Part 50 requires licensees to conduct a detailed staffing analysis demonstrating that on-shift personnel assigned emergency plan implementation functions are not assigned responsibilities that would prevent the timely performance of their assigned functions as specified in the emergency plan. The on-shift staff must be able to cope with the spectrum of events described in NSIR/DPR-ISG-01, “Interim Staff Guidance – Emergency Planning for Nuclear Power Plants” (ADAMS Accession No. ML113010523), until augmenting ERO staff arrives in accordance with the site’s emergency plan commitments. The augmented ERO responders assume many managerial, engineering, and administrative duties from the on-shift personnel, allowing them to focus more fully on plant operations.

In Level 1, the spectrum of credible accidents and operational events requiring a response from the ERO is reduced as compared to an operating plant, and the principal public safety concern involves the potential radiological risks associated with the storage of spent fuel onsite in the SFP. The reactor, reactor coolant system (RCS), and reactor support systems are no longer in

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operation and have no function related to the storage of spent fuel. Therefore, postulated accidents involving a failure or malfunction of the reactor, RCS, or reactor support systems are no longer applicable. As such, certain ERO positions and emergency functions as detailed in NUREG-0654, Table B-1, may not be applicable or necessary in Level 1. Commensurate with the reduced spectrum of credible accidents, the NRC staff is considering changes to the guidance on ERO staffing levels for Level 1. The onsite operations staff would continue to provide timely implementation of the emergency plan while providing for, if necessary, the prompt implementation of mitigative actions in the event of a SFP accident. Communication and coordination capabilities with offsite organizations for the level of support required for the remaining DBAs would be maintained. Additionally, the ERO will continue to provide appropriate assessment capabilities and the capability to provide timely protective action recommendations to responsible offsite organizations in the unlikely event of a radiological release offsite exceeding EPA PAGs.

Because the existing ERO staffing regulations are performance-based, the staff does not anticipate that regulatory amendments will be needed to address ERO staffing for Level 1. The NRC staff intends to provide guidance on the minimum staffing requirements for Level 1 similar to the approach taken in NSIR/DPR-ISG-02 for licensees seeking emergency planning exemptions and changes to their staffing commitments.

Emergency Action Levels and Emergency Classification Levels

Section IV.C of Appendix E to 10 CFR Part 50 requires licensees to develop a set of emergency action levels (EALs) based not only on onsite and offsite radiation monitoring information but also on readings from a number of sensors that indicate a potential emergency, such as the pressure in containment and the response of the ECCS. Given the defueled nature of Level 1 facilities, EALs associated with power reactor operations (e.g., reactor vessel water level, core temperature, and containment radiation levels) and EALs associated with mitigation systems not associated with the SFP would no longer contain applicable initiating conditions. Containment parameters do not provide an indication of the conditions at a defueled facility and emergency core cooling systems would no longer be required. Other indications such as SFP level or temperature can be used at sites where there is spent fuel in the SFPs. Level 1 licensees would still be required to maintain a set of EALs based on onsite radiation monitoring information and in-plant conditions and instrumentation applicable to a defueled reactor.

Nuclear Energy Institute (NEI) 99-01, Revision 6, "Development of Emergency Action Levels for Non-Passive Reactors" (ADAMS Accession No. ML12326A805), provides EALs for non-passive operating nuclear power reactors, permanently defueled reactors, and ISFSIs. The NRC endorsed NEI 99-01, Revision 6, in a letter dated March 28, 2013, as an acceptable method of developing EALs (ADAMS Accession No. ML12346A463). Licensees desiring to make an EAL scheme change must still submit the change to the NRC for approval as required by Section IV.B of Appendix E to 10 CFR Part 50.

Section IV.C of Appendix E to 10 CFR Part 50 also requires that emergency classes include four emergency classification levels (ECLs) defined by the NRC in NUREG-0654/FEMA-REP-1, Revision 1: (1) Notification of Unusual Event (NOUE), (2) Alert, (3) Site Area Emergency (SAE), and (4) General Emergency (GE). Under Option 2, all of these ECLs would still apply in Level 1. While there may be no credible event that could result in significant radiological release beyond the site boundary when a licensee enters Level 1, as previously stated, the purpose of Level 1 is to ensure that adequate EP is in place to ensure a prompt response even if a highly-

unlikely event should occur. As such, the NRC staff concludes that maintaining ECLs up to a General Emergency would ensure that other expected actions, such as the issuance of a protective action recommendation (PAR) would occur in a timely manner to protect the health and safety of the public.

Evacuation Time Estimate Studies

Section IV.3 of Appendix E to 10 CFR Part 50 requires licensees to use evacuation time estimates (ETEs) in the formulation of protective action recommendations and to provide the ETEs to State and local governmental authorities for use in developing offsite protective action strategies. Licensees must update ETEs on a periodic basis per the requirements in 10 CFR 50.47(b)(10) and Section IV.4, IV.5, and IV.6 of Appendix E to 10 CFR Part 50. In the 2011 EP Final Rule (76 FR 72560; November 23, 2011), the NRC amended its regulations regarding ETEs to require licensees to periodically assess changes to the EPZ population. Licensees are required to update their ETE analysis after every decennial census, and at any time during the decennial period if changes to the EPZ permanent resident population increases such that it causes the longest ETE value for specific zones to increase by 25 percent or 30 minutes, whichever is less.

The NRC staff concludes that updates to the ETE during Level 1 would provide limited benefit for the enhancement of protective action strategies and/or offsite evacuation planning. Even if the criteria for updating the ETE analysis were met within the Level 1 timeframe, updating an ETE report may take several months of analysis. After the ETE is updated, the regulations in Section IV.6 of Appendix E to 10 CFR Part 50 require an additional 180 days before an updated ETE can be used to inform protective action recommendations and offsite protective action strategies. The additional time and effort it takes to develop and implement a revised protective action strategy may exceed the time that a facility would spend in Level 1 and would also be counter to the purpose of Level 1 as a transition period during the decommissioning process. Additionally, based on the NRC staff's review of submitted ETEs, population changes within a time period comparable to the Level 1 timeframe are unlikely to impact ETEs enough to affect the formulation of protective action strategies. And since formal offsite REP planning and pre-planned protective action recommendations for evacuations in response to a radiological emergency are not requirements of Level 2 (see discussion below), updates to the ETE during Level 1 would provide almost no benefit. For all of these reasons, the NRC staff concludes that the regulatory requirements in 10 CFR 50.47(b)(10) and Section IV.4, IV.5, and IV.6 of Appendix E to 10 CFR Part 50 to periodically update ETEs should no longer be required in Level 1. Existing ETE analyses would remain effective within the emergency plan until no longer required in Level 2.

Annual Dissemination of Public Information

Section IV.D.2 of Appendix E to 10 CFR Part 50 currently requires licensees to make annual dissemination of basic emergency planning information to the public within the plume exposure pathway EPZ. Several ANPR commenters stated that this requirement should no longer apply to decommissioning sites. Section II.G of NUREG-0654/FEMA-REP-1, Revision 1, contains criteria for the information that should be included in the annual dissemination of public information including: educational information on radiation, points of contact, protective measures, and information for special needs populations. During the period of plant operation, EPZ residents will have had adequate opportunity to become aware of this information and much of this information is likely to remain unchanged from year to year. Starting in Level 2,

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and consistent with the removal of requirements for formal offsite REP for decommissioning sites (including the removal of EPZ requirements), the annual dissemination of public information would not be required. However, for Level 1, the change in operating status of the plant and the ensuing changes to the EP program prompt the need to provide a final annual dissemination of information to the public. This final dissemination would explain the decommissioning process and the resultant changes to the onsite and offsite EP that are likely to occur over the next several years. The NRC staff intends to provide guidance on what should be included in the final annual dissemination of public information.

Drill and Exercise Program

Section IV.F of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(14) include requirements for periodic drills and exercises for licensees. Given the low probability of DBAs or other low-likelihood events that could result in exceeding the EPA PAGs, as well as the available time to initiate mitigation measures consistent with plant conditions, the previously routine progression to a GE in power reactor site scenarios is not applicable to a decommissioning site. Therefore, the licensee would not be expected to demonstrate response to as wide a spectrum of events. Beginning in Level 1, exercise scenarios could be commensurately reduced with the permanent cessation of power reactor operations and removal of fuel from the reactor vessel to reflect a smaller suite of potential accident scenarios.

Section IV.F.2.c of Appendix E to 10 CFR Part 50 also requires that offsite REP plans for each site shall be exercised biennially with full participation by each offsite authority having a role under the radiological emergency plan. Depending upon when the licensee starts the decommissioning process, there exists a potential for a full participation exercise to be required during Level 1. As the risk of an accident resulting in a radiological release offsite is significantly reduced in Level 1 and since formal offsite REP programs would not be a requirement of Level 2, there would be limited safety benefit to performing full-scale participation exercises simulating a release with offsite consequences during the time a licensee is in Level 1. The NRC staff anticipates a need to further clarify through regulation or guidance the timing and scope of full participation exercises and drills in relation to the licensee's 8-year exercise cycle and the timeline for decommissioning. Any potential changes to the timing and scope of exercise and drill requirements will be made in consultation with FEMA.

Hostile Action Requirements

In the 2011 EP Final Rule (76 FR 72560; November 23, 2011), the NRC amended its regulations to include enhancements to EP in response to a hostile action event. Section IV.B.1 of Appendix E to 10 CFR Part 50 includes providing EALs for hostile action; Section IV.E.8.d of Appendix E to 10 CFR Part 50 includes alternative facilities for the staging of ERO personnel; Section IV.I of Appendix E to 10 CFR Part 50 provides for protective actions for onsite personnel; and Section IV.F.2.c.4 and Section IV.F.2.i of Appendix E to 10 CFR Part 50, includes hostile action scenarios in drills and exercises. These EP requirements related to hostile action are separate and distinct from physical protection regulations in 10 CFR Part 73, "Physical Protection of Plants and Materials." Several ANPR commenters requested that the NRC consider hostile action events in establishing levels for EP.

As discussed below, hostile action requirements would not apply to decommissioning sites that have progressed to Level 2. Although the rationale for the non-inclusion of hostile action requirements to Level 2 could be applied to Level 1, the NRC staff has determined that

maintaining provisions for hostile action within onsite and offsite radiological emergency plans is prudent given the condition of the facility in Level 1. Specifically, the spent fuel has not yet undergone a significant period of decay, and it is anticipated that more personnel will be onsite than for a Level 2 facility. As previously stated, the primary consideration for the planning basis for EP in Level 1 is the potential consequences and timing of the accident. Although the study in NUREG-1738 did not evaluate the potential consequences of a sabotage event that could directly cause offsite fission production dispersion (e.g., vehicle bomb damaging the SFP), the NRC staff did study the potential consequences of the zirconium fire event at different spent fuel decay times. Within the timeframe proposed for Level 1, the study in NUREG-1738 shows that decay time is significant when considering short-term radiological consequences. Additionally, significant changes to the onsite and offsite emergency plans would not be needed during Level 1. As such, the NRC staff is proposing to maintain EP requirements related to hostile action during Level 1. However, consistent with the above discussion on exercise and drill requirements, the NRC staff concludes that continuing with full-participation hostile-action based (HAB) exercises would provide limited safety benefit to a facility that is decommissioning. The NRC staff proposes to remove the HAB requirement from the 8-year exercise cycle starting in Level 1, although security-based EALs would remain in place as potential initiating events for exercises and drills.

Emergency Response Data System

Section VI of Appendix E to 10 CFR Part 50 outlines a set of system, testing, and implementation requirements for the Emergency Response Data System (ERDS). These systems transmit direct near real-time electronic data between the licensee's onsite computer system and the NRC Operations Center. Section VI.2 of Appendix E provides that nuclear power facilities that are shut down permanently or indefinitely are not required to provide hardware to interface with the NRC receiving system. Under Option 2, licensees in Level 1 would need to maintain a capability to provide meteorological, radiological, and SFP data (e.g., level, flow, and temperature data) to the NRC within a reasonable timeframe, but would no longer be required to maintain an ERDS per current regulations. Several ANPR comments expressed that ERDS should be required for decommissioning sites in order to inform decision-making for offsite response organizations (OROs). In addition, some commenters expressed support for removing ERDS requirements. The NRC's ERDS requirements only address transmission to the NRC and do not require licensees to transmit data to OROs, although licensees may have agreements in place to provide such information to OROs in the event of an emergency. The removal of ERDS under Option 2 would not affect a licensee's ability to provide information to OROs as long as such agreements remain in place.

Level 2: Permanently Defueled Emergency Plan

For plants that have permanently shut down and defueled (Level 1), the proposed EP approach is based primarily on conditions that: (1) a postulated radiological release would not exceed the EPA PAGs at the exclusion area boundary for DBAs applicable to a permanently shut down and defueled reactor; and (2) sufficient time would exist to take prompt mitigative actions in response to a postulated zirconium fire accident scenario in the SFP and, if warranted, for offsite officials to take appropriate response actions to protect public health and safety. The NRC staff is considering providing two regulatory alternatives to specify when the transition to a Level 2 PDEP may occur: (1) transition after a specified amount of cooling time in Level 1, or (2) transition after an alternative timeframe based on a site-specific analysis that shows the fuel cannot heat up to clad ignition temperature within 10 hours under adiabatic conditions. Several

ANPR commenters supported these proposed options.

The NRC staff's analysis of spent fuel decay times provided information on fuel heatup time to 900 °C as a function of cooling time for both PWR and BWR assemblies. The analysis also included sensitivities to the mass of the racks and the fuel configuration in the SFP. Based on this analysis, the NRC staff concluded that after a cooling period of 10 months for BWRs or 16 months for PWRs, the spent fuel cannot reasonably heat up to clad ignition temperature within 10 hours. These cooling times are based on a 10-hour adiabatic heatup to 900°C assuming the decay heat value for the hottest assembly (rather than average), a burnup of 60 GWd/MTHM⁷, uniform loading pattern, and accounting for the mass of the racks. This does not account for the additional margin to heatup that would be provided by a more favorable SFP configuration such as a 1×4 or checkerboard, and is determined to be conservative for regulatory purposes. The NRC staff notes that the cooling periods provided for PWRs and BWRs are based on studies that consider current operating parameters in the nuclear power industry (e.g., fuel types, enrichment, and fuel burnup levels). During the development of the proposed rule, the NRC staff will consider any necessary conditions for parameters outside of the NRC staff's past analysis. The proposed regulations would provide for transition to Level 2 after the specified time has passed, with potential conditions as discussed above. The NRC staff may also provide licensees with an option to submit a site-specific analysis proposing an alternative cooling period, but such analyses would be subject to review and approval by the NRC prior to a transition to Level 2. Specifying an acceptable cooling time within the regulations is meant to relieve licensees of the regulatory burden of providing a site-specific analysis. One alternative that the NRC staff could pursue in the proposed rule is the development of a chart that defines minimum cooling time as a function of fuel type, burnup, and enrichment for inclusion in the regulations. The details regarding these issues will be determined during the proposed rule phase of this rulemaking.

As demonstrated in the results of the NRC staff's task analysis of mitigation actions (Task 1 Report), 10 hours will provide sufficient time for plant staff to reliably implement mitigation strategies to prevent spent fuel heat-up damage. Additionally, in the worst case beyond-design-basis event leading to a rapid draindown of the SFP and subsequent zirconium fire, additional time margin exists on the order of 1 to 8 hours beyond the 10 hour heatup time in which protective actions can be taken to protect the public before EPA PAGs would be exceeded offsite (Task 3 Report). Because of the additional time available to take mitigation actions or, if necessary, to implement protective actions, many requirements applicable to permanently defueled reactors (under Level 1) would not be applicable to licensees with sufficiently decayed spent fuel (under Level 2). The following discussion addresses requirements that would be necessary to provide for adequate protection of public health and safety at Level 2 facilities.

Staffing and Emergency Response Organization

Several ANPR commenters requested that the NRC maintain minimum staffing requirements for decommissioning sites. Table 1 below describes the proposed minimum emergency response staffing requirements for licensees in Level 2. This table, from NSIR/DPR-ISG-02 (adapted from Table B-1 in NUREG-0654/FEMA-REP-1, Revision 1), describes the minimum emergency

⁷ MELCOR calculations discussed in the Task 2 report were calculated for a burnup of 60 GWd/MTHM, which is consistent with the assumption in NUREG-1738. In NUREG-1738, the decay heat for 60 GWd/MTHM was extrapolated from the values reported in NUREG/CR-5625 for a limiting burnup of 50 GWd/MTHM.

response staffing requirements for decommissioning nuclear power plants licensed per 10 CFR Part 50 and 10 CFR Part 52.

Table 1. Minimum Emergency Response Staffing Requirements for Facilities in Level 2

MAJOR FUNCTIONAL AREA	MAJOR TASKS	EMERGENCY POSITION, TITLE, OR EXPERTISE	ON-SHIFT	AUGMENTED STAFF CAPABILITY FOR RESPONSE IN 2 HOURS
Plant Operations and assessment of Operational Aspects	Plant Operations	Shift Supervisor Shift Operator	1 1	
Emergency Direction and Control	Emergency Coordinator	Shift Supervisor	*	
Notification/ Communication	Notify State and Federal personnel and maintain communications	Communicator	*	
Radiological Accident Assessment and Support of Operational Accident Assessment	Onsite Dose Assessment and Monitoring	Health Physics Expertise	*	1
Protective Actions (In-Plant)	In-Plant Surveys Radiation Protection <ul style="list-style-type: none"> • Access Control • HP Coverage for Repair, Corrective Actions, Search and Rescue, First Aid, and Firefighting • Personnel Monitoring • Dosimetry 	Health Physics Technician	1	As needed
Engineering Support	Technical Direction	Technical Expertise		1
Plant Condition Evaluation, Repair and Corrective Action	Repair, Mitigation and Corrective Action	Shift Operators	**	As needed
Firefighting	Firefighting	Per Fire Protection Plan		
Rescue Operations/ First Aid	Rescue and First Aid		*	As needed
Security	Security	Per Security Plan		

* May be provided by shift personnel assigned other functions. Identify if the shift personnel assigned EP functions/tasks are from Firefighting or Security resources.

** Number of additional personnel required to perform site-specific mitigation strategies required for a catastrophic loss of SFP inventory.

In addition, licensees in Level 2 would be required to include the following in their emergency plans:

- Specify the onsite emergency organization of plant staff personnel for all shifts and its relation to the responsibilities and duties of the normal staff complement;
- Designate an individual who shall be on shift at all times and who shall have the authority and responsibility to immediately and unilaterally initiate any emergency actions; and
- Establish the functional responsibilities assigned to the emergency coordinator.

At facilities in Level 2, the augmenting staff would need to include engineering capability appropriate for SFP accident mitigation, but may be otherwise reduced. For example, licensees in Level 2 would not be required to comply with the requirement under Section IV.A.3 of Appendix E to 10 CFR Part 50 to augment the ERO with licensee headquarters staff. Decommissioning sites typically have a level of emergency response that does not require response by headquarters personnel. The emergency plan for licensees in Level 2 would need to include specific assignments for emergency situations for all shifts and for plant staff members, both onsite and away from the site. Licensees in Level 2 would need to be able to augment on-shift capabilities within 2 hours after declaration of an emergency.

Section IV.A.9 of Appendix E to 10 CFR Part 50 requires licensees to conduct a detailed staffing analysis demonstrating that on-shift personnel assigned emergency plan implementation functions are not assigned responsibilities that would prevent the timely performance of their assigned functions as specified in the emergency plan. In the 2011 EP Final Rule (76 FR 72560), the NRC concluded that the staffing analysis requirement was not necessary for non-power reactor licensees due to the small staffing levels required to operate the facility. For the same reason, licensees in Level 2 would no longer be required to perform this analysis under Option 2.

Emergency Classification Levels and Emergency Action Levels

Section IV.C.1 of Appendix E to 10 CFR Part 50 requires that emergency action levels are based, in part, on onsite and offsite radiation monitoring data. Under Option 2, only the ECLs of NOUE and Alert would apply to licensees in Level 2. The NRC received several comments on the ANPR stating that SAE and GE should be required for decommissioning sites due to the possibility of a beyond-design-basis zirconium fire. In Level 2, the probability of a condition reaching the level above an emergency classification of Alert is very low. In the event of an accident at a facility in Level 2, there will be time available to initiate mitigation measures consistent with plant conditions. As stated in NUREG-1738, for instances of small SFP leaks or loss of cooling scenarios, these events evolve very slowly and generally leave many days for recovery efforts. Offsite radiation monitoring would be performed as the need arises. Because of the low probability of design-basis accidents or other credible events that would be expected to exceed the EPA PAGs and the available time to initiate mitigation measures consistent with plant conditions or, if necessary, to take appropriate response actions offsite, declarations of SAE and GE, and the associated offsite radiation monitoring systems would not be required in Level 2. The results from the Task Reports previously discussed support this conclusion.

Consistent with the discussion on Level 1, EALs associated with power reactor operations (e.g., reactor vessel water level, core temperature, and containment radiation levels) and EALs associated with mitigation systems not associated with the SFP would no longer be applicable

in Level 2. The EALs that the NRC found acceptable in NEI 99-01, Revision 6, are consistent with the ECLs for Level 2. A licensee desiring to make an EAL scheme change as part of the PDEP must follow the requirements of Section IV.B of Appendix E to 10 CFR Part 50.

Emergency Assessment, Classification, and Declaration

Section IV.C.2 of Appendix E to 10 CFR Part 50 requires licensees to maintain the capability to assess, classify, and declare an emergency condition within 15 minutes. A decommissioning power reactor has a low likelihood of a credible accident resulting in radiological releases requiring offsite protective measures and the event progression is much slower compared to operating reactors (see supporting discussion in “Offsite Radiological Emergency Response Plans” of this appendix). For these reasons, the NRC staff concludes that licensees in Level 2 would not be required to assess, classify, and declare an emergency condition within 15 minutes. The exact timeframe that will be required for emergency declaration for licensees in Level 2 is still under consideration by the NRC staff and will be provided at the proposed rule stage; however, the NRC staff concludes that this time should not exceed 60 minutes.

Offsite Radiological Emergency Response Plans

The NRC staff received numerous comments opposing the revision or removal of requirements for formal offsite REP for licensees in decommissioning, including assertions that these requirements should remain in place until all spent fuel is removed from a site and that offsite REP requirements should be site-specific.

The NRC concluded in several exemption requests that as long as a minimum of 10 hours was available to initiate mitigation measures or to take appropriate response actions offsite, formal offsite radiological emergency plans, required under 10 CFR Part 50, are not necessary for permanently shutdown and defueled nuclear power reactor licensees. The transition to Level 2 would be conditioned upon the presumption, as supported by analyses, that the licensee is wholly capable and responsible for mitigating the consequences of an event and that the licensee is not reliant upon OROs for offsite REP to mitigate the consequences of an event. Licensees must also demonstrate that adequate physical security remains to protect the spent fuel and that adequate mitigation strategies can be performed by the on-site staff. In addition to the analyses performed by the NRC staff to support this rulemaking, the NRC has previously conducted studies that support the technical basis for the 10-hour time criterion, including:

- NUREG-2161 considered various cooling mechanisms, as well as additional heat from oxidation. Previous studies had shown that earthquakes present the dominant risk for SFPs, so this analysis considered a severe earthquake with ground motion stronger than the maximum earthquake reasonably expected to occur for the reference plant, which would challenge the SFP integrity. The study considered two spent fuel configurations: high-density and low-density loading. The study also analyzed two cases for each scenario: one where mitigation measures of 10 CFR 50.54(hh)(2), the strategies to maintain or restore SFP cooling in the event of loss of large areas of the plant due to fire or explosion, were credited; and one where they were not used or were unsuccessful. The study results showed that successful mitigation reduces the likelihood of a release and that the likelihood of a release was equally low for both high- and low-density loading in the SFP. The study found that a release is not expected to occur at the operating power reactor site studied for at least 72 hours following a beyond-design-basis seismic event that occurs more than 60 days after shutdown.

- NUREG-1738 contained the results of the NRC staff's evaluation of the potential accident risk for a SFP at a decommissioning power reactor in the United States. Specifically, NUREG-1738 stated that fuel assembly geometry and rack configuration are plant specific, and both are subject to unpredictable changes after an earthquake or cask drop that drains the pool. Therefore, because a non-negligible decay heat source lasts many years and configurations ensuring sufficient air flow for cooling cannot be assured, the possibility of reaching the zirconium ignition temperature cannot be precluded on a generic basis. NUREG-1738 identified a zirconium cladding fire resulting from a substantial loss-of-water from the SFP as the only postulated scenario at a decommissioning power reactor that could result in a significant radiological release. While unlikely, the consequences of such an accident could lead to an offsite dose in excess of the EPA PAGs. Based on spent fuel storage design characteristics and operating practices considered in the analysis, the scenarios that lead to this condition have very low probabilities of occurrence. Accordingly, these scenarios are considered to be beyond the facility's design basis. Furthermore, as the spent fuel ages, the generation of decay heat decreases. After a certain amount of time, the overall risk of a zirconium fire becomes extremely low because of two factors: (1) the large amount of time available for preventative and mitigating actions; and (2) the increased probability that the decay heat will be low enough that the fuel will be air-coolable in the post-event configuration. This lower risk supports a commensurate level of EP as discussed above in the introduction to Option 2. Several ANPR commenters referenced the results of NUREG-1738 in support of revised requirements for permanently defueled reactors.

In a hypothetical SFP accident scenario, 10 hours is not the expected amount of time it would take for water to drain from the pool. A beyond-design-basis accident that results in the water draining from the pool (whether a full or partial drain-down) would likely take much longer than 10 hours because of the robust construction of the SFP and the large volume of water in the SFP. The 10-hour time period is also not intended to represent the time that it would take to repair all key safety systems or to repair a large SFP breach. The 10-hours is a conservative period of time in which pre-planned mitigation measures to provide makeup water or spray to the SFP can be reliably implemented before the onset of a zirconium cladding ignition; and if a release is projected to occur, 10 hours will be sufficient time for offsite agencies to take appropriate action to protect the health and safety of the public. This 10-hour time period is assured through conservative analyses of the amount of time it would take spent fuel stored in the SFP to reach the zirconium ignition temperature under conditions of adiabatic heatup, as previously discussed in this appendix. The NRC staff concludes that, for entry into Level 2, site conditions will provide at least 10 hours to initiate mitigation measures or to take appropriate response actions offsite – and, therefore, formal offsite radiological emergency plans would no longer be necessary for adequate protection of public health and safety.

Many commenters expressed concerns that OROs may not have adequate funding or training to address a radiological emergency if formal offsite REP requirements were revised or reduced. Licensees would still maintain a variety of capabilities that may be available to support OROs in EP and response, including: radiological training (as discussed under Level 1 above), regular coordination with OROs, radiological assessment capabilities, and the ability to make protective action recommendations upon request (discussed below). No action is expected or required by these proposed regulations from State or local government organizations in response to an event at a decommissioning site other than firefighting, law enforcement, and ambulance/medical services. Requirements for licensees to maintain agreements for these

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services exist outside of EP, including the requirement for licensees to maintain a fire protection plan in 10 CFR 50.48, “Fire protection” and physical security requirements in 10 CFR Part 73. Many communities have comprehensive all-hazard response or comprehensive emergency management plans in place to supplement these capabilities. Offsite response organizations will continue to take actions to protect the health and safety of the public as they would at any other industrial site, and under Option 2, memoranda of understanding (MOU) between licensees and OROs would still be expected to be established for firefighting, law enforcement, and ambulance/medical services. As currently required under Sections IV.A.6 and A.7 of Appendix E to 10 CFR Part 50, licensees would still be required to identify local offsite services and assistance expected from governmental agencies in their emergency plans. This approach is consistent with requests from several ANPR commenters that the NRC maintain requirements for licensees to have formal agreements with OROs in place for emergency response. In addition, a beyond-design-basis event is likely to result in activation of Federal resources. Many Federal resources are available to support OROs under the National Response Framework as described in the Nuclear/Radiological Incident Annex.⁸

Notification Requirement to State and Local Governmental Agencies

Section IV.D.3 of Appendix E to 10 CFR Part 50 currently requires licensees to have the capability to notify OROs of an emergency declaration within 15 minutes. Under Option 2, licensees in Level 2 would be required to promptly notify OROs and to make this notification no later than 1 hour after declaration of an emergency. This notification requirement is consistent with the requirements for current non-power reactor licensees. Because of the low probability of design-basis accidents or other credible events that would be expected to exceed the EPA PAGs and the available time to initiate mitigation measures consistent with plant conditions, or, if necessary, to take protective actions, the NRC staff concludes that 60 minutes provides sufficient time for ORO notification in Level 2.

Public Alert and Notification Systems

Section IV.D of Appendix E to 10 CFR Part 50 requires licensees to maintain a public alert and notification system. Because of the low probability of DBAs or other credible events that would be expected to exceed the limits of EPA PAGs and the available time for event mitigation, the public alert and notification system would not be required for licensees in Level 2. Similarly, exercises of this system, as required under Section IV.F.2 of Appendix E to 10 CFR Part 50 would no longer be required for licensees in Level 2. Several ANPR comments opposed revision to public alert and notification system requirements due to a decommissioning site’s reduced response capabilities. As discussed above, licensees in Level 2 would still be required to maintain the capability to notify responsible State and local governmental agencies within 60 minutes after declaring an emergency and sufficient time would be available to inform the public and implement protective actions, if necessary.

Plume Exposure Pathway and Ingestion Pathway Emergency Planning Zones

EPZs are defined as the areas for which planning is needed to assure prompt and effective actions can be taken to protect the public in the event of an incident. The requirements of 10 CFR Part 50 state that the EPZs associated with each nuclear power plant must be defined both

⁸ See Nuclear/Radiological Incident Annex available at: https://www.fema.gov/media-library-data/20130726-1825-25045-2310/nuclear_radiological_incident_annex_2008.pdf

for the shorter-term plume exposure pathway and the longer-term ingestion exposure pathway. The NRC received several ANPR comments both supporting and opposing the removal of EPZ requirements for decommissioning sites. Because of the low probability of design-basis accidents or other credible events that would be expected to exceed the EPA PAGs offsite, and the available time to initiate mitigation measures consistent with plant conditions, the potential offsite consequences would not warrant maintaining the plume exposure pathway and ingestion exposure pathway EPZs in Level 2. If necessary, sufficient time would be available for offsite response organizations to implement appropriate response actions even for the worst-case severe accident. Therefore, EPZs would not need to be maintained in Level 2.

Offsite Radiological Protective Action Recommendations

Licensees must currently develop a range of protective actions for the plume exposure pathway EPZ for emergency workers and the public per the requirements in 10 CFR 50.47(b). Evaluation criterion J.7 of NUREG-0654/FEMA-REP-1, Revision 1, states that, "Each licensee shall establish a mechanism for recommending protective actions to the appropriate State and local authorities." Several ANPR comments supported the removal of PAR requirements for licensees in Level 1 or Level 2. Consistent with the removal of requirements for formal offsite REP for decommissioning sites (including the removal of EPZ requirements), licensees in Level 2 would not need to develop pre-planned PAR strategies. The planning basis for Level 1 considers the time dependent characteristics of potential releases in relationship to the time needed to implement protective actions. While there may be no credible event that could result in significant radiological release beyond the site boundary when a licensee enters Level 1, as previously stated, the purpose of Level 1 is to ensure that adequate EP is in place to ensure a prompt response even if a highly-unlikely event should occur, and thus, protective action recommendations would still be required for licensees in Level 1. Although the likelihood of events that would result in doses in excess of the EPA PAGs to the public beyond the owner controlled area boundary based on the permanently shutdown and defueled status of the reactor is extremely low, licensees in Level 2 would still be required to determine whether a radiological release is occurring. If a release is occurring, then the licensee staff would be required to communicate that information to offsite authorities within 60 minutes (see Level 2 discussion above) for their consideration in taking appropriate response actions.

Licensees in Level 2 would still be required to provide protective actions for any emergency workers that may have to respond to the site for firefighting, law enforcement, and ambulance/medical services. Additionally, licensees in Level 2 would still be required to protect the health and safety of members of the public present within the owner controlled area in case of a radiological emergency.

Evacuation Time Estimate Studies

Licensees must currently develop and update ETEs per the requirements in 10 CFR 50.47(b) and Section IV.3 of Appendix E to 10 CFR Part 50. Section IV.3 requires licensees to use ETEs in the formulation of PARs and to provide ETEs to State and local governmental authorities for use in developing offsite protective actions strategies. Consistent with the determination for EPZs and PARs, maintaining ETEs would no longer be required in Level 2.

Emergency Facilities and Equipment

Section IV.E of Appendix E to 10 CFR Part 50 requires licensees to maintain and describe adequate provisions for emergency facilities and equipment, including: equipment at the site for personnel monitoring, equipment for radiological assessment, facilities and supplies for decontaminating onsite individuals, first aid facilities and medical supplies, arrangements for qualified medical service providers and the transportation of contaminated injured individuals, and arrangements for the treatment of individuals injured in support of licensed activities. These requirements have not been exempted for decommissioning reactors to date, and the NRC staff has determined that facilities in Level 1 and Level 2 would still need to maintain these capabilities.

Section VI.E.8 of Appendix E to 10 CFR Part 50 requires nuclear power reactor licensees to have an onsite technical support center (TSC), an onsite operational support center (OSC), and an emergency operations facility (EOF). Per NUREG-0696, "Functional Criteria for Emergency Response Facilities" (ADAMS Accession No. ML051390358), a TSC is an onsite facility located close to the control room that provides plant management and technical support to the reactor operating personnel located in the control room during emergency conditions; the OSC is an onsite area separate from the control room and the TSC where licensee operations support personnel will assemble in an emergency; and an EOF is a support facility for the management of overall licensee emergency response (including coordination with Federal, State, and local officials), coordination of radiological and environmental assessments, and determination of recommended public protective actions.

Several ANPR comments expressed that there is no longer a need for separate, dedicated facilities for the EOF, TSC, and OSC at decommissioning sites. For Level 2, the NRC staff concludes that the functions of the control room, EOF, TSC, and OSC could be combined into one or more locations. Due to the low probability of design-basis accidents or other credible events expected to exceed EPA PAGs, the significantly reduced staff, and the minimal expected offsite response required, offsite agency response will not be required at an EOF and onsite actions may be directed from the control room or other location, without the requirements imposed on a TSC or EOF. Additionally, a separate OSC would no longer be required to meet its original purpose of an assembly area for plant logistical support during an emergency. The OSC function could be incorporated into another facility.

Section IV.E.9 of Appendix E to 10 CFR Part 50 addresses requirements for emergency communications systems, plans, and arrangements. Requirements to maintain communication systems (with backup power) and communication plans would remain in place. Slight modifications would be made to the communication arrangement requirements in paragraphs E.9.a, c, and d for licensees in Level 2 because many of the referenced facilities (e.g., TSC, EOF) would no longer be required in Level 2. Communications with State and local Emergency Operations Centers would be maintained to coordinate assistance on site if required.

TSC, OSC, and EOF Designated Staff

Consistent with the removal of requirements for formal offsite REP for decommissioning sites (including the removal of EPZ requirements), requirements for TSC, OSC, and EOF designated staff would also no longer be applicable to licensees in Level 2. Because of the low probability of DBAs or other credible events that would be expected to exceed the EPA PAGs and the available time to initiate mitigation measures consistent with plant conditions, or, if necessary, to

take protective actions, licensees in Level 2 would not need the TSC, EOF, or offsite field assessment teams. See Table 1 for minimum staffing requirements for facilities in Level 2.

Hostile Action Requirements

Section IV.A.7 of Appendix E to 10 CFR Part 50 defines “hostile action” as an act directed toward a nuclear power plant or its personnel that includes the use of violent force to destroy equipment, take hostages, and/or intimidate the licensee to achieve an end, as it applies to the capability of implementing EP during such events. However, in the statement of considerations for the 2011 EP Final Rule, the NRC excluded non-power reactors from the definition of “hostile action” because a non-power reactor as defined in 10 CFR 50.2, “Definitions,” is not a nuclear power plant, and a regulatory basis had not been developed to support the inclusion of non-power reactors in the definition of “hostile action.” A facility in Level 2 would be similar to a non-power reactor in many respects, including a small operating staff and a low likelihood of a credible accident resulting in radiological releases requiring response actions offsite. As such, the NRC staff concludes that facilities in Level 2 do not fall within the scope of “hostile action” and that enhancements to EP in response to hostile action such as alternative facilities for the staging of ERO personnel, protection of onsite personnel, and challenging drills and exercises involving hostile action are not warranted for facilities in Level 2.

Although this rationale justifies the exclusion of facilities in Level 2 from the definition for a “hostile action” and its related requirements (including conducting hostile action exercises) as they apply to EP, elements for security-based events would be maintained for facilities in Level 2, including EALs for security-based events. Licensees in Level 2 would be required to identify ORO resources that would respond to a security event, and the assistance licensees expect from those resources would be maintained in PDEPs. For physical security, risk insights can be used to determine which targets are important to protect against sabotage. A level of security commensurate with the consequences of a sabotage event is required and is evaluated on a site-specific basis. The severity of the consequences declines as fuel ages and, thereby, removes over time the underlying concern that a sabotage attack, under the current definition, could cause offsite radiological consequences.

Drill and Exercise Program

In addition to the proposed changes to the drill and exercise program starting in Level 1, some of the principal functional areas that must be incorporated into drills (e.g., PAR development, assessment of offsite impact of radiological releases) would no longer be applicable in Level 2. The NRC staff intends to provide guidance for the conduct of drills and exercises for decommissioning sites.

Offsite Response Organization Participation in Drills and Exercises

Section IV.F of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(14) include requirements for periodic EP drills and exercises for licensees. Paragraph IV.F.2.c of Appendix E to 10 CFR Part 50 currently requires offsite REP plans for each site to be exercised biennially with full participation by offsite authorities having a role under the radiological response plan. Consistent with the removal of requirements for formal offsite REP for decommissioning sites (including the removal of EPZ requirements), ORO participation in radiological drills and exercises would no longer be required for licensees in Level 2, although licensees in Level 2 would be required to offer OROs the opportunity to participate.

Level 3: All Spent Fuel Transferred to an ISFSI

A licensee with an ISFSI that terminates its 10 CFR Part 50 or 52 license must first obtain a specific 10 CFR Part 72 license. Accordingly, the licensee would then transition to the EP requirements for dry cask storage already provided in 10 CFR 72.32. A licensee maintaining its Part 50 or 52 license may opt to make changes to its EP program to align it with the requirements of 10 CFR 72.32 once all spent fuel is transferred to an ISFSI. Under Option 2, these two categories of licensees in Level 3 – Part 72 specific licensees and Part 50 or 52 licensees with Part 72 general licenses – would be subject to the same requirements as currently exist under 10 CFR 72.32. Because the technical basis for the requirements in 10 CFR 72.32 already exists, this regulatory basis document does not address the technical basis for the EP requirements under Level 3.

Level 4: All Spent Fuel and Radioactive Material Removed from Site

Once all spent fuel and sources of radioactivity have been permanently removed from the site, a licensee can terminate its EP program because the site no longer poses any risk of a radiological release. Several ANPR comments supported the removal of EP requirements in Level 4.

Additional Amendments for Emergency Preparedness

Applicability of 10 CFR 50.54(s)(2)(ii) and (s)(3)

The requirements of 10 CFR 50.54(s)(2)(ii) and (s)(3), regarding findings and determinations of reasonable assurance, are conditions of every 10 CFR Part 50 license. The relationship between the NRC and FEMA concerning findings of reasonable assurance of offsite EP is based on the Atomic Energy Act of 1954, as amended; the Energy Reorganization Act of 1974, as amended; the NRC Authorization Act of 1980; NRC's regulations; an MOU between the two agencies; and case law. The conclusion consistently reached over the years is that the NRC has the authority and responsibility to make licensing findings on the overall adequacy of onsite and offsite emergency planning and preparedness. Commensurate with the Commission's responsibility to make such findings, the Commission has the authority to collect, review, and evaluate any information it needs to support its findings on EP. If available, the NRC must consider FEMA findings and determinations regarding the status of offsite EP.

However, the NRC staff is proposing that if formal offsite REP is not required by regulation, then such findings and determinations by FEMA would not be needed in order for the NRC to make determinations regarding reasonable assurance under 10 CFR 50.54(s)(2)(ii). Several ANPR comments made assertions that once formal offsite REP is no longer required, the requirements under 10 CFR 50.54(s)(2)(ii) and (s)(3) are no longer applicable. In the Low Power rule (47 FR 30232; July 13, 1982), findings and determinations on the state of offsite EP were not needed to support issuance of a license for fuel loading and low power testing because there was sufficient time in which to take action to protect the public in even the worst-case accident. Similarly, for decommissioning power reactors, when formal offsite REP programs are no longer required (i.e., starting in Level 2), findings and determinations on the state of offsite EP from either the NRC or FEMA would no longer be required in order for the NRC to make licensing determinations regarding reasonable assurance under 10 CFR 50.54(s)(2)(ii).

Therefore, the NRC staff is considering changes to clarify that 10 CFR 50.54(s)(3) applies only when offsite REP programs are required by regulation. This amendment would be generally applicable and not specific to decommissioning sites (e.g., it may apply in the future to the regulatory framework for small modular reactors or other new reactor technologies). Further, 10 CFR 50.54(s)(2)(ii) would continue to apply to licensees as a condition of the license during decommissioning.

Notifications under 10 CFR 50.72

The regulations in 10 CFR 50.72 provide immediate notification requirements and stipulations for a number of 1-hour, 4-hour, and 8-hour reports by the licensee to the NRC. The NRC staff uses the information reported under 10 CFR 50.72 and 10 CFR 50.73 in responding to emergencies, monitoring ongoing events, confirming licensing bases, studying potentially generic safety problems, assessing trends and patterns of operational experience, monitoring performance, identifying precursors of more significant events, and providing operating experience to the industry. NUREG-1022, Revision 3, "Event Reporting Guidelines: 10 CFR 50.72 and 50.73" (ADAMS Accession No. ML13032A220), contains guidelines that the NRC staff considers acceptable for use in meeting these reporting requirements. With regard to EP, 10 CFR 50.72(a)(1)(i) requires that licensees report any emergency declarations to the NRC within 1 hour. Additionally, 10 CFR 50.72(b)(3)(xiii) requires a report within 8 hours for "any event that results in a major loss of emergency assessment capability, offsite response capability, or offsite communications capability (e.g., significant portion of control room indication, Emergency Notification System, or offsite notification system)." The NRC staff does not anticipate any amendments to these regulations as they apply to decommissioning sites. The 1-hour reporting requirement of 10 CFR 50.72 is consistent with the proposed regulations for notification requirements for licensees in Level 2. The 8-hour reporting requirement of 10 CFR 50.72(b)(3)(xiii) will also continue to apply; however, since many of these capabilities may not be requirements of a PDEP, the NRC staff intends to provide additional guidance in NUREG-1022, or a similar document, to clarify how the regulation applies to facilities in decommissioning.

Change Process under 10 CFR 50.54(q)

This section describes the proposed process for transitioning between levels and making changes to emergency plans under Option 2. Licensees are required by 10 CFR 50.54(q)(2) to follow and maintain the effectiveness of an emergency plan that meets the standards in 10 CFR 50.47(b) and the requirements in Appendix E to 10 CFR Part 50. 10 CFR 50.54(q) also contains the conditions by which the licensee may make changes to its emergency plan without prior application to and approval by the NRC, provided that the changes do not reduce the effectiveness of the plan and that the plan, as changed, continues to meet the standards in 10 CFR 50.47(b) and the requirements in Appendix E to 10 CFR Part 50.

The change process under 10 CFR 50.54(q) does not establish whether a proposed change would impact reasonable assurance determinations; the change process establishes only whether the licensee has the authority to implement the proposed change without prior NRC approval. The change process uses the characteristic "reduction in effectiveness" to exclude from the requirement to seek prior NRC approval those changes that would likely not reduce the effectiveness of the licensee's emergency plan. Because these changes would not reduce the effectiveness of the plan, the NRC expects the changes to have a minimal impact on the agency's reasonable assurance determination. A licensee's determination that a proposed

change would reduce the effectiveness of the emergency plan does not mean that the licensee could not or would not implement appropriate protective measures to protect public health and safety during an accident, but only that prior NRC review is required to evaluate the impact of the change on the reasonable assurance determination. As part of routine oversight, the NRC staff screens emergency plan changes, including EAL changes, and reviews a sample of changes submitted under 10 CFR 50.54(q)(5), that could potentially reduce effectiveness. These reviews do not constitute the NRC's approval of the plan changes, and all such changes remain subject to future inspection and enforcement actions. The NRC documents its approval of plan changes under 10 CFR 50.54(q)(4) in its decisions to grant license amendment requests.

The licensee cannot properly evaluate a proposed change to the emergency plan if it has not considered the basis for the NRC staff's approval of the original plan or the basis for any subsequent change to the plan – whether those changes were approved by the NRC staff or implemented by the licensee without prior NRC staff approval under 10 CFR 50.54(q). RG 1.219, "Guidance on Making Changes to Emergency Plans for Nuclear Power Reactors" (ADAMS Accession No. ML102790357), describes a method that the NRC considers acceptable to implement the requirements in 10 CFR 50.54(q) as they relate to EP and specifically to making changes to emergency response plans. As provided in RG 1.219, the licensee should consider a number of licensing-basis documents to inform a 10 CFR 50.54(q) evaluation, the foremost of which are the regulatory requirements which are binding on the licensee unless the NRC explicitly exempts the licensee from them.

The change process is meant to ensure that plans are maintained up-to-date and that the level of planning does not fall below the standards, regulatory or otherwise, to which the licensee has committed. The regulations in 10 CFR 50.54(q) define "reduction in effectiveness" as a change in an emergency plan that results in reducing the licensee's capability to perform an emergency planning function in the event of a radiological emergency. "Emergency planning function" is defined as a capability or resource necessary to prepare for, and respond to, a radiological emergency, as set forth in the planning standards of 10 CFR 50.47(b) and the elements of Section IV of Appendix E to 10 CFR Part 50. In considering a graded approach to EP, the NRC staff recognizes that a transition between the EP requirements of each level is not equivalent to making changes to the emergency plan within a level. The transition between EP levels is essentially a commitment by the licensee to a different set of EP standards and associated emergency planning functions, and the change process should recognize this distinction. The NRC received many comments on the ANPR suggesting changes to 10 CFR 50.54(q). Some commenters suggested that changes to emergency plans within levels should not constitute a reduction in effectiveness, and others suggested that changes between levels should not constitute a reduction in effectiveness. Other commenters suggested that permanently shutdown and defueled licensees should be allowed to use the 10 CFR 50.59 process to make emergency plan changes if licensees were required to develop a revised accident analysis that reflects the current status of the site.

Under the current process of granting EP exemptions for decommissioning, the NRC determines that the exemptions can be implemented without reducing reasonable assurance that adequate protective measures can and will be implemented. Once the licensees are granted exemptions from EP requirements, they do not need to submit a separate license amendment request for NRC approval of the emergency plan, unless the plan changes go beyond those resulting from the exemptions granted. It is the intent of this rulemaking effort to establish clear regulatory requirements for EP, reducing the need to request certain exemptions.

As such, the NRC staff is considering modifications to the regulations under 10 CFR 50.54(q) that would establish the process for: (1) transitions between regulatory EP standards, and (2) changes to emergency plans subject to the graded EP standards. The NRC staff does not anticipate any EP-related changes to 10 CFR 50.59 as a result of this rulemaking option.

Plan Changes for the Next Level

For transitions between levels, licensees would be required to establish emergency plans that meet the regulatory EP standards for the next level. The NRC staff is considering two options: (1) submit plan changes to the NRC for approval, or (2) provide a change process for licensees to make changes to the plan without prior NRC approval.

Option 1: Using the 10 CFR 50.90 license amendment process, the licensee would submit the revised emergency plan that describes the licensee's commitments and plan features to meet one of the graded standards (i.e., PSEP, PDEP, or IOEP). In this case, the NRC would review and document its approval in a safety evaluation. This would establish NRC documentation that the licensee maintained reasonable assurance and would provide a documented, approved emergency plan as a licensing basis against which future changes could be compared.

Under the requirements of 10 CFR 50.54(q), the NRC has depended upon the licensee to review changes to its emergency plans against the current NRC-approved plan. This option would provide for regulatory certainty, public hearing rights under 10 CFR 50.91, and a documented baseline emergency plan against which future change reviews could be made. This option could also facilitate EP program inspections by providing certainty on the approved plan. However, these benefits would come at the cost of the additional licensee and NRC staff man-hours and expense associated with the license amendment process, and would not necessarily increase the margin of safety.

Option 2: The licensee would be able to make changes to its emergency plan using the 10 CFR 50.54(q) process (or a similar change process) but would not need to consider whether the change is a reduction in effectiveness or request a license amendment, provided that the change is enacted to comply with the graded EP regulatory standards. Licensees making changes to their emergency plan to commit to the graded EP regulatory standards would not be required to perform reduction in effectiveness determinations for these changes. Instead, this determination would have already been made by the Commission through its promulgation of the regulations regarding the graded EP standards and associated emergency planning functions. This regulatory approach does not go beyond the authority currently granted to licensees to make changes to their emergency plan under 10 CFR 50.54(q)(3). Although hearing rights associated with the license amendment process would no longer be available for each individual change to commit to the graded EP regulatory standards, the public would have been given the opportunity to comment on the graded EP regulatory standards themselves as part of this regulatory basis, the proposed rule associated with this rulemaking, and the drafts of the supporting guidance documents. If the licensee were to seek additional authority to that provided by the rulemaking, the licensee would be required to request exemptions from the graded EP regulatory standards.

Following the Three Mile Island accident, regulations in 10 CFR 50.54(u) (now deleted) required licensees to upgrade their emergency plans to meet the planning standards of

10 CFR 50.47(b) and Appendix E to 10 CFR Part 50 and to submit those plans to the NRC for review. Option 2 is analogous to the approach taken at that time when the sixteen EP planning standards were put into effect. Under Option 2, the NRC would not be relinquishing its oversight authority, as the regulation would require these emergency plans to be submitted to the NRC for review no less than 60 days prior to implementation. Some ANPR commenters suggested that emergency plan changes should be made available for public comment or should be coordinated with OROs. The NRC staff notes that all emergency plan changes submitted under 10 CFR 50.54(q)(5) are available on the NRC's public website. Changes that request prior NRC approval are noticed in the *Federal Register*. Additionally, for either option, the licensee would be required to allow the OROs expected to respond in case of an accident 60 days to comment on the initial submittal of the licensee's graded emergency plan changes. Regardless of the change process, emergency plans would remain subject to future inspection and enforcement actions.

Plan Changes within a Level

After the plan has been implemented for each level, licensees will be required to follow and maintain the effectiveness of the plan, consistent with the current license conditions of 10 CFR 50.54(q)(2). For changes to the emergency plan within Level 1 (PSEP) and Level 2 (PDEP) after the plan has been implemented, the Section 50.54(q) change process would continue to apply because these changes would not have been reviewed for their impact on the NRC's reasonable assurance determination. Licensees would be allowed to make such changes to their emergency plan without prior application to, and approval by, the NRC, provided that the changes would not reduce the effectiveness of the plan and that the plan, as changed, would continue to meet the EP regulatory standards for the applicable level. Licensees would be required to submit such changes within 30 days under 10 CFR 50.54(q)(5). Changes that would reduce the effectiveness of the plan would be required to be submitted for prior NRC approval per 10 CFR 50.54(q)(4) so that the NRC could make the requisite reasonable assurance determination. Additional guidance would be provided in RG 1.219, or a similar document, to assist the licensee in making its reduction in effectiveness determination. For Level 3 (IOEP), depending on whether a general or specific Part 72 license is in place, the licensee will have to meet the emergency plan change requirements of 10 CFR 50.54(q) or 10 CFR 72.44(f).

The NRC staff concludes that an amendment to the regulatory change process is necessary for three reasons: (1) 10 CFR 50.54(q)(2), which provides that a licensee must follow and maintain the effectiveness of the emergency plan, should continue to apply in order to ensure emergency plans are kept up to date; (2) the 10 CFR 50.54(q) change process and the associated regulatory guidance currently do not address how a licensee could change its emergency plans to comply with the standards of a decommissioning level; and (3) this regulatory approach would allow the NRC to maintain, through a regulatory change process, reasonable assurance that a licensee can and will take adequate protective measures in the event of a radiological emergency.

An amendment to the regulations, as described above, supplemented as necessary by regulatory guidance, would ensure that the effectiveness of the emergency plans would be maintained. Emergency plans that comply with the proposed graded EP regulatory standards would continue to provide reasonable assurance that adequate protective measures can and

will be taken. Any plan that did not meet these regulatory standards, and, if applicable, the reduction in effectiveness criterion, would be reviewed by the NRC and subject to further inspection. The proposed approach to transitioning between levels and making emergency plan changes within the levels would provide an efficient and effective regulatory change process and would promote consistent and predictable implementation and enforcement.

Program Element Review under 10 CFR 50.54(t)

Under 10 CFR 50.54(t), licensees must conduct reviews of EP program elements either: (1) at intervals not to exceed 12 months, or (2) as necessary, based on an assessment by the licensee against performance indicators, and as soon as reasonably practicable after a change occurs in personnel, procedures, equipment, or facilities that potentially could adversely affect EP. If a licensee chooses the second option, all program elements must still be reviewed at least once every 24 months. The NRC received ANPR comments both supporting and opposing revisions to paragraph 10 CFR 50.54(t), including comments asserting that licensees should be allowed to conduct reviews every 24 months and comments suggesting that NRC remove the requirement to review adequacy of interfaces with State and local governments. Considering the expected duration and intended purpose of Level 1 and the anticipated changes to emergency plans for Level 2, the NRC staff concludes that it would be appropriate to ensure that this audit is conducted as soon as reasonably practicable after a licensee has implemented its Level 2 emergency plan.

Due to the reduced spectrum and low probability of potential accident scenarios at a permanently shutdown and defueled power reactor, and in order to support the transition to a PDEP and ensure a practicable timeframe for review, the NRC staff is considering an amendment to the regulation such that, starting in Level 1, licensees would be able to conduct program element reviews under 10 CFR 50.54(t) at intervals not to exceed 24 months without conducting an assessment against performance indicators (rather than at intervals not to exceed 12 months). This regulatory approach would align the first such review for a PDEP to shortly after the plan has been implemented and would eliminate the potential to expend resources during Level 1 in reviewing transitional program elements.

ASSESSMENT OF OPTION 2

Option 2 would revise the current EP regulations in 10 CFR Part 50. This option would provide regulatory certainty for EP requirements for permanently shutdown and defueled facilities. This option would also reduce the need to use the license exemption process, which would significantly reduce the administrative burden to licensees and the NRC staff associated with the processing of exemptions on a case-by-case basis. As discussed below, overall, the proposed approach would provide ongoing cost savings to licensees and one-time costs followed by ongoing cost savings to the NRC, while maintaining the reasonable assurance of the public health and safety. Option 2 would result in small ongoing costs associated with the submission by licensees and review by NRC staff of emergency plans committing to the proposed graded EP regulatory standards.

Regulatory Scope of a Power Reactor Decommissioning Rulemaking Regarding Emergency Preparedness

The proposed EP requirements under Option 2 would implement a graded approach, where requirements for decommissioning sites are adjusted commensurate with the level of risk posed

[ENTER MONTH AND YEAR HERE]

within each stage of the decommissioning process. The proposed EP requirements would include revisions to 10 CFR 50.47, 10 CFR 50.54, 10 CFR 50.72, and Appendix E to 10 CFR Part 50 and address topics such as: EALs and ECLs; notifications to State and local governmental agencies; ERDS; TSC, OSC, and EOF facilities and designated staff; staffing; drill and exercise programs; offsite radiological emergency response plans; public alert and notification systems; EPZs; annual dissemination of public information; offsite protective action recommendations; evacuation time estimate studies; and EP program element reviews.

NRC Guidance, Policy, and Implementation Issues

NRC Guidance

The NRC would develop new EP-specific guidance as a result of Option 2. Draft guidance documents would be issued with the proposed rule. The following EP guidance documents may be updated or relevant portions included in a new guidance document specific to decommissioning facilities:

- RG 1.219, “Guidance on Making Changes to Emergency Plans for Nuclear Power Reactors”⁹
- NSIR/DPR-ISG-01, “Interim Staff Guidance, Emergency Planning for Nuclear Power Plants”
- NUREG-1022, “Event Reporting Guidelines, 10 CFR 50.72 and 50.73”
- Inspection Procedure (IP) 82501, “Decommissioning Emergency Preparedness Program Evaluation”
- IP 82401, “Decommissioning Emergency Preparedness Scenario Review and Exercise Evaluation”

Policy Issues on Emergency Preparedness

Defense-In-Depth

Defense-in-depth is an element of the NRC's safety philosophy that employs successive compensatory measures to prevent accidents or mitigate damage if a malfunction, accident, or naturally caused event occurs at a nuclear facility. The defense-in-depth philosophy ensures that safety will not be wholly dependent on any single element of the design, construction, maintenance, or operation of a nuclear facility. EP as part of defense-in-depth gives reasonable assurance that actions can be taken to protect the population around nuclear facilities in the unlikely event of an accident. This reasonable assurance is provided for in the EP regulations in 10 CFR 50.47 and Appendix E to 10 CFR Part 50, which require that adequate protective measures can and will be taken in the event of a radiological emergency; establish plume exposure and ingestion pathway EPZs for nuclear power plants; and ensure that formal offsite and onsite emergency plans are in place.

The planning basis for EP is established in NUREG-0396, “Planning Basis for the Development of State and Local Government Radiological Emergency Response Plans In Support of Light

⁹ RG 1.219 was updated in July 2016 to clarify the applicability of the 10 CFR 50.54(q) change process to facilities that have permanently ceased operation. Additional updates may be needed to this regulatory guide to address the graded approach for decommissioning described in this document.

Water Nuclear Power Plants” (ADAMS Accession No. ML051390356). This planning basis was endorsed for use in the NRC’s policy statement of October 23, 1979 (44 FR 61123), and continues to apply to a nuclear power reactor licensee after permanent cessation of operations and permanent removal of fuel from the reactor vessel. The planning basis includes the stipulation that no single specific accident sequence should be isolated as the one for which to plan because each accident could have different consequences, both in nature and degree. Planning should be based upon knowledge of the potential consequences, timing, and release characteristics of a spectrum of accidents, including severe accidents. However, the spectrum of possible accidents is significantly smaller, and the risk of an offsite radiological release is significantly lower at a nuclear power facility that has permanently ceased operations and removed fuel from the reactor vessel, than at an operating power reactor.

Under the safety analysis in NUREG-1738, the event sequences important to risk at a decommissioning power reactor are limited to a large earthquake and cask-drop events. When reviewing EP exemption requests, the NRC considered the need to maintain defense-in-depth to prevent and mitigate the consequences of these events and approved exemptions based on site-specific justifications by licensees as well as consideration of the objectives of the regulations. In response to the ANPR, the NRC received public comments stating that exemptions from existing EP requirements deviate from the NRC’s defense-in-depth approach to regulation and ignore the consequences of potential beyond-design-basis events. However, as described in NSIR/DPR-ISG-02, approval for the exemption from EP requirements for decommissioning licensees is based on an evaluation of site-specific analyses demonstrating that: (1) the radiological consequences of the remaining applicable DBAs would not exceed the limits of the EPA PAGs at the EAB; (2) in the event of a beyond-design-basis event resulting in the partial drain down of the SFP to the point that cooling is not effective, there is at least 10 hours (assuming an adiabatic heatup) from the time that the fuel is no longer being cooled until the hottest fuel assembly reaches 900 degrees Celsius; (3) adequate physical security is in place to assure implementation of security strategies that protect against spent fuel sabotage; and (4) in the unlikely event of a beyond DBA resulting in a loss of all SFP cooling, there is sufficient time for a licensee to implement pre-planned mitigation measures to provide makeup or spray to the SFP before the onset of a zirconium cladding ignition. With these exemptions, the NRC has considered the potential for beyond-design-basis events and maintained its commitment to the defense-in-depth philosophy, assuring that the required level of licensee EP is commensurate with the risk to public health and safety, and common defense and security at the licensee’s site.

In considering a basis for the proposed regulations governing EP for decommissioning sites, the NRC staff maintained a defense-in-depth philosophy in which emergency planning is the last in a series of barriers to protect the public. NUREG-1738 describes how the defense-in-depth philosophy applies to the operation of the SFP in a decommissioning plant and to potential regulatory changes contemplated for decommissioning plants:

Implementation of defense-in-depth for SFPs is different than for nuclear reactors because the hazards are different. The robust structural design of a fuel pool, coupled with the simple nature of the pool support systems, goes far toward preventing accidents associated with loss of water inventory or pool heat removal. Additionally, because the essentially quiescent (low-temperature, low-pressure) initial state of the SFP and the long time available for taking corrective action associated with most release scenarios provide significant safety margin, a containment structure is not considered necessary as an additional barrier to provide an adequate level of protection to the public.

Likewise, the slow evolution of most SFP accident scenarios allows for reasonable human recovery actions to respond to system failures, and provides sufficient time to allow for the implementation of protective actions.

In its analysis, the NRC staff found that defense-in-depth in the form of accident prevention measures and an appropriate level of emergency planning can limit risk and provide dose savings for as long as a zirconium fire is possible.

Reasonable Assurance

The Atomic Energy Act of 1954, as amended, authorizes the Commission to establish, by rule, minimum criteria for the issuance of licenses for utilization facilities in a manner that protects the health and safety of the public. The Commission has stated that compliance with its regulations and other license requirements is presumptive of providing reasonable assurance of adequate protection of the public health and safety and the common defense and security (53 FR 20603-20606; June 6, 1988). Prior to the issuance of a license, the NRC is required by 10 CFR 50.47(a) to make a finding that there is reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency. Therefore, emergency plans are considered adequate – and thus provide reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency – if they comply with the NRC's regulations and, more specifically, the 16 planning standards in 10 CFR 50.47(b). A licensee must follow and maintain the effectiveness of its emergency plan if the NRC is to continue to find, under 10 CFR 50.54(s)(2)(ii), that there is reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency. If, at any time after the license is issued, the NRC determines that the licensee's state of EP does not provide such assurance and the licensee does not correct the deficiency within 4 months, the Commission will determine whether the plant will be shut down or whether other enforcement actions would be appropriate.

The proposed graded approach to EP will: (1) provide an adequate basis for an acceptable state of EP; and (2) ensure that applicable arrangements with offsite agencies will be maintained (e.g., notification, assistance resources, etc.). Establishing emergency plans for decommissioning sites will not require the Commission to make new findings of reasonable assurance. The proposed graded approach to EP, based, in part, on previously approved exemptions and recently conducted research, is derived from the current operating reactor regulatory requirements for which findings of reasonable assurance of emergency plans and their implementation have already been made. These previous findings of reasonable assurance will be maintained by requiring licensees to establish emergency plans that comply with the proposed graded standards for EP. As previously stated, the NRC would not be relinquishing its oversight authority as emergency plans would remain subject to inspection and enforcement actions.

Implementation Issues

The implementation issues associated with the proposed graded EP regulatory standards fall into the overarching implementation issues discussed in Section 3.3 of this draft regulatory basis, "NRC Guidance, Policy, and Implementation Issues." The NRC staff will consider EP specific issues, such as the timing of exemptions for plants that shut down during the implementation period for this rule, in the development of the proposed rule.

Impacts of an Emergency Preparedness Rulemaking

This section provides an analysis of the two options for addressing the regulatory constraints associated with the current decommissioning process. Option 1 is the “no action” alternative and involves the continuation of current decommissioning practices (i.e., the issuance of site-specific exemptions). Option 2 is a rulemaking approach that streamlines the current decommissioning process by implementing a graded system with comprehensive licensee requirements. These options are discussed in more detail in the following sections.

Under the current process, licensees undergoing decommissioning are still subject to the EP requirements of 10 CFR Part 50. These licensees submit applications for exemptions from certain EP requirements. In their applications, licensees must justify the exemption requests by demonstrating that the cessation of operations and the removal of fuel from the reactor vessel substantially reduces the risk of offsite radiological release compared to an operating power reactor. The rulemaking options presented herein are aimed at streamlining the decommissioning process by turning consistently-granted, licensee-specific exemptions into generally-applicable standards and reducing the burden to both licensees and the NRC while maintaining the reasonable assurance of the public health and safety.

OPTION 1: NO ACTION

Under this option, the NRC staff would continue with the existing decommissioning process as described in the current regulations and guidance, including the emergency planning requirements of 10 CFR Part 50. The NRC staff would not pursue any changes to the current process.

Impacts on public health, safety, and security

Because this option would not change the current process, there would be no increase or reduction in public health, safety, and security.

Impacts on licensees

This option would have no incremental impact on licensees.

Impacts on NRC

This option would have no incremental impact on the NRC.

Additional considerations

This option would have no incremental impact on State, local, or Tribal governments.

Summary of benefits and costs

Benefits

- No incremental benefits to licensees or NRC.

Costs

- No incremental costs to licensees or NRC.

OPTION 2: GRADED APPROACH TO EMERGENCY PREPAREDNESS

Under this option, the NRC staff would undertake a rulemaking to implement a streamlined graded approach to the decommissioning process. The changes to the underlying regulations and guidance would create a clear set of rules and guidance for decommissioning reactors and reduce the need for EP exemptions as licensees transition through the decommissioning process.

The proposed approach would provide an alternative to the current site-specific decommissioning exemption and amendment process by issuing level-specific requirements for all licensees. As discussed previously, licensees for all recently decommissioning facilities have applied for exemptions from certain emergency planning requirements of 10 CFR Part 50 at the beginning of the decommissioning process, given the significantly reduced risk of offsite radiological release at permanently shutdown and defueled reactors compared to operating facilities. Under this option, many requirements from previously-approved exemption requests would be codified. Thus, licensees would no longer need to submit exemption requests for these requirements.

Impacts on public health, safety, and security

Because this option would involve graded EP regulatory standards commensurate with the risks associated with potential accidents within each level, there would be no reduction in public health, safety, and security.

Several ANPR comments requested that the NRC consider any environmental impacts of the changes in the EP requirements. An environmental assessment will be prepared for the rulemaking that will address any environmental impacts of the changes to the EP requirements for decommissioning sites. This environmental assessment will be available for public comment.

Impacts on licensees

Overall, this option would result in ongoing cost savings to licensees.

- Changes to the requirements would result in the elimination of the need for exemption requests for decommissioning sites. Licensees would no longer undergo the administrative burden associated with the exemption request process. Licensees may also be able to expedite the decommissioning process because any delays associated with processing exemptions would be eliminated.
- Licensees would incur moderate administrative burden associated with making changes to their emergency plan and submitting updated emergency plans to the NRC.

Impacts on NRC

Overall, this option would result in significant one-time costs to the NRC followed by ongoing savings.

- Initially, there would be incremental costs to the NRC to undertake the rulemaking process. These costs include the preparation of the proposed rule and accompanying guidance documents. The costs would include both NRC staff and contractor time to prepare proposed rule language, draft guidance documents, supporting analyses (e.g., a regulatory analysis and Office of Management and Budget Paperwork Burden analysis), and a *Federal Register* notice, and to conduct public outreach efforts during the rule and guidance development phase. After publishing the proposed rule, the NRC would incur costs associated with public comment resolution and preparation of the final rule, guidance documents, and supporting documentation for the rulemaking.
- By changing the decommissioning exemption and amendment process, the NRC would reduce both the number and length of the exemption and amendment requests. This would result in a more efficient process and save the NRC staff time and resources.
- The NRC staff may incur administrative burden associated with reviewing updated emergency plans for decommissioning sites transitioning between levels.

Additional considerations

Individual states and local governments have the primary authority and responsibility to protect their citizens and respond to disasters and emergencies. The proposed approach could create a transitional environment for offsite emergency planners in how they consider radiological hazards. The FEMA would continue to support offsite organizations as they adjust their plans, capabilities, and resources to the changing radiological threat. The proposed approach would impact FEMA in the form of reduced licensee user fees collected after discontinuation of formal offsite REP (i.e., in Level 2). The regulation in 44 CFR 354.4(e) explains FEMA's process for discontinuing charges for decommissioning sites. See EP discussion in Section 5 of this draft regulatory basis, "Stakeholder Involvement," regarding information about ANPR comments received related to offsite response organization (ORO) funding for EP.

Summary of benefits and costs

Benefits

- Enhanced clarity and predictability of decommissioning process.
- Savings to all licensees resulting from eliminating the need to use the exemption process.
- Potential savings to licensees resulting from the potential to expedite decommissioning process.
- Savings to the NRC from fewer applications for exemptions to review.
- Maintenance of reasonable assurance of adequate protection of the public health and safety commensurate with the potential risks.

Costs

- One-time cost to the NRC to revise guidance and develop the rule.
- Costs to licensees to provide updates to emergency plans between levels.
- Costs to the NRC to review updates to emergency plans between levels.

Backfitting and Issue Finality

Neither of the two options presented by the NRC staff in this appendix would constitute backfitting under 10 CFR 50.109, "Backfitting," or violate any issue finality provision in 10 CFR Part 52 if the option were implemented by the NRC. Option 1 would maintain the status quo of exemption and license amendment requests, thereby imposing no change in requirements or NRC staff positions. Option 2 would provide licensees with a voluntary alternative to exemption and license amendment requests by amending the NRC's regulations to establish a graded approach to EP commensurate with the reductions in radiological risk as licensees proceed through the decommissioning process. Because licensees would not be required to comply with the regulations setting forth the graded approach to EP, a rulemaking for Option 2 would not constitute backfitting or violate issue finality.

NRC Staff Observations on Stakeholder Feedback on the ANPR

The following observations reflect the NRC staff's review and consideration of the comments on the ANPR. As the NRC will use public comment on the draft regulatory basis to inform the proposed rule, which will be subject to review and approval by the Commission, conclusions regarding the subjects that will be included in the power reactor decommissioning rulemaking are subject to change.

1. In response to requests for new or revised EP guidance: the NRC would issue new/revised general guidance documents and the public would have an opportunity to comment on the drafts of those guidance documents.
2. In response to comments claiming that previous EP exemptions were site-specific and therefore should not serve as a basis for EP levels: the NRC conducted an analysis to demonstrate the decay time necessary for fuel to remain below temperatures associated with runaway clad oxidation for at least 10 hours assuming adiabatic heatup conditions. The results of this study are generally applicable across decommissioning sites.
3. In response to comments requesting that the NRC consider environmental impacts associated with the rulemaking when developing EP requirements: the NRC would prepare an environmental assessment to accompany the proposed rule that would be available for public comment.
4. In response to comments on the basis for each of the levels and a risk-based approach to levels: the NRC considered maximizing safety, minimizing environmental damage and economic impacts, supporting an efficient and expedient process, and promoting transparency, flexibility, and responsiveness in establishing the levels. This approach is risk-informed, particularly for the transition between levels. EP requirements would be commensurate with the risks associated with potential accidents within each level.
5. In response to comments questioning whether OROs have the resources to respond to a radiological emergency: Federal resources would continue to be available to OROs, and licensees will maintain MOUs with OROs to define ORO roles. The level of commitment required from OROs will decline over time as licensees move through the risk-based

levels, though licensees will still be required to coordinate with OROs and maintain certain radiological assessment capabilities throughout the levels.

6. In response to comments about a potential “reduction in effectiveness” as a result of transitioning between levels: changes to EP when transitioning between levels would not constitute a reduction in effectiveness because each level would represent a new set of requirements commensurate with the risks associated with potential accidents within the level that each plan would have to satisfy in order to be acceptable. Each new plan would need to be available to the NRC for review and inspection prior to implementation and subject to enforcement action.
7. In response to comments questioning the continuation of ERDS: decommissioning sites are not required by NRC regulations to maintain ERDS. As a practical matter, however, decommissioning licensees maintain a capability to communicate to the NRC.

Appendix B - Physical Security

Technical Basis for Amending Physical Security Requirements for Reactors Transitioning to Decommissioning

In the 1996 final decommissioning rule, the NRC noted that the degree of regulatory oversight required for a nuclear power reactor during its decommissioning stage is considerably less than that required for the facility during its operating stage. Additionally, because there is no fuel in the reactor core at a decommissioning power reactor, there is a reduction in both radiological consequences and the number of target sets at decommissioning power reactors. As discussed in Section 2.2 of this draft regulatory basis, “Power Reactor Decommissioning Activity since the 1996 Decommissioning Rule,” once a nuclear power reactor has permanently ceased operations, has removed all the fuel from the reactor vessel, and is undergoing decommissioning, there can be no risk of core damage. Therefore, many of the security strategies implemented through an operating reactor licensee’s security plans have no or limited applicability to a decommissioning reactor. However, there is no efficient regulatory mechanism for addressing the reduced security risk associated with decommissioning nuclear power reactors and appropriately adjusting the security requirements. The recommended regulatory changes discussed in this appendix take into account this reduction in radiological sabotage risk at a decommissioning or fully decommissioned reactor.

Decommissioning reactor licensees and the NRC staff have expended substantial resources processing security-related licensing actions for power reactors, such as exemption requests, license amendment requests, and rescission of orders, during the transition period to decommissioning status. Consistent with the power reactors that permanently shut down in the 1990s, licensees that have recently transitioned to decommissioning have redesigned their security strategies to address the lower overall consequences of an offsite radiological release when fuel has been permanently removed from the reactor vessel. The current regulatory process of exemption and license amendment approval is not an efficient use of NRC staff resources to adjust requirements for decommissioning reactors and it also introduces a significant regulatory burden to licensees. This rulemaking is intended to streamline the decommissioning process by incorporating into the regulations those adjustments to security requirements for decommissioning reactors that have been commonly requested and that may be generically applied to reduce the burden to both licensees and the NRC.

All reactor licensees have several options when it comes to making changes to the site security plans required under 10 CFR 50.34, “Contents of applications; technical information.” One of the most commonly used methods decommissioning licensees use for security plan changes are the provisions of 10 CFR 50.54(p)(2), which provides that changes may be made to security plans without prior NRC approval as long as the changes do not decrease the safeguards effectiveness of the plans. Licensees are required to provide a report to the NRC of any change made under 10 CFR 50.54(p)(2) within 2 months of making the change. Licensees spend significant resources ensuring changes do not decrease safeguards effectiveness and preparing and submitting security plan change reports. The NRC staff also reviews these reports as part of routine oversight activities to verify that the changes do not reflect a decrease in effectiveness. Current regulations do not provide a definition for “decrease in effectiveness,” and do not address how licensees may demonstrate that there is no such decrease. Therefore, the NRC staff is proposing to add language to the current provisions of 10 CFR 50.54(p) regulation to provide clarity for both licensees and NRC staff.

The NRC staff is also recommending amending certain physical security requirements to allow for a step-down in security during decommissioning commensurate with the decreased risk associated with cessation of reactor operations and the placement of all fuel into dry cask storage systems (DCSS).

Current Physical Security Requirements for Power Reactors Transitioning to Decommissioning

Nuclear power reactor licensees, whether they hold a license under 10 CFR Part 50 or 10 CFR Part 52, are subject to various security requirements in 10 CFR Part 73, “Physical Protection of Plants and Materials.” Such requirements include those in 10 CFR Part 73, Appendix B, “General Criteria for Security Personnel,” and Appendix C, “Safeguards Contingency Plans”; 10 CFR 73.54, “Protection of Digital Computer and Communication Systems and Networks”; and 10 CFR 73.55, “Requirements for Physical Protection of Licensed Activities in Nuclear Power Reactors Against Radiological Sabotage.” If the power reactor facility has an associated independent spent fuel storage installation (ISFSI) under the general license granted by 10 CFR 72.210, “General license issued,” the licensee must protect the ISFSI in accordance with 10 CFR 72.212, “Conditions of General License issued under § 72.210.”

In the wake of the terrorist attacks of September 11, 2001, the NRC took several actions to further reduce the possibility of a radiological event. The NRC issued immediately effective, non-public orders (cover letter available under ADAMS Accession No. ML020510637) that required licensees to implement additional security measures, including increased patrols, augmented security forces and capabilities, and more restrictive site-access controls to reduce the likelihood of a spent fuel pool (SFP) accident resulting from a terrorist initiated event. The NRC’s regulatory actions after the terrorist attacks of September 11, 2001, have significantly enhanced the safety of power reactors. A comprehensive discussion of these activities is provided in the memorandum to the Commission titled, “Documentation of Evolution of Security Requirements at Commercial Nuclear Power Plants with Respect to Mitigation Measures for Large Fires and Explosions,” dated February 4, 2010 (ADAMS Accession No. ML092990438).

Rulemaking Options

Generally, the power reactor physical security requirements in 10 CFR 73.55 and the NRC security orders that apply to licensees of operating nuclear power reactors also apply to decommissioning power reactor licensees. While a licensee may have permanently ceased operating and removed all fuel from its reactor vessel, this does not terminate its 10 CFR Part 50 license or provide relief from security requirements.

Under the existing regulations, each nuclear power reactor licensed under 10 CFR Part 50 remains subject to the requirements in 10 CFR 73.55 to maintain a Commission-approved physical security plan, training and qualification plan, safeguards contingency plan, and cyber security plan. Regulations in 10 CFR 73.55(b)(3) require the physical protection program to be designed to prevent significant core damage and spent fuel sabotage. This section further requires that the licensee’s physical protection program ensure that the capabilities to detect, assess, interdict, and neutralize threats (up to and including the design basis threat (DBT) of radiological sabotage, as stated in 10 CFR 73.1, “Purpose and scope,”) is maintained at all times. Regulations in 10 CFR 73.55(b)(3) also require that the licensee’s physical protection program provide defense in depth through the integration of systems, technologies, programs, equipment, supporting processes, and implementing procedures to ensure the program’s continued effectiveness.

For an operating nuclear power reactor, the possible adversary scenarios cover a wide range of targets and locations, thus requiring a complex security strategy that protects plant equipment at several locations throughout a facility. This contrasts with a permanently shutdown and defueled reactor that has irradiated fuel in the SFP or an ISFSI or both, where adversary scenarios are generally less complex and cover fewer target locations. At a decommissioning power plant, the targets to be protected are significantly reduced in number from when the plant was operating. Therefore, in contrast to an operating reactor, fewer security resources may be needed to maintain an equivalent level of protection against radiological sabotage at a decommissioning reactor.

During the initial transition from operation to decommissioning, the reactor is permanently shut down, and the spent fuel is permanently moved from the reactor vessel to a SFP. Although the potential adversary targets are fewer, and in fewer locations, the licensee is responsible for identifying and analyzing the “new” site-specific conditions to account for possible adversary approaches consistent with the changes in facility configuration. At this step in the process, licensees with reactors in the decommissioning transition process have submitted to the NRC various changes and requests for exemptions from the NRC security requirements under 10 CFR 73.5, “Specific Exemptions,” requests for license amendments under 10 CFR 50.90, “Application for Amendment of License, Construction Permit, or Early Site Permit,” and security plan changes under 10 CFR 50.54(p). Security plan changes made by the licensee under 10 CFR 50.54(p)(2) must not decrease the effectiveness of the security plan and must be provided to the NRC within 2 months of the change.

Option 2, discussed in detail below, would streamline the decommissioning process by providing in the regulations for those changes to security requirements that reflect the decreased risk presented by a power reactor in decommissioning status. These include changes commonly requested by decommissioning licensees and typically approved by the NRC. The NRC staff recommends Option 2 and notes that this option has the added benefit of reducing both licensee and NRC resource expenditures.

Under this option, the NRC will continue to review security plan change reports submitted by licensees and will continue to provide oversight of licensee security programs at decommissioning power reactors through a security inspection program that verifies compliance with applicable regulatory requirements. The security inspection program examines licensee activities in order to assess performance and to assure that the licensee’s overall security program is meeting the objective of providing assurance of adequate protection¹⁰ against the DBT. The following attributes of licensee security programs are inspected for decommissioning power reactors: (1) access authorization; (2) access control; (3) equipment performance, testing, and maintenance; (4) protective strategy evaluation; (5) protection of safeguards information; (6) security training; and (7) target sets.

¹⁰ The Commission provided the following direction in SRM-SECY-16-0073, “Staff Requirements – Options and Recommendations for the Force-on-Force Inspection Program in Response to SRM-SECY-14-0088,” dated October 5, 2016 (ADAMS Accession No. ML16279A345): “In implementing the NRC’s regulatory program, either in developing new regulations, inspecting licensee compliance with regulations, or executing the FOF program, the staff should be mindful that the concept of ‘assurance’ of adequate protection found in our security regulations is equivalent to ‘reasonable assurance’ when it comes to determining what level of regulation is appropriate.”

OPTION 1: NO ACTION

The no-action option would retain the current physical security regulatory structure for power reactor licensees during operation and decommissioning. Under this alternative, the NRC would continue to process requests from licensees undergoing decommissioning for exemptions from certain requirements and license amendments to amend the security commitments in existing license conditions.

Impacts on public health, safety, and security

Because this option would not change the current process, there would be no increase or reduction in public health, safety, and security.

Impacts on licensees

This option would have no incremental impact on licensees.

Impacts on NRC

This option would have no incremental impact on the NRC.

Additional considerations

This option would have no incremental impact on State, local, or Tribal governments.

Summary of benefits and costs

Benefits

- No incremental benefits to licensees or NRC.

Costs

- No incremental costs to licensees or NRC.

OPTION 2: RULEMAKING

Under this option, the NRC staff would pursue rulemaking to implement appropriate changes to the physical security requirements that would apply to decommissioning power reactors. These changes are discussed in detail below. Once a licensee certifies under 10 CFR 50.82, "Termination of license," that it has: (1) permanently ceased operation and (2) permanently removed fuel from the reactor vessel, and these certifications have been docketed by the NRC, changes to the operations of the plant may support a step-down in the physical security requirements currently imposed on operating reactors through regulations and orders.

As discussed in Section 2.2 of this draft regulatory basis, "Power Reactor Decommissioning Activity since the 1996 Decommissioning Rule," the risk of offsite consequences is reduced at a decommissioning reactor when compared to that at an operating reactor. Given the reduced risk of offsite consequences, the NRC staff has concluded that existing security requirements can be stepped down commensurate with the reduced level of risk. As demonstrated in a June

2003 technical report from Sandia National Laboratories (SNL)¹¹, results of the various calculations evaluating SFP accident scenarios establish that once irradiated fuel has been moved from the reactor vessel to the SFP, potential consequences of a radiological release are significantly reduced. These reduced consequences, and the removal of the reactor vessel as a target for radiological sabotage, permit reductions in the onsite physical security program. However, licensees are still required to maintain an onsite security organization, physical security plan, and response capability, including coordination with local government officials for onsite response commensurate with the remaining site target sets and potential radiological consequences.

In implementing these proposed changes, the NRC would continue its focus on providing assurance of adequate protection against the threat of radiological sabotage and adequate protection of public health and safety from any security event involving fuel stored in the SFP and DCSS.

This rulemaking option is informed by precedent from earlier decommissioning rulemakings, the statements of considerations (SOCs) that accompanied those rulemakings (specifically, the 1988 rulemaking and 1996 rulemaking as discussed in Section 2.1 of this draft regulatory basis), "Evolution of the Current Regulatory Framework for Power Reactors Transitioning to Decommissioning," and the following NUREGs, regulatory guides (RGs), staff requirements memoranda (SRMs), and Commission papers:

- SECY-00-0145, "Integrated Rulemaking Plan for Nuclear Power Plant Decommissioning," September 28, 2000 (ML003721626)
- SECY-13-0112, "Consequence Study of a Beyond-Design-Basis Earthquake Affecting the Spent Fuel Pool For a U.S. Mark 1 Boiling-Water Reactor," October 9, 2013 (ML13256A339)
- EA-02-026, "Interim Safeguards and Security Compensatory Measures," February 25, 2002, (ML021350569)
- Final Rule "Power Reactor Security Requirements" (RIN: 3150-AG63), March 27, 2009 (74 FR 13926)
- COMSECY-14-0015, "Security Inspections at U.S. Nuclear Regulatory Commission Decommissioning Power Reactors," April 23, 2014 (ML13347B178)
- SRM to COMSECY-14-0015, "Security Inspections at U.S. Nuclear Regulatory Commission Decommissioning Power Reactors," May 28, 2014, (ML14148A010)
- SECY-14-0118, "Request by Duke Energy Florida, Inc. for Exemptions from Certain Emergency Planning Requirements," October 29, 2014 (ML14219A444)
- SRM-SECY-14-0118, "Request by Duke Energy Florida, Inc. for Exemptions from Certain Emergency Planning Requirements," December 30, 2014 (ML1419A366)
- NUREG-1619, "Standard Review Plan for Physical Protection Plans for the Independent Storage of Spent Fuel and High-Level Radioactive Waste," July 1998, (ML020720453)
- NUREG/CR-3330, "Vulnerability of Nuclear Power Plant Structures to Large External Fires," August 1983 (ML062260290)
- NUREG-1628, "Staff Responses to Frequently Asked Questions Concerning Decommissioning of Nuclear Power Plants," June 2000 (ML003726190)
- NUREG -1738, "Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants," February 2001 (ML010430066)

¹¹ Sandia National Laboratories, SANDIA Report, MELCOR 1.8.5 Separate Effect Analyses of Spent Fuel Pool Assembly Accident Response, Rev. 0, (Draft Completed: June 2003.)

- Regulatory Guide (RG) 5.7, “Entry/Exit Control for Protected Areas, Vital Areas, and Material Access Areas,” May 1980 (ML003739976)
- Regulatory Guide 5.68, “Protection Against Malevolent use of Vehicles at Nuclear Power Plants,” October 1, 1994 (ML003739379)
- Regulatory Guide 5.75, “Training and Qualification of Security Personnel at Nuclear Power Reactor Facilities,” July 10, 2009 (ML091690037)
- NSIR/DSP-ISG-03, “Interim Staff Guidance Review of Security Exemptions/License Amendment Requests for Decommissioning Nuclear Power Plants,” September 28, 2015 (ML15106A737)

Discussion of Recommendations

NRC-Conducted Force-on-Force Inspections

NRC-conducted evaluations, including force-on-force exercises, are statutorily mandated by Section 170D of the Atomic Energy Act of 1954, as amended. The NRC’s prior and current practice is to conduct these evaluations at two classes of licensed facilities: (1) operating power reactors; and (2) Category I fuel cycle facilities. The current security inspection program for decommissioning power reactors does not include an NRC-conducted force-on-force inspection.

In COMSECY-14-0015 (ADAMS Accession No. ML13347B178), the NRC staff informed the Commission of the NRC staff’s intended approach for security inspections at decommissioning power reactors. The NRC staff concluded in COMSECY-14-0015 that NRC-conducted force-on-force inspections during decommissioning are not warranted because the current security inspection program provides adequate oversight and verification of the security posture given the reduction in both radiological consequences and the number of target sets at decommissioning power reactors. In SRM-COMSECY-14-0015 (ADAMS Accession No. ML14148A010), the Commission agreed with the NRC staff’s conclusion that NRC-conducted force-on-force inspections during decommissioning are not warranted. The NRC has not published regulations that implement the statutory requirement to conduct security evaluations, including force-on-force exercises. Therefore, once licensees have filed and the NRC has docketed the certifications of permanent cessation of operations and permanent removal of fuel from the reactor vessel pursuant to 10 CFR 50.82 or 10 CFR 52.110, the NRC will notify licensees by letter that they are no longer subject to NRC-conducted force-on-force inspections. This update will be reflected in internal licensing guidance. The NRC staff is not recommending any changes to the regulations for this issue.

Suspension of Security Measures

The NRC staff is proposing to amend 10 CFR 73.55(p) to permit a certified fuel handler, as defined in 10 CFR 50.2, “Definitions,” to approve the temporary suspension of security measures during certain emergency conditions or during severe weather at decommissioning nuclear power reactors whose 10 CFR 50.82(a) certifications have been docketed. Currently, security requirements located in 10 CFR 73.55(p)(1)(i), provide that a “licensee may suspend any security measures under this section in an emergency when this action is immediately needed to protect the public health and safety....” This suspension must be approved by a licensed senior operator. Similarly, 10 CFR 73.55(p)(1)(ii) provides that a licensee may suspend security measures during “severe weather when the suspension of affected security measures is needed to protect the personal health and safety of security force personnel....” This suspension must be approved, at a minimum, by a licensed senior operator with input from the security supervisor or manager. The licensee for a nuclear power reactor that has

permanently ceased operations and no longer has fuel in the reactor vessel may choose to no longer employ or have on site a licensed senior operator. As these provisions are now written, the suspension of the above security measures to protect the public or protect the security officer in the instance of severe weather could not be accomplished at a decommissioning reactor without first requesting an exemption.

Other provisions of NRC regulations allow for a certified fuel handler to perform actions that would otherwise need to be performed by a licensed senior operator. Nuclear power reactor licensees under the provisions of 10 CFR 50.54(x) may take reasonable actions that depart from a license condition or a technical specification in an emergency, when this action is immediately needed to protect its staff and the public and no action consistent with existing conditions or specifications is immediately apparent. In accordance with the provisions of 10 CFR 50.54(y), licensee actions permitted by paragraph (x) must be approved, as a minimum, by a licensed senior operator, or, at a decommissioning nuclear power reactor when the certifications required under 10 CFR 50.82(a)(1) have been submitted, by either a licensed senior operator or a certified fuel handler, prior to taking the action.

Adding the certified fuel handler as having the authority to approve the suspension of security measures during emergencies or severe weather will not endanger life or property or the common defense and security. By regulatory definition in 10 CFR 50.2, a "Certified fuel handler means, for a nuclear power reactor facility, a non-licensed operator who has qualified in accordance with a fuel handler training program approved by the Commission." Given the reduced nature of the risks at a permanently shutdown and defueled nuclear power reactor, a certified fuel handler has the requisite knowledge and experience to evaluate site conditions and make the types of judgments necessary to determine that the suspension of security measures is warranted. Further, 10 CFR 73.55(p)(2) would continue to state that "[s]uspended security measures must be reinstated as soon as conditions permit." The underlying purpose of 10 CFR 73.55(p) is to protect the health and safety of the public and of the security force, and this purpose will continue to be met.

The NRC staff therefore recommends that the changes below be reflected in 10 CFR 73.55(p):

(i) In accordance with §§ 50.54(x) and 50.54(y) of this chapter, the licensee may suspend any security measures under this section in an emergency when this action is immediately needed to protect the public health and safety and no action consistent with license conditions and technical specifications that can provide adequate or equivalent protection is immediately apparent. This suspension of security measures must be approved as a minimum by a licensed senior operator, or, at a nuclear power reactor facility for which the certifications required under § 50.82 or § 52.110 have been docketed, by either a licensed senior operator or a certified fuel handler, before taking this action.

(ii) During severe weather when the suspension of affected security measures is immediately needed to protect the personal health and safety of security force personnel and no other immediately apparent action consistent with the license conditions and technical specifications can provide adequate or equivalent protection. This suspension of security measures must be approved as a minimum by a licensed senior operator, or, at a nuclear power reactor facility for which the certifications required under § 50.82 or § 52.110 have been docketed, by either a licensed senior operator or a certified fuel handler, with input from the security supervisor or manager, before taking this action.

Protection Against Significant Core Damage

Under 10 CFR 73.55(b)(3), a nuclear power reactor licensee's physical protection program must be designed, in part, to prevent significant core damage. A nuclear power reactor that has permanently ceased operations and no longer has fuel in the reactor vessel would not undergo an emergency shutdown to prevent significant core damage or a radiological release; with no fuel in the reactor vessel, damage to the core poses no radiological risks. Accordingly, there is no longer a need for licensees to protect against significant core damage once all fuel is in the SFP or in a DCSS. Training of security personnel for this condition is also no longer warranted.

Therefore, the NRC staff is proposing to relieve licensees of a nuclear power reactor in decommissioning from the requirement in 10 CFR 73.55(b)(3) that the physical protection program be designed to prevent significant core damage. All other conditions in this section would remain in effect.

The current 10 CFR 73.55(b)(3) regulation reads:

The physical protection program must be designed to prevent significant core damage and spent fuel sabotage. Specifically, the program must: (i) Ensure that the capabilities to detect, assess, interdict, and neutralize threats up to and including the design basis threat of radiological sabotage as stated in §73.1, are maintained at all times. (ii) Provide defense-in-depth through the integration of systems, technologies, programs, equipment, supporting processes, and implementing procedures as needed to ensure the effectiveness of the physical protection program.

The NRC staff recommends the following paragraph (iii) be added to 10 CFR 73.55(b)(3):

(iii) Upon docketing of the certifications of permanent cessation of operations and permanent removal of fuel from the reactor vessel pursuant to § 50.82 or § 52.110 of this chapter, the requirement that the physical protection program be designed to prevent significant core damage no longer applies.

Training for Loss of the Ultimate Heat Sink

The provisions of Security Order EA-02-026, "Interim Compensatory Measures (ICM) for High Threat Environments" (not publicly available), require in Section B.1.a that licensees provide operational training for emergency response actions in the event of the loss of the ultimate heat sink for an operating reactor. The ultimate heat sink is the system of structures and components and associated assured water supply and atmospheric condition(s) credited for functioning as a heat sink to absorb reactor residual heat and essential station heat loads after a normal reactor shutdown or a shutdown following an accident or transient including a loss-of-coolant accident. The operational training required in the Order addresses loss of the ultimate heat sink needed for an emergency reactor shutdown in order to protect against reactor core damage and a radiological release.

A nuclear power reactor that has permanently ceased operations and no longer has fuel in the reactor vessel would not undergo an emergency shutdown to prevent core damage or a radiological release. This means that there is no longer a need for the ultimate heat sink once all fuel is in the SFP or in DCSS and no longer a need for any operational training to address

loss of the ultimate heat sink. Consequently, the security order requirement for operational training for this condition is no longer needed.

Therefore, the NRC staff is proposing to provide licensees with a nuclear power reactor in decommissioning with relief from the requirement in Section B.1.a of Security Order EA-02-026. All other conditions in this order would remain in effect.

Licensees will be notified by letter upon docketing of the certifications of permanent cessation of operations and permanent removal of fuel from the reactor vessel pursuant to 10 CFR 50.82 or 10 CFR 52.110 that the requirement to implement Section B.1.a of Order EA-02-026 is rescinded in its entirety. The NRC staff is not recommending any changes to the regulations for this issue.

Protection of the Control Room

Under 10 CFR 73.55(e)(9), licensees are required to protect the reactor control room as a vital area. A vital area is defined as any area which contains vital equipment, and vital equipment means any equipment, system, device, or material, the failure, destruction, or release of which could directly or indirectly endanger the public health and safety by exposure to radiation. Equipment or systems which would be required to function to protect public health and safety following such failure, destruction, or release are also considered to be vital.

The role of the reactor control room at an operating plant, as described in Criterion 19 of Appendix A to 10 CFR Part 50, is to provide a protected space from which actions can be taken to operate the nuclear power plant safely and without interruption under normal or accident conditions.

For a permanently shutdown and defueled facility, the vital equipment associated with operating the reactor vessel is no longer needed and the remaining vital equipment may no longer be needed or may be relocated to a vital area separate from the control room. Once a reactor has permanently ceased operations, the need for a reactor control room is eliminated if all of the vital equipment is removed and the area does not serve as the vital area boundary for other vital areas. If this is the case, the reactor control room need no longer be designated as a vital area.

The NRC staff recommends that the following be added to 10 CFR 73.55(e)(9)(v)(A):

At a minimum, the following shall be considered vital areas: (A) the reactor control room, unless the licensee has submitted and the NRC has docketed the certifications of permanent cessation of operations and permanent removal of fuel from the reactor vessel pursuant to § 50.82(a) or § 52.110(a) of this chapter.

Communications with the Control Room

Section 73.55(j)(4)(ii) of 10 CFR requires that a system for continuous communication capabilities with the control room must terminate in both alarm stations to ensure effective command and control during both normal and emergency conditions. One purpose of this requirement is to ensure communications are maintained between security operations and reactor operators who are normally located in the control room. A nuclear power reactor that has permanently ceased operations and no longer has fuel in the reactor vessel may no longer have a control room; therefore, the NRC staff is recommending that the requirement for continuous communications to be maintained between the alarm stations and the control room

should be replaced with a requirement for communications to be maintained between the alarm stations and the certified fuel handler and/or senior on-shift licensee representative. This change would ensure that communications between safety and security functions are maintained at a facility during decommissioning.

Communication requirements will continue to meet the following conditions:

- The licensee shall establish and maintain continuous communication capability with onsite and offsite resources to ensure effective command and control during both normal and emergency situations. (10 CFR 73.55(j)(1))
- The licensee shall establish and maintain radio or microwave transmitted two-way voice communication, in addition to conventional telephone service, between the alarm stations and local law enforcement authorities. (10 CFR 73.55(j)(4)(i))
- The licensee shall identify site areas where communication could be interrupted or cannot be maintained, and shall establish alternative communication measures or otherwise account for these areas in implementing procedures. (10 CFR 73.55(j)(6))

The NRC staff recommends the following language be considered to be added to 10 CFR 73.55(j)(4):

(ii) A system for communication with the control room; or, if the certifications of permanent cessation of operations and permanent removal of fuel from the reactor vessel have been docketed pursuant to § 50.82 or § 52.110 of this chapter, a system for communication with the Certified Fuel Handler and/or senior on-shift licensee representative responsible for overall safety and security of the permanently shutdown and defueled facility.

Number of Armed Responders

In accordance with 10 CFR 73.55(k), licensees must establish and maintain, at all times, properly trained, qualified, and equipped personnel required to interdict and neutralize threats up to and including the DBT of radiological sabotage as defined in 10 CFR 73.1. As required by 10 CFR 73.55(k)(5), licensees are responsible for determining the minimum number of armed responders necessary to satisfy the general performance objective and requirements in 10 CFR 73.55(b) and shall document this number in their security plans. The regulations also provide that the number of armed responders for operating reactors shall not be less than ten.

As discussed in Section 2.2 of this regulatory basis, “Power Reactor Decommissioning Activity since the 1996 Decommissioning Rule,” and in the discussion section of this Appendix, reactors that have ceased to operate and have removed all fuel from the reactor vessel have a lower risk of significant radiological release due to a security event. However, 10 CFR 73.55(k), like many security regulations applicable to operating reactors, does not take into account this lower risk and its corresponding reduction in the number of target sets required to be protected as facilities defuel and progress through the decommissioning process. Upon cessation of operations and removal of all fuel from the reactor vessel, each facility reduces or eliminates safety systems related to the reactor that were classified as target sets (e.g., emergency core cooling systems), and eliminates all attack scenarios relating to the reactor vessel. Commensurate with this reduction in potential targets, the NRC staff recognizes that a licensee is permitted to reassess the minimum number of armed responders needed to implement the site protective strategy consistent with the performance objectives and design requirements of 10 CFR 73.55(b) to prevent radiological sabotage. This reassessment would be provided to the NRC for review and

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approval in accordance with 10 CFR 50.90 and must demonstrate how the physical protection program continues to prevent radiological sabotage to ensure each site has the appropriate number of armed responders needed to maintain safeguards effectiveness with assurance. Therefore, the NRC staff recommends no change to the current regulations since existing regulatory processes are sufficient to address this issue.

Safeguards Effectiveness

All reactor licensees have several options when it comes to making changes to the site security plans required under 10 CFR 50.34. Consistent with 10 CFR 50.54(p)(1), licensees must submit a license amendment request under 10 CFR 50.90 for any change that decreases the effectiveness of their security plans. The license amendment request must fully describe the proposed change and the technical basis for the change. The license amendment request is subject to NRC review and approval. Consistent with 10 CFR 50.54(p)(2), licensees may make changes to their security plans without prior Commission approval if the change does not decrease the safeguards effectiveness of the plan. Licensees are required to provide a report of the changes to the Commission within two months following the change. Finally, licensees may request specific exemptions for security requirements in accordance with 10 CFR 73.5. Specific exemptions may be requested by licensees to address, among other things, changes in site conditions arising from decommissioning. All exemptions must be reviewed and approved by the NRC prior to the changes being implemented.

Upon the cessation of operations and removal of all fuel from the reactor vessel, licensees that are performing decommissioning activities may want to modify their physical protection programs to reflect changes in site conditions, including but not limited to: 1) changes to vital areas as defined in 10 CFR 73.2; 2) the reduced number of target sets; 3) the number of armed personnel necessary to protect the nuclear materials possessed at the facility; and 4) the location of physical barriers required to meet the requirements of 10 CFR 73.55.

Operating reactor licensees that are decommissioning currently use the 10 CFR 50.54(p)(2) process to implement changes to their site security plans (e.g., removal of barriers, reduction of vital areas and armed response team members). After the licensee has implemented the changes to their security plans and submitted the required report of the changes, NRC staff practice is to review these reports to ensure that the licensee has properly adhered to the requirements of 10 CFR 50.54(p)(2) and not implemented a change that decreases the safeguards effectiveness of its security plans. Although not specifically required by regulation, licensees have typically included in their submitted reports descriptions demonstrating that these changes do not constitute a decrease in safeguards effectiveness. NRC staff are usually able to complete these reviews and make a safeguards effectiveness determination based upon the additional information included in these licensee reports. Without the submittal of this additional information, NRC staff would be unable to verify the licensee's safeguards effectiveness determination through a review of the report alone, and can only complete this verification through inspection. However, submission of this additional information is not currently a regulatory requirement.

The NRC staff further notes that the 10 CFR 50.54(p)(2) change process is complicated for both licensees and NRC staff by the fact that the term "decrease in safeguard effectiveness" is not defined in regulations. This contrasts with the treatment of emergency plans in 10 CFR 50.54(q), which does contain a definition of the similar concept of "reduction in effectiveness." Accordingly, the NRC is considering adding the following definition to 10 CFR 50.2 or 10 CFR 50.54(p)(2):

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A decrease in the safeguards effectiveness of a security plan is a change or series of changes to the security plan that reduces or eliminates the licensee's ability to perform or maintain the security function that was previously performed or provided by the changed element or component without compensating changes to other security plan elements or components.

- Option 1, no change. Decommissioning licensees continue to implement security plan changes that do not decrease safeguards effectiveness using the provisions of 10 CFR 50.54(p)(2), reporting changes to the NRC within 2 months. If the NRC staff is unable to verify the licensee's safeguards effectiveness determination through a review of the submitted report, the NRC staff would continue to follow up on the changes through the inspection process.
- Option 2, develop regulatory guidance associated with decommissioning reactor security plan changes to provide licensees guidance for making security plan changes that do and do not decrease the safeguards effectiveness of the plan.
- Option 3, revise the requirements in 10 CFR 50.54(p) to include the aforementioned definition of safeguards effectiveness and revise the specific requirements in 10 CFR 50.54(p)(2) to more closely reflect the wording found in 10 CFR 50.54(q), specifically within 10 CFR 50.54(q)(3) and (5).

Transition to Physical Security Requirements Applicable to an ISFSI

Power reactor licensees that operate an ISFSI may hold either a general or specific license for the ISFSI. Under 10 CFR 72.212(b)(9), generally licensed ISFSIs are subject to the same physical security requirements in 10 CFR 73.55 as power reactors, with some exceptions. By contrast, licensees that hold a specific license under 10 CFR Part 72 are subject to the physical security requirements of 10 CFR 73.51, which are less stringent than the 10 CFR 73.55 requirements.

During the decommissioning process, power reactor licensees with a generally licensed ISFSI will progress to a phase when all the spent fuel has been removed from the SFP and placed in DCSS. At this point, the security measures needed to protect the facility from radiological sabotage decrease significantly. Once the reactor ceases to operate, many requirements in 10 CFR 73.55 (for example, fitness-for-duty, target sets, and vital areas) are no longer needed because there is no fuel in the core. General ISFSI licensees must submit license amendments and requests for regulatory exemptions to obtain relief from the more stringent requirements. The NRC has previously exempted decommissioning licensees who have placed all fuel into DCSS from the requirements of 10 CFR 73.55, and allowed the licensees to commit to following the ISFSI-specific physical security requirements in 10 CFR 73.51, which reflect a level of physical protection significantly less than that required at operating power reactors and decommissioned facilities with fuel in the SFP.

The NRC staff is recommending changes to the provisions of 10 CFR Parts 72 and 73 to transition a general licensed ISFSI to the requirements of 10 CFR 73.51 when the power reactor facility enters decommissioning status.

The NRC staff recommends the following language be considered to be added to 10 CFR 72.212(b)(9) to affect this change:

(vii) Upon docketing of the certifications of permanent cessation of operations and permanent removal of fuel from the reactor vessel pursuant to § 50.82 or § 52.110 of this chapter, and revision of the final facility safety analysis report to reflect that all spent fuel has been placed in dry storage at the facility (including a prohibition against storage of fuel in the spent fuel pool), the licensee shall provide for physical protection of the spent fuel under Subpart H of this part and § 73.51 of this chapter.

ASSESSMENT OF OPTION 2

This option would reduce the need to use the license exemption process, which would significantly reduce the administrative burden to licensees and the NRC staff associated with the processing of exemptions on a case-by-case basis. Overall the rule would provide ongoing cost savings to licensees and moderate one-time costs followed by ongoing cost savings to the NRC. Option 2 would result in small ongoing costs associated with the submission by licensees and review by NRC staff of security plans throughout the decommissioning process.

Impacts on public health, safety, and security

The impacts of these changes on public health, safety, and security would be minimal. The NRC staff notes that changes to the requirements reflect approved exemptions and amendments that occur under the current process. The NRC staff evaluation of all changes to ensure no decrease in the site security effectiveness continues to occur. The NRC staff concludes that changes to the regulations would capture the areas licensees current request relief from thereby providing a level of clarity to the process for the public.

Impacts on licensees

Overall, this option would result in ongoing cost savings to licensees.

- Changes to the requirements would result in the reduction of exemption requests for decommissioning reactors. Licensees would benefit from a reduction in the administrative burden associated with the exemption request process. Licensees may also be able to expedite the decommissioning process because any delays associated with processing exemptions would be reduced.
- Licensees would continue to incur moderate administrative burden associated with submitting updated physical security plans to the NRC as they transition between operating status, decommissioned status and an ISFSI.

Impacts on NRC

Overall, this option would result in significant one-time costs to the NRC followed by ongoing savings.

- Initially, there would be incremental costs to the NRC to undertake the rulemaking process concurrently with processing exemption requests. These costs include the preparation of the proposed rule and accompanying guidance. The costs would include both NRC staff and contractor time to prepare proposed rule language, draft guidance, supporting analyses (e.g., a regulatory analysis and Office of Management and Budget

Paperwork Burden analysis), a *Federal Register* notice, and public outreach efforts during the rule and guidance development phase. After publishing the proposed rule, the NRC would incur costs associated with public comment resolution and preparation of the final rule, guidance, and supporting documentation for the rulemaking.

- By streamlining the decommissioning exemption and amendment process, the NRC will reduce both the number and length of the requests. This would result in a more efficient process and save the NRC staff time and resources.
- The NRC staff would incur administrative burden associated with reviewing updated physical security plans for decommissioning reactors transitioning between tiers.

Additional considerations

The proposed rule would have no incremental impact on State, local, or Tribal governments.

Summary of benefits and costs

Benefits

- Enhanced clarity and predictability of decommissioning process.
- Savings to all licensees resulting from minimizing the need to use the exemption process.
- Savings to licensees resulting from potential to expedite the decommissioning process.
- Savings to the NRC from fewer amendments and exemptions to review.

Costs

- One-time cost to the NRC to prepare rule, revise guidance and implement rule.
- Ongoing costs to licensees to provide updates to physical security plans during the process.
- Ongoing costs to the NRC to review updates to physical security plans during the process.

Backfitting Considerations

Of the two options presented by the NRC staff in this appendix, Option 1 would not constitute backfitting under 10 CFR 50.109 or violate any issue finality provision in 10 CFR Part 52 if the option were implemented by the NRC. Option 1 would maintain the status quo of exemption requests, license amendment requests, and changes under 10 CFR 50.54(p), thereby imposing no change in requirements or NRC staff positions. With two exceptions, the recommendations in Option 2, if implemented, would provide licensees with a voluntary alternative to exemption requests, license amendment requests, and changes under 10 CFR 50.54(p) by amending the NRC's regulations to establish a graded approach to physical security commensurate with the reductions in radiological risk as licensees proceed through the decommissioning process. Because licensees would not be required to comply with these regulations, their inclusion in the rulemaking for Option 2 would not constitute backfitting or violate issue finality.

The proposed requirement for decommissioning licensees to provide physical protection of a generally licensed ISFSI in accordance with 10 CFR 73.51 may constitute backfitting.

The proposed requirement that licensees prepare and retain an analysis of security plan changes made under 10 CFR 50.54(p)(2) and submit a summary of that analysis to the NRC would be a new information collection and reporting requirement. Information collection and reporting do not fall within the backfit rule.

Consideration of Comments Received on the Advance Notice of Proposed Rulemaking for Regulatory Improvements for Decommissioning Power Reactors

Overall comments received on the planned regulatory improvements in the area of physical security are supportive of the changes. The NRC staff received comments from private citizens, local and State governments, public interest groups, industry and industry groups and non-governmental organizations. The NRC staff used the comments received to inform this regulatory basis but did not disposition comments individually.

Comments could be grouped into the following categories: those that supported reasonable changes based on security event consequences and those that supported no change or an increase in requirements based on a perceived vulnerability or increased risk. All comments were reviewed and considered and changes were made to this document based on the comments received.

Specifically, several commenters requested that security remain high as long as spent fuel was still located in the SFP. This comment was addressed by considering requirements for licensees to maintain a response force until all fuel has been placed in DCSS. Other commenters wanted to make sure that the rule did not have negative or unintentional impacts on standalone ISFSIs. This comment was addressed by proposing conforming changes to the regulations to ease the transition for decommissioning reactors from the requirements of 10 CFR 73.55 to the requirements of 10 CFR 73.51.

Other commenters urged that the scope of the rulemaking be directed at codifying the exemptions and other licensing actions that have historically been justified by licensees and approved by the NRC. To address this comment, the NRC staff reviewed past exemptions and included in this regulatory basis all exemptions that could be generically applied to future decommissioning sites, specifically adding relief from the protection against significant core damage.

One group of commenters requested that a way to reduce armed responders be added to the regulations. This provision was not adopted by NRC staff since other means exist (i.e., license amendment) for reducing armed responders. However, the NRC staff determined that discussing the provision in this draft regulatory basis, would provide value to the public.

Finally comments were made that all spent fuel should be removed from the site immediately and that spent fuel should not be allowed to be stored on the site at any time. These comments were outside of the scope of this rulemaking and not addressed in this regulatory basis.

Appendix C - Cyber Security

Introduction and Purpose

The current cyber security requirements for power reactors are set forth in 10 CFR 73.54, “Protection of digital computer and communication systems and networks.” These requirements were established as part of a 2009 final rule, “Power Reactor Security Requirements” (74 FR 13926; Mar. 27, 2009). As stated in the rule’s *Federal Register* notice, its requirements became effective on May 26, 2009, and for licensees “currently licensed to operate under 10 CFR Part 50” compliance was required by March 31, 2010. 74 FR at 13926. Neither the rule’s statement of considerations (SOC) nor the terms of 10 CFR 73.54 explicitly address the applicability of the cyber security requirements to a nuclear power plant licensee that permanently defuels and shuts down after the rule’s effective date. As a result, there is a potential for inconsistency in the application of the cyber security requirements to the licensee of a nuclear power plant that was in a decommissioning status as of May 26, 2009, and the licensee of a nuclear power plant that enters decommissioning after this date. The purpose of any rulemaking in this regulatory area would thus be to establish appropriate requirements for protecting digital computer and communication systems and networks at nuclear power plant sites at which all reactors have been permanently shutdown and defueled.

As discussed in Section 2.2 of this draft regulatory basis, the NRC staff recognizes that in comparison to the risks at an operating nuclear power reactor, the spectrum of possible accidents are significantly fewer, and the risk of an offsite radiological release is significantly lower, at a nuclear power reactor that has permanently ceased operations and has removed all fuel from the reactor vessel. The reduced cyber security risk is due, in part, to the fact that there are fewer critical digital assets (CDAs) at a decommissioning reactor in comparison to the number of CDAs at an operating reactor. For example, once spent fuel is moved from the reactor vessel and placed in the spent fuel pool (SFP), the digital computers and communication systems and networks that require cyber protection are primarily those associated with security and emergency preparedness (EP) functions, and those safety systems that support operation of the SFP. Furthermore, if the NRC staff adopts a graded EP approach as discussed in Appendix A of this document, systems and supporting equipment associated with EP functions would also be removed in phases during power reactor decommissioning. Additionally, the reduction in the number of digital computers and communication systems and networks reduces the number of attack pathways for a cyber attack during the decommissioning of a power reactor.

Existing Cyber Security and Related Requirements for Power Reactors

The preamble to 10 CFR 73.54 states in part that by November 23, 2009, each reactor licensee “currently licensed to operate” must, in accordance with 10 CFR 50.90, submit to the NRC “a cyber security plan” (CSP) for review and approval. The preamble further states that the 10 CFR 73.54 requirements are applicable to current “applicants for an operating license or combined license,” and required such applicants to amend their applications to include a CSP. Although there are, as yet, no power reactor facilities operating under a Part 52 combined license, this appendix is written assuming that there will be licensees operating under Part 52 licenses in the future.

Under 10 CFR 73.54(a), applicants and licensees must provide “high assurance¹²” that their digital computer and communication systems and networks associated with safety and important-to-safety, security and emergency preparedness (SSEP) functions “are adequately protected against cyber attacks, up to and including” the design basis threat (DBT) described in 10 CFR 73.1, “Purpose and scope.” Approved CSPs are referenced as license conditions in reactor operating licenses, and these license conditions continue to apply to any part 50 licensee or part 52 combined operating license holder that permanently shuts down. As discussed further below, a licensee may apply for a license amendment under 10 CFR 50.90 to remove its CSP license condition, and two such license amendment requests are pending.¹³

As indicated above, the language in 10 CFR 73.54 does not address the application of the cyber security rule to decommissioning nuclear power reactors that have filed certifications under 10 CFR 50.82, “Termination of license” or 10 CFR 52.110, “Termination of license” for 10 CFR Part 52 licensees after the effective date of the rule. As an initial step in the decommissioning process, a reactor licensee must submit written certifications that it has decided to permanently cease operations and has permanently removed all fuel from its reactor vessel, in accordance with 10 CFR 50.82(a)(1)(i) and (ii) or 10 CFR 52.110(a)(1) and (2) for 10 CFR Part 52 licensees. As stated in 10 CFR 50.82(a)(2) and 10 CFR 52.110(b), upon the NRC’s docketing of these certifications, the license no longer authorizes operation of the reactor or the placement or retention of fuel in the reactor vessel.

Proposed Application of Cyber Security Requirements to Decommissioning Reactors

The NRC staff has determined that once the NRC has docketed a licensee’s 10 CFR 50.82 or 10 CFR 52.110 certifications, 10 CFR 73.54 no longer applies to that license because the licensee is no longer authorized to operate a nuclear power plant. However, a reactor licensee who has submitted its 10 CFR 50.82(a)(1) or 10 CFR 52.110(a) certifications may still have fresh fuel in its SFP. As discussed in the spent fuel analyses referenced in Section 2.2 and Appendix A of this document, the NRC staff has concluded that after a cooling period of 10 months for boiling-water reactors (BWRs) or 16 months for pressurized-water reactors (PWRs), there is little chance that the spent fuel in the SFP could heat-up to clad ignition temperature within 10 hours of fire propagation in postulated draindown scenarios. The NRC staff has further concluded that once the spent fuel has sufficiently decayed, the potential consequences of a cyber attack are significantly reduced, since there are no design basis events at a decommissioning plant that could result in an offsite radiological release exceeding the limits established by the U.S. Environmental Protection Agency. With the significant reduction in radiological risk for a power reactor undergoing decommissioning, the NRC recognizes that the consequences of a cyber attack are reduced.

Despite the reduction in risk associated with a decommissioning power reactor, the NRC staff has determined that until all spent fuel in the SFP is sufficiently decayed such that a spent fuel fire is highly unlikely, reactor licensees should be required to maintain reasonable assurance that their critical digital assets remain protected against cyber attacks. Further, notwithstanding

¹² The Commission provided the following direction in SRM-SECY-16-0073, “Staff Requirements – Options and Recommendations for the Force-on-Force Inspection Program in Response to SRM-SECY-14-0088,” dated October 5, 2016 (ADAMS Accession No. ML16279A345): “In implementing the NRC’s regulatory program, either in developing new regulations, inspecting licensee compliance with regulations, or executing the FOF program, the staff should be mindful that the concept of ‘high assurance’ of adequate protection found in our security regulations is equivalent to ‘reasonable assurance’ when it comes to determining what level of regulation is appropriate.”

¹³ October 15, 2015, “Request for Approval of the Kewaunee Power Station Security Plan” (ML15294A072); May 24, 2016, “Crystal River Unit 3-License Amendment Request #321, Revision 0, ISFSI Only Physical Security Plan” (ML16152A045).

the NRC staff's view that 10 CFR 73.54 no longer applies once a licensee's 10 CFR 50.82 or 10 CFR 52.110 certifications are docketed, 10 CFR Part 50 licensees are still subject to their CSP license conditions until they are removed from the license, pursuant to a 10 CFR 50.90 amendment request. Accordingly, licensees that are decommissioning will remain subject to their CSP license conditions absent NRC approval of an amendment request. The NRC is currently following its normal process to evaluate any license amendment requests submitted by the licensees requesting for the removal of these license conditions on a case-by-case basis.

As indicated above, licensees that are decommissioning may request adjustments to their CSPs to account for the reduced number of CDAs, utilizing the processes under 10 CFR 50.54(p) and 10 CFR 50.90. For example, on October 1, 2015, the NRC staff approved a license amendment (ADAMS Accession No. ML15209A935) for San Onofre Nuclear Generating Station, Units 2 and 3 (SONGS) to revise the cyber security plan completion date in the facility operating licenses, based in part on the fact that the number of CDAs at SONGS was expected to be reduced from 3350 to approximately 1350 a result of the decision to decommission Units 2 and 3.

Reduced Cyber Risks at SFPs No Longer Receiving Fresh Spent Fuel

As discussed more fully in Section 2.2 in this draft regulatory basis, in the late 1990s NUREG-1738 studied the risk of an SFP accident to support a previous rulemaking regarding decommissioned nuclear power plants in the United States. NUREG-1738 conservatively assumed that if the water level in the SFP dropped below the top of the spent fuel, an SFP zirconium fire involving all of the spent fuel would occur, and thereby bounded those conditions associated with air cooling of the fuel (including partial-drain down scenarios) and fire propagation. Even with this conservative assumption, the study found the risk of an SFP fire to be low and well within the Commission's Safety Goals.

Although NUREG-1738 did not completely rule out the possibility of a zirconium fire, it did demonstrate that storage of spent fuel in a high density configuration in SFPs is safe, and that the risk of accidental release of a significant amount of radioactive material to the environment is low. The study used simplified and sometimes bounding assumptions and models to characterize the likelihood and consequences of beyond-design-basis SFP accidents. Subsequent NRC regulatory activities and studies reaffirmed the safety and security of spent fuel stored in pools, and demonstrated that SFPs are effectively designed to prevent accidents and minimize damage from malevolent attacks.

The NRC staff considers that at a decommissioning plant the consequences resulting from a successful cyber attack are reduced, in part because the number of SSEP systems, particularly safety systems, is reduced when a reactor enters decommissioning. Accordingly, the NRC staff has determined that: (1) there are no applicable design-basis events at these facilities that could result in an offsite radiological release exceeding the limits established by the U.S. Environmental Protection Agency's early phase protective action guidelines of 1 rem at the exclusion area boundary; and (2) sufficient time would exist to take prompt mitigative actions in response to a postulated zirconium fire accident scenario in the SFP. The current 10 CFR 73.54 regulations do not reflect these considerations.

10 CFR 73.54 Guidance

The regulatory guidance associated with 10 CFR 73.54 can be found in RG 5.71, "Cyber Security Programs for Nuclear Facilities" (ADAMS Accession No. ML090340159). The NRC

has also endorsed the industry guidance contained in NEI 08-09, "Cyber Security Plan for Nuclear Power Reactors," Revision 6 (ADAMS Accession No. ML101180437), and NEI 13-10, Revision 4, "Cyber Security Control Assessments," (ADAMS Accession No. ML15338A276).

Relationship Between Decommissioning Power Reactors and ISFSIs

The NRC staff developed SECY-12-0088, "The Nuclear Regulatory Commission Cyber Security Roadmap" (ADAMS Accession No. ML12135A050), dated June 25, 2012, which set forth the NRC staff's approach for evaluating the need for cyber security requirements for the following four categories of NRC licensees and facilities: (1) FCFs, (2) non-power reactors, (3), ISFSIs, and (4) byproduct materials licensees. The roadmap reflects a graded approach to developing cyber security requirements commensurate with the inherent nuclear safety and security risks associated with the different types of licensees and facilities.

Regarding ISFSIs, the NRC staff in SECY-12-0088 states in relevant part (SECY-12-0088, at page 6):

By regulation [10 CFR Part 72], dry cask storage in ISFSIs allows spent fuel that has already been cooled in the spent fuel pool for 1 year to be surrounded by inert gas inside a storage cask. Licensees that are subject to 10 CFR 72.212, "Conditions of General License Issued Under 10 CFR 72.210," (i.e., licenses limited to storage of spent fuel in casks) must also comply with specific portions of 10 CFR 73.55 requirements for physical security and the ASM [additional security measures] Orders, but are not subject to the provisions of 10 CFR 73.54, which specifically applies to operating reactors and COL [combined operating license] applicants.

The NRC staff will consider the need for cyber security requirements for ISFSIs as part of a general rulemaking on ISFSI security.

Recent Licensing Activity

After more than a decade without any power reactors permanently shutting down, operators of six power reactor units have permanently ceased operations since 2013, with several more indicating their intent to decommission in the next few years. Several licensees who are in the decommissioning process have indicated their intent to remove their CSP license conditions, and two such licensees have submitted license amendment requests in this regard that are now under NRC staff review. By letter dated October 15, 2015, Kewaunee Power Station submitted such a request, asking the NRC to approve the removal of cyber security requirements from its Operating License once all spent fuel in its SFP has been moved to its onsite ISFSI. By letter dated May 24, 2016, Duke Energy Florida, LLC submitted a similar amendment request, seeking the deletion of the cyber security license condition from its Crystal River Unit 3 license.

Public Comments Received on the ANPR

In response to the Advance Notice of Proposed Rulemaking (ANPR), the NRC received public comments for and against making changes to cyber security requirements for decommissioning power reactors. Two public commenters recommended changes to security requirements that would reflect a tiered approach to security, including cyber security. The commenters stated that the requirements of 10 CFR 73.54 should no longer be applicable once a licensee has submitted certifications of permanent removal of fuel from the reactor pursuant to 10 CFR 50.82(a)(1) or 52.110(a). The commenters recommended that the NRC amend 10 CFR 73.54

by adding a statement that “Upon docketing of the certifications of permanent cessation of operations and permanent removal of fuel from the reactor vessel pursuant to 10 CFR 10 CFR 50.82 or 10 CFR 52.110, the requirements of 10 CFR 73.54 no longer apply.”

References

The following sections identify and provide an analysis of options considered by the NRC staff to address potential changes to the current regulatory framework for cyber security at decommissioning sites. The NRC staff has consulted a number of references, including:

- 74 FR 13925, “Power Security Requirements; Final Rule,” March 27, 2009
- 71 FR 62663, “Power Security Requirements; Proposed Rule,” October 26, 2006
- SECY-12-0088, “The Nuclear Regulatory Commission Cyber Security Roadmap” (ML14072A257);
- RG 5.71, Revision 0, “Cyber Security Programs for Nuclear Facilities” (ML090340159)
- NEI-08-09, “Cyber Security Plan for Nuclear Power Reactors” (ML101180437)
- NEI-13-10, “Cyber Security Control Assessments” (ML15338A279)

Rulemaking Options

The NRC staff has identified three options (1, 2A, and 2B) to address the issues associated with cyber security requirements for decommissioning power reactors. These options were informed by stakeholder interaction on the ANPR.

OPTION 1: NO ACTION

Under the no-action option, there would be no changes to the current cyber security requirements set forth in 10 CFR 73.54. These requirements are applicable to 10 CFR Part 50 licensees and applicants, and to applicants and holders of combined licenses in accordance with 10 CFR 52.79(a)(36)(iii). The introductory wording of 10 CFR 73.54 states that it applies to “each licensee currently licensed to operate a nuclear power plant under Part 50 of this chapter. . . .”¹⁴ Once a licensee has filed the certifications required by either 10 CFR 50.82(a)(1)(i) and (ii); or 10 CFR 52.110(a); and those certifications have been docketed by the NRC, the licensee is no longer licensed to operate a nuclear power reactor.¹⁵ Therefore, by its terms, 10 CFR 73.54 does not apply to such licensees, because they are no longer authorized to operate a nuclear power reactor.

This conclusion is consistent with the position developed to support the 1996 final rule (“Decommissioning of Nuclear Power Reactors”) establishing the 10 CFR 50.82(a) certification provisions. As stated in the July 1995 SOC for the proposed rule, the intent of these 10 CFR 50.82(a) provisions was to remove “the licensee’s authority to operate the reactor or to maintain or place fuel in the reactor,” and this non-operating status would thus provide a basis “to remove regulatory requirements that are no longer necessary to protect the public health and safety.”¹⁶

¹⁴ In addition, 10 CFR 52.79(a)(36)(iii) requires a cyber security plan in accordance with the criteria set forth in 73.54

¹⁵ Additionally, the conclusion that once a licensee files its 10 CFR 50.82(a)(1) or 10 CFR 52.110(a) certifications and those certifications have been docketed by the NRC, it possesses a Part 50 or Part 52 license but is no longer authorized to operate a nuclear power reactor, supports the statutory restriction in Section 103.c of the Atomic Energy Act of 1954, as amended, that operating licenses issued by the Commission shall not exceed 40 years from the authorization to commence operation.

¹⁶ 60 FR. 37374, at 37378 (July 20, 1995).

It should be noted that, although the cyber security rule no longer applies to a licensee that has filed the certifications required by 10 CFR 50.82(a)(1)(i) and (ii) or 10 CFR 52.110(a), and those certifications have been docketed by the NRC, the licensee's CSP is still incorporated into the license as a license condition. As such, a licensee must abide by its CSP until the licensee submits a license amendment request to remove the CSP from its license. If a license amendment request is not submitted and approved, in whole or in part, the existing CSP would remain in force even after the submittal and docketing of the 10 CFR 50.82(a)(1) certifications.

ASSESSMENT OF OPTION 1

No additional resources would be expended to change the current cyber security requirements set forth in 10 CFR 73.54 if this were not included as part of the power reactor decommissioning rulemaking. The NRC expects that licensees would continue to submit license amendment requests to remove the CSP license condition.

OPTION 2: RULEMAKING TO CODIFY TIMING OF CYBER SECURITY REDUCTIONS

OPTION 2A: REMOVE REQUIREMENTS WHEN SPENT FUEL IS STORED IN DRY CASKS

The NRC staff received stakeholder input on the 2015 ANPR suggesting that 10 CFR 73.54 be amended, and that conforming changes be made to other regulations, which would require protection of digital computer and communications systems and networks until all spent fuel is moved to dry cask storage.

Under Option 2A, the NRC would pursue a rulemaking to propose that the cyber security requirements in 10 CFR 73.54 would continue to apply to decommissioning power reactors until all the fuel is transferred to dry cask storage. Therefore, cyber security requirements would continue to apply until (1) licensees have transferred transfer all spent fuel to dry cask storage, at which time the CSP license condition would be removed from the license upon approval of a license amendment request; and (2) the NRC approves a license amendment to remove the CSP license condition. Alternatively, if the Commission approves the Mitigation of Beyond-Design-Basis Events final rule¹⁷, the staff would evaluate the Commission decision to remove license conditions through rulemaking.

ASSESSMENT OF OPTION 2A

The NRC staff, in conducting its assessment of Option 2A, determined that there was not sufficient justification to pursue this option at this time. As noted in Section 2.2 of this regulatory basis document and in the discussion of Option 2B below, the staff has determined that the risk associated with maintaining spent fuel in the SFP after an appropriate period of decay is significantly reduced. Accordingly, this reduced level of risk does not justify the imposition of cyber security requirements on licensees until the spent fuel is transferred to dry cask storage.

OPTION 2B: REMOVE REQUIREMENTS WHEN SPENT FUEL IS SUFFICIENTLY DECAYED

Under Option 2B, the NRC would pursue a rulemaking to propose that the cyber security requirements in 10 CFR 73.54 would continue to apply to licensees of decommissioning power reactors who have submitted their 10 CFR 50.82(a)(1) or 10 CFR 52.110(a) certifications until

¹⁷ SECY-16-0142, "Draft Final Rule – Mitigation of Beyond-Design-Basis Events," dated December 15, 2016 (ADAMS Accession No.ML16301A005)

such time that all spent fuel in the SFP has sufficiently decayed (i.e., 10 months for BWRs and 16 months for PWRs). After these periods of time, the fuel in the SFP will have sufficiently decayed such that 10 hours is available to initiate mitigation measures in a postulated zirconium fire scenario, which corresponds to Level 2 as described in Appendix A of this document. Under this Option, the NRC staff expects that decommissioning reactor licensees would request license amendments to remove the cyber security plan license condition once their spent fuel has sufficiently decayed. Alternatively, if the Commission approves the Mitigation of Beyond-Design-Basis Events final rule, the staff would evaluate the Commission decision to remove license conditions through rulemaking.

ASSESSMENT OF OPTION 2B

The NRC staff's assessment of Option 2B is based on the spent fuel analyses referenced in Section 2.2 of this document, and as summarized above in this appendix under the heading, "Reduced Cyber Risks at SFPs No Longer Receiving Fresh Spent Fuel." The NRC staff has determined that cyber security requirements should be consistent with the graded approach to emergency preparedness as described in Appendix A of this document. In its review of stakeholder responses to the ANPR, the NRC staff did not find any input relevant to its assessment of this option. By publishing this draft regulatory basis for public comment, the NRC staff intends to obtain feedback on this option.

POTENTIAL BACKFIT CONSIDERATIONS

The NRC staff has determined that rulemaking to amend cyber security requirements (Option 2) would not constitute "backfitting" as defined in 10 CFR 50.109 for currently operating or recently shutdown Part 50 reactor licensees. The license for each of these licensees contains a CSP license condition that continues to apply after the reactor permanently shuts down. The rulemaking would replace the license conditions with an amended regulation, thereby maintaining the CSP requirements for these licensees. This rulemaking would not impose a new or changed requirement as the licensees are already implementing the requirement as part of their CSP license condition.

A rulemaking under Option 2 could constitute backfitting for Part 50 licensees that have their CSP license conditions removed by license amendment, or violate issue finality for Part 52 COL holders who do not have a CSP license condition. For these licensees, the NRC would have to assess whether the rulemaking would involve adequate protection or be necessary to bring a licensee into compliance with a requirement or commitment, and if not, whether the rulemaking would result in a cost-justified, substantial increase in the protection of the public health and safety or common defense and security.

Impacts of a Cyber Security Rulemaking

This section provides an analysis of the "no action" alternative and the NRC staff's recommended rulemaking option. Option 1 is the "no action" alternative and would make no changes to the regulatory framework for cyber security. Options 2 is a rulemaking approach that would codify the appropriate timing of cyber security reductions for decommissioning power reactors.

Under the current process, licensees undergoing decommissioning are still required by license condition to maintain their NRC-approved cyber security plans until such license conditions are amended or removed pursuant to 10 CFR 50.90. The rulemaking options presented herein are

aimed at establishing regulations to maintain an appropriate level of cyber security during the decommissioning process without the need to perform individual licensing actions.

OPTION 1: NO ACTION

Under this option, the NRC staff would continue with the existing decommissioning process as described in the current regulations and guidance. The NRC staff would continue to address cyber security at decommissioning power reactors through amendments to the cyber security plan license conditions.

Impacts on public health, safety, and security

Because this option would not change the current process, there would be no increase or reduction in public health, safety, and security.

Impacts on licensees

This option would have no incremental impact on licensees.

Impacts on NRC

This option would have no incremental impact on the NRC.

Additional considerations

This option would have no incremental impact on State, local, or Tribal governments.

Summary of benefits and costs

Benefits

- No incremental benefits to licensees or NRC.

Costs

- No incremental costs to licensees or NRC.

OPTION 2: RULEMAKING TO CODIFY TIMING OF CYBER SECURITY REDUCTIONS

Under this option, the NRC staff would undertake a rulemaking to remove requirements when spent fuel is sufficiently decayed for decommissioning power reactors. The changes to the underlying regulations and guidance would provide clarity as to the degree of cyber security that needs to be maintained during each stage of the decommissioning process. The proposed rule would clarify that cyber security requirements continue to apply to decommissioning power reactors until all fuel is sufficiently decayed in the SFP.

Impacts on public health, safety, and security

The rulemaking would continue to provide reasonable assurance of adequate protection of public health and safety, and the common defense and security.

Impacts on licensees

All reactor licensees that have an NRC-approved cyber security plan also have license conditions that reference these plans. This rulemaking would clarify that the cyber security plan license condition can be removed from the license following the submission and docketing of the 10 CFR 50.82(a)(1) certifications once all fuel in the SFP has sufficiently decayed.

- Licensees would still need to request a license amendment to remove the cyber security plan license condition. There would be no savings associated with the rulemaking in this regard. Alternatively, if the Commission approves the MBDBE final rule, the staff would evaluate the Commission decision to remove license conditions through rulemaking.
- The rulemaking would clarify and simplify the basis for removing the license condition.

Impacts on NRC

Overall, this option would result in a one-time cost to the NRC followed by ongoing savings.

- Initially, there would be incremental costs to the NRC to undertake the rulemaking process. These costs include the preparation of the proposed rule and accompanying guidance. The costs would include both NRC staff and contractor time to prepare proposed rule language, draft guidance, supporting analyses (e.g. a regulatory analysis and Office of Management and Budget Paperwork Burden analysis), a *Federal Register* notice, and public outreach efforts during the rule and guidance development phase. After publishing the proposed rule, the NRC would incur costs associated with public comment resolution and preparation of the final rule, guidance, and supporting documentation for the rulemaking.

Additional considerations

The proposed rule would have no incremental impact on State, local, or Tribal governments.

Summary of benefits and costs

Benefits

- Establish clear timing of cyber security reductions for power reactor decommissioning
- Ensure consistent regulatory approach to cyber security for decommissioning power reactors

Costs

- One-time cost to the NRC to develop rule and revise guidance

NRC Guidance

The following cyber security guidance documents would need to be updated if a cyber security rulemaking for decommissioning reactors is conducted:

- RG 5.71, “Cyber Security Programs For Nuclear Facilities”

NRC Staff Observations on Stakeholder Feedback on the ANPR

The following reflect the NRC staff’s observations on stakeholder comments on the ANPR. Neither senior NRC management nor the Commission has reviewed and approved any specific elements of the power reactor decommissioning rulemaking framework at this time, and as such, any conclusions regarding the elements of the power reactor decommissioning rulemaking are subject to change.

The NRC staff received input from industry that cyber security requirements should be removed at permanent cessation of operations. Specifically, stakeholder input received on the 2015 ANPR noted that, since the 2009 Power Reactor Security Requirements final rule did not apply cyber security requirements to power reactors that had ceased operations prior to the rule’s effective date, then the requirements of 10 CFR 73.54 should not apply to reactors that shutdown after this date. The NRC staff’s review of the current 10 CFR 73.54 cyber security regulations, and the public comments on the ANPR, show that the appropriate level of cyber security requirements for decommissioning power reactors needs to be clarified. For example, as discussed under Option 2B above, licensees of decommissioning reactor facilities would be required to maintain their CSPs until all spent fuel in the SFP has sufficiently decayed (i.e., 10 months for BWRs and 16 months for PWRs) such that 10 hours is available to initiate mitigation measures in the event of a zirconium fire scenario.

STAFF RECOMMENDATION

The NRC staff is publishing a *Federal Register* notice for this regulatory basis to obtain stakeholder feedback on the rulemaking options considered. The NRC staff encourages the public to provide feedback on this regulatory basis and the options considered above. The decision on which option the NRC staff recommends will be informed by public comments received on this draft regulatory basis document. The NRC staff’s recommendation, along with a full assessment of the rulemaking options described above, will be documented in the final regulatory basis.

Appendix D - Drug and Alcohol Testing

Current Drug and Alcohol Requirements for Power Reactors Transitioning to Decommissioning

Fitness for duty (FFD) program requirements, including drug and alcohol testing requirements, are provided in 10 CFR Part 26, "Fitness for Duty Programs." The requirement in 10 CFR 26.3, "Scope," lists those licensee types and other entities that are required to comply with designated subparts of 10 CFR Part 26, including "[l]icensees who are authorized to operate a nuclear power reactor under 10 CFR 50.57, and holders of a combined license under 10 CFR Part 52 after the Commission has made the finding under 10 CFR 52.103(g)..." Part 26, however, does not apply to a power reactor licensee that is no longer authorized to operate a nuclear power reactor because, for example, it has filed the certifications required under 10 CFR 50.82 and the NRC has docketed the certifications. Part 26 also does not apply to spent fuel storage facility licensees (i.e., when the spent fuel is no longer in the spent fuel pool (SFP)). However, as discussed below, several elements of the FFD program are required by existing regulations while the spent nuclear fuel is located in the SFP. Therefore, the current FFD requirements for power reactors transitioning to decommissioning are not consistent, nor are they clear or easily understood. The NRC staff is considering the options described below to provide clarification on these issues.

The purpose of FFD programs is to help ensure that individuals are not under the influence of any substance, or mentally or physically impaired from any cause that could adversely affect their abilities to safely and competently perform their duties. As described in Part 26, the major components of FFD programs include drug and alcohol testing, behavioral observation, fatigue management and employee assistance programs. Specifically stated in 10 CFR 26.23, "Performance Objectives," the objectives of the FFD program are to:

- (1) provide reasonable assurance that individuals are trustworthy and reliable as demonstrated by the avoidance of substance abuse;
- (2) provide reasonable assurance that individuals are not under the influence of any substances, legal or illegal, or mentally or physically impaired in a way that adversely affects their ability to safely and competently perform their duties;
- (3) provide reasonable measures for early detection of individuals who are not fit to perform the duties that require them to be subject to the FFD program;
- (4) provide reasonable assurance that the workplaces subject to Part 26 are free from the presence and effects of illegal drugs and alcohol; and
- (5) provide reasonable assurance that the effects of fatigue and degraded alertness on individuals' abilities to safely and competently perform their duties are managed commensurate with maintaining public health and safety.

In the context of this appendix, the FFD program discussions are limited to drug and alcohol testing, behavioral observation, and employee assistance programs. Fatigue management aspects of the FFD program described in Part 26 are discussed in Appendix K of this document.

The individuals at a facility that are required to be part of the FFD program are specified in 10 CFR 26.4, "FFD program applicability to categories of individuals". As it pertains to nuclear power plants, these individuals are subject to an FFD program that meets all of the requirements of Part 26, except subpart K, and include:

- (1) persons who are granted unescorted access to nuclear power reactor protected areas and perform the following duties:
 - operating or onsite directing of the operation of systems and components that a risk-informed evaluation process has shown to be significant to public health and safety;
 - performing health physics or chemistry duties required as a member of the onsite emergency response organization minimum shift complement;
 - performing the duties of a fire brigade member who is responsible for understanding the effects of fire and fire suppressants on safe shutdown capability;
 - performing maintenance or onsite directing of the maintenance of SSCs that a risk-informed evaluation process has shown to be significant to public health and safety; and
 - performing security duties as an armed security force officer, alarm station operator, response team leader, or watchman, hereinafter referred to as security personnel;
- (2) persons who are granted unescorted access to nuclear power reactor protected areas and who do not perform the duties described above, but they are not subject to certain sections of the FFD program's fatigue management provisions;
- (3) persons who are required to physically report to the licensee's Technical Support Center or Emergency Operations Facility above, but they are not subject to certain sections of the FFD program's fatigue management provisions; and
- (4) FFD program personnel who, in general, are involved in the day-to-day operations of the program.

In addition to ensuring that individuals are not impaired in a way that adversely affects their ability to safely and competently perform their duties, the FFD program supports determinations and requirements made in other portions of NRC physical protection regulations. As described in 10 CFR 73.55, "Requirements for physical protection of licensed activities in nuclear power reactors against radiological sabotage," nuclear power reactors licensed under Parts 50 and 52 are required to establish and maintain a physical protection program that will have as its objective to provide reasonable assurance¹⁸ that activities involving special nuclear material are not inimical to the common defense and security and do not constitute an unreasonable risk to the public health and safety. The physical protection program must protect against the design basis threat of radiological sabotage (DBT) as stated in 10 CFR 73.1, "General Provisions," which includes both external and internal threats. As such, the security organization, including armed security personnel, must detect, assess, interdict, and neutralize threats as long as spent fuel remains in the SFP.

¹⁸ The Commission provided the following direction in SRM-SECY-16-0073, "Staff Requirements – Options and Recommendations for the Force-on-Force Inspection Program in Response to SRM-SECY-14-0088," dated October 5, 2016 (ADAMS Accession No. ML16279A345): "In implementing the NRC's regulatory program, either in developing new regulations, inspecting licensee compliance with regulations, or executing the FOF program, the staff should be mindful that the concept of 'high assurance' of adequate protection found in our security regulations is equivalent to 'reasonable assurance' when it comes to determining what level of regulation is appropriate."

Insider threats present a unique problem for a physical protection system. Insiders could take advantage of their access rights, position authority, and/or knowledge of a facility, to understand, bypass, or defeat dedicated physical protection elements or other provisions (such as measures for safety or material control and accounting, including operating measures and procedures) to enable the execution of the DBT. The insider mitigation program (IMP) is intended to mitigate the risk of these insider actions. As required in 10 CFR 73.55(b)(9)(ii), the IMP must contain, among other things, elements from the FFD program described in Part 26. However, section 73.55 does not specify which elements or requirements of the FFD program defined in Part 26 must be part of the IMP.

In addition, the drug and alcohol testing, behavioral observation, and employee assistance programs inform power reactor licensees' access authorization program and their determinations of individuals' trustworthiness and reliability in support of 10 CFR 73.56, "Personnel access authorization requirements for nuclear power plants." The access authorization program must provide reasonable assurance that the individuals are trustworthy and reliable, such that they do not constitute an unreasonable risk to public health and safety or the common defense and security, including the potential to commit radiological sabotage. As required in 10 CFR 26.53, "General Provisions," in order to grant FFD authorization to an individual, a licensee or other entity shall ensure that a portion of the requirements in Part 26 have been met for either initial authorization, authorization update, authorization reinstatement, or authorization with potentially disqualifying FFD information, as applicable. The behavioral observation program (BOP) required by 10 CFR 73.56(f) must be designed to detect behaviors or activities that may constitute an unreasonable risk to the health and safety of the public and common defense and security, including a potential threat to commit radiological sabotage. The BOP required by 10 CFR 26.33, "Behavioral observation," is intended to detect, in part, behaviors that may indicate possible use, sale, or possession of illegal drugs; use or possession of alcohol on site or while on duty; or impairment that, if left unattended, may constitute a risk to public health and safety or the common defense and security. The BOP required in the FFD program complements the broader BOP in the access authorization program.

Unlike the FFD requirements in Part 26, which are not applicable to Part 50 licensees with decommissioning power reactors, the physical protection requirements in 10 CFR 73.55 (which include the access authorization requirements in 10 CFR 73.56) are applicable to licensees after the power reactor permanently ceases operation. Even though fuel has been permanently removed from the reactor vessel and the licensee has submitted the certifications under 10 CFR 50.82, licensees are still required to defend against the DBT for radiological sabotage under 10 CFR 73.55(b)(2) while the spent nuclear fuel is located in the SFP.

As part of the NRC's response to the events of September 11, 2001, the Commission issued Order EA-03-099 (ADAMS Accession No. ML042250002), on August 18, 2004, to decommissioning licensees with spent nuclear fuel in their SFPs. Order EA-03-099 contains safeguards information and is not publicly available. The Order modified licenses to require implementation of security measures associated with access authorization, drug and alcohol testing, and behavior observation in addition to the then-existing requirements. In part, the Order required these licensees to have a drug and alcohol testing program. The Order and the existing regulatory requirements provided the Commission with reasonable assurance that the public health and safety and common defense and security would continue to be adequately protected in the new threat environment resulting from the 9/11 attacks. However, this order was not issued to power reactor licensees that subsequently entered decommissioning (i.e., Crystal River, SONGS units 2 and 3, Kewaunee, Ft. Calhoun, and VY), because the threat environment had changed since the issuance of the Order in 2004, and therefore NRC staff

could not justify an immediate threat that would constitute a risk to the health and safety of the public or the common defense and security. Further, the NRC did not include requirements for Part 50 licensees in decommissioning in the 2008 amendments to Part 26 (73 FR 16966; March 31, 2008).

Technical Basis for Amending Fitness for Duty Requirements for Reactors Transitioning to Decommissioning

As discussed above, the current FFD requirements for power reactors transitioning to decommissioning are not internally consistent and lack clarity. Therefore, the NRC staff proposes to clarify through guidance what elements of the FFD program in Part 26 should be included in the IMP program during a reactor's operating and decommissioning phases consistent with 10 CFR 73.55(b)(9)(ii). Further, if the NRC staff pursues the rulemaking option, the NRC would amend 10 CFR 26.3 to clarify that Part 26 is applicable to each Part 50 power reactor licensee transitioning to decommissioning until all of the licensee's spent nuclear fuel has been moved to an independent spent fuel storage installation (ISFSI) or removed from the site. The NRC staff recognizes that groups of individuals specified in 10 CFR 26.4 may not meet the applicability criteria during decommissioning. The NRC staff also recognizes that certain portions of the FFD program may no longer be necessary during decommissioning. Therefore, the objective of an FFD rulemaking would be to set forth the sections of an FFD program that would be required under Part 26 during decommissioning.

These clarifications are necessary to enable licensees to enhance their ability to maintain reasonable assurance that individuals performing safety significant activities will perform their tasks in a reliable and trustworthy manner and are not under the influence of any substance, legal or illegal, or mentally or physically impaired from any cause, which in any way adversely affects their ability to safely and competently perform their duties. Additionally, clarifications are necessary to enable licensees to enhance their ability to maintain reasonable assurance of the following capabilities:

- (1) the security organization including armed security personnel can effectively defend against the external threat of the DBT;
- (2) insider threats at a nuclear power plant are appropriately mitigated by an effective IMP; and
- (3) individuals granted unescorted access remain trustworthy and reliable, in part, as demonstrated by the avoidance of substance abuse.

The scope of the NRC staff's clarifications focuses on a subset of individuals, as described below, who have been granted unescorted access. This will help ensure consistent implementation of Part 26 and help ensure that individuals can safely and competently perform assigned duties (such as security officers implementing security plans, procedures, and contingency response activities).

Use of legal or illegal drugs and/or alcohol can result in on-duty impairment and establishes a lack of trustworthiness and reliability in an individual to perform duties in a manner that would provide adequate protection of the public health and safety and common defense and security. This conclusion is well-documented and justifies the Part 26 drug and alcohol testing program, as discussed in the 2008 final rule. The NRC staff annually issues a report that summarizes FFD program performance of the commercial nuclear power industry. The drug and alcohol information in this report informs the public of the industry's detection and deterrence of illicit drug use and alcohol misuse at licensed facilities. These reports are based primarily on FFD

program performance information submitted to the NRC from licensees and other entities subject to Part 26. The NRC staff notes that annual FFD program performance summary reports were submitted in 2013, 2014 and 2015 to the NRC by decommissioning sites (SONGS, Kewaunee and Crystal River).¹ Vermont Yankee (VY) permanently ceased operations on December 29, 2014, and has not submitted any 10 CFR 26.717, “Fitness for Duty Program Performance Data,” reports since entering decommissioning.

The NRC performance reports (<https://www.nrc.gov/reactors/operating/ops-experience/fitness-for-duty-programs/performance-reports.html> and footnote 1) show that persons under the influence of illicit drugs and/or alcohol are being identified and removed from the protected area of NRC-licensed facilities, including decommissioning sites. These reports further show that persons of questionable trustworthiness and reliability are being identified through testing methods and the identification of subversion attempts.

The 2013 report, “Summary of Fitness for Duty Program Performance Reports for Calendar Year 2013” (ADAMS Accession No. ML14246A440), shows that 1007 people tested positive for drugs or alcohol at nuclear power plants, and 145 of these positive results were attempts to subvert the testing process. Although any positive drug or alcohol test may indicate a lack of trustworthiness and reliability, subversion attempts provide conclusive evidence that the individual is willing to disregard rules and regulations, such as safeguards requirements, which ensure the protection of public health and safety and the common defense and security. Section 26.75(b) requires licensees and other entities to permanently deny FFD authorization to individuals who refuse to be tested or who in any way subvert or attempt to subvert the testing process. This sanction is necessary because, as the Commission explained in the statement of considerations for the 2008 amendments to Part 26, “acts to subvert the testing process reflect a sufficiently egregious lack of trustworthiness and reliability to warrant permanent denial of authorization” (73 FR 16966, 17048).

Since 1993, contractors and vendors have had an overall positive test rate that is on average 3.6 times greater than that of licensee employees. Although this increase has been routinely observed at operating reactor sites, it becomes a concern at decommissioning sites because, typically, a licensee’s employee population decreases during decommissioning while the contractor/vendor population increases. The potential result could mean more confirmed positive test results and/or more subversion attempts and thereby represent a decrease in the trustworthiness and reliability of personnel with unescorted access to protected or vital areas.

Impairment of individuals performing safety activities

At a decommissioning facility, certified spent nuclear fuel handlers and individuals who perform emergency response and fire brigade activities and safety-significant operations, maintenance, and surveillance need to be mentally and physically capable to safely and competently perform their assigned duties and responsibilities. For example, a certified fuel handler under the influence of any substance, legal or illegal, or mentally or physically impaired could mishandle a fuel bundle that results in an onsite radiation exposure and localized contamination release. Impairment could result in other safety or security concerns associated with other personnel

¹ FFD program performance summary reports for 2013: Crystal River (ML14058B136, ML14058B137, ML14058B140, ML14058B141), Kewaunee (ML14058A240, ML14086A763), and San Onofre (ML14056A528, ML14056A530, ML14056A531); for 2014: Crystal River (ML15056A192, ML15056A193, ML15056A194, ML15056A195, ML15056A196, ML15056A197, ML15056A198), Kewaunee (ML15047A007, ML15035A496, ML15035A497), and San Onofre (ML15050A649, ML15050A651); and for 2015: Crystal River (ML16054A099); Kewaunee (ML16039A298); San Onofre (ML16042A624, ML16042A625, ML16042A626, ML16042A627).

who (1) conduct heavy lift operations; (2) maintain unescorted access to structures, systems, and components in protected or vital areas; or (3) maintain access to sensitive information.

As a result, the use of impairing substances can potentially result in conditions adverse to safety and security. Therefore, the rulemaking option includes a requirement that an effective FFD program should be required at a decommissioning nuclear power plant while the spent nuclear fuel is located in the SFP. Rather than requiring all individuals with unescorted access to nuclear power reactor protected areas to be subject to these requirements, in a rulemaking approach, the NRC staff would propose to require only those individuals identified in 10 CFR 26.4(a)(1)–(4) to be subject to the FFD program during decommissioning. These are the individuals who perform safety-significant operations such as fuel handlers (10 CFR 26.4(a)(1)); health physics or chemistry duties (10 CFR 26.4(a)(2)); fire brigade activities (10 CFR 26.4(a)(3)); and maintenance on safety-significant SSCs (10 CFR 26.4(a)(4)). The staff acknowledges that onsite FFD-related occurrences would not result in adverse consequences equivalent to those that might be experienced at an operating reactor site. The NRC staff notes that the safety-significant systems and components could change as decommissioning proceeds and that the number of individuals performing safety-significant operations may decrease over time. In addition, licensees should consider performing a risk-informed evaluation of individuals performing emergency preparedness activities similar to those defined in 10 CFR 26.4(c). As decommissioning proceeds and the risk of malicious acts or accidents involving the spent nuclear fuel in the pool decreases, the FFD program would no longer be required for the individuals identified in 10 CFR 26.4(a)(2)–(4). In general, once the spent nuclear fuel is placed in an ISFSI, the spent nuclear fuel is not moved and can no longer be affected by human interactions.

Impairment of individuals performing security activities

The existing physical protection requirements in 10 CFR 73.55 and the rulemaking options considered in Appendix B of this regulatory basis would still require that licensees of decommissioning power reactors licensed under Parts 50 or 52 implement the physical protection requirements described in 10 CFR 73.55 in order to provide reasonable assurance of protection against the DBT as long as fuel remains in the SFP. Security personnel must continue to meet their responsibilities for maintaining the common defense and security, and preventing radiological releases associated with SFP sabotage. At a decommissioning facility, security personnel need to be mentally and physically capable of competently performing their assigned duties and responsibilities. The influence of any substance, legal or illegal, can reduce the alertness and ability of security personnel to perform the critical job duties of identifying and promptly responding to security threats. For example, security personnel are trained and qualified to carry various weapons to defend against the DBT. An individual who is unfit for duty due to substance abuse could accidentally discharge their weapon or fail to observe, interdict, communicate, or respond to a threat. Therefore, the rulemaking option includes a requirement that an FFD program must be implemented at a decommissioning nuclear power plant while the spent nuclear fuel is located in the SFP. The individuals subject to these requirements would include individuals in the group defined in 10 CFR 26.4(a)(5). Once the spent nuclear fuel is placed in an ISFSI, the risk of radiological sabotage is reduced sufficiently to no longer require licensees to protect the spent nuclear fuel against the DBT.

Insider Mitigation Program and Trustworthiness and Reliability

Under 10 CFR 73.55(b)(3), the physical protection program required by 10 CFR 73.55 must be designed to prevent significant core damage and spent fuel sabotage. The DBT includes

threats from active and passive insiders. Power reactor licensees are required to protect their facilities against threats up to and including the DBT for radiological sabotage. The licensee's protective strategy involves, among other things, the implementation of an IMP that includes elements of: 1) the access authorization program in 10 CFR 73.56; 2) the FFD program in Part 26; 3) the cyber security program in 10 CFR 73.54; and 4) the physical protection program in 10 CFR 73.55. Once the spent nuclear fuel is moved to an ISFSI, the FFD program would no longer be mandatory.

A comprehensive IMP applied at a decommissioning plant is designed to minimize the potential for adverse actions by an active or passive insider to help prevent or mitigate the effects of radiological sabotage (i.e., spent fuel sabotage). The IMP assists in determining and monitoring the initial and continuing trustworthiness and reliability of individuals granted unescorted access or retaining unescorted access authorization to protected or vital areas. This involves detecting an insider threat through the simultaneous application of elements of the access authorization, FFD, cyber security, and physical protection programs. Because of their potential ability to access safety- or security-significant structures, systems, and components, insiders could include operators, engineers, mechanics, technicians, and information technology and security personnel. The FFD elements of the IMP are intended to provide, in part, reasonable assurance that individuals who are granted or maintain unescorted access are trustworthy and reliable as demonstrated by the avoidance of substance abuse.

Therefore, the rulemaking option includes a requirement that the implementation of an FFD program should be implemented at a decommissioning nuclear power plant while the spent nuclear fuel is located in the SFP. The individuals subject to these requirements would include individuals with access to the protected area and those managing the FFD program similar to those individuals defined in 10 CFR 26.4(b) and (g). The NRC staff expects that the size of the protected area and the number of individuals granted unescorted access to the protected area will decrease as decommissioning proceeds. Once the spent nuclear fuel is placed in an ISFSI, the risk of radiological sabotage is reduced sufficiently to no longer require licensees to protect the spent nuclear fuel against the DBT.

FFD Program at Decommissioning Sites

During decommissioning, until the spent nuclear fuel is moved to an ISFSI, the following Part 26 requirements should no longer be required. These requirements do not directly impact safety, and are not needed to specifically support trustworthiness and reliability determinations. Thus, if the NRC staff pursues rulemaking, the NRC staff could amend Part 26 to clarify that these provisions are not required for decommissioning power reactors, even if additional requirements are applied to decommissioning power reactors.

Drug and Alcohol Provisions	Reference Requirement
Audits and Corrective Actions	10 CFR 26.41(c)(1) and (2); and (e)
Collection Sites, Preparation, and Testing	10 CFR 26.85, 26.87, 26.89, 26.91, 26.93, 26.95, 26.97, 26.99, 26.101, 26.103, 26.105, 26.107, 26.109, 26.111, 26.113, 26.115, 26.117, and 26.119
Quality Assurance and Quality Control	10 CFR 26.167
Blind Performance Testing	10 CFR 26.168
FFD Program Performance Data	10 CFR 26.717(b)(9)
Reporting Requirements	10 CFR 26.719(c)

Under 10 CFR 26.41(c)(1)-(2) and (e), licensees are required to audit their blind performance specimen provider and HHS-certified laboratories. In lieu of these requirements, the NRC staff would suggest that alternative measures be adopted that would be equal to the current requirements but with less cost and no impact on safety or trustworthiness and reliability. Under the rulemaking approach, audits would still be conducted but by other approved entities (e.g., other NRC licensee). There would be no impact on safety or trustworthiness and reliability because the new rule would require licensees to perform annual audits of its laboratories and blind performance test sample (BPTS) to verify that: (1) the laboratories and the BPTS supplier process and provide specimens, respectively, from and to at least one other NRC licensee that is subject to the § 26.41 audit requirement; (2) at least one other operating reactor’s audit report is shared with the decommissioning licensee; and (3) significant performance issues have not been identified. The NRC staff would define a “significant performance issue” to be one identified by any licensee using the laboratory or BPTS supplier in which performance resulted in a condition adverse to Part 26 program effectiveness and adequate corrective actions were not implemented by the laboratory or BPTS supplier to preclude recurrence. Audits could be conducted by other NRC-licensed facilities or led by the Nuclear Energy Institute (NEI) on behalf of a facility or multiple facilities. This audit provision would also be based on the relatively few specimens expected to be provided by and to a licensee that has submitted its 10 CFR 50.82 certifications because access authorization will be limited to fewer persons (i.e., fewer persons subject to testing) when compared to the total number of federally-mandated tests being processed by operating licensees’ FFD programs.

A licensee’s use of a collection facility meeting the requirements of § 26.87, “Collection Sites,” provides reasonable assurance that specimen collections are conducted consistently, accurately, and effectively. When a decommissioning facility’s footprint shrinks due to demolition, there is a possibility that the licensee’s onsite collection facility may have to shut down and be moved off site. If the NRC staff pursues rulemaking, the NRC staff would propose a requirement similar to 10 CFR 26.87. This provision would allow decommissioning sites to set up collection sites off-site. This provision would not impact safety or trustworthiness and reliability because the requirements, referenced in the above table under “Collection Sites, Preparation, and Testing,” for a decommissioning site would remain the same as an operating site. However, in order to maintain consistency in collection site services, the licensee could also meet the U.S. Department of Transportation’s requirements of 49 CFR Part 40 Subpart D because Subpart D contains collection site requirements similar to those described in 10 CFR 26.87. For example, Subpart D, as in 10 CFR 26.87, requires all necessary personnel, materials, equipment, facilities, and supervision to provide for the collection, temporary storage, and shipping to a laboratory of urine specimens, and a suitable clean surface for writing. Further, Subpart D similarly describes the water, toilet, visual privacy and security requirements of a collection site. It also describes the steps for collectors and operators of the collection site

and measure to protect the security and integrity of urine collections. There are many more similarities and in many cases the wording in Subpart D is identical to 10 CFR 26.87.

Under 10 CFR 26.167, "Quality assurance and quality control," licensees are required to implement a quality assurance and quality control program with their HHS-certified laboratory, and under 10 CFR 26.168 licensees are required to implement a BPTS program with their HHS-certified laboratory. The rulemaking approach would satisfy these requirements and be more cost effective, so there would be no impacts on safety or trustworthiness and reliability. Other NRC licensees, who utilize the same laboratories, would verify the labs' quality assurance/quality control (QA/QC) and BPTS programs. The rulemaking approach would require decommissioning licensees to verify, on an annual basis, that: (1) both laboratories process QA/QC and blind samples from at least one other NRC licensee in accordance with Part 26 and (2) the BPTS supplier provides specimens to at least one other NRC licensee. The licensee would also verify that significant laboratory and BPTS supplier performance issues have not been identified by the other NRC licensee(s) using the laboratories and BPTS supplier. Laboratory and BPTS supplier performance could also be ascertained from a review of operating experience gathered by other NRC-licensed facilities or the NEI. This QA/QC BPTS provision would also be based on the relatively few specimens expected to be provided by a licensee who has submitted its 10 CFR 50.82 certifications because access authorization would be limited to fewer persons (i.e., fewer persons subject to testing) when compared to the total number of federally-mandated QA/QC and blind sample tests being processed by other NRC licensees using the site primary and back-up HHS-certified laboratories and BPTS supplier.

Under 10 CFR 26.719(c) licensees must submit a report to the NRC within 30 days for any drug or alcohol testing errors. In a rulemaking approach, except for the Medical Review Officer and random testing error provisions, decommissioning licensees would not be required to submit reports under 10 CFR 26.719(c)(1)-(3). This approach would not impact safety or trustworthiness and reliability at a decommissioning site because the proposed requirements under 10 CFR 26.167 and 26.168 (mentioned above) would allow decommissioning licensees to utilize other NRC licensee FFD programs' verification of QA/QC and BPTS of their HHS-certified laboratories. Therefore it would be the responsibility of those licensees conducting the actual QA/QC and BPTS performance testing to report any drug or alcohol testing errors under 10 CFR 26.719(c)(1)-(3).

Rulemaking Options

OPTION 1: NO ACTION

The no-action option would retain the FFD provisions of the current regulations. Licensees would continue to implement elements of 10 CFR Part 26 in their IMPs, as required by 10 CFR 73.55(b)(9). The NRC staff notes that based on observation of the reactor sites that recently decommissioned, licensees are implementing all of the elements of 10 CFR Part 26, with the exception of Subparts I and K, in their IMPs.

ASSESSMENT OF OPTION 1

As discussed above, the FFD applicability requirements in 10 CFR 26.3 for decommissioning sites are not consistent with the reliance on the FFD program in the existing and proposed physical protection program requirements in 10 CFR 73.55 to protect against both external and internal threats as required by the DBT. Specifically, the NRC staff notes that the wording of 10 CFR 73.55(b)(9) states that the IMP must contain elements from "the fitness-for-duty

program described in part 26 of this chapter.” However, 10 CFR 73.55 does not identify what FFD elements need to be included in the IMP. As such, the NRC staff expects that this could lead to inconsistent implementation of FFD elements in an IMP program at decommissioning power reactors for drug and alcohol testing, and behavioral observation practices. These inconsistencies in implementation would make consistent enforcement of the regulatory requirement difficult. As a matter of practice, most decommissioning power reactor licensees have continued their FFD programs including drug and alcohol testing, behavioral observation, and employee assistance.

The NRC staff notes that in SRM-M160623B, “Discussion of Security Issues” (ADAMS Accession No. ML16179A382), dated June 27, 2016, the Commission directed the NRC staff to complete interactions with stakeholders regarding any guidance updates to Regulatory Guide (RG) 5.77, “Insider Mitigation Program” (ADAMS Accession No. ML15219A609), and submit them to the Committee to Review Generic Requirements (CRGR) for review. After the CRGR completes its review, the NRC staff will provide the draft final RG 5.77 to the Commission for review and approval.

As part of the update to RG 5.77, the NRC staff identified a need to provide guidance relative to which elements of 10 CFR Part 26 are necessary to support 10 CFR 73.55(b)(9)(ii)(B). The NRC staff is updating RG 5.77 to clarify the elements of the FFD program that should be included in the IMP. This includes stating which elements of Part 26 should be implemented for the IMP to provide reasonable assurance of the trustworthiness and reliability of individuals with unescorted access and to mitigate insider threats. Except as provided in the table above, the updated RG 5.77 will include drug and alcohol testing, behavioral observation, and employee assistance aspects of the FFD program. The NRC staff currently expects to provide an updated RG 5.77 to the Commission for review and approval by September 2017.

If the updated RG 5.77 is approved by the Commission for issuance, then the NRC staff could pursue an industry commitment to follow the updated version of RG 5.77. Should licensees voluntarily incorporate RG 5.77 into their physical security plan (PSP), then the provisions of that security plan, including the RG provisions incorporated into the plan, would become enforceable against the licensee if the security plan becomes a condition of the license. However, there is no requirement for licensees to incorporate RGs into their PSP. If all licensees incorporate RG 5.77 into their PSP, this would allow for a consistent implementation of the FFD program at decommissioning power reactors.

OPTION 2: RULEMAKING TO CODIFY FITNESS FOR DUTY REQUIREMENTS FOR DECOMMISSIONING POWER REACTORS

In this option, the NRC staff would pursue rulemaking to amend 10 CFR Part 26 to clarify the applicability of FFD requirements for decommissioning nuclear power plants. Except for those requirements mentioned above that are no longer needed during decommissioning and Part 26 Subparts I and K, all other Part 26 subparts would apply to decommissioning sites to include A through H, N and O.

ASSESSMENT OF OPTION 2

The NRC staff would explicitly set forth in the regulations the FFD program requirements for decommissioning power reactors. These clarifications are necessary to enable licensees to enhance their ability to maintain reasonable assurance that individuals performing safety significant activities will perform their tasks in a reliable and trustworthy manner and are not

under the influence of any substance, legal or illegal, or mentally or physically impaired from any cause, which in any way adversely affects their ability to safely and competently perform their duties. Additionally, these clarifications would provide reasonable assurance that licensees would properly implement the site protective strategy to protect against the DBT. Rulemaking would specify which 10 CFR Part 26 requirements are necessary for inclusion in the licensee's IMP. Further, the NRC staff could consider rule language changes in 10 CFR 73.55(b)(9) as deemed appropriate. This option would resolve the regulatory inconsistencies between Part 26 and Part 73 for decommissioning power reactors and allow for more consistent implementation and enforcement under Part 26 without having to use Part 73 as the basis for an enforcement action.

POTENTIAL BACKFIT CONSIDERATIONS

The NRC staff has determined that neither option would constitute "backfitting" as defined in 10 CFR 50.109. Decommissioning power reactor licensees already implement all of the Part 26 requirements except Subparts I and K in compliance with the IMP requirements in 10 CFR 73.55(b), so the rulemaking option would not impose new or changed requirements on licensees. Further, the NRC staff notes that since decommissioning licensees are currently implementing all of the elements of 10 CFR Part 26 except Subparts I and K, the rulemaking approach may result in a reduction of burden by specifying those elements of 10 CFR Part 26 that are not required for decommissioning licensees. The updates to RG 5.77 would be only guidance unless licensees voluntarily request to have the updated RG 5.77 become part of their licenses. In either case, updating RG 5.77 would not constitute backfitting.

Regulatory Scope of a Power Reactor Decommissioning Rulemaking Regarding Fitness for Duty

A rulemaking approach could include revisions to 10 CFR Part 26 to clarify the applicability of FFD requirements to decommissioning power reactors. Specifically, a rulemaking could clarify which portions of Part 26 would apply during decommissioning and to which individuals, as well as clarify which elements of Part 26 are required to support the IMP. The scope would be limited to individuals authorized unescorted access to protected or vital areas during decommissioning. The FFD aspects would include drug and alcohol testing, behavioral observation, and employee assistance programs.

NRC Guidance, Policy, and Implementation Issues

NRC Guidance

The following FFD guidance documents may be updated as a result of Option 2:

- RG 5.77, "Insider Mitigation Program"
- RG 5.66, "Access Authorization Program for Nuclear Power Plants"

Updates to RG 5.77 would continue under Option 1.

Policy Issues on Fitness for Duty

There are no specific policy issues associated with either of the NRC staff's options.

Implementation Issues

There are no specific implementation issues associated with either of the NRC staff's options.

Impacts of the Two Options

This section provides an analysis of the two options: no action and rulemaking.

OPTION 1: NO ACTION

Under this option, the NRC staff would continue with the existing decommissioning process as described in the current regulations and guidance. Under the current process, the requirements of Part 26 do not apply to licensees undergoing decommissioning after the NRC has docketed their 10 CFR 50.82 certifications. However, in order to meet the IMP requirements under 10 CFR 73.55(b)(9), the decommissioning licensees' IMPs must contain elements of Part 26. The NRC staff determined that because the specific elements of Part 26 are not clearly defined, decommissioning licensees may develop site-specific interpretations of which elements should or should not be implemented and, as a result, inconsistently apply the drug and alcohol testing and BOP requirements of Part 26.

Under this option, the NRC staff is also pursuing a revision to existing IMP guidance (RG 5.77) to address the NRC staff's position on the elements of FFD programs for an IMP. If the updated RG 5.77 is approved by the Commission for issuance, then the NRC staff could pursue an industry commitment to follow the updated version of RG 5.77. Should licensees voluntarily incorporate RG 5.77 into their PSP, then the provisions of that security plan, including the RG provisions incorporated into the plan, would become enforceable against the licensee if the security plan becomes a condition of the license. However, there is no requirement for licensees to incorporate RGs into their PSP.

Impacts on public health, safety, and security

As a matter of practice, most decommissioning power reactor licensees have continued their FFD programs including drug and alcohol testing, behavioral observation and employee assistance. As such, there would be no increase or reduction in public health, safety, and security for these licensees. Currently, licensees have the option to use RG 5.77 to comply with the regulation and thus the NRC staff does not expect an impact from the "no action" option. With regard to the revision of RG 5.77, this option would help to provide reasonable assurance of adequate protection of the spent nuclear fuel stored in the SFP at decommissioning power reactors.

Impacts on licensees

With regard to the revision of RG 5.77, this option would promote a more uniform approach to FFD elements necessary for an IMP. The following impacts are anticipated under this option should individual licensees choose to implement an updated version of RG 5.77:

- Licensees would need to include a commitment to following the revised RG 5.77 in their NRC approved security plans.
- Licensees would need to incorporate necessary changes to their IMP and NRC-approved security plans.

Impacts on NRC

This option could have some incremental impact on the NRC in resolving the inconsistencies in the applicability of FFD programs in 10 CFR 26.3 and 10 CFR 73.55. The NRC staff determined that the inconsistencies could affect the NRC's Regions' inspection and enforcement process. The lack of a specific regulatory framework could potentially result in site-specific interpretations of applicable IMP FFD elements if licensees don't maintain their existing FFD programs. Such site-specific interpretations of applicable FFD elements could result in inconsistencies in how licensees implement the IMP FFD elements. These inconsistencies could result in an increase in cost to the inspection process.

With regard to the revision to RG 5.77, this option would result in one-time costs to the NRC. Initially, there would be incremental costs to the NRC to update RG 5.77. These costs include the preparation of updated guidance, public meetings with stakeholders, and publication of an updated version of RG 5.77. The costs would include both NRC staff and contractor time to update guidance and perform supporting analyses, and public outreach efforts during the guidance development phase.

Additional considerations

This option would have no incremental impact on State, local, or Tribal governments.

Summary of benefits and costs

Benefits

- With regard to revision of RG 5.77, this approach would help promote uniformity and standardization in the application of FFD programs at decommissioning power reactors.

Costs

- With regard to revision of RG 5.77, the costs associated with this option include development and implementation of NRC and industry guidance.

OPTION 2: RULEMAKING TO CODIFY FITNESS FOR DUTY REQUIREMENTS FOR DECOMMISSIONING POWER REACTORS

Under this option, the NRC staff would undertake a rulemaking to codify FFD requirements for decommissioning power reactors. The changes to the underlying regulations and guidance would clarify the FFD program requirements for decommissioning power reactors and resolve regulatory inconsistencies between Part 26 and Part 73 for decommissioning power reactors that have submitted certifications under 10 CFR 50.82 and removed spent nuclear fuel from the core but still have spent nuclear fuel in the fuel pool. Specifically, the amendments to Part 26 would require decommissioning power reactor licensees to have a drug and alcohol testing, behavioral observation, and employee assistance programs.

Impacts on public health, safety, and security

This option would provide reasonable assurance of adequate protection of individuals' abilities to safely and competently perform their assigned duties, and to protect against the external and

internal threats of the DBT. Currently, licensees in decommissioning with fuel in the SFP demonstrate reasonable assurance of adequate protection by complying with IMP requirements.

Impacts on licensees

This change should not have a significant impact on current holders of Part 50 or 52 licenses because decommissioning licensees are currently implementing the Part 26 requirements in order to satisfy the IMP requirements. As a matter of practice, most decommissioning power reactor licensees have continued their FFD programs including drug and alcohol testing, BOP (including BOP training), and employee assistance. As such, the impacts on licensees would be the continued cost of implementing these programs. Licensees that have not maintained their program would need to implement specific aspects specified in the rule that are not already addressed in their existing physical security plan.

Impacts on NRC

Overall, this option would result in significant one-time costs to the NRC followed by ongoing savings. Initially, the NRC would incur incremental costs to undertake the rulemaking process. These costs include the preparation of the proposed rule and accompanying guidance. The costs would include both NRC staff and contractor time to prepare proposed rule language, draft guidance, supporting analyses (e.g., a regulatory analysis and Office of Management and Budget Paperwork Burden analysis), and a *Federal Register* notice, and for public outreach efforts during the rule and guidance development phase. After publishing the proposed rule, the NRC would incur costs associated with public comment resolution and preparation of the final rule, guidance, and supporting documentation for the rulemaking.

Additional considerations

The proposed rule would have no incremental impact on State, local, or Tribal governments.

Summary of benefits and costs

Benefits

- Enhanced clarity and predictability of decommissioning process.

Costs

- One-time cost to the NRC to revise guidance and implement.
- Licensee costs to implement or continue the drug and alcohol testing program.

NRC Staff Observations on Stakeholder Feedback on the ANPR

The following observations reflect the NRC staff's review and consideration of the comments on the ANPR. Neither senior NRC management nor the Commission has approved any specific aspects of the power reactor decommissioning rulemaking framework at this time, and as such, any conclusions regarding the aspects of the power reactor decommissioning rulemaking are subject to change.

- In response to comments opposing the creation of a separate FFD rule for decommissioning power stations, the NRC staff has evaluated two options in this draft regulatory basis. In the rulemaking approach, the NRC staff would propose to amend 10 CFR 26.3 to include Part 50 power reactor licensees for which the certifications of permanent cessation of operations and permanent removal of fuel from the reactor vessel have been docketed by the NRC. Further, the NRC staff would amend all other Part 26 Subparts (as mentioned in Option 2 above) applicable to decommissioning power reactors. The NRC staff is also considering only continuing to update RG 5.77.
- In response to comments that no alternative regulatory framework should be pursued, the NRC is currently pursuing an alternative to rulemaking: updating RG 5.77. Successful implementation of this alternative assumes Commission approval and licensee use of the revised RG 5.77.
- In response to comments that decommissioning power reactors should only have to employ corporate FFD requirements, and should not be subject to Part 26, the NRC staff has determined that industrial FFD programs would be insufficient because application would vary from site to site. Further, corporate programs do not provide assurance that licensees will implement an FFD program that provides reasonable assurance that individuals who have unescorted access to the SFP (a vital area) are trustworthy and reliable, and can safely and competently perform their assigned duties and responsibilities in a manner that prevents radiological sabotage.

STAFF RECOMMENDATION

The NRC staff is publishing a *Federal Register* notice for this regulatory basis to obtain stakeholder feedback on the options considered. The decision on which option the NRC staff recommends will be informed by public comments received on this draft regulatory basis document. The NRC staff's recommendation, along with a full assessment of the rulemaking options described above, will be documented in the final regulatory basis.

Appendix E – Minimum Staffing and Training Requirements for Non-Licensed Operators, Including Certified Fuel Handlers

The NRC's nuclear power plant regulations do not address minimum staffing levels or training requirements for a facility undergoing decommissioning. The NRC staff is not aware of any adverse safety impacts resulting from inadequate staffing at decommissioning plants. Since most decommissioning licensees have elected to develop technical specification amendments with prescribed minimum staffing levels, lack of regulation in this area imposes a burden on both licensees and the NRC when preparing, justifying, reviewing, and evaluating operator staffing amendments or exemption requests. Such a burden could be avoided if appropriate regulations existed. Codifying current regulatory practice at decommissioning plants would enhance the efficiency and uniformity of the regulatory process for future decommissioning.

During decommissioning, the principal safety concern is the safe storage of spent fuel in the spent fuel pool (SFP). The skills needed for maintaining safe storage of spent fuel are not comparable to the skills needed for operating a nuclear power plant. Overall safety at decommissioning reactors is primarily dependent on the procedural and configuration controls exercised by the licensee over often varied and unique dismantlement and decontamination activities. The NRC staff's technical study on SFP risk at decommissioning nuclear power plants (NUREG-1738, "Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants," available under Agencywide Documents Access and Management System (ADAMS) Accession No. ML010430066) did not recommend any minimum staffing levels or training requirements inherent in supporting the risk conclusions. However, it did show that the frequency of events that could lead to a spent fuel uncover and potential zirconium fire is impacted by human error probabilities. Therefore, it is the NRC staff's judgment that establishment of a baseline staffing and training level, commensurate with the reduced risks at decommissioning nuclear power plants while spent fuel is stored in the SFP, is appropriate.

The current regulations for operating reactors require specific staffing levels for licensed operators for each shift, as well as control room staffing requirements and commensurate training requirements for licensed operators. The regulations define the duties of licensed operators as either the manipulation of controls or supervising the manipulation of controls that directly affect the reactor reactivity or power level of the reactor. A decommissioning plant is clearly not "operating" and no manipulation of controls that affect reactor reactivity or power can occur at a permanently defueled reactor. Furthermore, as the decay heat levels are reduced, the time available for operators to initiate mitigation measures is increased. For example, after 10 months for boiling water reactors (BWRs) and 16 months for pressurized water reactors (PWRs), operators will have approximately 10 hours to initiate mitigation measures from the time the SFP is completely empty before a zirconium fire could initiate. Therefore, the regulations that require specified licensed operator staffing for operating reactors are not applicable to a decommissioning plant.

Licensees have been requesting amendments to their technical specifications to eliminate the need to maintain licensed operators on the staff. Furthermore, the associated licensed operator training programs are being discontinued for decommissioning plants. In place of the licensed operators, decommissioning plant licensees have required the presence of a certified fuel handler (CFH) (i.e., a non-licensed operator (NLO) who has qualified in

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accordance with a fuel handler training program approved by the Commission) and an additional NLO as the minimum staffing for each shift. A CFH at a permanently shutdown and defueled nuclear power reactor undergoing decommissioning is an individual who has the requisite knowledge and experience to evaluate plant conditions and make judgments about what actions are necessary to protect the public health and safety.

As part of its integrated rulemaking approach, the staff considered other regulations with requirements having potential relevance to decommissioning staffing and training. For example, while the minimum staffing level for an operating reactor is explicitly defined in 10 CFR 50.54(m) Table entitled: "Minimum Requirements Per Shift for On-Site Staffing of Nuclear Power Units by Operators and Senior Operators Licensed Under 10 CFR Part 55, ['Operators' licenses]," the proposed regulation would still require the licensee to have the necessary staff to be able to respond to facility emergencies and is, therefore, consistent with the emergency preparedness (EP) requirements. After the spent fuel is removed from the SFP and transferred to an independent spent fuel storage installation (ISFSI), there would be no prescribed minimum staffing level or training requirements for CFHs. This is consistent with the current ISFSI requirements.

Paragraph (m) of 10 CFR 50.54, "Conditions of license," governs the number of senior reactor operators required to be present at the facility, depending on the number of units operating, the number of units on site and the number of control rooms. There are several statements in the regulations that indicate that it is applicable to only operating reactors. In Footnote 2 to the Table 10 CFR 50.54(m), a unit is described as operating "when it is in a mode other than cold shutdown or refueling." Thus, non-operating would be when a unit is in cold shutdown or refueling. Those are both modes of operating reactors. Further, 10 CFR 50.54(m)(1) discusses startup, shutdown and refueling activities, 10 CFR 50.54(m)(2)(ii) references "fueled units," 10 CFR 50.54(m)(2)(iii) covers modes other than cold shutdown or refueling, and 10 CFR 50.54(m)(2)(iv) concerns core alterations. Once the certifications required under paragraph (a)(1) of 10 CFR 50.82, "Termination of license," or paragraph (a) of 52.110, "Termination of license," have been submitted, 10 CFR 50.82(a)(2) or 52.110(b) removes the licensee's authority to operate the reactor or for the emplacement or retention of fuel into the reactor vessel. None of the above activities are consistent with a permanently shutdown and defueled unit. Therefore, 10 CFR 50.54(m) is not applicable to permanently shutdown and defueled reactors.

Current Certified Fuel Handler Requirements

The operator staffing regulations in 10 CFR 50.54(m) specify the minimum licensed operator staffing levels for operating reactors (e.g., minimum staff per shift for licensed operators and senior operators) but do not provide any alternatives for licensees that have certified that they are permanently shutdown and defueled under 10 CFR 50.82(a)(1) or 52.110(a).

For decommissioning plants, the NRC has been approving license amendment requests that discontinue the requirements for licensed operators and allow shift staffing consisting of a CFH and an additional non-licensed operator. However, there are no regulatory requirements that mandate these staff-approved staffing levels.

In its proposed rule, "Decommissioning of Nuclear Power Reactors," published in the *Federal Register* on July 20, 1995 (60 FR 37374), the Commission explained the role of the CFH during emergency actions (60 FR at 37379):

I. Emergency Actions

In 10 CFR 50.54(x) a licensee is allowed to take reasonable actions that may depart from a license condition or technical specification in an emergency. This is permitted when action is immediately needed to protect the public health and safety and no actions consistent with license conditions and technical specifications that can provide adequate or equivalent protection are immediately apparent.

These regulations serve to ensure that emergency action decisions necessary to protect the public health and safety are made by an individual who has both the requisite knowledge and plant experience. The licensed senior operator at an operating nuclear power reactor has the requisite knowledge and experience to evaluate plant conditions and make these judgments.

The Commission is proposing to amend 10 CFR 50.54(y) to permit a certified fuel handler at nuclear power reactors that have permanently ceased operations and permanently removed fuel from the reactor vessel, subject to the requirements of § 50.82(a) and consistent with the proposed definition of "Certified Fuel Handler" specified in § 50.2, to make these evaluations and judgments. A nuclear power reactor that has permanently ceased operations and no longer has fuel in the reactor vessel does not require a licensed individual to monitor core conditions. A certified fuel handler at a permanently shutdown and defueled nuclear power reactor undergoing decommissioning is an individual who has the requisite knowledge and experience to evaluate plant conditions and make these judgements.

In its Final Rule, "Decommissioning of Nuclear Power Reactors" (61 FR 39278; July 29, 1996), the Commission adopted the above changes. Thus, since 1996, the Commission's regulations in 10 CFR 50.2, "Definitions," define a certified fuel handler, for a nuclear power reactor facility, as "a non-licensed operator who has qualified in accordance with a fuel handler training program approved by the Commission."

The Commission's regulations do not set standards of approval for a fuel handler training program beyond what is stated in 10 CFR 50.120, "Training and qualification of nuclear power plant personnel," which addresses the training and qualification requirements for, among others, non-licensed reactor operators. The requirements of 10 CFR 50.120 apply to each applicant for and holder of a 10 CFR Part 50, "Domestic licensing of production and utilization facilities," operating license and each holder of a combined license issued under 10 CFR Part 52, "Licenses, certifications, and approvals for nuclear power plants." In addition, the CFH must be qualified in accordance with a fuel handler training program approved by the Commission. Although 10 CFR 50.120 does not address the specifics of how a NLO becomes qualified as a

CFH through the Commission-approved fuel handler training program, regarding the relationship between qualification and training, the Commission stated the following in the final rule, "Training and Qualification of Nuclear Power Plant Personnel," published in the *Federal Register* on April 26, 1993 (58 FR 21904):

As stated in the preamble for the proposed rule, qualification in the context of this rule means job task qualification. The proposed rule contained the requirement that licensees and applicants develop, implement, and maintain a SAT-based training program to ensure that nuclear power personnel are qualified to perform the tasks of their jobs. Because licensees and applicants must comply with all applicable regulations, there should be no ambiguity concerning the fact that successful completion of a training program does not obviate the need to comply with any other training or qualification requirements imposed by other regulations or license conditions. This means that nuclear power plant personnel must also meet the licensees' initial job qualification requirements imposed as part of initial employment.

The regulations in 10 CFR Part 55, "Operators' licenses," establish procedures and criteria for the licensing of operators and senior operators of power reactors. An "operator" is defined in 10 CFR 55.4, "Definitions," as an individual licensed under Part 55 to manipulate a control of a facility. A "senior operator" is defined in 10 CFR 55.4 as an individual licensed under 10 CFR Part 55 to manipulate the controls of a facility and to direct the licensed activities of licensed operators. Section 55.4 defines "controls," when used with respect to a nuclear reactor, to mean apparatus and mechanisms the manipulation of which directly affects the reactivity or power level of the reactor.

Under the language of 10 CFR 50.54(m) and Part 55, licensed operators are not required at decommissioning reactors. The NRC regulations do not explicitly state the staffing requirements for licensed operators after a reactor has permanently shut down and defueled under 10 CFR 50.82(a)(1) or 10 CFR 52.110(a). When licensees permanently shut down their reactors, they must continue to meet minimum staffing requirements in technical specifications and required programs (e.g., emergency response organizations, fire brigade, and security). Given the reduced risk of a radiological incident once the certifications of permanent cessation of operation and permanent removal of fuel from the reactor vessel have been submitted, licensees typically transition their operating staff to a decommissioning organization. This transition includes replacing licensed senior operators with CFHs as the on-shift management representatives responsible for supervising and directing the monitoring, storage, handling, and cooling of irradiated nuclear fuel in a manner consistent with ensuring the health and safety of the public. Regulations in 10 CFR 50.2 define a CFH for a nuclear power reactor as a NLO who has qualified in accordance with a fuel handler training program approved by the Commission. At a nuclear power reactor facility for which the certifications required under 10 CFR 50.82(a)(1) or 52.110(a) have been submitted, the Commission's regulation at 10 CFR 50.54(y) allows CFHs to make decisions otherwise reserved for licensed senior operators. Note that for an operating reactor, before a licensee could qualify a CFH, the NRC would need to approve the licensee's fuel handler training program and issue any necessary amendments to the operating license.

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The Commission's regulation at 10 CFR 50.120, "Training and qualification of nuclear power plant personnel," requires that each holder of an operating license must establish, implement, and maintain a training program that is derived from a systems approach to training (SAT) and that provides for the training and qualification of, among other personnel, NLOs.

At the time the training and qualification of nuclear power plant personnel rule was promulgated in 1993, the NRC staff did not specifically consider the applicability of its requirements to CFHs, because the definition of a CFH was not added to 10 CFR 50.2 until the issuance of the decommissioning rule in 1996. However, in the final rule published in the *Federal Register* on April 26, 1993 (58 FR 21904), concerning training during decommissioning, and continuing to use an SAT during decommissioning, the Commission wrote:

The SAT-process ensures that as plant conditions change, training programs will be revised to reflect these changes. These revisions could include the development of new programs or the elimination of obsolete programs. However, the process also ensures that the modification of the program to reflect the changed environment is performed in an orderly fashion. If permanent changes in the condition of the plant (i.e., decommissioning or POL [having a possession-only license]) make some or all existing training programs unnecessary, the licensee would obtain relief from these requirements by applying for an exemption eliminating or modifying the affected programs.

58 FR at 21907. The regulation at 10 CFR 50.120(b)(3) reads as follows:

The training program must incorporate the instructional requirements necessary to provide qualified personnel to operate and maintain the facility in a safe manner in all modes of operation. The training program must be developed to be in compliance with the facility license, including all technical specifications and applicable regulations. The training program must be periodically evaluated and revised as appropriate to reflect industry experience as well as changes to the facility, procedures, regulations, and quality assurance requirements. The training program must be periodically reviewed by licensee management for effectiveness. Sufficient records must be maintained by the licensee to maintain program integrity and kept available for NRC inspection to verify the adequacy of the program.

Therefore, the NRC staff finds that the use of the SAT and the requirements of 10 CFR 50.120(b)(3) are appropriate and applicable for training of NLOs for nuclear power reactors during the decommissioning process; this includes those NLOs who are also qualified as CFHs.

The NRC staff recognizes that there is a significant reduction in radiological risk and consequences of an accident for a nuclear power reactor undergoing decommissioning. Furthermore, following the events at the Fukushima Dai-ichi Nuclear Power Plant on March 11, 2011, and subsequent issuance of NRC Order EA-12-049, licensees developed and implemented strategies and guidance in response to the requirements imposed by the Order, to provide the necessary capabilities to supplement those permanently installed plant structures,

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systems, and components that could become unavailable following beyond-design-basis external events. The strategies were developed to add multiple ways to maintain or restore core cooling, containment, and SFP cooling capabilities, in order to improve the defense-in-depth of licensed nuclear power reactors. These additional mitigation capabilities contribute to additional reductions in the potential risk associated with the spectrum of accidents that may occur at a decommissioning reactor and improve the licensee's ability to respond to those events.

Because of the reduced risks and relative simplicity of the systems needed for safe storage of the spent fuel, the Commission stated in the 1996 decommissioning final rule that "[t]he degree of regulatory oversight required for a nuclear power reactor during its decommissioning stage is considerably less than that required for the facility during its operating stage." In the proposed rule, the Commission also provided insights as to the responsibilities of the CFH position. Specifically, the CFHs are needed at decommissioning reactors to ensure that emergency action decisions necessary to protect the public health and safety are made by an individual who has both the requisite knowledge and plant experience (60 FR 37374, 37379).

The regulatory framework concerning operator and fuel handler staffing during decommissioning was discussed by the NRC staff in SECY-00-0145, Attachment 1, "Integrated Rulemaking Plan for Emergency Planning, Insurance, Safeguards, Staffing and Training, and Backfit at Decommissioning Nuclear Power Plants," dated June 28, 2000 (ADAMS Accession Number ML003721626), which states, in part:

The certified fuel handler is intended to be the onshift licensee representative who is not only responsible for safe fuel handling operations at a decommissioning plant, but is always present on shift to ensure the safe maintenance and storage of spent fuel and the overall safety of any decommissioning-related activities at the facility...

In addition, the certified fuel handler must be qualified in accordance with a certified fuel handler training program approved by the Commission. However, there are no regulations besides the definition that specifies the training requirements for the certified fuel handler.

Considering the definition of CFH in 10 CFR 50.2 and the background provided by the 1996 decommissioning final rule, which added that definition, and the insights provided in SECY-00-0145, the NRC staff determined that, in addition to the requirements contained in 10 CFR 50.120, an acceptable fuel handler training program suitable to qualify CFH should ensure that the trained individual has requisite knowledge and experience in the safe conduct of the decommissioning activities; safe handling and storage of spent fuel; and is capable of evaluating plant conditions and exercising prudent judgment for emergency action decisions.

In previous approvals of licensee fuel handler training programs suitable to qualify a CFH (ADAMS Accession Nos. ML14104A046 and ML13268A165), the NRC staff used the following three broad-scope objectives as criteria for determining the acceptability of such programs:

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- (1) Safe conduct of decommissioning activities;
- (2) Safe handling and storage of spent fuel; and
- (3) Appropriate response to plant emergencies.

In addition, since the CFH is defined as a non-licensed operator, the NRC staff has also evaluated the CFH training program in accordance with 10 CFR 50.120, which includes a requirement in 10 CFR 50.120(b)(2) that the training program must be derived from a systems approach to training as defined in 10 CFR 55.4 and must provide for the training and qualification of certain categories of nuclear power plant personnel, including the category of non-licensed operator. The NRC staff notes that while the definition for a CFH in 10 CFR 50.2 indicates that a fuel handler training program requires Commission approval, there are no specific requirements in the regulations describing what constitutes an acceptable program, besides those included in 10 CFR 50.120, which apply to all NLOs. Because a training program for an NLO subject to 10 CFR 50.120 doesn't require Commission approval, unless that NLO is a CFH, the NRC staff has determined that a CFH program should address the above-described three broad-scope objectives that are above and beyond those already prescribed in 10 CFR 50.120(b)(2) and (b)(3).

Regarding the minimum staffing requirements for decommissioning nuclear power reactors, the NRC staff considered the analogous matters from the history of rulemaking for licensed operator staffing at nuclear power plants in 10 CFR 50.54(m). In the final rule published in the *Federal Register* on July 11, 1983 (48 FR 31611), the Commission provided justification for the provisions of the rule, which stated, in part:

Several commenters stated that the NRC had not provided adequate justification of the need for codifying the proposed staffing requirements and that the comment period should be extended until the staff develops a technical basis which demonstrates an increase in safety as a result of implementation of the rule. While an empirical data base which specifies the exact number and qualifications of licensed operators needed on shift at nuclear power plants does not exist, the basis described below is considered sufficient to warrant these increased staffing requirements pending confirmation by research programs which are planned or are currently underway.

The Commission notes, in this regard, that although these staffing levels have been Commission policy for several years, they have not previously been codified through rulemaking because of a belief that the industry recognized the importance of adequate, competent staffing and would voluntarily implement these staffing levels. However, that assumption has been proven false in several cases. The Commission has therefore decided that to protect the health and safety of the public, it is necessary

to adopt this rule to guarantee that all plants have an adequate number of licensed operators and senior operators available on shift.

48 FR at 31612.

The Commission further wrote:

A shift supervisor with a senior operator's license shall be on site at all times that any unit is loaded with fuel. The presence of this individual will assure that a technically competent supervisor will be present on each shift to direct the overall operation of the plant. A situation can arise at any time that requires the presence of someone with knowledge of the facility's technical specifications and the conditions and limitations in the facility license. Under current NRC requirements, senior operators are examined in more depth and more areas concerning a unit's conditions, limitations, and specifications than a reactor operator or unlicensed manager. In addition, a senior operator normally has more operational experience, further enhancing the senior operator's ability to respond to any situation that may occur. The absence of this knowledge on site, where it is readily available, could possibly create a hazardous condition.

...

A senior operator's technical expertise is required in the control room in addition to a reactor operator's technical expertise because of the differences in their training programs and experience. A senior operator typically has greater operating experience than a reactor operator. Also, a senior operator is trained and examined in seven areas that are not required for a reactor operator. ... More detailed knowledge in some of these areas would be helpful to the operators in the control room in the event of an emergency. ... Individuals with this knowledge have a better basis to provide a broader viewpoint and, therefore, should be available in the control room of an operating nuclear power plant at all times.

The requirement for a senior operator's continuous presence in the control room would assure that: (1) A person is available who can provide the oversight function of the supervisor so that the probability of detecting abnormal events early enough to mitigate potential adverse consequences might be increased; (2) the senior operator in the control room is aware of plant conditions prior to and resulting from an abnormal event so that the senior operator will be able to use extra experience, training and knowledge to act promptly to mitigate that event; and (3) the reactor operator is able to direct attention to performing immediate actions necessary to mitigate that event rather than having to brief the senior operator about the background of that event if that person were absent from the control room. It cannot be foreseen how quickly accidents will develop; having a senior operator in the control room at the initiation of any incident, rather than several minutes later if the senior operator is simply on site, could alleviate potentially serious consequences of foreseeable events. The presence of a

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senior operator, with increased experience and training, will also increase the probability of correctly detecting abnormal events and human error early enough to mitigate potential consequences of any accident. The Commission finds that these considerations are sufficient to justify imposition of the requirement that a senior operator be present at all times in the control room from which the unit is being operated.

48 FR at 31612.

In evaluating the Commission's justification for the 1983 rulemaking, the NRC staff notes the following:

- There is no sufficient data with regard to whether or not licensees of decommissioning facilities fail to recognize the importance of adequate competent staffing of CFHs and NLOs. Furthermore, most of the recent experience with permanently shut down and defueled reactors is limited to single-unit sites. Therefore, uncertainty remains whether licensees with two or more units that would enter the decommissioning process in the future, may propose staffing levels by NLOs and CFHs that would be acceptable to the NRC staff.
- Although the NRC staff recognizes that there is a significant reduction in radiological risk and consequences of an accident for a nuclear power reactor undergoing decommissioning, the staff finds that some of the considerations similar to those used in the 1983 rulemaking for the licensed operator staffing at operating nuclear power plants would still apply for decommissioning facilities. In particular, the staff believes that continuous presence of a technically competent shift supervisor on each shift is required to oversee the safe operation of the decommissioning facility and direct onsite activities necessary for safe storage and maintenance of the nuclear fuel. Previously issued amendments to technical specifications of licensees that have permanently shut down and defueled included provisions requiring that the shift supervisor position be filled by a CFH (ADAMS Accession Nos. ML14217A072 and ML14097A145).
- The NRC staff finds that a CFH's technical expertise is required on each shift, in addition to an NLO's technical expertise, because of the differences in their training programs and experience. A CFH typically has greater experience than a NLO who was not trained and qualified as a CFH. A situation can arise at any time that may require the presence of someone with knowledge of the facility's technical specifications and the condition and limitations in the facility's license. Because it is not possible to predict when an abnormal event or a human error may occur, and how quickly an accident will develop, more detailed knowledge, experience, and training of a CFH would be helpful to other NLOs on site in the event of an emergency.

The NRC staff believes that the above are sufficient to justify considering the imposition of requirements for minimum staffing levels of NLOs and CFHs for decommissioning reactors.

Another staffing position required for operating reactors is the shift technical advisor (STA). The STA provides engineering expertise on shift for assisting in the diagnosis of complex structure, system, and component problems during reactor operation. This staffing requirement is not relevant to a decommissioning plant and is typically removed via license amendment from

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the decommissioning plant technical specifications. However, the acceptability of discontinuing the STA training program for permanently shutdown and defueled reactors is not addressed in the current regulations and needs to be clarified.

Technical Basis for Amending CFH Minimum Staffing and Training Requirements for Reactors Transitioning to Decommissioning

In SRM-SECY-14-0118, "Request by Duke Energy Florida, Inc., for Exemptions from Certain Emergency Planning Requirements," the Commission directed the staff to proceed with rulemaking on decommissioning. Further, SRM-SECY-14-0118 specifically stated that the rulemaking should address, among other topics, issues discussed in SECY-00-0145, "Integrated Rulemaking Plan for Nuclear Power Plant Decommissioning," lessons learned from the plants that have already (or are currently) going through the decommissioning process, and any other issues deemed relevant by the NRC staff.

Therefore, the staff is considering the development of a rule or guidance that would:

- Clarify the management role of the CFH in a manner that is consistent with 10 CFR 50.54(y), and with the NRC staff's interpretation of SECY-00-0145;
- Revise the definition of the CFH in 10 CFR 50.2 that would eliminate the need for licensees to seek Commission's approval for fuel handler training programs suitable to qualify CFH, while adding a provision that the training program address the safe conduct of decommissioning activities, safe handling and storage of spent fuel, and appropriate response to plant emergencies. In doing so, the NRC staff would codify the existing practice of ensuring that the fuel handler training program suitable to qualify CFH addresses the above-mentioned three broad-scope objectives. The NRC staff anticipates that implementation of training programs suitable to qualify NLOs and CFHs can be inspected using existing Inspection Procedures (IPs), such as IP 41501, "Review of Training and Qualification Programs";
- Clarify that an STA training program is not required for permanently shutdown and defueled reactors.
- Specify the minimum staffing levels of NLOs and CFHs at permanently shutdown and defueled reactors.

If the staff pursues rulemaking in this area, the staff would consider the draft regulatory language as described in Option 3, below.

RULEMAKING OPTIONS

The following discussions provide a preliminary regulatory assessment of the proposed rulemaking approach and other alternatives considered by the staff.

OPTION 1: NO ACTION

This option would retain the current wording of the regulations. Discontinuing the training and use of licensed operators after permanent cessation of operation and removal of fuel from the reactor could be justified by interpretation of the operator staffing requirements of 10 CFR

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50.54(m) and training requirements of 10 CFR 50.120. The regulations state, in part, that “[t]he training program must be periodically evaluated and revised as appropriate to reflect... changes to the facility, procedures, regulations....” 10 CFR 50.54(y) requires that when a licensee takes reasonable action that departs from a license condition or a technical specification, the action shall be approved “by a licensed senior operator, or, at a nuclear power reactor facility for which the certifications required under 10 CFR 50.82(a)(1) or 52.110(a) have been submitted, by either a licensed senior operator or a certified fuel handler, prior to taking the action.” This language is sufficiently broad to allow reactors that have permanently shut down and defueled to use CFHs instead of licensed operators.

ASSESSMENT OF OPTION 1

The no-action option would likely not result in any significant additional cost or burden to the licensees and the NRC if decommissioning technical specifications were kept for staffing requirements consistent with current practice, as reflected in recent precedents. However, because the regulations do not require a licensee to commit to specific NLO staffing levels for permanently shutdown and defueled reactors, there is the possibility that future license amendments related to NLO staffing could propose more relaxed NLO staffing requirements than those established by current practice. Notwithstanding this possibility, the NRC staff would continue to review the staffing requirements proposed in the license amendment requests submitted by the licensees and ensure adequate protection of public health and safety.

OPTION 2: VOLUNTARY INDUSTRY INITIATIVES FOR STAFFING AND TRAINING FOR PERMANENTLY SHUTDOWN AND DEFUELED REACTORS AND TO CLARIFY RELATED DEFINITIONS

In this option, the NRC staff would consider reviewing voluntary industry initiatives that may provide guidance on the responsibilities of the certified fuel handler, provide guidance on minimum staffing for a decommissioning nuclear reactor licensee that has submitted the certifications required by Section 50.82(a)(1) or 52.110(a), and provide guidance on the structure and contents of a fuel handler training program that can be used to qualify a CFH that would be acceptable to the NRC staff.

The staff notes that while regulatory guidance exists that addresses acceptable methods of meeting the requirements for qualification and training of various categories of personnel, including the NLO (for example, Regulatory Guide (RG) 1.8, “Qualification and Training of Personnel for Nuclear Power Plants,” and NUREG-1220, “Training Review Criteria and Procedures”), none of the existing regulatory guidance specifically addresses fuel handler training programs suitable to qualify CFH.

ASSESSMENT OF OPTION 2

This option would clarify the intent of the 1996 decommissioning rulemaking, which defined the certified fuel handler position without providing clear details on the minimum staffing and training requirements for certified fuel handlers. It is the staff's position that training requirements for NLOs during decommissioning are covered under 10 CFR 50.120. Licensees have requested and NRC staff has reviewed and approved proposed CFH training programs using, in part, requirements in 10 CFR 50.120. However, the regulations do not require that the fuel handler training program address the broad-scope objectives of ensuring the safe conduct of decommissioning activities, safe handling and storage of spent fuel, and appropriate response to plant emergencies, which, in the NRC staff's position, are the necessary attributes of a fuel handling training program that would be acceptable to qualify a CFH. If proposed voluntary industry initiatives are consistent with existing regulatory practices, no burden or increased cost is anticipated beyond what is currently expected for decommissioning plants.

The NRC staff notes that NEI has issued draft industry guidance on the certified fuel handler training program in NEI 15-04, "Guidelines for a Certified Fuel Handler Training and Retraining Program" (ADAMS Accession Number ML15350A145). The staff has not formally reviewed draft NEI 15-04 for potential endorsement via a regulatory guide. The NRC staff also notes that, to date, no voluntary industry initiatives have been proposed with regard to the minimum staffing requirements for permanently shut down and defueled reactors.

OPTION 3: CHANGE THE REGULATIONS FOR STAFFING FOR PERMANENTLY SHUTDOWN AND DEFUELED REACTORS AND RELATED DEFINITIONS

The rulemaking option would revise the definition of "Certified fuel handler" in 10 CFR 50.2 to clarify the management role of the CFH in a manner consistent with 10 CFR 50.54(y); eliminate the need for a licensee to seek Commission's approval for fuel handler training programs suitable to qualify CFH; add a provision that the training program address the safe conduct of decommissioning activities, safe handling and storage of spent fuel, and appropriate response to plant emergencies, in addition to requiring consistency with the existing requirements for training of NLOs in 10 CFR 50.120; and specify the minimum staffing requirements in 10 CFR 50.54(m) for a decommissioning nuclear reactor licensee that has submitted the certifications required by 10 CFR 50.82(a)(1) or 52.110(a). The regulatory changes would be consistent with established precedents that have been approved by the NRC staff on a case-by-case basis for permanently shut down and defueled reactors.

For example, the staff is considering the following changes to the definition of CFH in 10 CFR 50.2:

Certified fuel handler means, for a nuclear power reactor facility, a non-licensed operator who is responsible for decisions on (1) safe conduct of decommissioning activities, (2) safe handling and storage of spent fuel, and (3) appropriate response to plant emergencies, and has qualified in accordance with a fuel handler non-licensed operator training program approved by the Commission required by 10 CFR 50.120.

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As discussed above, 10 CFR 50.54(m) is not applicable to permanently shut down, defueled, decommissioning reactors. Based on recent experience and lessons learned from recent decommissioning power reactors, the staff may propose adding the following footnote to clarify the table provided in Section 50.54(m):

² (i) For the purpose of this table, a nuclear power unit is considered to be operating when it is in a mode other than cold shutdown or refueling as defined by the unit's technical specifications, and (ii) the requirements of this table apply only with fuel in the reactor vessel.

The NRC staff proposed additional changes to 10 CFR 50.54(m) in SECY-00-0145, including the addition of a table to specify the minimum requirements for the number of CFHs and NLOs on-shift at a permanently shut down and defueled nuclear power unit. The NRC staff is re-considering those changes to 10 CFR 50.54(m) in addition to changes in 10 CFR 50.120 that would clarify that the STA position and the associated training program are not needed for a decommissioning nuclear power reactor.

ASSESSMENT OF OPTION 3

This rulemaking option would clarify the responsibilities and functions and add specific requirements for fuel handler training programs suitable to qualify CFHs by codifying current licensing practices. In addition, the rulemaking would specify the minimum staffing requirements of NLOs, including CFHs, for permanently shutdown and defueled nuclear power plants. Providing this rulemaking would prevent licensing delays due to misinterpretation of or confusion about the existing regulations. Further, by creating new regulations in this area, consistent, predictable requirements would be established, which would support the principles of good regulation, including clarity, efficiency, and reliability.

POTENTIAL BACKFIT CONSIDERATIONS

This option would constitute backfitting under 10 CFR 50.109. Imposing on current holders of operating licenses new requirements, even ones that would not take effect until the licensee enters decommissioning, would meet the definition of "backfitting" in 10 CFR 50.109(a)(1). Because this option would not involve adequate protection or be necessary to bring a licensee into compliance with a requirement or commitment, the rulemaking would have to result in a cost-justified, substantial increase in the protection of the public health and safety or common defense and security to be implemented. The NRC staff believes that a minimum number of appropriately qualified personnel who are trained in the safe conduct of decommissioning activities, safe handling and storage of nuclear fuel, and response to plant emergencies, consistent with the goals of ensuring protecting the health and safety of the public, should be present during each shift on site, at each decommissioning nuclear power reactor, until the spent fuel is permanently removed from the SFP. To that end, the staff also recognizes that decay heat levels in spent fuel pools diminish over time and provide operators additional time to mitigate potential events. For example, after 10 months for BWRs and 16 months for PWRs, operators will have approximately 10 hours to initiate mitigation measures from the time the SFP

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is completely empty before a zirconium fire could initiate. The NRC staff is evaluating whether promulgation of such requirements through a rulemaking would result in a substantial increase in the overall protection of the public health and safety.

Regulatory Scope of a Power Reactor Decommissioning Rulemaking Regarding Certified Fuel Handlers, Other NLOs, and Minimum Staffing

The proposed rulemaking would include revisions to the definition of CFH in 10 CFR 50.2 and minimum staffing requirements in 10 CFR 50.54(m), to clarify the responsibilities of CFHs, to add specific requirements for fuel handler training programs suitable to qualify CFHs, by codifying current regulatory practices, to clarify that licensed operators are not required for permanently shutdown and defueled reactors, and specify the minimum staffing level of CFHs and other NLOs. The staff is also considering changes to 10 CFR 50.120 that would clarify that the STA position and the associated training program are not needed for a decommissioning nuclear power reactor.

NRC Guidance, Policy, and Implementation Issues

NRC Guidance

The NRC staff would need to generate a new guidance document to support the proposed rulemaking. Regarding training programs acceptable to qualify CFH, the NRC staff would consider reviewing NEI draft industry guidance document NEI 15-04, "Guidelines for a Certified Fuel Handler Training and Retraining Program," for potential endorsement via a regulatory guide. Additional guidance may be considered to support the implementation of proposed minimum staffing requirements.

Policy Issues

There are no specific policy issues associated with the proposed amendments to regulations for CFHs or other NLOs at decommissioning power reactors.

Implementation Issues

There are no specific implementation issues associated with the proposed amendments to regulations for certified fuel handlers at decommissioning power reactors.

Impacts of Proposed Rulemaking

This section provides an analysis of the "no action" alternative, the use of voluntary industry initiative, and the rulemaking option. Option 1 is the "no action" alternative and involves the continuation of current decommissioning practices. Option 2 is an alternative in which the staff would review any voluntary industry initiatives, such as guidance to clarify the intent of the 1996 decommissioning rulemaking, which defined the certified fuel handler position without providing clear details on the minimum staffing and training requirements for CFHs and other NLOs. Option 3 is a rulemaking approach that would codify clarifications related to CFHs and other NLOs at decommissioning power reactors.

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OPTION 1: NO ACTION

Under this option, the NRC staff would continue with the existing decommissioning process as described in the current regulations and guidance.

Impacts on public health, safety, and security

Because this option would not change the current process, there would be no increase or reduction in public health, safety, and security.

Impacts on licensees

Due to the lack of clarity in the regulations with regard to the staffing alternative for licensed operators after a reactor has permanently shut down and defueled and in the absence of regulatory requirements for CFH and NLO minimum staffing for decommissioning plants, the fuel handler training programs suitable to qualify CFH and any necessary amendments to the operating licenses submitted by the licensees will continue to be reviewed by the NRC staff on a case-by-case basis. Although there is no incremental impact on licensees, this option would result in continued expenditures by licensees associated with review and approval of such submittals.

Impacts on NRC

This option would have no incremental impact on the NRC. However, the NRC staff would continue to expend resources associated with review of fuel handler training programs suitable to qualify CFH and license amendment requests, on a case-by-case basis.

Additional considerations

This option would have no incremental impact on State, local, or Tribal governments.

Summary of benefits and costs

Benefits

No incremental benefits to licensees or NRC.

Costs

No incremental costs to licensees or NRC. However, licensees and the NRC staff would continue to carry the burden associated with regulatory review and approvals of fuel handler training programs suitable to qualify CFH and necessary license amendments, on a case-by-case basis.

OPTION 2: VOLUNTARY INDUSTRY INITIATIVES FOR STAFFING AND TRAINING FOR PERMANENTLY SHUTDOWN AND DEFUELED REACTORS AND RELATED DEFINITIONS

Under this option, the NRC staff would review any proposed voluntary industry initiatives, such as guidance for certified fuel handler training programs and staffing at decommissioning power reactors. The staff notes that NEI has issued draft industry guidance on the certified fuel handler training program in NEI 15-04, “Guidelines for a Certified Fuel Handler Training and Retraining Program” (ADAMS Accession Number ML15350A145). The staff also notes that to date, no voluntary industry initiatives have been proposed with regard to the minimum staffing requirements for permanently shut down and defueled reactors.

Impacts on public health, safety, and security

This option would have no impact on public health and safety. The existing regulations would be maintained under this option.

Impacts on licensees

This option could provide benefits to licensees by establishing guidance that would clarify the NRC staff’s expectations in regard to acceptable fuel handler training programs suitable to qualify CFH and staffing for permanently shut down and defueled reactors. This may lead to small-to-modest operational savings to licensees, primarily because consistent application of such guidance may result in a meaningful reduction in the number of Requests for Information (RAIs) issued by the NRC staff to licensees. As a result, licensees would incur savings associated with this reduction in RAIs. Further, the burden associated with preparation of fuel handler training programs suitable to qualify CFH and license amendment requests related to staffing at decommissioning power reactors would decrease, because the preparation of such submittals would be streamlined.

Impacts on NRC

Overall, this option would result in one-time costs to the NRC. Initially, there would be incremental costs to the NRC to review any voluntary industry initiatives, such as guidance regarding fuel handler training programs suitable to qualify CFH. These costs include review of documents submitted for the NRC staff’s review, public meetings with stakeholders, and publication of regulatory guidance, if appropriate. The NRC would also support public meetings on the draft regulatory guidance. The costs would include both staff and contractor time to develop guidance and perform supporting analyses, and public outreach efforts during the guidance development phase.

Additional considerations

This option would have no incremental impact on State, local, or Tribal governments.

Summary of benefits and costs

Benefits

The staff notes that this approach would promote uniformity and standardization for fuel handler training programs suitable to qualify CFH. Specifically, because the three broad-scope objectives (safe conduct of decommissioning activities, safe handling and storage of spent fuel, and appropriate response to plant emergencies) that the NRC staff has determined to be necessary for issuance of approval for fuel handler training programs suitable to qualify CFHs, are not addressed in the regulations, voluntary industry initiatives may be useful in describing these expectations.

Costs

The costs associated with this option include development and implementation of NRC and industry guidance.

OPTION 3: CHANGE THE REGULATIONS FOR STAFFING FOR PERMANENTLY SHUTDOWN AND DEFUELED REACTORS AND RELATED DEFINITIONS

Under this option, the NRC staff would undertake a rulemaking to clarify the requirements for staffing and training of non-licensed operators, including certified fuel handlers, at decommissioning power reactors.

Impacts on public health, safety, and security

Under this option, the NRC staff would continue to make findings of reasonable assurance that the health and safety of the public would not be endangered by complying with the changed regulations for staffing and training of non-licensed operators at permanently shutdown and defueled reactors. Additional, indirect benefits to public health, safety, and security may arise as a byproduct of the improved regulatory efficiency and stability that would result from clarifying the requirements for minimum staffing and training of non-licensed operators, as described in this option.

Impacts on licensees

Some aspects of this option would lead to small-to-modest operational savings to licensees, primarily because establishing clear, consistent, and enforceable requirements and developing regulatory guidance would enhance regulatory stability and predictability. The licensees would also incur savings because the proposed rulemaking would eliminate the need for licensees to seek the Commission's approval for fuel handler training programs suitable to qualify CFHs.

Furthermore, this option may result in a reduction in the number of RAIs issued by the NRC staff to licensees in connection with license amendment requests submitted by licensees entering the decommissioning process and requesting changes to the "Administrative Controls" section of the technical specifications that address the minimum staffing and qualifications of operations staff. As a result, licensees would incur savings associated with responding to these RAIs.

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Conversely, licensees may incur additional costs to establish and maintain a regulatory-mandated programs. However, the NRC staff expects that the overall burden to licensees associated with preparation of training programs suitable to qualify CFHs and license amendment requests related to staffing at decommissioning power reactors would not be significant, because the preparation of such documents would be streamlined.

Licensees would also incur costs associated with NRC inspection activities intended to verify appropriate implementation of the rule. Such inspections can be performed concurrently with other inspections that would be conducted at decommissioning facilities and, therefore, any such increase in burden and cost to the licensees would be small.

Impacts on NRC

Initially, this option would result in significant one-time costs to the NRC, followed by a decrease in burden and savings to the NRC, due to the elimination of the need to review and approve fuel handler training programs suitable to qualify CFHs.

Initially, there would be incremental costs to the NRC to undertake the rulemaking process. These costs include the preparation of the proposed rule and accompanying guidance. The costs would include both NRC staff and contractor time to prepare proposed rule language, draft guidance, supporting analyses (e.g. a regulatory analysis and Office of Management and Budget Paperwork Burden analysis), a *Federal Register* Notice, and public outreach efforts during the rule and guidance development phase. After publishing the proposed rule, the NRC would incur costs associated with public comment resolution and preparation of the final rule, guidance, and supporting documentation for the rulemaking.

After the final rule becomes effective, the NRC staff would incur savings, due to the elimination of the need for the NRC staff to review and approve fuel handler training programs suitable to qualify CFHs. The NRC staff expects to expend some resources for inspection of CFH training programs after their implementation by licensees during the decommissioning process. The NRC staff expects that existing inspection procedures, such as IP 41501, "Review of Training and Qualification Programs," may be used to conduct such inspections. The burden and costs associated with such inspection are expected to be much smaller than those currently being expended on reviews and approval of fuel handler training programs suitable to qualify CFH, on a case-by-case basis.

Additional considerations

The proposed rule would have no incremental impact on State, local, or Tribal governments.

Summary of benefits and costs

Benefits

- Enhanced clarity and predictability of decommissioning process.

- Reduced burden and cost savings to licensees due to elimination of the requirement to seek Commission approval of fuel handler training programs suitable to qualify CFH.
- Reduced burden to the NRC staff due to the elimination of need to review and approve fuel handler training programs suitable to qualify CFH.
- Reduced burden and cost savings to licensees associated with a reduction in the number of RAIs issued by the NRC staff to licensees.

Costs

- One-time cost to the NRC to undertake the rulemaking process and create guidance.
- Licensee costs to implement specific provisions of the rule.
- Small costs to the NRC and licensees associated with future inspections intended to verify appropriate implementation of the rule.

NRC Staff Observations on Stakeholder Feedback on the ANPR

The NRC received several public comments regarding training requirements for certified fuel handlers, both for and against regulatory changes in this area. Several commenters recommended that the NRC develop a regulation for the licensing of fuel handlers, arguing that the site should always be under the control of individuals who have been specifically licensed and regulated by the NRC for the task. Some commenters noted that a licensed fuel handler should not be required for a reactor plant which still maintains licensed operators, but that a licensed fuel handler program must be established and personnel licensed by the NRC prior to abolishing the requirement to maintain licensed operators.

Other commenters suggested that the NRC should review and endorse industry guidance documents regarding certified fuel handler training programs.

Several commenters suggested that the NRC should not perform rulemaking in this area, and that certified fuel handler training programs should be left to licensees given the unique conditions at each site.

The NRC staff considered all of these comments when developing the options presented in this Appendix.

STAFF RECOMMENDATION

The NRC staff recognizes that the risks to public health and safety associated with spent fuel pools is significantly lower than those associated with an operating plant and that no adverse safety impacts have been identified related to CFH staffing or training. These risks have been further reduced by actions taken in response to the September 11, 2001, terrorist attacks and the Fukushima Dai-ichi accident. However, the staff concludes that there is:

- (1) A lack of clarity in the regulations with regard to the staffing alternative for licensed operators after a reactor has permanently shut down and defueled under 10 CFR 50.82(a)(1) or 52.110(a);

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(2) A regulatory gap with respect to minimum staffing requirements for staff at permanently shut down and defueled reactors; and

(3) An inconsistency in the regulatory treatment of training program requirements of NLOs, the training programs that do not require Commission approval, and the training programs for fuel handlers that can be used to qualify CFHs, which are also NLOs, and that require Commission approval. The staff further notes that there is a lack of clarity in the regulations with regard to what requirements, in addition to those stipulated in 10 CFR 50.120(b)(2) and (b)(3), an acceptable fuel handler training program for qualifying CFHs would have to meet, in order to be approved by the Commission.

The NRC staff has reviewed licensee submittals for plants entering the decommissioning process from the past few years, including approvals of licensee fuel handler training programs suitable to qualify a CFH (ADAMS Accession Nos. ML14155A181, ML13268A165, and ML14162A209), and amendments to licenses of decommissioning facilities that include changes to the “Administrative Controls” Section of the technical specifications that address the minimum staffing and qualifications of operations staff (ADAMS Accession Nos. ML14097A145, ML14138B240, and ML14217A072). Based on the results of these reviews, the NRC staff believes that the proposed rulemaking option (Option 3) will closely align with these recent approvals. The use of voluntary industry initiatives, such as industry guidance, may address the lack of clarity in the regulations with regard to the staffing alternative for licensed operators after a reactor has permanently shut down and defueled under 10 CFR 50.82(a)(1) or 52.110(a), as well as the lack of clarity with regard to responsibilities of CFHs and other NLOs at decommissioning reactors.

At this time, the staff is requesting public comments regarding these options as discussed below. The NRC staff encourages the public to provide feedback on this draft regulatory basis and the options described within. The decision on which option the staff recommends in the final regulatory basis will be informed by public comments received on this draft regulatory basis document. The staff’s recommendation, along with a full assessment of the rulemaking options described above, will be documented in the final regulatory basis document.

Appendix F - Decommissioning Trust Funds

The U.S. Nuclear Regulatory Commission (NRC) requires nuclear power plant licensees to provide reasonable assurance that funds will be available for plant radiological decommissioning. An element of this assurance is the requirement for licensees to provide a minimum decommissioning fund per the formula defined in Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.75(c). The table of minimum amounts formula (NRC minimum formula) was established in 1988 as a means to assure the bulk of funds needed for radiological decommissioning were available. The requirement in 10 CFR 50.75(c) also defines a process for adjusting the formula to current-year dollars. The NRC staff uses the formula and adjustment factors to periodically assess the adequacy of the decommissioning trust funds (DTFs) established by the nuclear power plant licensees. The formula is also used by the NRC and licensees as a benchmark that a site-specific cost estimate (SSCE) must meet or exceed.

The NRC staff is proposing changes to address the legitimate use of DTFs, and also considering changes to the manner in which licensees provide financial assurance for radiological decommissioning through use of a SSCE (at licensing or during operations) in lieu of the NRC minimum formula. The primary intent of these changes would be to ensure that sufficient funding is available for plant decommissioning, while reducing the need for regulatory exemptions with respect to use of the DTF by licensees. In addition, the clarification of allowable DTF expenses for both radiological and non-radiological decommissioning expenses, such as spent fuel management, will codify current practice. Overall, this rulemaking is anticipated to minimize the need for licensees to request exemptions from decommissioning funding regulations and introduce a greater degree of flexibility in the licensees' use of the DTF.

History of the Decommissioning Trust Fund (DTF)

Decommission, as defined in 10 CFR 50.2, means “to remove a facility or site safely from service and reduce residual radioactivity to a level that permits: (1) release of the property for unrestricted use and termination of the license; or (2) release of the property under restricted conditions and termination of the license.” Pursuant to 10 CFR 50.75, “Reporting and recordkeeping for decommissioning planning,” power reactor licensees and applicants must certify that financial assurance for radiological decommissioning has been (for licensees) or will be (for applicants) provided in an amount greater than or equal to either the amount provided in the Commission’s regulations (the formula amount under 10 CFR 50.75(c)) or a site-specific amount based on a cost estimate for decommissioning the facility (SSCE amount under 10 CFR 50.82(a)(4)(i)). This amount must be covered by one or more of the methods described in 10 CFR 50.75(e), which include: (i) prepayment; (ii) surety bond, insurance, or parent company guarantee; (iii) external sinking fund in an account segregated from licensee assets and outside the administrative control of the licensee and its subsidiaries or affiliates; (iv) a statement of intent (for applicable government agencies); (v) contractual obligation on the part of the licensee’s customers; or (vi) any other mechanism, or combination of mechanisms, as determined by the NRC to be equivalent to the foregoing (i) through (v). The purpose of this requirement is to provide reasonable assurance that the bulk of the money necessary to decommission is available.

In September 1998, the NRC amended its financial assurance regulations (63 FR 50465) to specify that only regulated utilities may use the external sinking fund method of funding. The NRC also added the requirements currently in 10 CFR 50.75(f)(1) and (f)(2), that each power reactor licensee must file a report on the status of its decommissioning funding for each reactor it owns with the NRC by March 31st of every odd-numbered year or annually for plants that are either within five years of being decommissioned, or are in the process of being decommissioned. This report must specify the assumptions that underlie the licensee's decommissioning funding assurance and shall include

“the amount of decommissioning funds estimated to be required pursuant to 10 CFR 50.75(b) and (c); the amount of decommissioning funds accumulated to the end of the calendar year preceding the date of the report; a schedule of the annual amounts remaining to be collected; the assumptions used regarding rates of escalation in decommissioning costs, rates of earnings on decommissioning funds, and rates of other factors used in funding projections; any contracts upon which the licensee is relying pursuant to paragraph (e)(1)(v) of this section; any modifications occurring to a licensee's current method of providing financial assurance since the last submitted report; and any material changes to trust agreements.”

The 1998 amendments were also in response to the potential deregulation of the power generating industry, and changed the definition of “electric utility” in 10 CFR 50.2. That rule required power reactor licensees to report periodically on the status of their decommissioning funding, and allowed credit to be taken on the earnings of decommissioning funds. The 1998 rule also established the schedule under which the NRC would be reviewing funding plans. The rule also required licensees to have the required decommissioning funds, less credit for 2 percent real rate of return, in their DTFs at all times. In August 1990, the NRC published Regulatory Guide (RG) 1.159, “Assuring the availability of funds for decommissioning nuclear reactors” (Agencywide Document Access and Management System (ADAMS) Accession No. ML003740066). This guidance provides that licensees make up short falls in funding within two years.

The NRC published a final rule, “Decommissioning Trust Provisions,” amending 10 CFR 50.75 on December 24, 2002 (67 FR 78332), which became effective on December 24, 2003. This rule change required licensees that were no longer rate-regulated, or no longer had access to a non-by-passable charge for radiological decommissioning, to establish decommissioning trust agreements in a form acceptable to the NRC in order to increase assurance that an adequate amount of decommissioning funds is available. In October 2003, the NRC issued Revision 1 to RG 1.159 (ADAMS Accession No. ML032790365) to provide guidance regarding the revised regulations. The RG includes explanations, definitions, and examples of documents related to the financial assurance process, including recommended language to be used in DTF and financial guarantee documents. The amended regulations and the revised RG take into account the fact that the ownership of nuclear generating facilities was being transferred from regulated utilities to non-regulated utilities and the resulting reduction in regulatory oversight by the state oversight entities (e.g., Public Utilities Commissions) and the Federal Energy Regulatory Commission (FERC). The guidance in RG 1.159 contains provisions that are specifically applicable to non-regulated utilities (e.g., Sections 2.2.2.5 and 2.2.3.2) and the recommended

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format for DTF documents and letters of financial assurance to be submitted to the NRC. In addition, RG 1.159 indicates that utilities are allowed to take credit for a 2 percent annual rate of return (the difference between the assumed rate of return and the escalation rate for the cost of radiological decommissioning) in making their financial assurance determinations (Section 2.2.3.2). A licensee that has prepaid funds based on an SSCE under 10 CFR 50.75(b)(1) may take credit for projected earnings on the prepaid decommissioning trust funds, using up to a 2 percent annual real rate of return from the time of future funds' collection through the projected decommissioning period, provided that the SSCE is based on a period of safe storage that is specifically described in the estimate. This includes the periods of safe storage, final dismantlement, and license termination. A licensee that has prepaid funds based on the formulas in 10 CFR 50.75(c) may take credit for projected earnings on the prepaid decommissioning funds using up to a 2 percent annual real rate of return up to the time of permanent cessation of operations. A licensee may use a credit of greater than 2 percent if the licensee's rate-setting authority has specifically authorized a higher rate. However, licensees certifying only to the formula amounts (i.e., not an SSCE) can take a pro-rata credit during the immediate dismantlement period (i.e., recognizing both cash expenditures and earnings the first 7 years after shutdown). Actual earnings on existing funds may be used to calculate future fund needs.

Commingling of Funds

Of note, some licensees have created separate DTF subaccounts for decommissioning activities beyond radiological decommissioning. Licensees may include in, and separately account for such funds in their DTF to provide for activities that do not fall within the definition of decommissioning in 10 CFR 50.2. The NRC allows the commingling of funds within a licensee's DTF to address site restoration costs and spent fuel management costs as long as the licensee is able to identify and account for the NRC required radiological decommissioning funds that are contained within its trust. The practice of combining these funds is commonly known as "commingling," and is generally permitted under NRC regulations, as described in NRC Regulatory Information Summary (RIS) 2001-07, "10 CFR 50.75 Reporting and Recordkeeping for Decommissioning Planning," Revision 1 (ADAMS Accession No. ML083440158), dated January 8, 2009. Should the licensee follow this guidance, an exemption would not be necessary.

Table of Minimum Amounts

As set forth in 10 CFR 50.75(b), licensees are required to certify that financial assurance for radiological decommissioning will be provided in an amount which may be more, but not less, than the amount stated in the table of minimum amounts found in 10 CFR 50.75(c). This table of minimum amounts establishes the minimum amount that a licensee has to set aside to provide reasonable assurance that there will be sufficient money to pay for radiological decommissioning. The table of minimum amounts does not represent the actual cost of radiological decommissioning for specific reactors, but rather is a reference level established to assure that licensees demonstrate adequate financial responsibility that the bulk of the funds necessary for a safe decommissioning are being considered and planned for early in facility life; this provides reasonable assurance that the facility would not become a risk to the public health and safety when it is decommissioned (53 FR 24018, 24030, June 27, 1988). In 1986 dollars,

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the minimum amount for a pressurized water reactor (PWR) was \$105 million, and the minimum amount for a boiling water reactor (BWR) was \$135 million. This amount covers only the cost of the radiological decommissioning of a nuclear generating plant and excludes the cost of such expenditures as restoring the property to its original condition (i.e., “green-fielding”) and/or managing spent fuel. The \$105 million and \$135 million cost numbers are escalated each year to reflect increasing costs of labor, energy, and waste burial (10 CFR 50.75(e)(2)). The guidance in NUREG-1307, “Report on Waste Burial Charges: Changes in Decommissioning Waste Disposal Costs at Low-Level Waste Burial Facilities,” as amended, updates the escalation factors to be used annually and adjusts the results, in dollars, to the current year; thus ensuring the continued viability of the formula. The staff may consider revising NUREG-1307, Rev. 15 (ADAMS Accession No. ML13023A030) to address additional considerations impacting the formula and to improve the clarity of the guidance.

The accuracy of the *Table of Minimum Amounts* was validated in 2010, via a finding by the NRC staff that licensees, using the minimum formula, provided reasonable assurance of decommissioning funding (SECY-11-0149, “Summary Findings Resulting from the Staff Review of the 2010 Decommissioning Funding Status Reports for Operating Power Reactor Licensees” (ADAMS Accession No. ML112800468)). Also in 2010, the minimum formula was again validated by the NRC staff; confirming its adequacy in estimating the funds needed for radiological decommissioning. In SECY-13-0066, “Staff Findings on the Table of Minimum Amounts Required to Demonstrate Decommissioning Funding Assurance” (ADAMS Accession No. ML13127A234), the NRC staff concluded that the minimum formula successfully established “a common minimum standard, or reference level, to which each licensee must accumulate committed financial resources during the life of the operating license as it was intended” and that licensees have the flexibility to use a site-specific cost estimate, as allowed by the regulations.

Use of the Decommissioning Trust Fund

Disbursements or withdrawals from the DTF, other than for payment of ordinary administrative costs and other incidental expenses of the fund in connection with the operation of the fund, are restricted to radiological decommissioning expenses or transfer to another financial assurance method until final decommissioning has been completed. Prior to the permanent cessation of operations and the permanent removal of fuel, 3 percent of the generic amount specified in 10 CFR 50.75 may be used for decommissioning planning. After the permanent cessation of operations and the permanent removal of fuel, and commencing 90 days after the NRC has received the post-shutdown decommissioning activities report (PSDAR), an additional 20 percent may be used. A site-specific decommissioning cost estimate must be submitted to the NRC prior to the licensee using any funding in excess of these amounts. Additionally, after the permanent cessation of operations and the permanent removal of fuel, DTFs may be used by licensees if: (A) their use is for legitimate radiological decommissioning activities; (B) their use will not reduce the value of the trust below the amount necessary to place the facility in safe storage (if needed); and (C) their use does not inhibit the licensee to complete funding of any shortfalls in the DTF. The PSDAR illustrates a licensee’s plans for decommissioning the facility, including funding plans and annual expenses. NRC approval of the PSDAR is not required, but the NRC does review the document to confirm that it is in compliance with all applicable

regulations and guidance. Use of the DTF outside of these requirements would require the licensee to request a regulatory exemption.

Independent Spent Fuel Storage Installation (ISFSI) Decommissioning

Pursuant to 10 CFR 72.6, licenses for the receipt, handling, storage, and transfer of spent fuel are of two types: general and specific. Part 72 general licensees may use excess funds from their Part 50 DTF to provide the financial assurance for ISFSI decommissioning because ISFSI decommissioning falls under the definition of decommissioning in 10 CFR 50.2. Part 72 specific licensees, on the other hand, must seek an exemption to use excess funds from their Part 50 DTF to provide the financial assurance required by 10 CFR 72.30 for ISFSI decommissioning.

Exemptions Granted

In transitioning from operations to a decommissioning status, licensees have asked to withdraw funds from the DTF to pay for spent fuel management, a purpose that does not fall within the definition of decommissioning in 10 CFR 50.2. In instances where the DTF and spent fuel management funds have been commingled in a manner inconsistent with NRC regulatory guidance, it has been unclear that the use of the DTF for spent fuel management would comply with DTF regulations; therefore, regulatory exemptions were used to enable the use of DTF funds for spent fuel management.

Exemptions were granted on a finding of reasonable assurance that sufficient funding will remain available in the DTF to complete radiological decommissioning and upon a determination that the licensee meets the requirements in 10 CFR 50.12, "Specific exemptions." Exemptions under 10 CFR 50.12, will not be considered by the NRC for approval unless special circumstances exist and the exemptions are:

Authorized by law, will not present an undue risk to the public health and safety, and are consistent with the common defense and security.

Special circumstances include, *inter alia*, the following circumstances: (1) application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule; or (2) compliance would result in an undue hardship or other costs that are significantly in excess of those contemplated when the regulation was adopted, or that are significantly in excess of those incurred by others similarly situation.

Justification for Rulemaking

This rulemaking is being undertaken to minimize the need for licensees to request exemptions from decommissioning funding regulations by clarifying what expenses may be paid with DTFs. Specifically, the rulemaking would allow the DTF to be used for radiological decommissioning expenses and non-radiological expenses, such as spent fuel management, as well as for Part 72 specific-licensed ISFSI decommissioning, so long as these funds are distinctly identified in the DTF and sufficient funding remains for radiological decommissioning. Currently, DTF

regulations do not consider the unavailability of permanent spent fuel repositories and licensees are required to provide long-term onsite storage of spent fuel in an ISFSI.

Presently, allowable DTF expenses must be related to planning for, and cleanup and removal of, radiological structures and materials to be legitimate, allowable decommissioning expenses. Specifically, 10 CFR 50.82(a)(8)(i)(A) states that DTFs can only be used by licensees if their withdrawals “are for expenses for legitimate decommissioning activities consistent with the definition of decommissioning in 10 CFR 50.2.” In accordance with 10 CFR 50.2, *Decommission* means to remove a nuclear facility or site safely from service and reduce residual radioactivity to a level that permits: (1) release of the property under unrestricted conditions and termination of the NRC license; or (2) release of the property under restricted conditions and termination of the NRC license. Therefore, “legitimate decommissioning activities” include only those activities related to the removal of a nuclear facility, or a site, safely from service and reducing residual radioactivity to a level that permits license termination and release of the property for restricted/unrestricted use. The regulation does not address the commingling of funds set aside for radiological decommissioning and funds for spent fuel management and/or site restoration.

When funds are commingled in the DTF and are not distinctly identified, the NRC does not have a mechanism to allow for the use of those funds for non-decommissioning purposes such as spent fuel management or for Part 72 specific-licensed ISFSI decommissioning outside of the exemption process. Because of these circumstances, licensees have sought and been granted exemptions from 10 CFR 50.75 requirements to allow the use of DTFs to pay for expenses associated with spent fuel management and other related planning expenses, as well as site-specific issues associated with the decommissioning process.

The reliance on exemptions creates uncertainties as well as burdens on licensees and the NRC. A licensee must expend resources to prepare the documentation and analysis that is required to obtain approval of its exemption request. The NRC staff must also divert resources from other agency activities in order to evaluate and approve each request.

However, inconsistent interpretation of the DTF regulations in processing exemptions could hold licensees to different standards and lead to confusion regarding appropriate decommissioning activities and associated expenses. As discussed in the SRM to SECY-14-0118 (ADAMS Accession No. ML14364A111), the Commission directed the NRC staff to proceed with a decommissioning rulemaking, and to include other issues deemed relevant by the staff. Consistent with this Commission direction, the staff has included DTF issues within the scope of the power reactor decommissioning rulemaking.

Through this rulemaking effort, the NRC staff will seek to change the NRC regulations to allow licensees to use the DTF, to the extent that it exceeds the minimum value for radiological decommissioning as set forth in 10 CFR 50.75(c), to pay for limited miscellaneous expenses related to decommissioning, spent fuel management costs, and Part 72 specific-licensed ISFSI decommissioning as a part of, or in addition to, radiological decommissioning activities and thus eliminating the need for licensees to request exemptions from regulations for such activities. These proposed changes will better inform licensees of their options for use of the DTF, and will apply the principles of good regulation ensuring independence, clarity, openness, transparency,

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reliability, and efficiency into associated regulations. These changes will also provide licensees the flexibility to consider site-specific conditions in maintaining their DTF. Finally, the changes will create consistent standards for use in determining whether licensees are compliant with the appropriate use of the DTF.

The NRC staff expects that the effort expended on clarifying the DTF regulations would be small and accommodated using existing budgeted resources. In addition, by addressing this issue through rulemaking, rather than continuing the current case-by-case approach in reviewing exemptions, the overall impact on resources will likely be to reduce NRC staff time expended on the exemption process in the future.

The alternative to rulemaking is to pursue no deviation from the current process of a licensee requesting exemptions from DTF requirements. However, as discussed above, this process would continue to lack regulatory certainty, continue the expenditure of resources to prepare and process exemption requests, and would remain both burdensome and inefficient.

Summary of Justification for Proposed Changes:

As discussed above, this rulemaking is being undertaken to codify the current practices of NRC staff and licensees in an effort to minimize the need for exemptions from decommissioning funding regulations. This rulemaking is also intended to provide greater transparency by clarifying what expenses may be paid with DTFs, and to introduce flexibility and transparency by allowing licensees to use the DTF for radiological and non-radiological decommissioning expenses. Expenses such as spent fuel management and Part 72 specific-licensed ISFSI decommissioning would be allowed, so long as these funds are distinctly identified in the DTF and sufficient monies remain for radiological decommissioning. Such allowable expenses would better reflect the current environment where there is a lack of a permanent repository for spent fuel and licensees are required to provide long-term, onsite storage of spent fuel in an ISFSI. The rulemaking also seeks to more accurately reflect the funds needed for decommissioning by updating 10 CFR 50.75(c) requirements to use a site-specific cost estimate instead of the table of minimum amounts formula to determine the amount licensees would need to maintain in the DTF.

As established in 10 CFR 50.75 and 10 CFR 50.82, nuclear power licensees are required to maintain a DTF throughout the 40-year operating license period, throughout the extended operating license period, if applicable, and throughout the period of decommissioning, until license termination. The proposed changes would not undermine the underlying purpose of the rule, which is to assure that sufficient funds are available for the safe and timely decommissioning of an NRC-licensed facility.

Technical, Legal, or Policy Information that Supports the Rulemaking

In SRM-SECY-14-0118, the Commission directed the NRC staff to proceed with rulemaking on reactor decommissioning and set an objective of early 2019 for its completion. Additionally, in SECY-15-0014 (ADAMS Accession No. ML15082A089), the NRC staff committed to proceed

with a rulemaking on reactor decommissioning and provided an anticipated schedule and estimate of the resources required for the completion of a decommissioning rulemaking.

Finally, in SECY-02-0085, "Recent Issues with Respect to Decommissioning Funding Assurance that have Arisen as part of License Transfer Applications and other Licensing Requests," dated May 16, 2002 (ADAMS Accession No. ML013550423), the NRC staff noted that there is no requirement in 10 CFR 50.75 for a DTF to maintain funds above those needed to meet the minimum amount required for decommissioning. The NRC staff also noted that the Commission, on three separate occasions, had denied staff requests to amend 10 CFR 50.75 to permit licensees to certify a lesser amount if based on site-specific studies. Therefore, while the Commission has remained dedicated to maintaining the generic minimum formula, in the SRM to SECY-02-0085 (ADAMS Accession No. ML030030539), the Commission requested the NRC staff to explore "the legal and policy issues regarding withdrawal of non-decommissioning funds deposited to serve purposes other than NRC requirements (e.g., for greenfield restoration) from fully-funded decommissioning funds." The Commission also directed the NRC staff to consider the possibility that during the extended term of a renewed license accumulated gains in DTFs could far exceed the amounts necessary to weather severe economic downturns and decommissioning cost increases and thus, on a case-by-case basis, some withdrawals could be appropriate. This rulemaking, if adopted, would permit withdrawals under circumstances consistent with those identified by the Commission.

Summary of Public Comments and NRC Observations for DTF Rulemaking:

The NRC received 162 comment submissions on the Advance Notice of Proposed Rulemaking (ANPR) for the DTF from a variety of stakeholders. As stated in the ANPR, the NRC staff did not develop formal responses to the public comments received, but did consider the comments in the development of this regulatory basis. Below are a categorization and summaries of the comments received on the ANPR.

Categories and Comments for Consideration:

1. *Transparency and Enforcement* - Provide greater transparency regarding use of the funds (institute 30 day notice of intent before intended disbursement) and address possible violations regarding the DTF.
2. *Appropriate Uses for the DTF* - Allow use of the DTF for spent fuel management and permit the commingling of funds for radiological decommissioning, spent fuel management, and site restoration.
3. *Prohibitions on the use of the DTF* - Do not allow use of the DTF for spent fuel management and confirm that the legitimate use of decommissioning expenses is related to radiological cleanup only.
4. *Adequate Funding for the DTF* - Address the adequate funding of plants with no ratepayer revenue source; address the issue that ratepayer revenue is not sufficient for long term storage; resolve the concern that true decommissioning costs are unknown and underfunded; and, address the underfunding of DTFs.

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5. *Rule Change not Required* – Maintain the status quo as there have been no instances where a DTF has been found to be insufficient to cover radiological decommissioning.

NRC Staff Observations on Stakeholder Feedback by Category

1. **Transparency and Enforcement:** The NRC staff used these comments to inform the proposed changes for the DTF in this rulemaking as stated in the Regulatory Options 1, 2, 3, and 5 to improve transparency. Violations would be addressed as part of the future inspection plan.
2. **Appropriate Uses for the DTF:** The NRC staff used these comments to propose approved uses of the DTF in this rulemaking as stated in the Regulatory Options 1, 2, 3, and 5.
3. **Prohibitions on the Use of the DTF:** The NRC staff seriously considered this action in the Regulatory Option 5.
4. **Adequate Funding for the DTF:** The NRC staff used these comments to propose an effective method of calculating cost requirements for the DTF in this rulemaking as stated in the Regulatory Options 2 and 5.
5. The NRC staff considered alternatives to rulemaking and determined this approach would not address the identified issues.

Regulatory Options

Option 1: No action option

This option would retain all current requirements found in 10 CFR 50.75 and 10 CFR 50.82 on DTF. Under this option the licensees would still need to apply for exemptions to use DTF for spent fuel management or other non-decommissioning expenses. NRC would review these exemptions on a case-by-case basis.

Option 2: Rulemaking

Based on the spectrum of stakeholder comments received on the ANPR, “Regulatory Improvements for Decommissioning Power Reactors,” published in the *Federal Register* on November 19, 2015 (80 FR 72358), and in consideration of lessons learned from reactor licensing activities and operating experience, the NRC staff recommends the four changes as described below, to minimize exemptions and reduce ambiguity in the DTF regulations:

1. Amend the regulations in 10 CFR 50.75 and 10 CFR 50.82 to allow the DTF to be used for radiological decommissioning, spent fuel management, and Part 72 specific-licensed ISFSI decommissioning, as long as the licensee has delineated these expenses in the DTF and sufficient funds remain available to pay for radiological decommissioning of the facility.

2. Amend the regulations to modify the reporting requirements in 10 CFR 50.75(f)(1) and (f)(2) to be consistent with the decommissioning funding assurance reporting requirements for ISFSIs in 10 CFR 72.30(c). Licensees would report the status of decommissioning funding on a triennial basis (every 3 years) instead of on a biennial frequency.
3. Amend the decommissioning regulations in 10 CFR 50.75 and 10 CFR 50.82 to allow 1 percent of the estimated total in the DTF at license termination to pay for miscellaneous expenses to support decommissioning. Specifically, the NRC staff would revise the regulatory framework to allow for up to 1 percent of the estimated total of the DTF at license termination (calculated at inception of the fund, or effective date of this rule) to be used for miscellaneous expenses not directly related to decommissioning. Specifically, the NRC staff proposes up to 1 percent of the DTF funds to be accessible to licensees without approval from the NRC. The NRC staff considered the types of decommissioning expenses that might be incurred during operations and chose not to provide a detailed listing. The NRC staff concluded that this requirement would place an additional compliance burden on the licensees. It would also require the NRC to expend resources via a review process. Instead, the NRC staff recommends a percentage that has been determined to be an amount sufficient to off-set or cover anticipated decommissioning expenses that can occur during operations without jeopardizing the bulk of the funds within the DTF. The NRC staff's analysis of the proceeding five years of the Decommissioning Funding Status Reports found that 1 percent would not negatively impact the performance of the funds in the DTF or reduce the funding to a level that threatened the licensee's ability to perform decommissioning activities. The withdrawal would still need to satisfy the requirements of 10 CFR 50.82(a)(8)(i)(B) and (C) such that: (1) the withdrawal for such expenses would not reduce the value of the DTF below an amount necessary to place and maintain the reactor in a safe storage condition if unforeseen conditions or expenses arise; and, (2) the withdrawals would not inhibit the ability of the licensee to complete funding of any shortfalls in the DTF needed to ultimately release the site and terminate the license.
4. Amend the regulation at 10 CFR 50.75(b) to further clarify that licensees shall maintain decommissioning funding assurance at all times. Licensees would have to correct shortfalls in a timely manner within three years (proposed reporting cycle). Current guidance provides that licensees may remedy shortfalls by utilization of a parent company guarantee, trust fund growth, or trust fund contributions. Language would be added to address instances when the amount in the DTF falls below the regulatory amount required (either by the NRC minimum formula as set forth in 10 CFR 50.75(c), or a licensee's site-specific cost estimate), thereby creating a "shortfall." Shortfall is defined as the difference between the amount of financial assurance provided by the licensee and the amount of financial assurance required. To appropriately address a shortfall, licensees that are not electric utilities would be required to report the shortfall in the next decommissioning report pursuant to 10 CFR 50.75(f). The licensee would be required to make up the shortfall within three years from the end of that reporting period. Licensees under rate setting authority would also be required to report the shortfall in the next decommissioning report pursuant to 10 CFR 50.75(f). However, because utilities are permitted to utilize sinking funds as their sole method of amassing

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decommissioning funding, they will not be in violation unless they do not provide reasonable assurance that there will be sufficient funds for decommissioning when needed.

The above proposed regulatory changes, if implemented, would reduce the need for future decommissioning funding assurance exemption requests given that clear regulatory requirements would be in place to govern the use of the DTF. These changes to the regulatory framework would align with the current status quo as the commingling of funds in the DTF is not addressed in NRC regulation, but is addressed under guidance. Shortfalls would be addressed in a timely fashion by licensees with greater transparency on these actions. Further, these changes would allow for greater transparency of a licensee's decommissioning costs and plans for funding at licensing, and throughout operations and decommissioning, while also providing a measure of flexibility for the use of funds in the DTF. This would increase public confidence in the DTF's accuracy for accounting for radiological decommissioning, and the DTF's overall effectiveness.

The NRC staff acknowledges that these proposed regulatory changes may introduce a degree of uncertainty with regard to adequate funds available in the DTF for radiological decommissioning. For instance, early withdrawals from the DTF during operations could introduce uncertainty regarding the sufficiency of the DTF to fund radiological decommissioning and poorly tracked commingling of funds in the DTF could make it difficult to identify funds available for radiological decommissioning and non-radiological expenses (e.g., spent fuel management and Part 72 specific-licensed ISFSI decommissioning). NRC oversight in this area would remain crucial to ensure the availability of funds available for decommissioning.

OTHER CONSIDERATIONS

Given the current environment where licensees are increasingly electing to enter decommissioning prematurely, another goal of the rulemaking would be to more accurately establish the amount of funds needed for decommissioning earlier in a facility's life. This would be accomplished by updating 10 CFR 50.75(c) to require a SSCE in lieu of the table of minimum amounts formula as the mechanism to determine the amount licensees will need to maintain in the DTF. Future licensees would provide site-specific decommissioning plans, including an initial SSCE (upon authorization to load fuel and operate) that captures the major assumptions, major decommissioning activities, references, and any other bases used for developing this estimate. Each plan would address how the cost estimate will be adjusted for future cost escalation, the mechanism to be established for funding, and a schedule for periodic contributions and assumptions about future DTF growth (e.g., 2 percent real-rate of return). During operations, each licensee would update the initial site-specific cost estimate periodically to account for cost escalation and any changes in assumptions that may result in increased decommissioning costs (i.e., years 1-35 at 5 year intervals; annually thereafter). Should this option be considered, the following would apply:

1. The Table of Minimum Amounts in 10 CFR 50.75(b) would continue to require certification of a site-specific decommissioning cost estimate that meets, or exceeds, the NRC minimum formula amount.

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2. The NRC staff would recommend that current licensees be provided the biennial (2 year) status report period, plus one year, to provide and assure to the site-specific decommissioning plan referenced herein.

The staff believes that this option would minimize uncertainty associated with estimating decommissioning costs such that a licensee would be required to plan for, and provide assurances for, funding decommissioning to a more realistic cost estimate earlier in the facility's lifecycle (with current licensees and licensees in decommissioning also reexamining their costs in compliance with the proposed changes). As discussed above, these changes allow for greater transparency of a licensee's decommissioning costs and plans for funding at licensing, and throughout operations and decommissioning. This would also increase public confidence in the DTF's sufficiency to cover costs associated with decommissioning.

This option may result in overall cost increases to licensees. For instance, power reactor licensees would: (1) incur increased costs to develop and maintain decommissioning cost estimates (at licensing and during operations); and (2) provide increased initial funding of the DTF at licensing, especially for merchant plants. Finally, these options may also require increased NRC staff resources and attention for review of licensee submittals.

ADDITIONAL ACCOMPANYING ADMINISTRATIVE CHANGES:

Additionally, the NRC staff seeks to implement the following administrative changes in conjunction with this rulemaking:

1. Amend 10 CFR 50.75 (h)(1)(B)(iv) to be consistent with 10 CFR 50.4, "Written communications," with respect to written notice of intent to make a disbursement or payment from the DTF. This change would require materials be sent to the Document Control Desk instead of the Office Director, as it is now written.
2. Eliminate 10 CFR 50.75(f)(2) as it is duplicative of the language of 10 CFR 50.75(f)(1).

OTHER RULEMAKING OPTIONS CONSIDERED:

As part of this rulemaking effort, NRC staff considered but did not recommend the following options:

1. Take no action. The existing regulatory framework for the establishment and use of the DTF would remain unchanged. The framework as written establishes the means to provide adequate funding for licensees for radiological decommissioning. The commingling of funds in the DTF for spent fuel management, Part 72 specific-licensed ISFSI decommissioning, or site restoration is not specifically prohibited by the regulations. This being the case, licensees can continue to request exemptions in order to address site-specific conditions as needed.

However, agency guidance regarding the use of DTFs for ancillary expenses are vague and open to disparate interpretations by licensees; thereby not complying with the principles of good regulation in terms of efficiency, clarity, openness, and reliability.

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Further, a licensee's re-allocation of funds by account within the DTF (pursuant to exemption) may have unintended consequences with regard to external stakeholders such as state and local governments, state Public Utility Commissions (PUCs), FERC, Securities and Exchange Commission (SEC), Internal Revenue Service (IRS), and utility customers. Thus, the goals of reducing reliance on exemptions and relieving licensees and the staff from the burdens associated with decommissioning reporting and analysis, would not be realized.

2. Amend the regulations in 10 CFR 50.75 to require the DTF to be fully funded at licensing (or within an implementation period for operating and decommissioning reactors.)

Although this option could instill a greater sense of stakeholder confidence in the ability of a licensee's DTF to pay for decommissioning, this option would place an undue financial burden on new power reactor applicants and licensees in that it would require a considerable investment to prefund decommissioning and restrict the ability for licensees and applicants to take credit for future contributions and DTF growth.

3. Amend the regulations at 10 CFR 50.75(b) and (c) to consider a range of costs based on megawatt thermal (MWt) values (the amount of thermal power produced) and reactor type (i.e., pressurized water reactor or boiling water reactor) to estimate the anticipated total cost of decommissioning and require that the licensee assure to that cost estimate. This option would seek to provide a more realistic total decommissioning cost estimate by using a reactor size and type-related factor, as opposed to either the current NRC minimum formula or a site-specific cost estimate. This option would eliminate the current table of minimum amounts found in 10 CFR 50.75(c), with DTF funding based on the size and type of plant (in terms of MWt values and reactor type) and the cost data obtained from plants with matching/similar MWt values and reactor types that have already decommissioned.

While some stakeholders might favor this approach because it uses data from plants that have already been through the decommissioning process, it fails to account for the uniqueness of each plant. It is unlikely that this approach will prove more accurate than using a site-specific cost estimate as the basis for the required amount of funding in the DTF. It is also unlikely that this approach would add additional transparency to the process or increase public confidence that the amount required would represent actual decommissioning costs for the individual licensees.

4. Amend the regulations in 10 CFR 50.75 and 10 CFR 50.82 to allow a one-time clarification of DTF uses and commingling. This would allow a one-time action taken by licensees to clarify and identify DTF sub-accounts for uses other than radiological decommissioning (specifically, spent fuel management, Part 72 specific-licensed ISFSI decommissioning, and site restoration.) This change would provide accountability and transparency regarding the intended use of decommissioning trust accounts, codify provisions in guidance, and diminish reliance on exemptions to authorize such withdrawals.

However, a licensee's re-allocation of funds by account within the DTF may have unintended consequences with regard to external stakeholders, such as state and local governments, PUCs, FERC, SEC, IRS, and utility customers. Thus the goals of reducing the reliance on exemptions and relieving licensees and the staff from the burdens associated with decommissioning reporting and analysis, would not be realized.

5. Amend the regulations in 10 CFR 50.75 and 10 CFR 50.82 to expressly prohibit commingling. The NRC staff would revise the regulatory framework to prohibit commingling of funds in the DTF. This would restrict the use of the DTF for only radiological decommissioning and ensure that funds in the DTF are retained for the original purpose of radiological decontamination. This would also reduce the ambiguity of permitted uses for the DTF.

While this action may provide regulatory clarity regarding the use of the DTF, it would not necessarily prevent exemption requests by licensees. In fact, it may have the opposite effect as licensees may seek to use perceived excess funds anticipated in the DTF for management of spent fuel and other non-radiological decommissioning expenses.

Backfitting and Issue Finality

Currently, the NRC does not anticipate that the options in this appendix would constitute backfitting under 10 CFR 50.109, "Backfitting," or violate any issue finality provision in 10 CFR Part 52 if the option were implemented by the NRC. Option 1 would maintain the status quo of exemption and license amendment requests, thereby imposing no change in requirements or NRC staff positions. Option 2 would allow, but not require, the use of the DTF for certain activities and modify the reporting requirements. These changes would not constitute "backfitting" as defined in 10 CFR 50.109 or a violation of issue finality under 10 CFR Part 52.

Appendix G - Offsite and Onsite Financial Protection Requirements and Indemnity Agreements

Introduction and Summary

To implement the requirements under the Price Anderson Act (PAA), codified in Section 170 of the Atomic Energy Act (AEA) of 1954, as amended, the U.S. Nuclear Regulatory Commission (NRC) requires nuclear power plant licensees to comply with regulations for offsite financial protection requirements and indemnity agreements. Large operating reactors, with a rated capacity of 100,000 electrical kilowatts or more, are required to have and maintain offsite financial protection. The amounts of insurance required for each large operating reactor are set forth in Title 10 of the *Code of Federal Regulations* (10 CFR) Section 140.11(a)(4), which are: (1) primary financial protection in the amount of \$450 million; and, (2) secondary financial protection consisting of funds from a nuclear industry retrospective rating plan. The Commission executes and issues agreements of indemnity for large operating reactors pursuant to 10 CFR 140.20, "Indemnity agreements and liens." The general form of indemnity agreement to be entered into by the Commission with large operating reactors is at 10 CFR 140.92, "Appendix B-Form of indemnity agreement with licensees furnishing insurance policies as proof of financial protection."

Apart from PAA requirements, nuclear reactors are also required by the NRC to maintain onsite insurance. Specifically, 10 CFR 50.54(w) requires that large operating reactors obtain insurance for each reactor station site in the amount of \$1.06 billion or the maximum amount of coverage generally available from private sources, whichever is less to cover their obligations in the event of an incident.

The PAA does not expressly address the concept of decommissioning. Likewise, the NRC's onsite insurance requirements do not address the status of facilities during the period of decommissioning.

The NRC staff is proposing to expand the NRC's financial protection regulations to address the unique aspects of a decommissioning reactor. The proposed rule would allow the licensees of large operating reactors that have permanently shutdown, thereby representing a much smaller accident incident risk, to reduce both onsite and offsite financial protection without the need to request an exemption. In addition, addressing insurance requirements for decommissioning reactors would provide regulatory certainty and transparency. Overall, this rulemaking is anticipated to provide a reliable process that minimizes the need for licensees to request exemptions from regulations for relief from requirements that are no longer needed.

Current Requirements for Offsite and Onsite Financial Protection Requirements and Indemnity Agreements

Offsite Financial Protection: Title 10 of the Code of Federal Regulations (10 CFR) Part 140, "Financial Protection Requirements and Indemnity Agreements."

As provided in 10 CFR Part 140, large operating reactors are nuclear reactors that are licensed to operate, are designed for the production of electrical energy, and have a rated capacity of 100,000 electrical kilowatts or more. Pursuant to 10 CFR 140.11, "Amount of financial protection for certain reactors," large operating reactors are required to have and maintain financial protection that is derived from two sources as set forth in 140.11(a)(4): (1) primary

financial protection in the amount of \$450 million; and, (2) secondary financial protection consisting of funds from a nuclear industry retrospective rating plan (i.e., a form of nuclear industry self-insurance in which the licensee of each facility covered by the plan would be required to contribute up to \$121,255,000 for each large nuclear unit (but no more than \$18,963,000 per incident per calendar year) in the event of a nuclear incident at any licensed nuclear power plant covered by the plan). As of May 2016, the aggregate amount of financial protection is approximately \$13.4 billion.

Onsite Financial Protection: 10 CFR 50.54(w)

Pursuant to 10 CFR 50.54, “Conditions of licenses,” nuclear reactors are required to maintain insurance (sometimes referred to as onsite property insurance) to cover their obligations in the event of an incident. Specifically, 10 CFR 50.54(w) requires that large operating reactors shall take reasonable steps to obtain insurance for each reactor station site in the amount of \$1.06 billion or the amount of coverage generally available from private sources, whichever is less. In the event of an incident at the licensee’s reactor, the insurance would be used to stabilize and decontaminate the reactor and the reactor station site at which the reactor experiencing the incident is located.

Indemnity

The NRC regulations regarding indemnity for large operating reactors are found in 10 CFR 140.20 and 10 CFR 140.92. The regulation in 10 CFR 140.20 provides that the Commission will execute and issue agreements of indemnity pursuant to the regulations in 10 CFR Part 140. The regulation in 10 CFR 140.92 provides the general form of indemnity agreement to be entered into by the Commission with reactor licensees who furnish financial protection in the form of a nuclear energy liability insurance policy.

Under Section 170c of the AEA, government indemnification of up to \$500 million is available for licensed facilities that are required to have less than \$560 million in PAA liability insurance. Due to the current combined amount of insurance required under the primary and secondary layers, operating nuclear reactors with a rated capacity of 100,000 electrical kilowatts are not eligible for the government indemnity under Section 170c of the AEA. Nevertheless, as provided in 10 CFR 140.20, licensees of these reactors have entered into indemnification agreements with the Commission that allow for indemnification in the event the facility becomes eligible. If the PAA insurance requirement is reduced to less than \$560 million for decommissioning reactors, the decommissioning licensee will be in the category where government indemnification is required under Section 170c of the AEA. In that event, a revision in the indemnity agreement will be unnecessary because the form of indemnity agreement in Section 140.92, Appendix B, Article III.6, already provides for government indemnification when the total amount of nuclear liability insurance required for a licensee falls below \$560 million.

Rated Capacity:

As noted above, the PAA and Section 140.11(a)(4) of the NRC’s regulations require licensees of facilities with a rated capacity of 100,000 electrical kilowatts or more to have the primary and secondary insurance coverage described above. Typically, the NRC issues a decommissioning licensee a license amendment to remove the rated capacity of the reactor from the facility license. Removal of the rated capacity has been treated by the NRC, for PAA purposes, as

removing the reactor licensee from the category of licensees that are required to maintain the primary and secondary insurance amounts under the PAA and 10 CFR Part 140.

In 1993, in the staff requirements memorandum (SRM) associated with SECY-93-127, “Financial Protection Required of Licensees of Large Nuclear Power Plants During Decommissioning,” the Commission approved reducing the PAA insurance required for decommissioning licensees. In 1997, in the SRM associated with SECY-97-186, “Changes to the Financial Protection Requirements for Permanently Shutdown Nuclear Power Reactors, 10 CFR 50.54(w) and 10 CFR 140.11,” the Commission approved a proposed rulemaking to reduce the PAA offsite insurance requirements (as well as the NRC’s onsite insurance requirements) for permanently shutdown reactors. The proposed amendments would have addressed “rated capacity” in 10 CFR 140.11 as used in Section 170b. of the AEA to indicate that a permanently shutdown nuclear reactor has a “rated capacity” of zero.

Consistent with the Commission’s policy direction in the SRMs associated with SECY-93-127 and SECY-97-186, to date, licensees in decommissioning have sought and been granted exemptions from 10 CFR 140.11(a)(4) to allow a reduction in offsite and onsite insurance once fuel has cooled sufficiently that it is not susceptible to either a zirconium cladding fire or gap release caused by an incipient fuel cladding failure. The 1993 and 1997 SRMs, and the exemption approvals, inherently recognize that, when a license for a shutdown facility is amended to remove rated capacity upon decommissioning, the facility no longer has a rated capacity within the meaning of the PAA.

Expanding the financial protection regulations to address the unique aspects of a decommissioning reactor will provide a reliable process that minimizes the need for licensees to request exemptions from regulations.

Objectives of the Rulemaking:

This appendix is part of a broad effort to eliminate unnecessary regulatory burdens for large operating reactors that are permanently shutdown and are in the process of decommissioning. Specifically addressing the applicability of regulations to decommissioning reactors will allow for the use of a predetermined process that does not rely on the use of exemptions for relief from requirements that are no longer needed. The proposed changes would allow the licensees of large operating reactors that have permanently shutdown a reduction in offsite and onsite financial protection without resorting to the exemption process. Additionally, addressing insurance requirements for decommissioning reactors would provide regulatory certainty and transparency.

Evaluation of Options:

The current approach necessitates that the licensee of a decommissioning reactor request an exemption from 10 CFR 140.11(a)(4) and 10 CFR 50.54(w). Rulemaking is necessary to clearly identify the process that a decommissioning reactor would undergo in order to reduce their financial protection requirement levels without the need to request exemptions. The alternative to rulemaking is to retain the current exemption process. This process, however, would be a less optimal alternative due to the lack of regulatory certainty and the higher regulatory burden.

Options for Rulemaking:

The NRC staff's proposed option is to:

Amend the regulations to eliminate the need for exemptions to account for a reduction in risk with a corresponding reduction in financial protection as characterized in Levels 1 and 2 (below).

Levels 1 and 2 are consistent with exemptions that have been granted to decommissioned and decommissioning reactors. The current exemption process provides a graded approach that aligns a decrease in risk with a corresponding reduction in insurance requirements.

Proposed financial protection requirements would be reduced in two ways:

- The onsite requirement would be reduced from \$1.06 billion to \$50 million.
- The offsite requirements would be reduced from \$450 million in primary financial protection and participation in the industry retrospective rating plan, to \$100 million and withdrawal from the industry retrospective rating plan.

This reduction would apply when the risk of radioactive release following an unexpected draindown of the spent fuel pool (SFP) has been sufficiently reduced—specifically, when fuel has cooled sufficiently that it is not susceptible to either a zirconium cladding fire or gap release caused by an incipient fuel cladding failure.

RULEMAKING OPTIONS

The following discussion provides a preliminary and qualitative regulatory assessment of a no action option and a rulemaking option:

1. No action option – Maintain offsite and onsite financial protection requirements for permanently shutdown reactors as prescribed by 10 CFR 50.54(w) and 10 CFR 140.11, respectively. Relief from regulatory requirements could be granted by the NRC on a case-by-case basis through the exemption process.

2. Rulemaking option – A graded reduction in risk with corresponding reductions in financial protection – Change the offsite and onsite financial protection requirements based on the reduced risk of anticipated reactor configurations (levels) over time at permanently shutdown reactors.

The Commission papers listed above proposed a graded approach that considers decreasing risk with corresponding reductions in insurance requirements. Several different configurations for permanently shutdown reactors were established and encompass anticipated spent fuel characteristics and storage modes between the period of permanent shutdown and termination of the license. The insurance amounts were based on the estimated cost of recovery from limiting hypothetical events for specific reactor configurations (levels).

Level 1: Permanently Ceased Operations and Permanently Defueled

Licensees would enter Level 1 after the NRC's docketing of certifications of permanent cessation of operations and permanent removal of fuel from the reactor vessel pursuant to 10 CFR 50.82, "Termination of license," or 10 CFR 52.110, "Termination of License." The reactor is defueled and permanently shut down, but the spent fuel in the SFP is still susceptible to a zirconium fuel cladding fire if the SFP is unexpectedly drained. This configuration encompasses the period from immediately after the core is removed from the reactor to just before the decay heat of the hottest assemblies is low enough that no rapid zirconium oxidation will take place. At this point, the fuel cladding would remain intact with no gap release if water in the SFP is lost.

For facilities in Level 1, the requirements for offsite and onsite financial protection remain as presently specified in 10 CFR 140.11(a)(4), and 10 CFR 50.54(w), respectively.

Level 2: Sufficiently Decayed Fuel

The reactor is defueled and permanently shut down, and spent fuel in the SFP has decayed and cooled sufficiently that it is not susceptible to a zirconium cladding fire, or gap release caused by an incipient fuel cladding failure, in the event the SFP is unexpectedly drained. In this configuration, the spent fuel can be stored long-term in the SFP without the possibility of a zirconium fire or significant fuel cladding failure. In addition, the site may contain a radioactive inventory of liquid radiological waste (radwaste), radioactive reactor components, and contaminated structural materials. The radioactive inventory during this configuration may change depending on the licensee's proposed shutdown activities and schedule.

In Level 2, the fuel in the SFP has decayed for a sufficient time as discussed in Appendix A of this draft regulatory basis. The NRC staff is considering providing two regulatory alternatives to specify when the transition to Level 2 onsite and offsite insurance requirements may occur: (1) transition after a specified amount of cooling time in Level 1, or (2) transition after an alternative timeframe based on a site-specific analysis that shows the fuel cannot heatup to clad ignition temperature within 10 hours under adiabatic conditions.

However, if there are significant sources of radioactive material stored onsite, it would be appropriate to maintain an adequate level of onsite insurance coverage. Although the offsite consequences are negligible in Level 2, an appropriate level of offsite financial protection is required to account for the potential of significant judgments or settlements from litigation that might be instituted and to protect the federal government from indemnity claims.

The NRC staff is considering reduced onsite financial protection requirements for decommissioning reactors that have reached Level 2, from \$1.06 billion to \$50 million. The \$50 million reflects the potential for a radiological incident resulting from the mobile sources of radioactivity at a permanently shutdown reactor site. A scenario involving the rupture of a large liquid radwaste storage tank (~450,000 gallons) containing slightly radioactive water was selected as conceivable and a bounding scenario. For estimating cleanup costs, the limiting event considered costs associated with removal of soil contamination and potential contamination of the groundwater table. That postulated event was estimated to result in an onsite waste cleanup costs of approximately \$50 million with negligible radiological

consequences offsite. In economic terms, it would surpass the cleanup costs associated with a fuel handling incident and it has been taken into account in determining the upper bound level of onsite insurance coverage required in Level 2.

The offsite requirements would be reduced from \$450 million in primary financial protection and participation in the industry retrospective rating plan, to \$100 million and withdrawal from the

industry retrospective rating plan. The \$100 million figure is based on the possibility of judgments or settlements resulting from litigation despite the negligible offsite consequences.

Level 3: All Spent Fuel Transferred to an Independent Spent Fuel Storage Installation (ISFSI)

The reactor is permanently shut down and all spent fuel has been removed to an offsite or onsite dry storage ISFSI, or to a Department of Energy (DOE) high-level repository. The remaining radioactive inventory depends on the decommissioning status and may include liquid radwaste, radioactive reactor components, and contaminated structural materials.

In Level 3, when spent fuel is no longer stored in the SFP, the potential for a radiological incident is primarily in mobile sources of radioactivity at a permanently shutdown reactor site. The offsite damage costs were found to be negligible for Level 3, but as was noted in Level 2, an appropriate level of offsite financial protection is still required to account for the possibility of judgments or settlements from litigation that might be instituted. Because the level of risk has decreased vis-à-vis Level 2 because there is no spent fuel in the SFP, the level of offsite financial protection required is being reduced to take into account only the mobile radioactive inventory onsite.

The NRC staff is considering onsite financial protection requirements in Level 3, where there is no fuel in the SFP and risk is dependent on radioactive inventory at the reactor site, to be \$50 million, as for Level 2. The \$50 million amount is the estimated amount needed to recover from a postulated onsite event of a rupture of a large slightly contaminated liquid storage tank.

Because the level of risk has decreased from Level 2 (i.e., there is no spent fuel in the SFP), the level of offsite financial protection required can be further reduced by only taking into account the mobile radioactive inventory found on the reactor site. The offsite requirement would be reduced to \$50 million, based on the possibility of judgments or settlements resulting from litigation that might still occur despite negligible offsite consequences; however, the level of risk is considered less than in Level 2.

Level 4: All Spent Fuel and Radioactive Material Removed from Site

Level 4 is the same as Level 3, except that the reactor site has no significant amount of mobile sources of radioactivity, such as contaminated liquids (< 1,000 gallons). In Level 4, with no significant amount of mobile sources of radioactivity such as contaminated liquids onsite, there is no need to maintain the same level of insurance coverage for onsite or offsite financial protection as in Level 3. The basis for the transition from Level 3 to Level 4 is the point at which there are less than 1,000 gallons of liquid radwaste stored onsite. The postulated rupture of this much smaller tank is estimated to have at least two orders of magnitude less impact than the rupture of the large tank, such that onsite cleanup costs would not necessitate the level of insurance coverage specified in Level 3. Therefore, the coverage would be reduced further to account for the potential of onsite cleanup of a rupture of a less than 1,000 gallon tank during

this period.

In Level 4, if the licensee has cleaned the site to unrestricted release levels and is awaiting a confirmatory survey for terminating the license, the necessary level of onsite insurance coverage at this stage would be less than when 1,000 gallons of liquid radwaste were stored onsite. Under these circumstances, the onsite coverage could be further reduced or eliminated to account for negligible onsite consequences. However, although the offsite consequences are negligible, offsite financial protection must be maintained until the NRC license is terminated.

The NRC staff is considering reducing the onsite financial protection requirements in Level 4, when there is no fuel in the SFP and no significant source of mobile radioactive material, to either \$25 million or zero. The \$25 million amount is based on the possibility of having to clean up onsite contamination from an accidental rupture of a less than 1,000 gallon contaminated liquid storage tank during shutdown activities. Elimination of onsite insurance coverage would be warranted when a licensee has completed all decommissioning activities other than a confirmatory survey for license termination. The offsite requirement is \$25 million, based on the possibility for claims arising from asserted offsite consequences. This would minimize the possibility that federal government indemnification would be required. As noted above, under the PAA, offsite liability insurance coverage is required for licenses issued under Section 103 of the AEA, which under the NRC's regulations include 10 CFR Part 50 licenses (and by extension, 10 CFR Parts 52 and 54 licenses). Thus, while offsite insurance coverage for such licensees can be reduced, it may not be eliminated entirely.

Graded Approach to Onsite and Offsite Insurance:

The NRC staff is proposing a graded approach to onsite and offsite insurance that corresponds to the graded approach to emergency planning discussed in Appendix A of this draft regulatory basis. The following table provides onsite and offsite insurance requirements in each level that the NRC staff may consider in a proposed rule.

Level	Description	Offsite Requirement	Onsite Requirement
1	Permanently Ceased Operations and Permanently Defueled	\$450 million; participation in the industry retrospective rating plan	\$1.06 billion
2	(1) transition after a specified amount of cooling time in Level 1, or (2) transition after an alternative timeframe based on a site-specific analysis that shows the fuel cannot heatup to clad ignition temperature within 10 hours under adiabatic conditions.	\$100 million	\$50 million
3	All Spent Fuel Transferred to an ISFSI	\$50 million	\$50 million
4	All Spent Fuel and Radioactive Material Removed from Site	\$25 million	\$25 million / eliminated

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Basis for Proposed Changes:

There are potential offsite and onsite radiological consequences that could be associated with the onsite storage of the spent fuel in the spent fuel pool from time after permanent shutdown. The most significant accident sequence for a permanently defueled and shutdown reactor involves the complete loss of water from a light water reactor spent fuel pool (SFP). In the event of a complete loss of SFP coolant inventory such as from a beyond design basis earthquake scenario, there is a potential for overheating of the fuel by decay heat. This beyond design-basis accident (DBA) sequence could result in a zirconium fuel cladding fire that could propagate through the spent fuel storage pool and result in significant offsite consequences. Although such an accident is beyond the design basis, it may be considered “reasonably conceivable” and could warrant requiring substantial financial protection. Such an accident is possible during the first year after reactor shut down for a low density spent fuel storage configuration and during the first two to three years after shut down for spent fuel stored in certain high density configurations. To prevent a zirconium fuel cladding fire in the event of the loss of all SFP water, the rod cladding temperature must not exceed 565 degrees C. Once the requisite cooling period after reactor shut down has elapsed, the zirconium fuel cladding fire sequence is no longer a concern since the fuel would sufficiently air cool to avoid zirconium fuel cladding combustion. The time periods for spent fuel cooldown and rod cladding temperature are important factors in the consideration of modifying the financial protection requirements for permanently shutdown reactors.

In SECY-93-127 the NRC staff examined a number of legal and technical issues associated with PAA insurance for licensees of decommissioning plants. The Commission, in SRM-SECY-93-127, approved the NRC staff’s recommendation that after a sufficient spent fuel cooling period had elapsed so that a zirconium fire was no longer possible in a SFP drained of all water, financial protection could be reduced by allowing these licensees to withdraw from participation in the secondary financial protection layer and reduce the primary level coverage from \$200 million (the maximum amount of primary financial protection available at the time) to \$100 million through the exemption process.

In SECY-97-186, the NRC staff proposed amendments that would have reduced the PAA offsite insurance requirements (as well as the NRC’s onsite insurance requirements) for permanently shutdown reactors where spent fuel cladding temperatures could be limited and where the amount of liquid radwaste on site was also limited. The Commission approved issuance of the proposed rule in the SRM to SECY-97-186. On October 30, 1997, the Commission published a proposed rule, “Financial Protection Requirements for Permanently Shutdown Nuclear Power Reactors” (62 FR 58690), to amend regulations governing liability coverage for permanently shutdown nuclear plants. The proposed amendments were linked to generic spent fuel decay times after which a zirconium fire could not occur. Numerous public comments were received on the proposed rule, most of which favorably supported the reductions in insurance. Some of the comments even suggested alternative liability limits. After completing its evaluation of the comments on the proposed rule, the staff was preparing to propose the rule with a modified set of requirements for onsite and offsite liability coverage limits. These efforts were halted when it was realized that no staff-approved technical basis existed for generic decay times after which a zirconium fire concern could be eliminated. This discussion can be found in SECY-00-0145, “Integrated Rulemaking Plan for Nuclear Power Plant Decommissioning.” The rulemaking effort was subsequently suspended by the Commission.

To date, consistent with the SRMs for SECY-93-127 and SECY 97-186, licensees in decommissioning have sought and been provided NRC approval to reduce financial protection requirements for permanently shutdown reactors once fuel has cooled sufficiently that it is not susceptible to either a zirconium cladding fire or gap release caused by an incipient fuel cladding failure. The NRC staff notes that the decay times approved in the insurance exemptions are based on an air cooling analysis performed by the licensee. The NRC staff also notes that the decay times approved in these exemptions are similar to the timeframes recommended in Appendix A of this draft regulatory basis (e.g., 10 months for boiling water reactors and 16 months for pressure water reactors), which are based on adiabatic analyses of spent fuel. Therefore, since the decay times in each case are similar, the staff recommends aligning the onsite and offsite insurance requirements with the graded approach to emergency preparedness as discussed in Appendix A of this draft regulatory basis.

Other Considerations/Implications for Decommissioning Reactors:

The PAA was enacted into law on September 2, 1957, to meet two basic objectives: (1) remove the deterrent to private sector participation in atomic energy presented by the threat of potentially enormous liability claims in the event of a catastrophic nuclear incident; and, (2) ensure that adequate funds are available to the public to satisfy liability claims if such an incident were to occur. Thus, the PAA was enacted in recognition of the nuclear industry life cycle (which includes four stages: introduction, growth, maturity, and decline). Since its inception, the PAA has been amended numerous times to account for the evolution of the nuclear industry's growth stage, and possibly even the maturity stage, of the industry life cycle. However, the decline of the industry life cycle is not explicitly addressed in the PAA. Questions remain surrounding PAA implications during the transition of individual decommissioning plants in an industry that is in the maturation stage.

Solvency:

As required by 10 CFR 140.21, "Licensee guarantees of payment of deferred premiums," each licensee is required to annually provide evidence to the Commission that it maintains one of the following guarantees of payment of deferred premium for each reactor it is licensed to operate: surety bond; letter of credit; revolving credit/term loan arrangement; maintenance of escrow deposits of government securities; annual certified financial statements (as described in 10 CFR 140.21); or, such other type of guarantee as may be approved by the Commission. Under this regulation, and before licensees receive permission to withdraw from the secondary layer of financial protection (i.e., once the spent fuel has sufficiently cooled), licensees maintain a potential obligation of up to \$121,255,000 (up to \$18,963,000 per incident per calendar year) in the event of a nuclear incident at any licensed nuclear power plant participating in the industry retrospective rating plan.

A reactor that has decommissioned, however, is no longer generating income. It is unclear how a licensee, who previously relied on the income of their operating reactor, and who no longer has operating income, would be able to provide proof, or payment, of retrospective premiums. Thus, a licensee who previously used annual certified financial statements (as described in 10 CFR 140.21) as a guarantee of payment of deferred premium should be required to provide another form of guarantee of payment of deferred premium between the time that the reactor permanently ceases operations and the time that the licensee is authorized to withdraw from the secondary layer of financial protection.

Indemnity:

Pursuant to the PAA, and 10 CFR 140.20, the Commission is to enter into agreements of indemnity with its licensees. Indemnity implications, however, were omitted from the original information provided in the ANPR; potential implications are discussed here.

In order to encourage participation in the nuclear industry, the PAA provided agreements of indemnification which provided liability coverage of \$500 million. In 1975, secondary financial protection was incorporated into the PAA, and as the amount of reactors participating in the industry retrospective rating plan increased, the amount of financial protection for licensed facilities became greater than the maximum amount of indemnity available to licensees.

Under Section 170c of the AEA, government indemnification of up to \$500 million is available for licensed facilities that are required to have less than \$560 million in PAA liability insurance. Since 1982, due to the current combined amount of insurance required under the primary and secondary layers, operating nuclear reactors with a rated capacity of 100,000 electrical kilowatts have not been eligible for the government indemnity under § 170c of the AEA. Nevertheless, as provided in 10 CFR 140.20, licensees of these reactors have entered into indemnification agreements with the Commission that allow for indemnification in the event that the facility becomes eligible. If the PAA insurance requirement is reduced to less than \$560 million for decommissioning reactors, the decommissioning licensee will be in the category eligible for government indemnification under Section 170c of the AEA. In SECY-93-127, the NRC staff recognized that decreasing liability insurance to \$100 million would result in the facility being eligible for government indemnity, which, under the terms of the indemnity agreement (10 CFR 140.92, Article VII), would continue until all fuel has been removed from the site.

- On the issue of indemnity the PAA states: “The Commission shall, with respect to licenses issued between August 30, 1954, and December 31, 2025, for which it requires financial protection of less than \$560 million, agree to indemnify and hold harmless the licensee and other persons indemnified, as their interest may appear, from public liability arising from nuclear incidents which is in excess of the level of financial protection required of the licensee.” Thus, under this PAA language, decommissioned reactors will be eligible for indemnification because they will have less than the indemnity threshold specified in the Act.
- The NRC staff notes that if indemnification is to be provided to decommissioned reactors, consideration must be given to the obligation assumed by the government through indemnification. Continuing to minimize the amount of insurance required for large operating reactors will continue to obligate the government to pay indemnity claims should they arise.

Additional NRC Staff Notes Regarding Financial Protection:

- The SECY-93-127 states, “The staff concluded that the liability claims experience of Three Mile Island Unit 2 [TMI-2] provides a reasonable basis for determining the liability insurance coverage level appropriate for permanently shutdown reactors that have completed their respective spent fuel cooling periods.” This limit was subsequently set at \$100 million and entirely relied on the experience with the TMI accident. The total expenses paid from PAA insurance from the TMI accident were \$71 million, and were not based on a quantitative analysis. The NRC staff strongly recommends the use of a

quantitative analysis that appropriately considers risk to set the amounts of insurance required of decommissioned reactors.

- The SECY-01-0100, "Policy Issues Related to Safeguards, Insurance, and Emergency Preparedness Regulations at Decommissioning Nuclear Power Plants Storing Fuel in Spent Fuel Pools," states, "Based on this Commission policy, licensees of many decommissioning plants have been exempted from the secondary financial protection layer and are presently providing \$100 million in primary insurance." The NRC staff notes that many of the licensees that were granted exemptions to 10 CFR 140.11(a)(4) to reduce their primary financial protection amount from \$375 million (the maximum amount of primary financial protection available at the time) to \$100 million, have voluntarily opted to keep the \$375 million in coverage. This may indicate the industry's sentiment that the \$100 million amount is not sufficient. This leads to the question of whether or not primary financial protection should be maintained at the current \$450 million, and not \$100 million. Again, the \$100 million figure was originally conceived from the experience gained during the TMI-2 accident in which the staff believed a reasonable basis for determining the liability insurance coverage was provided.
- The proposed exemption amounts that are provided in the SECY papers and that are discussed in this Appendix were proposed in the 1997 rulemaking and have not been adjusted for inflation. After almost 20 years, consideration should be given to whether or not to adjust these figures for inflation to maintain their intended purchasing power. If so, the NRC staff proposes to adjust these figures in five-year increments that coincide with required PAA inflation updates required of the figures pursuant to Section 170t of the AEA.

Emergency Management and Recovery:

- As previously discussed, the NRC granted exemptions based on site-specific analyses demonstrating quantified reductions in radiological risk. The NRC staff recognizes that the risk of a significant radiological release offsite at a decommissioning facility storing irradiated fuel in the SFP is lower than the risk from an operating power reactor and associated SFP. This is based on the consideration of initiating reactor events associated with normal and abnormal operations, design-basis accidents, and certain beyond-design-basis events applicable to a decommissioning site. Similar to the graded approach to EP discussed in Appendix A, the insurance reductions that the staff is considering would reflect the reduced risk profile for decommissioning reactors.
- Unintentional inequities may be created at reactor sites that have both operating and decommissioning units. While the operating reactors may have full PAA coverage, the decommissioning reactors would only have minimal coverage. Should an incident at the decommissioning reactor occur, it could be unclear to the public, who may have believed that they were entitled to full PAA coverage, why they are not receiving the full PAA coverage. The NRC staff will provide updates in the final regulatory basis to address these considerations, and intends to address this issue in guidance to accompany the proposed rule.

ISFSI:

The SECY-93-127 states that, “it should be noted that continuing a requirement for financial protection after the spent fuel has cooled sufficiently to avoid concern for zirconium cladding fires would not be fully consistent with the decision not to require financial protection for [ISFSIs] licensed pursuant to 10 CFR Part 72.” The Commission paper further states, “Development of such a rule should consider whether shutdown reactors with cooled spent fuel should be treated differently from ISFSIs or whether ISFSI licensees should provide some financial protection consistent with the level chosen for licensees of shutdown nuclear power plants.” If used, Option 2 would involuntarily impose financial protection requirements for ISFSIs.

Transportation:

The SECY-93-127 states that, “The liabilities and indemnification requirements associated with the transfer of spent fuel from the licensee to the [DOE] will be evaluated on a case-by-case basis at a future time when spent fuel is shipped to a repository.” This implies that the NRC staff determined that the “transfer of spent fuel” required its own special consideration. Possible future consideration may be required.

Impacts of Proposed Changes on Stakeholders:

The proposed changes are beneficial to both licensees and NRC staff as they will clarify the requirements for decommissioning plants, provide for regulatory certainty, and reduce regulatory burden without impacting adequate protection for public health and safety. The changes are beneficial to members of the public because the changes help to simplify and clarify the process and promote openness since the process will be codified.

Summary of Public Comments:

Summary of Public Comments Related to Rulemaking

The NRC received 50 submissions from the solicitation of comments from the ANPR from a variety of stakeholders. As stated in the ANPR, the NRC staff is not developing formal responses to the public comments but did consider the comments in the development of this regulatory basis. In most cases, the comments provided were beyond the scope of the rulemaking. Below is a categorization and summary of the comments received.

Categories and Considerations:

Requests for other bounding limitations on liability – Comments under this topic did not believe that spent fuel decay should be the bounding limitation on liability. Some comments asked for continued flexibility and consideration for licensees to provide their own analysis which includes other incident scenarios (such as a “cask drop”) as a possible alternative to spent fuel decay analyses. Additionally, some comments suggested that the “10-hour mitigation” timeframe is unfounded and should, therefore, not be codified. One comment noted that dry storage becomes impractical should a canister become defective and require replacement. Other comments suggested that the “10-hour mitigation” timeframe was sufficient. In response, the NRC staff notes that the 10-hour mitigation strategy has been thoroughly vetted and become the accepted standard by the Commission.

Adjustment of exemption figures – Comments under this topic were divided. Some commenters believed that the reduction in figures (i.e., from \$375 million (the maximum amount of primary financial protection available at the time) to \$100 million, withdrawal from the secondary pool for offsite insurance, and from \$1 billion to \$50 million for onsite insurance) was too extreme. These commenters requested that the amounts remain the same, or increased. Other commenters stated that these amounts were too high, and should be reduced. Finally, many comments requested that the figures be adjusted for inflation, increased costs due to fuel types, and increased knowledge in real-world applications, such as the response to the accident at Fukushima Dai-ichi. In response, the NRC staff has noted that the figures presented in the PAA were directed by Congress. Additionally, the NRC staff notes that the Commission does have discretion to reduce the figures directed by Congress when appropriate. Finally, the NRC staff notes that the exemption reduction amounts for offsite insurance are qualitatively set.

Timing of the exemption authorization – Comments under this topic suggested that a “zero-risk” scenario is impossible so long as fuel remains on the property. Some comments stated that an exemption should only be granted once the fuel is moved to dry storage, while other stated that an exemption should only be granted once the fuel is completely removed from the site. In response, the NRC staff notes that the Commission previously determined that both “dry storage” and “wet storage” are equally safe. In response, the staff notes that the 10-hour mitigation strategy is the result of detailed research and analysis and has been accepted for site-specific applications.

Request for site specific reviews – Comments under this topic stated that generic requirements for exemptions were not satisfactory. One comment suggested that, instead of writing generic regulations that apply to the industry, the NRC staff should write regulations that consider site-specific factors (such as, location, neighboring locations, environmental considerations, reactor size, and clean-up costs). In response, the NRC staff notes that the 10-hour mitigation strategy is the result of detailed research and analysis and has been accepted for site-specific applications; development of site-specific insurance amounts is not warranted given the basis available for the 10-hour estimate.

Longevity and solvency of a limited liability company (LLC) – A comment under this topic stated that “the long-term financial viability of LLC’s have to be considered.” In response, the NRC staff notes that solvency, as presented by 10 CFR 140.21, is a consideration of the NRC staff. However, it remains unclear if limited liability companies are allowed to be segregated and assessed alternate requirements. Additionally, the NRC staff notes that the NRC does not treat limited liability companies differently than other licensees with respect to the PAA’s insurance requirements.

Backfitting and Issue Finality

Neither of the two options presented by the NRC staff in this appendix would constitute backfitting under 10 CFR 50.109, “Backfitting,” or violate any issue finality provision in 10 CFR Part 52 if the option were implemented by the NRC. Option 1 would maintain the status quo of exemption and license amendment requests, thereby imposing no change in requirements or NRC staff positions. Option 2 would provide licensees with a voluntary alternative to exemption and license amendment requests by amending the NRC’s regulations to establish a graded approach to offsite and onsite financial protection requirements and indemnity agreements commensurate with the reductions in radiological risk as licensees proceed through the decommissioning process. Because licensees would not be required to comply with the

regulations setting forth the graded approach, a rulemaking for Option 2 would not constitute backfitting under 10 CFR 50.109 or violate any issue finality provision in 10 CFR Part 52.

Appendix H - Current Regulatory Approach to Decommissioning

Decommissioning Process Framework

After a licensee permanently shuts down a facility, the licensee goes through a transition period. This period includes activities and licensing actions to reconfigure the licensing basis and operational approach to reflect both ongoing and planned decommissioning activities. After this transition, specific decommissioning regulations govern the remainder of the decommissioning process. These requirements establish a timeframe for completion of decommissioning, determine which types of activities require prior NRC approval before being implemented, govern the appropriate release criteria the site must meet to qualify for license termination, outline the appropriate use of decommissioning funds, and set up the enveloping environmental considerations for decommissioning, among other items. These regulations were last updated during a 1996 rulemaking effort (61 FR 39278) to include enhancements and lessons learned from earlier decommissioning activities.

Specifically, the 1996 rulemaking implemented changes to 10 CFR 50.82, "Termination of license," to provide licensees with simplicity and flexibility in implementing the decommissioning process.¹⁹ The changes were intended to clarify ambiguities in the previous decommissioning regulations, codify procedures and terminology that had been used in a number of specific cases, and increase opportunities for the public to become informed about licensees' decommissioning activities. The changes were also designed to establish a level of NRC oversight commensurate with the level of safety concerns expected during decommissioning activities. The resulting regulations form the current reactor decommissioning process.

In SRM-SECY-14-0118, Request by Duke Energy Florida, Inc., for Exemptions from Certain Emergency Planning Requirements, December, 30, 2014, the Commission directed that the staff reexamine the overall decommissioning process and several of the current decommissioning regulations to determine if the regulatory basis for these regulations was still appropriate given lessons learned from additional decommissioning experience since promulgation of the 1996 final rule. The NRC staff considered four general areas where decommissioning experience could inform the development of the power reactor decommissioning rulemaking regulatory basis:

1. The NRC staff evaluated whether the currently required timeframe of 60 years in 10 CFR 50.82(a)(3) to complete decommissioning remains appropriate
2. The NRC staff reviewed the options for decommissioning described in NUREG-0586, Supplement 1, "Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities" (Agencywide Documents Access and Management System (ADAMS) Accession No. ML023470304), also called the Decommissioning Generic Environmental Impact Statement (GEIS), to determine whether additional options have become available since the 1996 rule.
3. The NRC staff evaluated 10 CFR 50.82(a)(4) and 10 CFR 50.82(a)(5) to determine whether each licensee's Post-Shutdown Decommissioning Activities Report (PSDAR)

¹⁹ The requirements in 10 CFR 50.82 are mirrored in 10 CFR 52.110, "Termination of license," for holders of combined licenses issued under 10 CFR Part 52, "Licenses, certifications, and approvals for nuclear power plants," so any future changes to the regulatory requirements in 10 CFR 50.82 would need to be reflected in 10 CFR 52.110.

should be explicitly approved by the NRC prior to allowing major decommissioning activities to commence.

4. Consistent with Commission direction, the NRC staff examined the role of State and local governments and nongovernmental stakeholders in the decommissioning process.

In conducting its Commission-directed evaluation of the decommissioning process, the NRC staff used precedent from earlier decommissioning rulemakings, the statement of considerations (SOCs) for those rules, and the technical basis documents (NUREGs, regulatory guides (RGs), Commission papers, etc.) that supported the final rules, as well as general lessons learned from previous decommissioning activities that remain applicable today. The NRC staff also reviewed: (1) industry and NRC reports created to document the decommissioning process at several power reactors that have had their licenses terminated under the pre-1996 decommissioning regulations (e.g., Yankee Rowe and Trojan); (2) a series of technical reports created by the Electric Power Research Institute (EPRI) to discuss decommissioning experiences and lessons learned; (3) the decommissioning information and licensing documents generated to support facilities that have achieved or are nearing license termination under the current regulations (e.g., Humboldt Bay and Big Rock Point); and (4) the existing NUREGs and other technical documents that form the basis for the current decommissioning process. These documents were examined to determine which technical and regulatory bases and conclusions are still applicable, which may need to be updated, and which could be improved or enhanced given the lessons learned since the last update of the decommissioning regulations.

Based on its evaluation of the above documents and the ongoing implementation of the decommissioning regulations promulgated by the 1988 and 1996 rules, the NRC staff concluded that the current decommissioning regulations with respect to the four subjects identified above are sufficient to protect public health and safety and the environment because the underlying technical conclusions that support the regulations have not changed. Specifically, the NRC staff determined that the previous conclusions in areas such as overall source term present at the sites, the volume of radiological waste produced during decommissioning, the time necessary for radiation to decay to a certain level, and the overall costs associated with decontamination and dismantlement have remained valid for facilities undergoing decommissioning since the 1996 rule change. In addition, current experiences with decommissioning facilities indicate that the overall process is being implemented in a manner that is consistent with the intent of both the 1988 and 1996 rules; namely, that decommissioning will be accomplished in a safe and timely manner, that adequate funds will be available for this purpose, and that the rule will reduce regulatory burden, provide greater flexibility, and allow for greater public participation in the decommissioning process. As discussed in more detail below, in general, while the NRC staff has concluded that it does not have a basis to significantly overhaul the current decommissioning process or associated policies, it can incorporate improvements where appropriate, primarily through providing updated and more detailed guidance to licensees to assist in the decommissioning process.

An additional consideration for making significant changes to the current decommissioning process is that, depending on the nature of any changes to the long term decommissioning requirements, there could be substantial impacts on licensees, stakeholders, and the NRC. For example, if the timeframe or options available for decommissioning were to change drastically, given that all of the decommissioning planning activities, including the decommissioning trust fund levels, are driven and established by the current regulations, this could have a significant impact on the ability of licensees nearing the end of plant life to adequately prepare for decommissioning activities. There could also be an impact if the decision of the 1996

decommissioning rulemaking is reversed, wherein NRC approval of a decommissioning plan is once again made a requirement, since this would increase the regulatory level of effort necessary for both licensees and the NRC staff without a commensurate gain to the public health and safety, as already outlined in the 1996 rulemaking SOC.

For the reasons discussed in this appendix, at this time the NRC staff concludes that most clarifications or enhancements to the decommissioning process can most efficiently be included in updates to the associated guidance documents. This approach would be the most straightforward approach for the NRC, more efficient for numerous stakeholders, and still provide an improvement to the overall level of detail and transparency present in the decommissioning process. In addition, during its review of the overall decommissioning regulations, the staff identified areas where the existing regulations could be updated or clarified to be more consistent with, or more appropriately reflect, the current decommissioning requirements. These proposed updates and clarifications to the existing regulations would not impose any additional burden on the licensees.

These areas for clarification and the Commission-directed topics are discussed below, with staff recommendations to address potential changes. The staff is soliciting public comments regarding these options, and publishing a *Federal Register* notice for this regulatory basis to obtain stakeholder feedback on the options considered throughout this appendix. The decision on which option the staff recommends in the final regulatory basis will be informed by public comments received on this draft regulatory basis document. The staff's recommendation, along with a full assessment of the rulemaking options described, will be documented in the final regulatory basis. The NRC plans to conduct a public meeting during the public comment period regarding this draft regulatory basis.

The Level of PSDAR Review and Approval by the NRC

Existing Regulatory Framework

Prior to the 1996 rulemaking, the reactor decommissioning regulations required a licensee to submit a detailed decommissioning plan (DP) and have it approved by the NRC before the licensee could begin dismantlement or any major decommissioning activities. One of the drivers behind the 1996 rulemaking was a recognition of the reduction in the risks to the public health and safety at a permanently shutdown reactor with the fuel removed from the reactor vessel as compared to an operating reactor, as discussed further in Section 2.1 of this regulatory basis document. Thus, the rulemaking changed the decommissioning regulations to reflect this reduced risk. The purpose of this change was to “reduce the regulatory burden, provide greater flexibility, and...enhance efficiency and uniformity in the regulatory process of decommissioning nuclear power plants” (61 FR 39278). One of the primary means of achieving these goals was to replace the DP with the PSDAR, which the NRC would review but not approve. In the associated SOC, the Commission explained the basis for this change (61 FR 39279):

[T]he activities performed by the licensee during decommissioning do not have a significant potential to impact public health and safety and these require considerably less oversight by the NRC than during power operations.

The Commission also allowed decommissioning activities to be conducted under 10 CFR 50.59, “Changes, tests, and experiments,” without prior NRC approval (61 FR 39279):

Based on NRC experience with licensee decommissioning activities, the Commission recognized that the § 50.59 process used by the licensee during reactor operations encompassed routine activities that are similar to those undertaken during the decommissioning process. The Commission concluded that the § 50.59 process could be used by the licensee to perform major decommissioning activities if licensing conditions and the level of NRC oversight required during reactor operations are continued, commensurate with the status of the facility being decommissioned.

An additional change to the NRC's decommissioning process as part of the 1996 rulemaking was that without NRC approval of the PSDAR, there was no longer a requirement for the NRC to conduct an assessment under the National Environmental Policy Act (NEPA) or related consultations under other environmental statutes, such as the Endangered Species Act (ESA) or National Historic Preservation Act (NHPA) for decommissioning activities. Instead, at the time of the rulemaking the NRC concluded that the environmental impacts associated with power reactor decommissioning activities are expected to be minor and should be bounded by previous environmental analyses, such as the Final Environmental Statements (FES)²⁰ conducted to support initial operation and the Decommissioning GEIS (61 FR 39283). The NRC therefore issued a finding of no significant impacts (FONSI) for the rulemaking (61 FR 39296).

However, the 1996 rulemaking further required that licensees include a discussion in the PSDAR that provides the reasons for concluding that the environmental impacts that might occur during decommissioning activities have already been considered in site-specific or generic Environmental Impact Statements (EISs). The SOC for the 1996 rulemaking explained that the requirement for a discussion of environmental impacts in the PSDAR is consistent with the goals of the PSDAR process – to promote public knowledge and provide an opportunity to hear public views on decommissioning activities before licensees commence decommissioning (61 FR 39283). Further, 10 CFR 50.82(a)(6) states that licensees shall not perform any decommissioning activities that result in significant environmental impacts not previously reviewed. The 1996 SOC explained this would account for site-specific situations that occur outside the previously considered environmental impacts (61 FR 39283).

The current rule in 10 CFR 50.82(a)(4)(i), requires that, prior to or within 2 years following permanent cessation of operations, the licensee must submit a PSDAR that contains a description of the planned decommissioning activities, a schedule for their accomplishment, the reasons for concluding that the environmental impacts associated with site-specific decommissioning activities will be bounded by appropriate previously-issued environmental impact statements, and a site-specific decommissioning cost estimate (DCE), including the projected cost of managing irradiated fuel.

The PSDAR serves several purposes: (1) informing the public of the licensee's planned decommissioning activities, (2) assisting in the scheduling of NRC resources necessary for the appropriate oversight activities, (3) ensuring that the licensee has considered the costs of the planned decommissioning activities and provided an estimate of those costs, and (4) ensuring that the environmental impacts of the planned decommissioning activities are bounded by those considered in existing EISs.

²⁰ Final Environmental Statement (FES) is the equivalent of a Final Environmental Impact Statement (EIS), as this form of document is presently known.

After the NRC receives a PSDAR, 10 CFR 50.82(a)(4)(ii) requires that the NRC publish a notice of receipt in the *Federal Register*, make the PSDAR available for public review and comment, and hold a public meeting in the vicinity of the plant to discuss the licensee's plans. The standard practice of the NRC staff when conducting reviews of the PSDAR has been to provide an acknowledgement letter to the licensee that summarizes the staff's understanding of the PSDAR, highlights the outcome of the PSDAR public meeting, and categorizes the stakeholder comments received on the PSDAR. Creation of such a letter, while not required, is being incorporated as a lesson learned from the recent set of shutdown reactors, and will likely continue and be formalized as part of the standard review plan as additional facilities enter decommissioning. Although the NRC will determine whether the information in the PSDAR is consistent with the regulations, formal NRC approval of the PSDAR is not required. However, should the NRC determine that the PSDAR does not satisfy the informational requirements of 10 CFR 50.82(a)(4), the NRC will inform the licensee, in writing, of the deficiencies before the PSDAR public meeting and before major decommissioning activities begin. The deficiencies are conveyed to the licensees in a Request for Additional Information (RAI), which the licensee will provide a response to in order to satisfy the informational requirements in 10 CFR 50.82(a)(4).

In accordance with 10 CFR 50.82(a)(6), the licensee shall not perform any decommissioning activities that could preclude release of the site for possible unrestricted use, impact a reasonable assurance finding that adequate funds will be available for decommissioning, or potentially result in a significant environmental impact not previously reviewed. The 1996 rulemaking SOC states that if a licensee contemplates decommissioning activities that would violate these requirements, the licensee may not use the 10 CFR 50.59 process to perform the activities (61 FR 39283). The licensee would then be required to obtain a license amendment to perform the activities, which provides a right for stakeholders to request a public hearing and requires the NRC to conduct an environmental review. Unless the NRC approves the amendment request, the licensee may not conduct the requested decommissioning activity.

In addition, the 1996 rulemaking required that all power reactor licensees submit an application for termination of the license, which would be accompanied or preceded by a License Termination Plan (LTP) that must be submitted at least two years prior to the termination of the license date. The LTP and its associated license amendment request require NRC approval and contain many of the details previously found in the DP. Specifically, under 10 CFR 50.82(a)(9)(ii), the LTP must include: (1) a site characterization; (2) identification of remaining dismantlement activities; (3) plans for site remediation; (4) detailed plans for the final radiation survey; (5) a description of the end use of the site, if restricted; (6) an updated site-specific estimate of remaining decommissioning costs; (7) a supplement to the environmental report, pursuant to 10 CFR 51.53, "Postconstruction environmental reports," describing any new information or significant environmental changes associated with the licensee's proposed termination activities; and (8) identification of parts, if any, of the facility or site that were released for use under 10 CFR 50.83, "Release of part of a power reactor facility or site for unrestricted use," before approval of the LTP.

The regulation 10 CFR 50.82(a)(9)(iii) requires that, after receiving an LTP, the NRC publish a notice of receipt in the *Federal Register*, makes the LTP available for public review and comment, and holds a public meeting in the vicinity of the plant to discuss the licensee's plans. The NRC then conducts a detailed technical and regulatory review to ensure that the LTP demonstrates that the remainder of decommissioning activities will be performed in accordance with the decommissioning regulations, will not be inimical to the common defense and security or to the health and safety of the public, and will not have a significant effect on the quality of the

environment, pursuant to 10 CFR 50.82(a)(10). The NRC also prepares an environmental assessment (EA) to document the environmental impacts from license termination activities.

The NRC conducts independent confirmatory radiological surveys to verify that the license termination activities have been implemented as described in the LTP and that the remediation activities at the facility were successful in reducing the remaining residual radioactivity to a level below the unrestricted site release criteria found in Subpart E, "Radiological Criteria for License Termination," of 10 CFR Part 20, "Standards for Protection Against Radiation." Taken together, the PSDAR, the LTP, and the NRC's independent verification of the site release criteria create the current regulatory framework for power reactors undergoing the decommissioning and license termination process.

Regulatory and Rulemaking Options

The NRC staff examined whether the regulatory or technical bases for any of the above statements has changed since the promulgation of the 1996 decommissioning rule, and explored the opportunity to incorporate additional enhancements or overall improvements to the regulatory framework. The NRC considered and evaluated four options: no action, guidance development and enhancement, rulemaking for specific issues, and rulemaking to require formal PSDAR approval by the NRC. A description and the NRC staff's assessment of each option follows below.

OPTION 1 – NO ACTION

The no-action option would retain the current decommissioning regulations regarding NRC review of the PSDAR before commencing major decommissioning activities, the level of detail contained in the PSDAR, the submission of an amendment to the PSDAR under certain circumstances, and NRC review without approval of the PSDAR.

ASSESSMENT OF OPTION 1

In determining whether the current decommissioning requirements regarding the PSDAR remain sufficient to address ongoing and future decommissioning activities, the NRC staff evaluated the technical and regulatory bases associated with the 1988 and the 1996 decommissioning rules, as well as the associated SOC and public comments, and comments received to date on the Advance Notice of Proposed Rulemaking (ANPR) published for this rulemaking activity. Based on this review, the NRC staff concluded that the efficiency goal of the 1996 rulemaking regarding flexibility and simplicity in implementing the decommissioning process, while maintaining a level of NRC oversight and involvement commensurate with the level of safety concerns expected during decommissioning activities, continues to be met using the current PSDAR process. A review of lessons learned from power reactors that have performed decommissioning activities under a PSDAR rather than a DP also demonstrated that use of a PSDAR did not in any way diminish the amount of planning, preparation, and oversight expended by the licensee in undertaking decommissioning activities.

In addition, by maintaining the current regulatory framework, the NRC would continue to perform a NEPA review upon submittal of the LTP, which would evaluate the environmental impacts of license termination activities and other related actions. The NRC's review of the LTP provides an opportunity for public involvement, although most of the major decommissioning activities are typically complete by the time a licensee submits the LTP. This opportunity for public involvement during the LTP review phase of decommissioning, as well as the public interactions

associated with the PSDAR, provide the public and other stakeholders with an opportunity to become involved in the decommissioning process.

Maintaining the current regulations with respect to the PSDAR would continue to meet the safety and regulatory goals envisioned by the 1996 decommissioning rule, would maintain regulatory efficiency and flexibility, and would have no additional impact on future plants intending to transition to a decommissioning status. The continued use of the current requirements for the level of detail required in the PSDAR, the NRC's review of the PSDAR, and implementation of the 10 CFR 50.59 process to enact changes at a decommissioning facility ensures adequate protection of the health and safety of the public.

OPTION 2 – GUIDANCE DEVELOPMENT / ENHANCEMENT

Several NRC guidance documents related to the decommissioning process will be updated as part of the power reactor decommissioning rulemaking. As part of these guidance updates, the NRC staff could address the concerns identified by stakeholders regarding the level of detail and review process for the PSDAR without the need for formal rulemaking. Specifically, several of the comments received on the ANPR focused on the level of detail contained in PSDARs submitted within the past few years. To inform the public and other stakeholders more fully regarding the decommissioning process at specific facilities, RG 1.185, "Standard Format and Content for Post-Shutdown Decommissioning Activities Report" (ADAMS Accession No. ML13140A038), would be updated to encourage licensees to add additional detail on topics already required to be included in the PSDAR in the areas that are of greatest interest to those stakeholders impacted by the decommissioning process.

These updates to the guidance would reflect additional detail related to information licensees are already required to submit in the PSDAR, and thus would not impose an additional burden on the licensee. Currently, the NRC staff routinely asks questions on the information submitted in the PSDAR, and the licensee responds accordingly; this interaction increases the burden to both parties. The increased level of detail in the guidance and submittals under this option would greatly reduce or eliminate the staff's need to ask the licensee additional questions as part of the staff's PSDAR review. Although the NRC would need to expend a small amount of upfront resources to develop this guidance, both the NRC and licensees would save resources in the future since the additional information provided would result in a more streamlined and predictable process. Further, such clarified guidance would help the NRC plan resource needs for future decommissioning reviews. Finally, this option would result in a greater level of transparency for the NRC's decommissioning process for external stakeholders.

Areas where additional detail could be included in the PSDAR that would benefit the NRC staff and stakeholders would include:

1. Site modifications planned for the first five years after entering decommissioning, including any plans for construction and operation of an independent spent fuel storage installation (ISFSI), as well as the associated schedules and timelines for such activities.
2. Explanations of why a particular decommissioning strategy and timeline was chosen over any others, including the associated cost estimate over time for all of the strategies considered.
3. The long term spent fuel management plans at the site, including a discussion of the plan for ongoing security, emergency planning, staffing, and funding at the ISFSI, and

contingencies addressing the potential need to replace casks or other spent fuel storage components at some point before the end of life of the ISFSI, if applicable.

4. If available, site characterization and potential remediation activities that will be undertaken, including a discussion of the results of any preliminary surveys or other environmental characterization activities that were performed prior to submission of the PSDAR, as well as a proposed plan for final site status/uses (e.g., industrial use, “green field”).
5. The licensee’s plans regarding Tribal, State, and local government and community involvement in the decommissioning process, such as formation of an advisory panel or similar group constituted from the stakeholders most impacted by the decommissioning activities at the facility, and a discussion of how this group, if the licensee intends to create one, would be utilized throughout the process.
6. A summary of the licensee’s evaluation regarding the environmental impacts of the site-specific decommissioning activities (e.g., construction and operation of an ISFSI, remediation activities, removal of large components) and planned site modifications. Currently, Regulatory Guide 1.185 indicates that: (1) licensees should compare the potential environmental impacts associated with decommissioning to similar impacts given in the FES for the plant (as supplemented), the Decommissioning GEIS, and site-specific environmental assessments; (2) the comparison to impacts in the GEIS should recognize the unique nature of the site; and (3) licensees should focus on those resources not covered by previous site-specific NEPA analyses, environmental documents, or in the Decommissioning GEIS. The licensee’s reasons for reaching its conclusions are already required, in accordance with 10 CFR 50.82(a)(4) to be submitted in the PSDAR. The guidance could be supplemented to suggest that a summary of the evaluation, in addition to the licensee’s conclusions, be provided in the PSDAR.
7. A discussion of how the licensee would maintain stewardship and compliance with all Federal, State and local regulations in effect during decommissioning, including non-radiological effluent releases, waste management, environmental monitoring, emergency planning considerations, and environmental statutes such as the Endangered Species Act and National Historic Preservation Act.

The NRC staff also proposes to include guidance that encourages licensees to provide an additional discussion of what considerations and site-specific issues would be addressed in the LTP when it is submitted because that document contains a greater level of detail than the PSDAR regarding remediation activities, final site disposition, and overall decommissioning completion. The guidance could also provide a reminder that the LTP can be submitted before the required minimum of 2 years before the license termination date, providing earlier information to stakeholders of ongoing and upcoming decommissioning activities, and can be supplemented as needed if conditions or the level of activity changes at the facility. The NRC would publish this updated guidance as a draft RG 1.185, Revision 2, for public review and comment prior to finalizing the guidance document.

In addition to enhancing the guidance on PSDAR preparation, the NRC staff would, under this option, update and revise the Decommissioning GEIS, which was last updated in 2002. Potential revisions to the Decommissioning GEIS could be to (1) include experience from recent decommissioning facilities, (2) incorporate the conclusions of the Continued Storage GEIS, (3)

revisit the findings based on updated information, and (4) revise as necessary to reflect the outcome of rulemaking.

The NRC will also consider how the Decommissioning GEIS is implemented and consider incorporating enhancements in the revision to the GEIS based on the way environmental reviews are conducted for other NRC applications. For example, in license renewal, the generic findings of the License Renewal GEIS (NUREG-1437, “Generic Environmental Impact Statement for License Renewal of Nuclear Plants” (ADAMS Accession No. ML13106A241)) were codified in 10 CFR Part 51, and the supplemental EIS for each reactor license renewal focuses on the site-specific issues. Another approach could be similar to materials decommissioning. In NUREG-1757, “Consolidated Decommissioning Guidance,” Volume 1, Revision 2 (ADAMS Accession No. ML063000243), the NRC categorizes materials facilities undergoing decommissioning into groups based on the complexity of the decommissioning. Then, for each materials decommissioning group, the NRC establishes the level of NEPA review that would be required.

ASSESSMENT OF OPTION 2

Selection of this option would provide licensees with guidance regarding an additional level of detail in the PSDAR on topics already required to be covered by the PSDAR, for issues that have been a concern for many stakeholders, without the need to further formalize PSDAR content in NRC regulations. This would continue to provide the flexibility needed by many decommissioning sites in various stages of the decommissioning process. Since the majority of licensees tend to use RG 1.185 and the Decommissioning GEIS as the roadmap for assembling decommissioning documents to be submitted to the NRC, appropriate guidance updates related to the PSDAR and the Decommissioning GEIS could lead to an overall enhancement in the licensees’ documents submitted to the NRC.

Use of this option would have a small impact on the NRC staff because it would require an update to RG 1.185 and the Decommissioning GEIS. While these changes could result in an increased level of detail in the PSDAR, they would also enhance the opportunity for public and other stakeholder involvement in the decommissioning process, and expand overall regulatory transparency and openness.

OPTION 3 – RULEMAKING FOR SPECIFIC ISSUES

In this option, the NRC staff would pursue rulemaking in one or more specific areas related to the review of the PSDAR. Supplemental requirements could include provisions for (1) specific State involvement in the PSDAR review process, (2) required periodic updates to the PSDAR (e.g., every five years), and/or (3) the licensee to conduct a comprehensive environmental review as part of the PSDAR process. These areas have been identified by some stakeholders as shortcomings in the current review process for the PSDAR.

New language would be added, as warranted, to 10 CFR 50.82(a)(4) and 10 CFR 50.82(a)(5) to address the following aspects of the PSDAR review process:

1. Request State and local government input and feedback on the PSDAR. Any comments formally provided would need to be individually addressed and resolved by the licensee (through revision or supplement of the PSDAR) before the PSDAR can be implemented.

NRC Staff Assessment: The level of stakeholder interest is a key consideration in considering the expansion of stakeholders' official role in the review of the PSDAR. The NRC's experience with decommissioning facilities has demonstrated that not all communities have the same level of desire to be involved in the decommissioning process, and imposing new requirements in this area could have a detrimental impact on resources for those groups potentially mandated to participate in the PSDAR review process. In addition, the NRC goal is to remain a fair and balanced regulatory approach, which involves endeavoring not to favor any specific group or entity over others in the regulatory process. As such, granting certain States, local governments, or other stakeholders a special role in the PSDAR review process would be contradictory to this goal. Therefore, maintenance of the current practice, wherein all comments received on the PSDAR have the same weight and importance in the process, best supports the agency's mission of openness and transparency in the regulatory process, while taking all viewpoints into consideration to the extent practical.

2. All PSDARs must be updated on a periodic basis in order to include the additional decommissioning details that do not resolve themselves until later in the process (e.g., site characterization and remediation plans), as well as to provide overall schedule, work planning, and final site disposition updates.

NRC Staff Assessment: In accordance with 10 CFR 50.82(a)(7), licensees are already required to notify the NRC and any affected States before "performing any decommissioning activity inconsistent with, or making any significant schedule change from, those actions and schedules described in the PSDAR, including changes that significantly increase the decommissioning cost," which typically also requires an update to the PSDAR. An additional requirement to periodically update the PSDAR regardless of the level of activity at the decommissioning site, or how closely these activities are following the outline of the current PSDAR, would decrease the level of flexibility and efficiency available to decommissioning licensees without a commensurate increase in the positive impact on public health and safety.

Specifically, while the level of NRC oversight at decommissioning facilities is less than during operation, oversight nonetheless continues, with periodic inspections in numerous areas taking place under the decommissioning reactor inspection program. These inspections ensure that the NRC staff remains well informed of the ongoing activities at the plant, is made aware of any issues in a timely manner, and has the opportunity to follow up on corrective actions. The results of these inspections are made available to the public in inspection reports that can be obtained from many sources, including the NRC public Web site and ADAMS. Therefore, a requirement to periodically update the PSDAR would impose an additional burden on licensees that would result in no benefit to the NRC staff or other stakeholders since this information would already be available to the public.

3. Require the licensee to conduct a site-specific environmental analysis and appropriate consultations as part of its overall preparation and submittal of the PSDAR and submit this analysis to the NRC. Some topics, such as environmental justice (see Section 4.3.3.13.14 of the Decommissioning GEIS), would need to be addressed in all such environmental reviews. For other resources, the level of environmental review could be determined by the NRC staff based on site-specific criteria such as presence of groundwater contamination or new protected species not previously considered.

NRC Staff Assessment: By receiving information to begin conducting its environmental review at the PSDAR stage rather than after submittal of the LTP, the NRC could gather the necessary information and perform the analysis to fulfill its obligation to comply with NEPA and other environmental statutes earlier in the decommissioning process, versus during the license termination stage. In moving up the timeframe for the environmental analysis and associated consultations, licensees would likely have more NRC staff and resources available to support the environmental review effort than would be present toward the end of the decommissioning process. In addition, by implementing the process earlier in decommissioning, the public would have an opportunity to participate in the process prior to many major decommissioning activities occurring.

However, the NRC staff notes that licensees are already required to provide information in the PSDAR that provides the reasons for the licensee's conclusions that the site-specific environmental impacts of decommissioning are bounded by previous environmental documents, assessments, and the Decommissioning GEIS. The analysis supporting these conclusions is available to the NRC staff during subsequent inspection activities. Given this consideration, as well as the fact that many details of the licensee's decommissioning approach are not available at the PSDAR stage, the licensee and the NRC would likely need to further evaluate the environmental impacts of decommissioning during the LTP stage, thereby potentially negating any efficiencies gained by gathering environmental information earlier in the process.

ASSESSMENT OF OPTION 3

Use of all or parts of this option would have a moderate to high impact on both licensees and the NRC staff since it would require the NRC staff to promulgate new rule language for the imposition of several potential regulations. In addition, decommissioning licensees would need to expend additional time and effort to provide the additional level of feedback, documentation, and other resources suggested. While requiring the licensees to conduct a site-specific environmental analysis and appropriate consultations would have no direct positive impact on public health and safety, the completion of a site-specific environmental analysis may delay the licensee's decommissioning activities.

OPTION 4 – RULEMAKING TO REQUIRE PSDAR REVIEW AND APPROVAL

In this option, the NRC would pursue rulemaking to require NRC review and approval of the PSDAR, as was required before the 1996 decommissioning rule. Specifically, these additional regulations would require that the PSDAR be submitted as a license amendment request, which would include an opportunity for impacted stakeholders to request a hearing on the PSDAR, as well as a formal review and approval of the PSDAR and full environmental review by the NRC. Until these reviews were complete, and the PSDAR formally approved by an accompanying NRC safety evaluation and an environmental analysis, the licensee would not be permitted to enter into any major decommissioning activities except as allowed by the requirements of 10 CFR 50.59. In addition, because a licensing action would be undertaken by the NRC – approval of the PSDAR – the NRC would conduct an environmental review in accordance with NEPA and other environmental statutes.

Under this option, the NRC would require that the PSDAR be submitted as a license amendment request in accordance with 10 CFR 50.90. This would cause the PSDAR to be subject to the same level of review as other license amendment requests. Specifically: (1) the PSDAR would be formally submitted and accepted for review by the NRC, (2) the document

would be noticed in the *Federal Register* for a public comment period and opportunity for impacted stakeholders to request a hearing on all or portions of the PSDAR, (3) the PSDAR would need to include an environmental report and the NRC would have to conduct a NEPA analysis (i.e., EA or EIS) and conduct appropriate consultations (e.g., under NHPA or the ESA), (4) the NRC would review the document to ensure it contains enough detail on the decommissioning process to ensure that the activities would not have a negative impact on public health and safety, and (5) the NRC would compile a safety evaluation and NEPA document giving the conclusions of the review of the PSDAR and, if approved, allowing the licensee to commence major decommissioning activities.

This option would include a requirement that precludes licensees from beginning active decontamination or dismantlement procedures, or any other major activities, until the PSDAR is approved by the NRC.

ASSESSMENT OF OPTION 4

Selection of this option would remove the requirements imposed by the 1996 decommissioning rule that allow the PSDAR to be submitted to the NRC without the need for a formal approval mechanism, and only be updated when decommissioning activities vary significantly from those first proposed. As discussed previously, one of the main drivers for the 1996 rule, beyond the recognition that decommissioning power reactors inherently pose less risk to the public than operating facilities, was to provide more flexibility in dealing with premature closures and the decommissioning process in general while establishing “a level of NRC oversight commensurate with the level of safety concerns expected during decommissioning activities” (61 FR 39279). The primary method for increasing this flexibility was removal of the NRC’s formal approval of a decommissioning plan in favor of a licensee’s submittal of the PSDAR in order to streamline the process.

Requiring NRC approval of the PSDAR would be an NRC licensing action and would require the NRC to conduct a review in accordance with NEPA and related environmental statutes, as well as requiring licensees to submit an environmental report as part of the PSDAR submittal in accordance with 10 CFR 51.53(d). Licensees are already required to provide information in the PSDAR that justifies why the environmental impacts of decommissioning are bounded by existing environmental documents, as well as provide an assessment of certain site-specific environmental impacts in the LTP. The NRC would expect the information included in the environmental report submitted as part of the PSDAR to be similar to what is currently submitted with an LTP, the only difference being that the information would be made available to the NRC earlier in the decommissioning process.

In addition, similar to the existing process, licensees and the NRC could learn from or incorporate by reference previous site-specific and generic EISs to support their environmental analysis as appropriate. By implementing the environmental review process earlier in decommissioning, the NRC would directly evaluate the environmental impacts of decommissioning before the facility is largely dismantled, and the public would have an additional opportunity to participate in the decommissioning process prior to many major dismantlement and disposal activities occurring. Incorporating NEPA and consultations into the PSDAR process would also afford additional opportunities for public involvement and consultation with other State and Federal agencies earlier in the decommissioning process. Finally, by preparing a NEPA document upon submittal of the PSDAR, the NRC could rely on that NEPA analysis and its conclusions to address many of the environmental impacts that must also be addressed when the LTP is submitted, which requires an accompanying EA.

Because very few decommissioning projects were announced between implementation of the 1996 rule and the recent set of shutdown facilities, there has been little opportunity to quantitatively measure the efficiencies added by implementation of the PSDAR approval approach. However, based on lessons learned and experiences from previously decommissioned reactors, there is currently no indication that the use of a PSDAR instead of a DP at the formal approval stage has any substantial impact on the public health and safety, or that use of a PSDAR in any way diminishes the amount of planning, preparation, and oversight expended by the licensee in undertaking decommissioning activities. In addition, the current process already requires an environmental analysis by the licensee at the PSDAR stage, NRC review (but not formal approval) of the PSDAR, and NRC review and approval of the LTP that provides the site specific decommissioning approach. Further, the return to a more formal approval mechanism for the PSDAR would remove several of the efficiencies and flexibilities envisioned by the 1996 decommissioning rule without any increase in public health and safety.

Use of this option would have a high impact on both licensees and the NRC because it would require the NRC to promulgate new rule language for the imposition of regulations that are in opposition to the goals of the 1996 decommissioning rule, develop a regulatory and technical basis in support of conclusions that diverge from the current decommissioning process, create a new review standard for PSDARs that would be submitted as license amendment requests, conduct a backfit assessment to determine what the consequences of implementation of such a rule would be on licensees, and potentially expend resources to prepare for hearing related activities. The NRC would also need to expend resources to conduct the associated environmental reviews and consultations as necessary. In addition, decommissioning licensees would need to expend additional time and effort to provide the level of documentation suggested, potentially respond to additional requests from the NRC and other stakeholders, and delay decommissioning activities while the PSDAR review is underway.

Comments received on both the 1996 rulemaking and the ANPR for this rulemaking asserted that the NRC's reliance on the Decommissioning GEIS to generically resolve and bound issues at specific sites may not be adequate. There are several resource areas (e.g., threatened and endangered species and environmental justice) that the NRC did not generically resolve in the Decommissioning GEIS. Commenters further stated that power reactor decommissioning should require a site-specific NEPA review and should be considered a major federal action and require evaluation in accordance with NEPA. Others commented that the NRC cannot assume all environmental impacts are bounded by previously issued EISs, most of which are now several decades old. Commenters also raised several issues that they believe have not been evaluated on a site-specific basis as they relate to decommissioning, such as socioeconomic impacts, environmental justice, threatened and endangered species, and archeological resources. If the NRC chooses to require NRC approval of the PSDAR before licensees can undertake decommissioning, the concerns raised by the public would be addressed because the NRC would conduct a site-specific NEPA analysis and necessary consultations prior to any major decommissioning activities occurring.

For licensees, the changes would decrease the flexibility available to conduct decommissioning activities, thereby decreasing efficiency, and potentially delaying decommissioning activities while the regulatory process is completed. In addition, the opportunity for stakeholder feedback is already afforded through the existing PSDAR process, and is more formally utilized during the LTP review and approval process when more information on the site-specific decommissioning approach is submitted to the NRC. As such, the NRC staff expects that any health and safety concerns would be identified and addressed during these existing processes, as well as during the ongoing NRC inspection and oversight activities that take place through decommissioning.

NRC STAFF RECOMMENDED APPROACH

Based on consideration of the 1996 SOC, lessons learned, stakeholder comments on the ANPR, and other data that informed the Commission's decision to remove NRC approval of a DP and replace it with NRC review of a PSDAR, as well as an assessment of the ongoing decommissioning activities currently taking place under PSDAR requirements, there appears to be no additional public health or safety improvements to be gained by further regulatory changes in this area. Therefore, given the NRC's desire to maintain safety, reduce unnecessary regulatory burden, and improve efficiency and effectiveness in the regulatory process for decommissioning nuclear power plants, the NRC staff recommends Option 2 – Guidance Development/Enhancement. Use of this option would allow stakeholders access to more detailed information in the PSDARs for those licensees choosing to implement the enhanced guidance, without reducing the flexibility provided by the use of a PSDAR instead of a DP for decommissioning plants, or imposing unnecessary burdens on licensees and NRC staff to create and review additional documents that do not have any net positive impact on public health and safety. These guidance updates would reflect additional information on topics that is currently required to be submitted in PSDARs, and thus would not impose an additional burden on the licensee.

The Appropriateness of Maintaining the Three Existing Options for Decommissioning

Existing Regulatory Framework

Licensees currently have three options for decommissioning power reactor facilities, although they are not required or codified by regulation. These options were first identified in the 1988 Decommissioning GEIS and defined as follows:

- **DECON:** The equipment, structures, and portions of the facility and site that contain radioactive contaminants are promptly removed or decontaminated to a level that permits termination of the license shortly after cessation of operations.
- **SAFSTOR:** The facility is placed in a safe, stable condition and maintained in that state (safe storage) until it is subsequently decontaminated and dismantled to levels that permit license termination. During SAFSTOR, a facility is left intact, but the fuel has been removed from the reactor vessel, and radioactive liquids have been drained from systems and components and then processed. Radioactive decay occurs during the SAFSTOR period, thus reducing the quantity of contaminated and radioactive material that must be disposed of during decontamination and dismantlement. The definition of SAFSTOR also includes the decontamination and dismantlement of the facility at the end of the storage period.
- **ENTOMB:** Radioactive systems, structures, and components are encased in a structurally long-lived substance, such as concrete. The entombed structure is appropriately maintained, and continued surveillance is carried out until the radioactivity decays to a level that permits termination of the license.

It is the view of the NRC that entombment should be used as a last resource for decommissioning of power reactor facilities, with the expectation that this method would be selected only under unique decommissioning circumstances. The NRC staff understands that the International Atomic Energy Agency (IAEA) has circulated a similar

view for comment. Entombment should be implemented only if this option provides more benefit than harm to public health and safety and the environment, and does not create a legacy situation that has to be managed by future generations.

The choice of the decommissioning method is left to the licensee, provided that the decommissioning method can be performed in accordance with the NRC's regulations. As described in the Decommissioning GEIS, the NRC would require the licensee to reevaluate its decision on the method for decommissioning that it chose if it: (1) could not be completed as described, (2) could not be completed within 60 years of the permanent cessation of plant operations, (3) included activities that would endanger the health and safety of the public by being outside of the NRC's health and safety regulations, or (4) would result in a significant impact to the environment. The licensee's choice is communicated to the NRC and the public in the PSDAR. To date, all NRC licensees that are decommissioning or have decommissioned power reactors have used either DECON or SAFSTOR. Several sites have performed some incremental decontamination and dismantlement during the storage period of SAFSTOR – a combination of SAFSTOR and DECON – as personnel, money, or other factors dictate.

Regulatory and Rulemaking Options

Discussion of the current options available for decommissioning is contained in documents such as the Decommissioning GEIS and RG 1.184, "Decommissioning of Nuclear Power Reactors" (ADAMS Accession No. ML13144A840). As part of this rulemaking activity, the NRC staff considered whether these options should be explicitly addressed and defined in the regulations instead of solely in guidance and environmental documents. The NRC staff also explored whether other options for decommissioning should be considered given the advances in dismantlement and decontamination technologies since the decommissioning regulations were last updated.

Based on an initial assessment of SAFSTOR and DECON (which are basically "decommission now" or "decommission later" philosophies), as well as the fact that the ENTOMB option has never been used for any U.S. nuclear power reactor, there appear to be no additional safety or regulatory improvements to be gained by changes in this area. In general, the decision about what decommissioning option to choose depends primarily on which method is most useful for the facility given the timeframes associated with the different approaches. In accordance with the existing regulations, the licensee's decommissioning approach and timeline is an independent decision, as long as it can be completed within the 60-year timeframe.

However, the NRC staff did examine whether the regulatory or technical bases for any of the above statements has changed since the promulgation of the 1996 decommissioning rule and the 2002 update of the Decommissioning GEIS, and explored the opportunity to incorporate additional enhancements or overall improvements to the regulatory framework. The NRC considered and evaluated three options: no action, guidance development and enhancement, and rulemaking to codify the decommissioning approaches. A description and the NRC staff's assessment of each option follows below.

OPTION 1 – NO ACTION

The no-action option would retain the provisions of the current decommissioning regulations and guidance documents with regard to the decommissioning methods available to licensees, the flexibility for licensees to choose which decommissioning option they wish to implement and on what timeline, and the ability to move between SAFSTOR and DECON as resources or other

factors dictate as long as license termination is accomplished within the 60-year period unless an alternative schedule is explicitly approved by the NRC.

ASSESSMENT OF OPTION 1

Because the NRC does not expect additional safety improvements from options other than SAFSTOR and DECON, maintaining the current regulatory environment with respect to the methods available for decommissioning will continue to meet the safety and regulatory requirements envisioned by the current decommissioning regulations, and will have no additional impact on future plants intending to transition to a decommissioning status. The continued use of guidance documents to discuss the decommissioning options is an adequate forum to aid licensees in formulating a decommissioning strategy because it maintains the flexibility envisioned by the 1996 decommissioning rule, allows licensees to govern their own decommissioning approach and timeframe, and is protective of public health and safety.

OPTION 2 – GUIDANCE DEVELOPMENT / ENHANCEMENT

In this option, the NRC staff would update or create guidance documents to address the various methods to decommission power reactors. Specifically, RG 1.184 would be updated to include an additional discussion of SAFSTOR and DECON, as well as enhanced guidance to licensees regarding the potential merits and disadvantages of entering into long term SAFSTOR versus pursuing immediate DECON of at least certain systems and components at the facility. In addition, discussion of the ENTOMB option would be removed from the existing guidance documents for power reactor decommissioning to the extent practical since this method is not practically feasible for current U.S. power reactors, and the timeframe for decommissioning completion using the ENTOMB method is generally inconsistent with the current regulations. In order to capture this information, RG 1.185 and the Decommissioning GEIS would also be updated to include provisions for capturing additional information regarding the decommissioning strategy chosen in the PSDAR.

Several NRC guidance documents related to the decommissioning process could be updated as a result of this rulemaking effort, which could provide an opportunity to address the concerns identified by stakeholders regarding the options available for decommissioning without the need for formal rulemaking. Specifically, several of the comments received on the ANPR focused on the motivation of licensees for selecting the long term SAFSTOR option, the lack of detail provided to support certain decisions regarding the option selected for decommissioning, and a general consensus among external, non-industry stakeholders that movement of the spent fuel into dry storage as soon as technically feasible represents a safety improvement at the site. In order to better inform the public and other stakeholders regarding the decommissioning process at specific facilities, RG 1.184 and RG 1.185 would be updated to encourage licensees to add additional detail to the PSDAR, DCE, and Irradiated Fuel Management Plan (IFMP) regarding the option selected for decommissioning, the motivation for selecting that option, and what impact that decision has on long term storage of spent fuel.

Areas where additional detail could be included in the PSDAR, DCE, and IFMP that would benefit the NRC staff and stakeholders would include:

1. The decision making process behind the selection of SAFSTOR or DECON as the decommissioning method, and a detailed overview of the conditions under which DECON will commence at the facility.

2. For the DECON method, how the facility would optimize worker and community safety, cost, institutional knowledge, and socioeconomic impacts, while minimizing opportunities for contamination to migrate offsite.
3. The cost over time of the decommissioning method selected, specifically in regard to the potential escalation of dismantlement costs and waste disposal fees.
4. If available, the potential future uses of the site and the overall plan for final disposition of the structures and other components at the facility (i.e., will the site be made available for industrial use, will the buildings and other structures be left in place, and/or will the site become a “green field”), as well as the associated timelines.
5. The ENTOMB option would be removed as an option from the existing guidance given that it is not practically feasible for U.S. nuclear power reactors and not consistent with the required timeframe to complete decommissioning.

The NRC staff notes that the removal of the ENTOMB option is consistent with previous discussions between the NRC, internal and external stakeholders, and members of the international regulatory community. In general, while internal and external stakeholders and members of the international regulatory community all recognize entombment, they also recognize that its application is very situational, so within the typical regulatory framework, it may not be appropriate to maintain it as a prescribed strategy. To that end, the IAEA is working on a revision to their decommissioning safety position, wherein entombment would no longer be considered as desirable as immediate and deferred dismantlement (i.e., DECON and SAFSTOR). The revised IAEA safety position would recognize that entombment is not a “strategy” or a solution for normal planned shutdown, but should only be considered a solution under exceptional circumstances (such as severe accidents) for existing facilities, and would be considered on a case by case basis. However, this safety position is currently being reviewed by the international community and is not yet available for use.

ASSESSMENT OF OPTION 2

Selection of this option would provide an additional level of detail related to current requirements in the PSDAR and associated documents on topics that have been a concern for many stakeholders, without the need to further formalize PSDAR, DCE, or IFMP content in NRC regulations. This would continue to provide the flexibility needed by many decommissioning sites in various stages of the process as well as help maintain adequate protection of public health and safety. Since the majority of licensees tend to use these documents as the roadmap for assembling documents to be submitted to the NRC, appropriate guidance updates related to the PSDAR, DCE, and IFMP could lead to an overall enhancement in the decommissioning documents submitted to the NRC.

Use of this option would have a small impact on the NRC staff since it will require an update to RG 1.184, RG 1.185, and the Decommissioning GEIS. These updates to the guidance would reflect additional detail related to information licensees are already required to submit in PSDARs, DCE, and IFMP documents, and thus would not impose an additional burden on the licensee. The increased level of detail in the guidance and submittals under this option would greatly reduce or eliminate the NRC staff’s need to ask the licensee additional questions as part of the PSDAR, DCE, and IFMP reviews. Although the NRC would need to expend minimal upfront resources to develop this guidance, both the NRC and licensees would save resources in the future since the additional information provided would result in a more streamlined and

predictable process to manage information. Finally, this option would enhance the opportunity for public and other stakeholder involvement in the decommissioning process, as well as expanding overall regulatory transparency and openness.

OPTION 3 – RULEMAKING TO CODIFY THE DECOMMISSIONING APPROACHES

In this option, the NRC staff would pursue rulemaking to codify the methods available for decommissioning and establish requirements for each option. Specifically, these additional regulations would outline the types of activities that may be undertaken under both DECON and SAFSTOR, as well as the associated timelines and expectations for switching between the two methods. Under this option the NRC staff would pursue rulemaking to formally define the available decommissioning methods in 10 CFR 50.82, as well as to establish the level of activity and timelines expected to be associated with each method. In addition, licensees would be required to inform the NRC of which decommissioning method they intend to use, and provide additional notice if that selection is changed as decommissioning progresses.

ASSESSMENT OF OPTION 3

Selection of this option would remove some of the flexibility envisioned by the 1996 decommissioning rule that allows for licensees to move between the “dismantle and decontaminate now” and “dismantle and decontaminate later” options that are the basis of DECON and SAFSTOR, respectively. Movement between the two methods is usually predicated on resource considerations, including the availability of decontamination and dismantlement equipment and personnel, waste disposal transportation agreements and disposal facility capacity, and the appropriate use of decommissioning funds, which allows licensees to optimize their approach to decommissioning depending on site-specific considerations, including input from the State and local community as appropriate.

Based on lessons learned and experiences from previously decommissioned reactors, there is currently no indication that the use of DECON and SAFSTOR as decommissioning methods, or the ability to switch between the two, has any substantial impact on the public health and safety, or that this approach in any way diminishes the amount of planning, preparation, and oversight expended by the licensee in undertaking decommissioning activities. Therefore, implementation of a more formal structure to define various decommissioning methods would remove several of the flexibilities envisioned by the 1996 decommissioning rule, which is not necessary for the protection of public health and safety.

Use of this option would have a high impact on both licensees and the NRC because it would require the NRC to promulgate new rule language for the imposition of regulations that are significantly different from the goals of the 1996 decommissioning rule, develop a regulatory and technical basis in support of conclusions that diverge from the current decommissioning process, and incorporate requirements associated with the decommissioning options throughout numerous review and oversight activities associated with the decommissioning process.

In addition, decommissioning licensees would need to expend additional time and effort to provide the additional level of documentation required and potentially respond to additional requests from the NRC. While these changes would have no direct positive impact on public health and safety, the changes would decrease the flexibility available to licensees to conduct decommissioning activities, thereby decreasing efficiency and potentially delaying decommissioning activities while the regulatory process is completed.

NRC STAFF RECOMMENDED APPROACH

Based on an initial inspection of the SOC, lessons learned, stakeholder comments on the ANPR, and other data that informed previous decommissioning rulemaking activities, there appear to be no additional public health or safety improvements to be gained by further regulatory changes in this area. Therefore, given the NRC staff's desire to maintain safety and improve efficiency and effectiveness in the regulatory process for decommissioning nuclear power plants, the NRC staff recommends Option 2 – Guidance Development/Enhancement. Use of this option would allow stakeholders access to more detailed information in the PSDAR, DCE, and IFMP without reducing the flexibility provided by the current decommissioning regulations, or imposing unnecessary burdens on licensees and NRC staff to create and review additional documents that do not have any net positive impact on the public health and safety.

The 60-Year Timeframe Associated with Decommissioning

Existing Regulatory Framework

The regulation 10 CFR 50.82(a)(3) states that decommissioning will be completed within 60 years of permanent cessation of operations.

The 60-year timeline described in the NRC decommissioning regulations is the result of a risk-informed performance-based decision. Specifically, the 60-year timeline was based on the following factors:

1. The time needed for the decay of several predominant radiological isotopes to reduce radiation exposures to workers, in accordance with the as low as reasonably achievable (ALARA) principles. Sixty years roughly corresponds to 10 half-lives for cobalt-60, one of the predominant isotopes remaining in a decommissioning nuclear reactor facility. By 50 years, most of the short-lived isotopes, which provide the most dose and exposure to workers during decommissioning, will have decayed to background levels, leaving the licensee with 10 additional years to dismantle and decontaminate the facility.
2. The ability to effectively maintain safety and institutional controls throughout the project. Based on the technical data collected, the 60-year period appears to be reasonable from the standpoint of expecting institutional controls to be maintained. For periods beyond 60 years, an evaluation of the need for additional institutional controls may be required. Institutional controls include engineered controls such as fences, and restrictions on the site's deed that activities like a park or farming would not be allowed during the period of decommissioning. Institutional control could also include ownership by the Federal or State government, thus providing for a legal mechanism to restrict public access.
3. The overall costs of decommissioning as a function of time.

During subsequent decommissioning rulemaking activities, this underlying technical basis for the 60-year timeframe, as established by the SOC for the 1988 decommissioning rule, did not change. During the 1988 rulemaking, the NRC determined that using the DECON or SAFSTOR method for up to 50 years would be a reasonable approach for decommissioning a light water reactor. DECON and SAFSTOR have benefits and are capable of being carried out in a manner that protects public health and safety. Specifically, the benefits of DECON include the removal of contaminated systems, components, and structures to a degree that will allow for unrestricted use of the site at the time of license termination. The benefits of SAFSTOR include

an allowance for radioactive decay to occur to a level that decreases the net radiological contamination remaining at the site, both in terms of potential occupational exposure and overall waste volumes created.

In selecting 60 years as an acceptable period of time for decommissioning a nuclear power reactor, the Commission considered the amount of radioactive decay likely to occur during an approximate 50-year storage period and the number of months expected to be needed to dismantle the facility. To date, 30 nuclear power reactors have permanently ceased operation. Ten reactors promptly completed decommissioning after ceasing operations. The remaining 20 power reactors have a collective ~483 years of being placed in SAFSTOR, with seven of these reactors remaining in SAFSTOR for an average of 40 years or more. Given that all of these reactors have and continue to be maintained safely in SAFSTOR, as demonstrated by the at least annual NRC inspection and oversight activities at each facility, the NRC staff has no reason to propose changing the Commission's original determination that decommissioning can be completed safely at any time during the 60-year timeframe.

Completion of decommissioning beyond 60 years will be approved by the Commission only when necessary to protect public health and safety. Factors that will be considered by the NRC in evaluating an alternative that provides for completion of decommissioning beyond 60 years of permanent cessation of operations include unavailability of waste disposal capacity and other site-specific factors affecting the licensee's capability to carry out decommissioning, including the presence of other nuclear facilities at the site. These factors would be considered as part of the NRC review process if an exemption from the 60-year timeframe was requested by a decommissioning licensee.

In addition, in cases where the specific exemption criteria of 10 CFR 50.82(a)(3) cannot be met, the NRC has determined that licensees may request an exemption from the 60-year decommissioning timeframe in a manner consistent with other regulatory exemptions sought under 10 CFR 50.12, "Specific exemptions." In this situation, a licensee could use the general exemption criteria in 10 CFR 50.12 to obtain NRC approval of an alternative decommissioning timeframe if that approach meets specific requirements including one or more of the special circumstances listed in 10 CFR 50.12, is authorized by law, will not present an undue risk to the public health and safety, and is consistent with the common defense and security.

Regulatory and Rulemaking Options

The current timeframe available for decommissioning was established as part of the decommissioning regulations promulgated in 1988. As part of the current rulemaking activity, the NRC staff considered whether the decommissioning timeline should be adjusted given the advances in dismantlement and decontamination technologies since the decommissioning regulations were last updated. Based on an initial assessment of the technical bases that established the 60-year decommissioning timeframe in the 1988 rulemaking, as well as the decommissioning reactor experience to date, power reactor decommissioning activities can be performed safely at any time during the 60-year period.

The NRC staff has examined the question of whether the regulatory or technical bases for any of the above statements has changed since the promulgation of the 1988 and 1996 decommissioning rules, and explored the opportunity to incorporate enhancements or overall improvements to the regulatory framework. The NRC considered and evaluated three options: no action, guidance development and enhancement, and rulemaking to change the timeframe for decommissioning. Given that no comments were received on the ANPR suggesting that the

NRC extend the 60-year decommissioning timeline, and based on the technical considerations in the existing regulatory framework documented above, the NRC staff did not evaluate extending the decommissioning timeline beyond 60 years. A description and the NRC staff's assessment of each option follows below.

OPTION 1 – NO ACTION

The no-action option would retain the provisions of the current decommissioning regulations and guidance documents with regard to the decommissioning timeframe available to licensees.

ASSESSMENT OF OPTION 1

In determining whether the 1988 and 1996 decommissioning requirements regarding the timeframe for completion of decommissioning remain sufficient to address ongoing and future decommissioning activities, the NRC staff evaluated the technical and regulatory bases associated with both the 1988 and the 1996 decommissioning rules, as well as the associated technical documents (i.e., NUREG/CR-0130, "Technology, Safety, and Costs of Decommissioning a Reference Pressurized Water Reactor Power Station," and NUREG/CR-0672, "Technology, Safety, and Costs of Decommissioning a Reference Boiling Water Reactor Power Station"), SOCs, public comments, and comments received to date on this rulemaking. Based on this review, the NRC staff concluded that the bases for the 60-year decommissioning timeframe remain valid for current decommissioning activities and no additional safety improvements from a change in the timeframe available to complete decommissioning activities are expected.

The NRC staff did note that the overall radiological dose and waste volumes created during the immediate decommissioning process (i.e., DECON) may no longer be as high as those determined by NUREG/CR-0130 and NUREG/CR-0672 due to the implementation of new dismantlement and remediation technologies since the publication of those documents. However, the NRC staff also determined that these changes were not significant enough to meaningfully enhance public health and safety should the decommissioning timeframe be shortened. Furthermore, decommissioning can and has been completed safely under the SAFSTOR process using the current regulatory timeframe. As such, maintaining the current regulatory environment with respect to the 60-year limit for decommissioning will continue to meet the safety and regulatory requirements envisioned by the 1988 and 1996 rules, will have no additional impact on future plants intending to transition to a decommissioning status, and will ensure that adequate protection of the health and safety of the public is ensured.

OPTION 2 – GUIDANCE DEVELOPMENT / ENHANCEMENT

In this option, the NRC staff would update or create guidance documents to address the timeframe available to decommission power reactors. Specifically, RG 1.184 would be updated to include a discussion of the basis for the 60-year decommissioning timeline, including what framework was used to establish the initial timeframe, why the assumptions used to support the 1988 decommissioning rule remain valid today, even considering advances in dismantlement and decontamination technologies, and a provision that the health and safety of the public is maintained within the current regulatory framework.

Several NRC guidance documents related to the decommissioning process could be updated as a result of this rulemaking effort, which could provide an opportunity to address the concerns identified by stakeholders regarding the timeframe available for decommissioning without the

need for formal rulemaking. Specifically, several of the comments received on the ANPR focused on the motivation of licensees for selecting the long term SAFSTOR option over immediate DECON, the lack of detail provided to support the timeline proposed for decommissioning and justify why site dismantlement and decontamination at an earlier date is not technically feasible or desirable, and a general consensus among external, non-industry stakeholders that movement of the spent fuel into dry storage as soon as technically feasible represents a safety improvement at the site. In order to better inform the public and other stakeholders regarding the decommissioning process at specific facilities, RG 1.184 and RG 1.185 would be updated to encourage licensees to add additional detail to the PSDAR, DCE, and IFMP, as needed, regarding the timeframe proposed for decommissioning, the considerations for selecting that option, what circumstances would prompt a change in the decommissioning timeline (i.e., movement between SAFSTOR and DECON), and what impact that decision has on long term storage of spent fuel.

These updates to the guidance would reflect additional detail related to information licensees are currently required to submit in PSDAR, DCE, and IFMP documents, and thus would not impose an additional burden on the licensee. The increased level of detail in the guidance and submittals under this option would greatly reduce or eliminate the NRC staff's need to ask the licensee additional questions as part of the PSDAR, DCE, and IFMP reviews. Although the NRC would need to expend minimal upfront resources to develop this guidance, both the NRC and licensees would save resources in the future since the additional information provided would result in a more streamlined and predictable process to manage information that is already being submitted as part of the decommissioning documents. Finally, this option would enhance the opportunity for public and other stakeholder involvement in the decommissioning process, as well as expanding overall regulatory transparency and openness.

Areas where additional detail could be included in the PSDAR, DCE, and IFMP that would benefit the NRC staff and stakeholders would include:

1. The decision making process behind the proposed timeline to complete decommissioning at the facility, as well as considerations for entering SAFSTOR, and a detailed overview of the timeframe under which DECON will commence at the facility.
2. A discussion of the cost over time of the decommissioning strategy selected, specifically in regard to the considerations for delaying active dismantlement of the facility during the SAFSTOR period.
3. If available, the possibility of early release of parts of the site or facility from the NRC license so that they have the potential to be more quickly put back to beneficial use for the local community (e.g., use of warehouse space for other industrial purposes, repurposing of administrative buildings for other uses).

ASSESSMENT OF OPTION 2

Selection of this option would provide the additional level of detail in the PSDAR and associated documents on items that have been a concern for many stakeholders, without the need to further formalize PSDAR, DCE, or IFMP content in NRC regulations. This would continue to provide the flexibility needed by many decommissioning sites in various stages of the process while continuing to help maintain adequate protection of public health and safety. Since the majority of licensees tend to use these documents as the roadmap for assembling documents to be submitted to the NRC, appropriate guidance updates related to the PSDAR, DCE, and IFMP

could lead to an enhancement in the decommissioning documents submitted to the NRC. Use of this option would have a small impact on the NRC because it would require updates to RG 1.184 and RG 1.185. While these changes could result in an increased level of detail in the PSDAR, DCE, and/or IFMP they would also enhance the opportunity stakeholder involvement in the decommissioning process, and expand overall regulatory transparency and openness.

OPTION 3 – RULEMAKING TO CHANGE THE TIMEFRAME FOR DECOMMISSIONING

In this option, the NRC staff would pursue rulemaking to decrease the time allowed to complete decommissioning at facilities that are not co-located with operating reactor units and establish requirements for expediting decommissioning to the extent practical at each facility. Specifically, 10 CFR 50.82(a)(3) and the financial regulations for decommissioning would be revised to implement a reduced time limit to complete decommissioning at a reactor facility once the last reactor unit has been permanently shut down, unless the licensee can demonstrate that delaying decommissioning has an overall net positive benefit to the public health and safety. If this option is selected as part of the final regulatory basis for this rulemaking, the NRC staff will conduct additional analyses on the decommissioning data provided by NUREG/CR-0130 and NUREG/CR-0672, EPRI, and other industry groups to determine the appropriate revised timeframe for completion of decommissioning.

ASSESSMENT OF OPTION 3

Selection of this option would remove flexibility envisioned by the 1988 and 1996 decommissioning rules that allow for licensees to plan and conduct decommissioning over a period that was established based on: (1) the time needed for the decay of several predominant radiological isotopes to reduce radiation exposures to workers, in accordance with ALARA principles; (2) the ability to effectively maintain institutional controls throughout the project; and (3) the overall costs of decommissioning as a function of time. While all of these factors may vary with time across decommissioning facilities, the NRC staff's evaluation of the continuing validity of the technical bases for the 60-year decommissioning timeframe concluded that the overall assumptions used and analyses conducted to select the 60-year time limit have not significantly changed since promulgation of the decommissioning regulations in 1988.

In addition, any change to the regulatory requirements for the allowable timeframe associated with decommissioning would be subject to a backfit assessment in accordance with 10 CFR 50.109, "Backfitting." The backfitting requirements stipulate that, in general, in order for the NRC to impose a regulatory requirement that is new or different from one already in place, the new or different requirement must involve adequate protection, be necessary to bring a licensee into compliance with a requirement or commitment, or result in a substantial increase in the overall protection of the public health and safety or the common defense and security, the costs of which are justified in view of this increased protection.

Use of this option would have a high impact on both licensees and the NRC since it would require the NRC to promulgate new rule language for the imposition of regulations that are significantly different from of the 1988 and 1996 decommissioning rules, develop a regulatory and technical basis in support of conclusions that diverge from the current decommissioning process, create a new regulatory framework for completion of decommissioning on a shorter timeframe than currently established, and conduct a backfit assessment to determine what the consequences of implementation of such a rule would be on currently operating licensees and licensees that have already entered decommissioning. In addition, decommissioning licensees would need to expend additional time and effort to alter their decommissioning timeframes in

accordance with a new rule and locate resources for completing decommissioning in an expedited manner. While these changes would have no direct positive impact on public health and safety, the changes would decrease the flexibility available to licensees to conduct decommissioning activities, thereby decreasing efficiency and potentially delaying decommissioning activities if additional resources are unavailable.

Finally, the NRC staff notes that the associated financial requirements for decommissioning found in 10 CFR 50.75(c) are not proposed to be changed as a part of this regulatory basis in such a way that would support the shortening of the allowable decommissioning timeframe without the need for an additional backfitting assessment. A discussion of the financial requirements currently applicable to decommissioning power reactors, as well as the proposed changes to those requirements, can be found in Appendix F of this regulatory basis.

NRC STAFF RECOMMENDED APPROACH

Based on an initial inspection of the SOC, lessons learned, and other technical data that informed previous decommissioning rulemaking activities regarding the 60-year timeframe to complete decommissioning, as well as an assessment of the ongoing decommissioning activities currently taking place under the current requirements, there appear to be no additional public health or safety improvements to be gained by regulatory changes to the decommissioning timeframe. Therefore, given the NRC staff's desire to maintain safety, reduce unnecessary regulatory burden, and improve efficiency and effectiveness in the regulatory process for decommissioning nuclear power plants, the NRC staff recommends Option 2 – Guidance Development/Enhancement. Use of this option would allow stakeholders access to more detailed information in the PSDAR, DCE, and IFMP without reducing the flexibility provided by the current decommissioning regulations, or imposing unnecessary burdens on licensees and NRC staff to create and review additional documents that do not have any net positive impact on public health and safety.

The Role of State and Local Governments and Non-Governmental Stakeholders

Existing Regulatory Framework

Although the NRC does not have the authority to direct governmental and non-governmental entities (other than NRC licensees) to participate in the decommissioning of a facility, the NRC's regulations currently offer the public an opportunity to review licensee submittals and provide input during many stages of the decommissioning process. Specifically, in accordance with 10 CFR 50.82(a)(4) and 10 CFR 50.82(a)(9), the NRC is required to publish a notice of the receipt of the licensee's PSDAR and LTP, make the PSDAR and LTP available for public comment, schedule public meetings in the vicinity of the licensed facility to discuss the PSDAR and the LTP, and publish a notice of the meetings in the *Federal Register* and another forum readily accessible to individuals in the vicinity of the site. The NRC staff also routinely engages with State and local government stakeholders by participating, as requested, in meetings or other interactions with these governmental bodies (e.g., the public utility commission, the coastal commission, environmental and radiological control boards).

In addition, for many years the NRC has strongly recommended that licensees involved in decommissioning activities form a community committee or other advisory organization aimed at fostering communication and information exchange between the licensee and the public. By actively engaging the community and obtaining local citizen views and concerns regarding the decommissioning process and spent fuel storage issues, licensees can maintain better relations

with the local citizens. The NRC's guidance related to creating a site-specific community advisory board can be found in NUREG-1757, Appendix M, "Overview of the Restricted Use and Alternate Criteria Provisions of 10 CFR Part 20, Subpart E" (ADAMS Accession No. ML063000243). Appendix M does not require licensees to create a community advisory board, but provides recommendations for methods of soliciting public advice, as well as useful guidance and suggestions for effective public involvement in the decommissioning process, that can be adopted by any licensee. Although not a regulatory requirement, to date all decommissioning licensees have created some form of community advisory board, with membership and activity levels commensurate with the overall level of interest in the decommissioning activities at the facility.

Regulatory and Rulemaking Options

Based on an evaluation of the authority given to the NRC by the Atomic Energy Act of 1954, as amended (AEA), there is no basis for the NRC to mandate participation in the decommissioning process by any non-licensee stakeholders. Such interactions must be negotiated on a case by case basis among the licensee, the NRC staff, and other stakeholders as necessary to address the specific decommissioning situation at each facility. However, the NRC staff did explore the opportunity to incorporate additional enhancements or overall improvements to the role of State and local governments, members of the public, and other external stakeholders in the decommissioning process. The NRC considered and evaluated three options: no action, guidance development and enhancement, and rulemaking to mandate creation of a community advisory board. A description and the NRC's staffs assessment of each option follows below.

OPTION 1 – NO ACTION

The no-action option would retain the provisions of the current decommissioning regulations and guidance documents with regard to the NRC's expectations for external stakeholder involvement in the decommissioning process, the role of State and local government entities in decommissioning decisions, and the overall assumption that decommissioning licensees maintain a similar level of regulatory involvement with their individual States as was present when the facility was operating (e.g., continued compliance with State environmental requirements for non-radiological effluent releases, interactions with the State radiological control board on decommissioning issues and site remediation plans).

ASSESSMENT OF OPTION 1

Because the AEA requires NRC to be an independent regulator, any formal NRC sponsorship or participation in a local advisory panel could be viewed as biased by all participants. During the decommissioning process, the NRC requires the maintenance of the current regulatory environment with respect to the expectations for public, State and local government, and other stakeholder involvement in the decommissioning process would continue to meet the safety and regulatory requirements envisioned by the 1996 decommissioning rule, and would have no additional impact on current or future plants intending to transition to a decommissioning status. Nonetheless, openness is among the NRC's organizational values and Principles of Good Regulation, and it is the NRC's general policy to share information with the public in a transparent manner. As such, the NRC would encourage licensees to continue to create some form of community advisory board at decommissioning facilities.

The continued use of guidance documents to discuss best practices for establishing community advisory boards is an adequate forum to aid licensees in formulating an overall

decommissioning strategy in regard to stakeholder participation. In addition, all currently decommissioning facilities have already established community advisory boards; additional NRC direction in this area would reduce the flexibility currently available to decommissioning licensees and the associated parties impacted by the decommissioning activities to tailor these committees to suit the needs of, and stakeholder interest in, the decommissioning of the facility, with little additional benefit to public health and safety.

OPTION 2 – GUIDANCE DEVELOPMENT / ENHANCEMENT

In this option, the NRC staff would update guidance documents to expressly address the creation of community advisory boards at decommissioning power reactors. Specifically, RG 1.184 and RG 1.185 would be updated to include a discussion of best practices for creating a community advisory board at decommissioning facilities, including suggested best practices for membership, the anticipated level of community advisory board activity and involvement in the decommissioning process, and ways in which to leverage the community advisory board to assist in making decommissioning decisions.

Several NRC guidance documents related to the decommissioning process could be updated as a result of this rulemaking effort, which could provide an opportunity to address the concerns identified by stakeholders regarding the need for additional external stakeholder input into the decommissioning process without the need for formal rulemaking. Specifically, several of the comments received on the ANPR published for this rulemaking activity focused on a perceived lack of meaningful participation by State and local governments in the decommissioning process, a concern that not enough opportunities were presented by the NRC for public participation in decommissioning decision making activities (e.g., the lack of a public comment period afforded for regulatory exemptions), and a desire for impacted communities around decommissioning facilities to have a larger voice in the decommissioning timeline and other activities that may directly impact the socioeconomic health of the local population.

In order to better inform the public and other stakeholders regarding the decommissioning process at nuclear power plants, RG 1.184 and RG 1.185 would be updated to indicate that licensees that are planning to create a community committee should add additional detail to the PSDAR regarding the creation of the community advisory board, the proposed minimum membership of that board, and the ways in which the board will be used to promote stakeholder involvement in the decommissioning and decision making process. Alternatively, the PSDAR should include a discussion of why a community advisory board was not considered necessary or prudent for the site and under what conditions this decision would be reconsidered as decommissioning progresses (e.g., would the licensee consider implementing a community advisory board when the facility moves from SAFSTOR to DECON).

Areas where additional detail could be included in the PSDAR guidance for licensees that plan to form a community engagement panel include:

1. A discussion of the proposed community advisory board composition, to potentially include members from the licensee staff, representatives from appropriate State agencies, officials or their designees from host communities and counties and communities within the surrounding emergency planning zone, representatives from citizen groups, etc.
2. Provisions for when the community advisory board would be convened and at what frequency meetings would take place. The formation of an independent

decommissioning advisory panel that is engaged at the earliest stages of decommissioning planning is essential in developing a comprehensive process intended to maintain external stakeholder involvement while supporting the licensee through an extended and potentially controversial decommissioning process.

3. A discussion of what sort of topics would be brought before the community advisory board, how the board's input would be used to inform the decision making process for various decommissioning activities, and what interaction, if any, the board would have with the NRC or other federal regulatory bodies (e.g., the Environmental Protection Agency (EPA) or Department of Energy (DOE)) to support the board members' overall understanding of the decommissioning process and promote dialogue between the impacted stakeholders.
4. Provisions for how the community advisory board would be formed and implemented, including whether the State, licensee, or some other party would take charge of finding members for the board, who would be responsible for the logistics required to support the board's meetings and other routine activities (e.g., securing conference space and audio visual equipment for presentations to the public), and what the expected term of members of the board would be.
5. An enhanced discussion of how the licensee would maintain stewardship and compliance with all State and local regulations in effect during decommissioning, including non-radiological effluent releases, environmental monitoring, and emergency planning considerations.

ASSESSMENT OF OPTION 2

Selection of this option would provide additional guidance on best practices related to the formation of community advisory boards. Use of this option would address the issue of community advisory boards without the need to further formalize PSDAR content in NRC regulations, which will continue to provide the flexibility needed by many decommissioning sites in various stages of the process. Since the majority of licensees tend to use these documents as the roadmap for assembling documents to be submitted to the NRC, appropriate guidance updates, if licensees implement them, could lead to an overall enhancement of considerations for whether or not to establish such community advisory boards.

Use of this option would have a small impact on the NRC staff since it will require an update to RG 1.184 and RG 1.185. These updates to the guidance would reflect additional detail related to information licensees are already required to submit in the PSDAR and activities licensees are currently undertaking with respect to decommissioning submittals, and thus would not impose an additional burden on the licensee. Although the NRC would need to expend minimal upfront resources to develop this guidance, both the NRC and licensees would save resources in the future since the additional information provided would result in a more streamlined and predictable process to manage information submitted as part of the decommissioning documents. Finally, this option would enhance the opportunity for public and other stakeholder involvement in the decommissioning process, as well as expanding overall regulatory transparency and openness.

OPTION 3 – RULEMAKING TO MANDATE CREATION OF COMMUNITY ADVISORY BOARD

In this option, the NRC staff would pursue rulemaking to (1) codify a requirement that all licensees entering into the decommissioning process create a community advisory board and (2) establish provisions for minimum membership levels, the extent that board input will be taken into consideration during the decommissioning process, the level of independence the board will have to implement decisions regarding decommissioning activities at the facility, and the ability of the board to request meetings with the licensee and other stakeholders, including the NRC, to discuss certain topics that may be of significant interest during the decommissioning process. In addition, the NRC would require licensees and/or community advisory boards to provide periodic (likely annual) updates to the NRC regarding the activities of the board, the topics discussed at board meetings, the decisions made as they relate to ongoing decommissioning of the plant, and the overall progress and status of decommissioning at the facility.

ASSESSMENT OF OPTION 3

Selection of this option would remove some of the flexibility envisioned by the current decommissioning rules that allow licensees or other stakeholders the option to establish community advisory boards that function depending on site-specific considerations, levels of stakeholder interest, and other individual factors that impact the decommissioning process at different facilities. In addition, this option would be difficult to implement in order for the NRC to maintain its role as an independent safety regulator. To mandate external stakeholder involvement in the decommissioning process would be difficult to establish requirements that would be generically applicable to the wide range of decommissioning activities and degree of stakeholder interest. In addition, the NRC staff notes that a community advisory body in some form has been present at nearly all previously decommissioned reactors. As such, mandating the creation of something that stakeholders are already opting to implement voluntarily has little added benefit. Therefore, implementation of a more formal structure to create a community advisory board would remove several of the flexibilities envisioned by the 1996 decommissioning rule.

Use of this option would have a moderate impact on both licensees and the NRC since it would require the NRC to promulgate new rule language for the imposition of regulations that are in opposition to the goals of the 1996 decommissioning rule, develop a regulatory and technical basis in support of conclusions that diverge from the current decommissioning process, create potentially complex requirements for the establishment of community advisory boards that are all-inclusive and take into account the widely varying scope of decommissioning activities, and incorporate requirements associated with the community advisory boards throughout numerous review and oversight activities associated with the decommissioning process. In addition, decommissioning licensees would need to expend additional time and effort to provide the additional level of planning and logistical support required for a mandated community advisory board. While these changes would have no direct impact on public health and safety, the changes would decrease the flexibility available to licensees to conduct decommissioning activities, thereby decreasing efficiency, and potentially delaying decommissioning activities while a newly established community advisory board process is implemented.

NRC STAFF RECOMMENDED APPROACH

Based on the NRC staff's consideration of the 1988 and 1996 SOCs, lessons learned, and other information that informed previous decommissioning rulemaking and guidance activities

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regarding the need to establish requirements for the implementation of community advisory boards, as well as an assessment of the ongoing decommissioning activities currently taking place under the current requirements, there appear to be no additional public health or safety improvements to be gained by further regulatory changes in this area.

Therefore, given the NRC staff's desire to maintain safety, reduce unnecessary regulatory burden, and improve efficiency and effectiveness in the regulatory process for decommissioning nuclear power plants, the NRC staff recommends Option 2 – Guidance Development/Enhancement. Use of this option would provide additional guidance on best practices for engaging the community during the decommissioning process, without reducing the flexibility provided by the current decommissioning regulations, or imposing unnecessary burdens on licensees and the NRC staff to create additional procedures, committees, and the associated documents that do not have any net positive impact on the public health and safety.

Clarifying the Spent Fuel Management Requirements of 10 CFR 72.218, 10 CFR 50.54(bb), 10 CFR 50.82, and 10 CFR 52.110

Existing Regulatory Framework

During its review of the overall decommissioning regulations, the NRC staff identified areas where the existing regulations could be updated or clarified to be more consistent with, or more appropriately reflect, the current decommissioning requirements. One of these areas was the cross references between the spent fuel management requirements in 10 CFR 72.218, 10 CFR 50.54(bb), 10 CFR 50.82, and 10 CFR 52.110. Specifically, 10 CFR 72.218(a) notes that the 10 CFR 50.54(bb) spent fuel management program must include a plan for removal of the spent fuel stored under the general license from the reactor site. The plan must show how the spent fuel will be managed before starting to decommission systems and components needed for moving, unloading, and shipping this spent fuel. The requirement in 10 CFR 72.218(b) notes that an application for termination of a reactor operating license submitted under 10 CFR 50.82 or 10 CFR 52.110 must also contain a description of how the spent fuel stored under the general license will be removed from the reactor site. Although 10 CFR 72.218 provides what information must be specifically included in the 10 CFR 50.54(bb) spent fuel management program and the 10 CFR 50.82 and 10 CFR 52.110 LTP, the requirements in 10 CFR 50.54(bb), 10 CFR 50.82, and 10 CFR 52.110 do not contain this information.

10 CFR 72.218 was first promulgated with the ISFSI general license rulemaking (“Storage of Spent Fuel in NRC-Approved Storage Casks at Power Reactor Sites”) on July 18, 1990 (55 FR 29181). The proposed rule was published on May 5, 1989 (54 FR 19379). 10 CFR 72.218 is only applicable to general ISFSI licensees.

In the SOC for the 1989 proposed ISFSI general license rule, the Commission stated the following (54 FR 19381):

When the power reactor operating license expiration date approaches, the holder of the license must take some actions. Under 10 CFR 50.54(bb) the reactor license holder must submit a program in writing to the Commission, no later than five years prior to the license expiration date, showing how the reactor licensee intends to manage and provide funding for the management of all irradiated fuel on the reactor site. This program would have to include the spent fuel stored under the general license proposed in this rulemaking. The reactor licensee will

also have to decide whether to request termination of the reactor operating license under 10 CFR 50.82. If the reactor license holder decides to apply for termination of the license, the plan submitted with the application must show how the spent fuel stored under this general license will be removed from the site. The plan would have to include an explanation of when and how the spent fuel will be moved, unloaded, and shipped prior to starting decommissioning of the equipment needed for these activities.

The promulgation of 10 CFR 72.218 in 1990 pre-dated the 1996 decommissioning rulemaking. Prior to 1996, the reactor decommissioning regulations required a licensee to submit a detailed Decommissioning Plan (DP) before the licensee could begin dismantlement or any major decommissioning activities. As such, the requirement included in 10 CFR 72.218(b) for “an application for termination of a reactor operating license,” is intended to describe a detailed DP. As discussed above, the 1989 SOC stated that the DP “must show how the spent fuel stored under this general license will be removed from the site. The plan would have to include an explanation of when and how the spent fuel will be moved, unloaded, and shipped prior to starting decommissioning of the equipment needed for these activities.”

There was also a new requirement added in 1996 for a PSDAR to be submitted prior to or within 2 years following permanent cessation of operations, and for an LTP to be submitted two years prior to license termination for NRC review and approval. However, by the time of LTP submittal, most of the 10 CFR Part 50 or 10 CFR Part 52 facilities may have already been dismantled under 10 CFR 50.59, and the LTP may consist of only a dose assessment and a final status survey plan, to demonstrate that the residual radioactivity that remains on site meets the dose limits for license termination and site release.

The Commission recognized this in the 1996 final rule SOC (61 FR at 39280):

A licensee wishing to terminate its license would submit a license termination plan for approval similar to the approach that is currently required for a decommissioning plan. However, the plan would be less detailed than the decommissioning plan required by the current rule, because it would not need to provide a dismantlement plan, and could be as simple as a final site survey plan.

Thus, the 10 CFR 72.218(b) reference to the 10 CFR 50.82 and 10 CFR 52.110 application for termination of a reactor operating license (that must contain a description of how the spent fuel stored under the general license will be removed from the reactor site) was intended to apply to the detailed DP that was (prior to 1996) required to be submitted to the NRC for review and approval. As was discussed in the SOC for the 1989 proposed rule, this plan would have to include an explanation of when and how the spent fuel would be moved, unloaded, and shipped prior to starting decommissioning of the equipment needed to conduct these activities.

However, after the 1996 decommissioning rule change, there is no longer a requirement for a detailed DP for dismantlement and decommissioning, and thus no requirement for the licensee to consider and document, or for the NRC to review and approve, how to manage and remove the spent fuel offsite before decommissioning structures, systems, and components that support moving, unloading, and shipping of spent fuel. Following the 1996 rulemaking, the 10 CFR 72.218(b) reference to 10 CFR 50.82 and 10 CFR 52.110 refers primarily to the LTP. However, by the time the LTP is submitted, the entire 10 CFR Part 50 or Part 52 facility, including any support facilities for moving, unloading, and shipping spent fuel, may have already been decommissioned.

The SOC for the 1996 final rule included a discussion of a relevant comment on the 1995 proposed rule (61 FR at 39292):

Comment. Several individual commenters wanted to know whether NRC rules allow the optional period of storage of the reactor facility to be longer than 60 years and does the 60-year completion date for decommissioning specified in the current rule consider storage of fuel in an [ISFSI]. One commenter stressed that spent fuel should not be separated from any of the phases of decommissioning because this is a piecemeal approach and inappropriate. Another commenter stated that the licensee should be required to maintain capability to handle the fuel for dry cask storage.

Response. The primary considerations of the proposed rule were procedural, with emphasis on the issue of premature closure. Other aspects of the existing rule were unchanged. A 60-year period for completion of decommissioning is still imposed, subject to other considerations delineated in the current rule requirements. The existing rule, as well as the proposed rule, consider the storage and maintenance of spent fuel as an operational consideration and provide separate 10 CFR Part 50 requirements for this purpose. Regarding maintaining the capability to handle the fuel for dry cask storage, these requirements are maintained in 10 CFR Part 72.

This blanket reference to 10 CFR Part 72 in the 1996 SOC does not specifically reference 10 CFR 72.218, but 10 CFR 72.218 is the most relevant reference regarding fuel handling or unloading capability. The NRC staff's conclusion is that the original reference from 10 CFR 72.218 to 10 CFR 50.82 (at the time of the 1990 promulgation of 10 CFR 72.218) was appropriate, given the reactor decommissioning framework at that time. However, after the 1996 reactor decommissioning rulemaking, this reference is no longer effective since there is not an explicit requirement in 10 CFR 50.82 for a licensee to consider or plan how it is going to manage and remove spent fuel from the site before it decommissions the structures, systems, and components that support moving, unloading, and shipping of spent fuel.

In addition, 10 CFR 72.218(a) notes that the 10 CFR 50.54(bb) spent fuel management program must include a plan for removal of the spent fuel stored under the general license from the reactor site. The plan must show how the spent fuel will be managed before starting to decommission systems and components needed for moving, unloading, and shipping this spent fuel. The requirements in 10 CFR 50.54(bb) also direct licensees (either 5 years before license expiration or 2 years following shutdown, whichever comes first) to submit for NRC "review and preliminary approval" its program for management, and providing funding for the management, of spent fuel until DOE takes title to, and possession of, the spent nuclear fuel. However, currently the requirements of 10 CFR 50.54(bb) pertain mostly to the financial requirements of storing and managing spent nuclear fuel, and there is no corresponding requirement to establish how the fuel should be managed until the fuel is removed from the site under the general license, prior to the licensee decommissioning the systems needed to move, unload, and ship the spent fuel at the facility. This disconnect between the 10 CFR Part 50, 10 CFR Part 52, and 10 CFR Part 72 regulatory frameworks would be addressed during this rulemaking effort.

Regulatory and Rulemaking Options

The NRC staff examined whether the regulatory or technical bases for any of the above statements have changed since the promulgation of the 1988, 1990, and 1996 rules discussed above, or as a result of experiences or lessons learned during previous decommissioning activities. The NRC staff explored the opportunity to incorporate additional enhancements or overall improvements into the regulatory process, such as guidance revisions or development, to ensure that licensees undergoing the decommissioning process are taking adequate actions in regard to maintaining the appropriate systems and capabilities for spent fuel management and handling capabilities. The NRC considered and evaluated three options: no action, guidance development and enhancement, and rulemaking to clarify the spent fuel management requirements. A description and NRC's assessment of each option follows below.

OPTION 1 – NO ACTION

The no-action option would retain the provisions of the current decommissioning regulations and guidance documents with regard to the NRC's expectations for spent fuel management and handling capabilities during decommissioning, and would make no changes or clarifications to the requirements in 10 CFR 50.82, 10 CFR 50.54(bb), 10 CFR 52.110, or 10 CFR 72.218.

ASSESSMENT OF OPTION 1

Based on lessons learned and experiences from previously decommissioned reactors, as well as the numerous reactor facilities that currently operate onsite ISFSIs, there is no indication that the current licensee approaches to spent fuel management or the lack of cross referencing in the regulatory requirements for spent fuel management and handling capabilities diminish the amount of planning, preparation, and oversight expended by the licensee in undertaking decommissioning activities.

In addition, the NRC staff notes that most licensees have already undertaken the spent fuel management planning envisioned by 10 CFR 72.218 to some degree, whether it is through use of dry casks that have associated transportation certificates, a provision for the use of fuel handling equipment at a nearby power reactor, or some other means of addressing the potential need to manipulate fuel in dry storage before the end of ISFSI operations. As such, changes to the current regulatory requirements in this area could have limited additional benefit. Furthermore, opting not to make any changes to the current regulatory requirements would have no additional impact on future plants intending to transition to a decommissioning status.

OPTION 2 – GUIDANCE DEVELOPMENT / ENHANCEMENT

In this option, the NRC staff would update or create guidance documents to expressly address the need for decommissioning licensees to consider or plan how to manage and remove spent fuel from the site before they decommission the structures, systems, and components that support moving, unloading, and shipping of spent fuel. Specifically, RG 1.184 and/or RG 1.185 would be updated to include a discussion of best practices for creating a spent fuel management plan that addresses the potential need for fuel handling equipment to be available after the facility has entered into the decommissioning and dismantlement process.

In order to better inform the public and other stakeholders about the decommissioning process at specific facilities, guidance would be provided to licensees regarding the need for additional detail in the PSDAR, IFMP, and DCE to discuss any plans in place to address the potential

need to manipulate the spent fuel while it is in dry storage, whether it be as part of a future maintenance activity, to address a concern with the cask storage system itself, or to promote future permanent removal of the spent fuel from the reactor site. Alternatively, licensees could discuss in the PSDAR, IFMP, and/or DCE why a spent fuel management and handling plan was not considered necessary or prudent for the site and under what conditions this decision would be reconsidered as decommissioning progresses.

ASSESSMENT OF OPTION 2

The perception that long term planning for the management of spent fuel in dry storage is not being appropriately considered by licensees at decommissioning facilities has been a concern for many stakeholders, and use of this option would address the issue without the need to further formalize PSDAR, IFMP, or DCE content in NRC regulations. This would continue to provide the flexibility needed by many decommissioning sites in various stages of the process. Since the majority of licensees tend to use these documents as the roadmap for assembling decommissioning documents to be submitted to the NRC, appropriate guidance updates could lead to an overall enhancement in the documents submitted to the NRC and a better overall discussion of spent fuel management.

Selection of this option could provide additional guidance and an enhanced level of detail for the PSDAR, IFMP, and DCE regarding management and removal of spent fuel from the site before the structures, systems, and components that support moving, unloading, and shipping of spent fuel have been decommissioned and dismantled. To prepare appropriate technical specifications for each type of cask design, the NRC staff already evaluates, and the ISFSI dry cask vendors already assess, the potential need to manipulate the spent fuel while it is in dry storage. These evaluations are generally available in cask design basis documents and the subsequent amendments, as well as the Final Safety Analysis Reports of the facilities using the specific cask design. As such, decommissioning licensees would be able to reference this available information in the PSDAR, IFMP, and/or DCE in order to enhance the discussion of spent fuel management.

Use of this option would have a small impact on the NRC staff since it will require an update to RG 1.184 and RG 1.185. These updates to the guidance would reflect activities licensees are currently undertaking with respect to planning for spent fuel management and dry cask storage systems in accordance with 10 CFR Part 72, and thus would not impose an additional burden on the licensee since the additional detail would be provided for topics already required to be in the decommissioning documents. Although the NRC would need to expend minimal upfront resources to develop this guidance, both the NRC and licensees would save resources in the future since the additional detail in the guidance would result in a more streamlined and predictable process to manage information submitted as part of other decommissioning documents. The increased level of detail in the guidance under this option would greatly reduce or eliminate the NRC staff's need to engage in site-specific interactions with the licensee to clarify information regarding the management of spent fuel during decommissioning. Finally, this option would enhance the opportunity for public and other stakeholder involvement in the decommissioning process, as well as expanding overall regulatory transparency and openness.

OPTION 3 – RULEMAKING TO CLARIFY SPENT FUEL MANAGEMENT REQUIREMENTS

In this option, the NRC staff would pursue rulemaking to clarify and update the regulations in 10 CFR 50.82, 10 CFR 50.54(bb), 10 CFR 52.110, and 10 CFR 72.218 as they relate to requirements for a licensee to consider or plan how it is going to manage and remove spent fuel

from the site before it decommissions the structures, systems, and components that support moving, unloading, and shipping of spent fuel. Specifically, language would be added to 10 CFR 50.82(a)(4) and 10 CFR 52.110(d) requiring that the PSDAR contain a description of how the spent fuel stored under a general ISFSI license will be removed from the reactor site. In addition, language would be added to 10 CFR 50.54(bb) to establish that the program for managing spent fuel during decommissioning must take into consideration how the spent fuel will be managed before starting to decommission systems and components needed for moving, unloading, and shipping the spent fuel. In addition, the language in 10 CFR 72.218(b) would be clarified to refer to the PSDAR, rather than the LTP, and 10 CFR 72.218 would also be made applicable to specific ISFSI licensees.

ASSESSMENT OF OPTION 3

The NRC staff evaluated the regulatory language in 10 CFR 50.82, 10 CFR 50.54(bb), 10 CFR 52.110, and 10 CFR 72.218 as it relates to requirements for a licensee to consider or plan how it is going to manage and remove spent fuel from the site before it decommissions the structures, systems, and components that support moving, unloading, and shipping of spent fuel. As a result of this evaluation, the NRC staff determined that since the 10 CFR 72.218 provisions to include a plan for removal of the spent fuel from the reactor site are not reflected in 10 CFR 50.54(bb), 10 CFR 50.82, and 10 CFR 52.110, this may cause regulatory uncertainty. Adding the specific provisions from 10 CFR 72.218 to 10 CFR 50.54(bb), 10 CFR 50.82, and 10 CFR 52.110, as outlined above, would provide regulatory clarity, as well as enhance overall regulatory transparency and openness.

Use of this option would have a small impact on both licensees and the NRC staff since it would only require the NRC staff to promulgate rule language that is already present in other sections of 10 CFR Chapter I and simply move it into the appropriate portions of 10 CFR 50.82, 10 CFR 50.54(bb), and 10 CFR 52.110. In addition, decommissioning licensees would need to expend a relatively small amount of time and effort to provide the additional level of detail and information suggested under the adjusted requirements for spent fuel management and handling capabilities during decommissioning since most of these considerations are already being taken into account at decommissioning facilities. While these changes would have no direct impact on public health and safety, the increased clarity of the requirements associated with planning for spent fuel management and handling during decommissioning would enhance the planning information available to stakeholders regarding the management of spent fuel, and would increase the overall transparency of the decommissioning process.

NRC STAFF RECOMMENDED APPROACH

Based on an initial inspection of the 1996 SOC, lessons learned, and other information that informed previous decommissioning rulemaking and guidance activities regarding spent fuel management and handling capabilities during decommissioning, as well as an assessment of the ongoing decommissioning activities currently taking place under the current requirements, there appear to be no additional public health or safety improvements to be gained by further regulatory changes in this area. However, given the NRC staff's desire to maintain safety, reduce regulatory uncertainty, and improve efficiency and effectiveness in the regulatory process for decommissioning nuclear power plants, the NRC staff recommends the use of Option 3 – Rulemaking to Clarify the Spent Fuel Management Requirements to address this issue recognizing that the rulemaking process typically includes revising associated guidance. This option will provide additional regulatory clarity without reducing the flexibility provided by

the current decommissioning regulations, or imposing unnecessary burdens on licensees or the NRC staff.

Clarifying the Environmental Requirements in 10 CFR Part 50 and 10 CFR Part 51

As part of its overall review of the decommissioning regulations, the NRC staff identified that some of the regulations in 10 CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," imply that a license amendment is required before decommissioning activities may commence at power reactors, which appears to be in conflict with the current regulations in 10 CFR 50.82. Specifically, 10 CFR 51.53 states, in part:

Each applicant for a license amendment authorizing decommissioning activities for a production or utilization facility either for unrestricted use or based on continuing use restrictions applicable to the site; and each applicant for a license amendment approving a license termination plan or decommissioning plan under § 50.82 of this chapter either for unrestricted use or based on continuing use restrictions applicable to the site; and each applicant for a license or license amendment to store spent fuel at a nuclear power reactor after expiration of the operating license for the nuclear power reactor shall submit with its application a separate document, entitled "Supplement to Applicant's Environmental Report—Post Operating License Stage," which will update "Applicant's Environmental Report—Operating License Stage," as appropriate, to reflect any new information or significant environmental change associated with the applicant's proposed decommissioning activities or with the applicant's proposed activities with respect to the planned storage of spent fuel.

In addition, 10 CFR 51.95 states, in part:

In connection with the amendment of an operating or combined license authorizing decommissioning activities at a production or utilization facility covered by § 51.20, either for unrestricted use or based on continuing use restrictions applicable to the site, or with the issuance, amendment or renewal of a license to store spent fuel at a nuclear power reactor after expiration of the operating or combined license for the nuclear power reactor, the NRC staff will prepare a supplemental environmental impact statement for the post operating or post combined license stage or an environmental assessment, as appropriate, which will update the prior environmental documentation prepared by the NRC for compliance with NEPA under the provisions of this part.

However, 10 CFR 50.82 was revised in 1996 to no longer require that a license amendment be approved by the NRC before a licensee could begin decommissioning activities. In its place, a PSDAR is submitted within two years of permanent shutdown, which requires NRC review but not approval before major decommissioning activities can commence. In addition, the PSDAR does not require the licensee to supplement, or the NRC to review, the environmental report for the decommissioning facility. Instead, the 1996 SOC explained that the environmental impacts of decommissioning should be bounded by previous environmental analyses, and therefore licensees only had to document in the PSDAR the reasons the proposed activities are bounded by existing analyses of environmental impacts.

To resolve this inconsistency, as part of this rulemaking effort the NRC proposes to amend 10 CFR 51.53 and 10 CFR 51.95 to clarify that the discussions in the environmental

requirements regarding the need for a license amendment before decommissioning activities may commence applies only to non-power reactors, in accordance with the 1996 changes to the decommissioning regulations. This change is consistent with the SOC for the 1996 decommissioning final rule (61 FR at 39290), in which the Commission explained that the language addressing license amendments in these two sections concerns non-power reactors only.

Specifically, the opening phrase of 10 CFR 51.53(d), which reads, “Each applicant for a license amendment authorizing decommissioning activities for a production or utilization facility either for unrestricted use or based on continuing use restrictions applicable to the site; and...” will be removed because it is unnecessary. In addition, the opening sentence of 10 CFR 51.95 will also be revised to read, “In connection with the amendment approving a license termination plan or decommissioning plan under 10 CFR 50.82 of this chapter at a production or utilization facility covered by 10 CFR 51.20, either for unrestricted use or based on continuing use restrictions applicable to the site, ...” for consistency. Finally, 10 CFR 50.82(9)(ii)(G) which reads, “A supplement to the environmental report, pursuant to 51.53, describing any new information or significant environmental changes associated with the licensee’s proposed termination activities” would be revised to reflect the consistency changes made in 10 CFR 51.53.

NRC Guidance Documents

The following NRC guidance documents may require revision based on the content of the proposed final rule, as informed by the options outlined above:

- RG 1.184, “Decommissioning of Nuclear Power Reactors”
- RG 1.185, “Standard Format and Content for PSDAR”
- NUREG-1628, “Decommissioning Frequently Asked Questions”
- NUREG-1757, “Consolidated Decommissioning Guidance”
- NUREG-1555, “Environmental Standard Review Plan”
- NUREG-1496, “Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities”
- NUREG-0586, “Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities”

A description of which sections of these documents may need to be updated or enhanced, and in what manner, will be provided when the final scope of the rulemaking effort is established and likely rule and/or decommissioning process changes are firmly identified.

Appendix I - Application of Backfit Rule

Current Requirements for Power Reactor Licensees in Decommissioning

The language of Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.109, “Backfitting,” and the issue finality provisions in 10 CFR Part 52 (hereinafter collectively referred to as the “Backfit Rule”) clearly apply to a licensee designing, constructing, or operating a nuclear power facility. For example, 10 CFR 50.109(a)(1) defines “backfitting” as

[T]he modification of or addition to systems, structures, components, or design of a facility; or the design approval or manufacturing license for a facility; or the procedures or organization required to design, construct or operate a facility; any of which may result from a new or amended provision in the Commission's regulations or the imposition of a regulatory staff position interpreting the Commission's regulations that is either new or different from a previously applicable staff position.

How the Backfit Rule applies to decommissioning plants is not as clear. In SECY-98-253, “Applicability of Plant-Specific Backfit Requirements to Plants Undergoing Decommissioning” (Agencywide Documents Access and Management System (ADAMS) Accession No. ML992870107), the NRC staff presented the Commission with a list of reasons underlying this uncertainty:

- The Backfit Rule has no end point when the rule no longer applies, “thereby implying that backfit protection continues into decommissioning and up to the point of license termination.”
- The term “operate” could reasonably be interpreted as including activities to decommission the reactor.
- The Backfit Rule was developed when the decommissioning of plants was not an active area of regulatory concern.
- The Backfit Rule’s definition of “backfitting” uses terms associated with the design, construction and operation of a facility, rather than its decommissioning, although the staff noted in the paper that “prior to the 1996 decommissioning rule, the Commission regarded decommissioning as a phase of the plant’s life cycle which is different from the operational phase.”
- Two of the factors used in evaluating a backfit – costs of construction delay/facility downtime, and changes in plant/operational complexity – are targeted for power operation and “conceptually inappropriate in evaluating the impacts of a backfit on a decommissioning plant.”
- The Statements of Considerations (SOC) for the 1970, 1985, and 1988 final Backfit Rules did not discuss any aspect of decommissioning, focusing instead on construction and operation.
- Proposed changes to decommissioning requirements usually focused on relaxing requirements or whether a requirement applicable to an operating reactor continued to be applicable to a decommissioning plant. Thus, “the notion of a ‘substantial increase’ in protection to public health and safety from a backfit does not appear to be particularly useful [in decommissioning].”

[ENTER MONTH AND YEAR HERE]

- The 1996 decommissioning final rule did not directly respond to questions from the public on the applicability of the Backfit Rule to a decommissioning plant.

In SECY-98-253, the NRC staff requested Commission approval to amend, among other regulations, 10 CFR 50.109, so that the Backfit Rule would clearly apply to licensees in decommissioning. In the paper, the staff also proposed that, until the rulemaking was finished, the staff would apply the Backfit Rule to plants undergoing decommissioning “to the extent practical.”

In the February 12, 1999, Staff Requirements Memorandum (SRM) to SECY-98-253 (ADAMS Accession No. ML003753746), the Commission approved development of a Backfit Rule for plants undergoing decommissioning. The Commission directed the NRC staff to continue to apply the then-current Backfit Rule to plants undergoing decommissioning until the final rule was issued. The Commission ordered the development of a rulemaking plan, which became SECY-00-0145 (ADAMS Accession No. ML003721626). In SECY-00-0145, the NRC staff proposed, among other decommissioning-related amendments to its regulations, amendments to 10 CFR 50.109 to clearly show that the Backfit Rule applies during decommissioning and to remove factors that are not applicable to nuclear power plants in decommissioning. As explained in section 2.2 of this draft regulatory basis, the NRC did not conduct that rulemaking.

Technical Basis for Amending the Backfit Rule for Licensees in Decommissioning

The NRC’s regulatory framework supports application of the Backfit Rule to power reactor licensees in decommissioning.

Under sections 101 and 103a. of the Atomic Energy Act of 1954, as amended (AEA) (42 U.S.C. 2131 and 2133a.), the NRC’s issuance of a 10 CFR Part 50 power reactor operating license or Part 52 combined license grants the holder a license to, among other things, own, possess, and operate a “production facility” or “utilization facility,” as those terms are defined in section 11 of the AEA. Once the 10 CFR Part 50 or Part 52 licensee submits its certifications of permanent cessation of reactor operations and removal of fuel from the reactor vessel and the NRC docket those certifications, the licensee is no longer authorized to operate the reactor under 10 CFR 50.82(a)(1) or 10 CFR 52.110(b), respectively. The license is no longer an “operating license” for the reactor because the licensee is not operating a production or utilization facility pursuant to sections 101 and 103a. of the AEA. Instead, as described in 10 CFR 50.51(b) for Part 50 licenses and 10 CFR 52.109 for Part 52 combined licenses, when the reactor has permanently ceased operations, the license “continues in effect beyond the expiration date to authorize ownership and possession of the production or utilization facility” until the Commission terminates the license. Thus, when the licensee is no longer authorized to operate the reactor, it retains its possession and ownership authority under its 10 CFR Part 50 or Part 52 facility license.

Although the decommissioning licensee’s license no longer authorizes operation of the reactor because the licensee is not operating a production or utilization facility, the licensee still must operate certain systems, structures, and components (SSCs) at the site. Under

10 CFR 50.51(b), when the licensee has only a possession and ownership license for the reactor, the licensee must do the following:²¹

1. Take actions necessary to decommission and decontaminate the facility and continue to maintain the facility, including, where applicable, the storage, control and maintenance of the spent fuel, in a safe condition, and
2. Conduct activities in accordance with all other restrictions applicable to the facility in accordance with the NRC regulations and the provisions of the specific 10 CFR Part 50 license for the facility.

As expressed in 10 CFR 50.51(b), “maintaining the facility” once reactor operations permanently cease includes not only maintaining the reactor but also “the storage, control and maintenance of the spent fuel, in a safe condition.” Power reactor licensees currently store, control, and maintain spent fuel after permanent cessation of reactor operations through the operation of a spent fuel pool and independent spent fuel storage installation.

Although 10 CFR 50.109(a)(1) defines “backfitting” as “the modification of or addition to ... the procedures or organization required to design, construct or operate a facility ...,” indicating that the Backfit Rule applies to only a holder of a license to “operate a facility,” the language of 10 CFR 50.51(b) shows that operating a facility can be interpreted to mean more than just operating a reactor. This is supported by the Commission direction in the SRM to SECY-98-253 that the NRC staff develop a Backfit Rule for plants undergoing decommissioning (i.e., when the licensee no longer operates a reactor) and continue to apply the then-current Backfit Rule to plants undergoing decommissioning until the final rule was issued. Thus, a licensee that has a license to possess and own a facility—but not operate the facility because the reactor has permanently ceased operations—is still protected by the Backfit Rule because the words, “operate a facility,” in 10 CFR 50.109(a)(1) can be read to encompass operating not just the reactor but also the spent fuel pool and associated SSCs necessary for compliance with 10 CFR 50.51(b).

As the Commission and NRC staff recognized in the 1990s, certain provisions of the Backfit Rule do not clearly apply to power reactor licensees in decommissioning. Currently, Backfit Rule guidance in Management Directive 8.4, “Management of Facility-Specific Backfitting Information Collection,” provides only that the Backfit Rule applies to decommissioning plants (ADAMS Accession No. ML12059A460). The NRC has the opportunity now to resolve the issues identified in SECY-98-253 and clarify the regulatory language concerning the application of the Backfit Rule to power reactor licensees during decommissioning.

²¹ The regulation at 10 CFR 52.109 contains almost identical requirements. The only difference is in the second numbered paragraph, which references the provisions of the combined license for the facility instead of the provisions of the part 50 license for the facility referenced in 10 CFR 50.51(b)(2).

Rulemaking Options

The NRC considered three options for applying the Backfit Rule to licensees in decommissioning: (1) applying the current Backfit Rule to the extent practical, (2) issuing new or revised guidance, and (3) conducting rulemaking. These options are discussed below.

OPTION 1. NO ACTION

The NRC could continue to apply the Backfit Rule to licensees in decommissioning “to the extent practical.” This means that the NRC would not use the provisions of the Backfit Rule that concern reactors that are being designed, constructed, or operated because those provisions cannot be applied to a licensee of a reactor that has already terminated the design, construction, and operation phases of its reactor’s life. These provisions are, in part or in whole, the following sections of 10 CFR 50.109:

- 10 CFR 50.109(c)(5): Installation and continuing costs associated with the backfit, including the cost of facility downtime or the cost of construction delay;
- 10 CFR 50.109(c)(6): The potential safety impact of changes in plant or operational complexity, including the relationship to proposed and existing regulatory requirements; and
- Other references to reactor design, construction, or operation in 10 CFR 50.109.

ASSESSMENT OF OPTION 1

The approach described in Option 1 would require the NRC to refrain from applying certain provisions of the Backfit Rule to licensees in decommissioning because the NRC determines that the provisions cannot be practically applied to those licensees. The NRC staff would employ this process on a case-by-case basis, given the specific circumstances at a particular licensee’s site. This approach could undermine the Backfit Rule’s predictability and stability policies because of its case-by-case nature and resultant uncertainty regarding applicability.

OPTION 2. GUIDANCE DEVELOPMENT

The NRC’s primary guidance document for licensees and other external stakeholders in the area of backfitting is NUREG-1409, “Backfitting Guidelines,” which was issued in 1990. This document describes the types of backfits, how backfitting determinations are made and justified, how generic and facility-specific backfits are imposed, and the appeal process. This NUREG was issued before the Commission made significant changes in its regulations concerning issue finality and the application of backfitting provisions to nonreactor licensees such as spent fuel storage installations and fuel cycle facilities.

Pursuant to SECY-14-0002, “Plan for Updating the U.S. Nuclear Regulatory Commission’s (NRC’s) Cost-Benefit Guidance” (ADAMS Accession No. ML13274A519), the NRC staff is updating its methodologies and tools to perform cost-benefit analysis in support of regulatory, backfit and environmental analyses. These updates could include updates to NUREG-1409 or other guidance documents related to backfit analyses. Recently, the NRC’s Executive Director for Operations tasked the NRC staff to assess the adequacy and currency of the NRC’s existing

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backfitting requirements, guidance, criteria, and procedures, including NUREG-1409 (ADAMS Accession No. ML16133A575).

ASSESSMENT OF OPTION 2

Because the issues concerning the application of the Backfit Rule to licensees in decommissioning are grounded in the language of the Backfit Rule, changes to the relevant guidance documents would not resolve those issues. NRC guidance cannot change the meaning of NRC regulations. If the NRC chooses not to conduct rulemaking, the only guidance the staff would need would concern implementation of Option 1: how to not apply the reactor design-, construction-, and operation-related provisions of the Backfit Rule to licensees in decommissioning. However, because such guidance would be used on a case-by-case basis in fact-dependent circumstances, the staff's implementation of this guidance could have the same negative outcomes as Option 1 (i.e., a lack of predictability and stability).

OPTION 3. CONDUCT RULEMAKING TO CLARIFY HOW THE NRC APPLIES THE BACKFIT RULE TO LICENSEES IN DECOMMISSIONING.

The NRC could create a new Part within 10 CFR for decommissioning regulations, create a new subpart within Part 50, or amend 10 CFR 50.109 to provide licensees that have had their 10 CFR 50.82(a) certifications docketed by the NRC with the same backfitting protection as they had during their operating phase. A new backfitting provision for licensees in decommissioning would eliminate any confusion with the meaning of the words, "operate a facility," in 10 CFR 50.109(a)(1). The current 10 CFR 50.109(a) would be limited to licensees operating reactors, and the new provision would be limited to licensees in decommissioning.

In their comments on the ANPR, representatives of the nuclear power industry supported a backfitting rule for licensees in decommissioning based in large part on the existing language in 10 CFR 50.109. Representatives of state agencies and non-governmental organizations argued that the Backfit Rule does not apply to licensees in decommissioning.

ASSESSMENT OF OPTION 3

The NRC's existing regulatory requirements and Commission precedent indicate that the NRC should conduct rulemaking to clarify the application of the Backfit Rule to licensees in decommissioning, and the NRC staff recommends this approach. For the reasons provided in the section entitled, "Technical Basis for Amending the Backfit Rule for Licensees in Decommissioning," the NRC does not agree with the stakeholders that commented that the Backfit Rule does not apply to licensees in decommissioning.

The NRC could propose different rulemaking approaches. The NRC could list the activities and NRC approvals that have, or do not have, backfitting protection during decommissioning. Such a list likely would be site-specific and thus not conducive to generic rulemaking. Determining the scope of activities and approvals that would continue from the operations phase into a decommissioning phase could also prove to be too complex to include in a regulation. Instead of specifying in regulatory text the activities for which licensees could have backfitting protection, the NRC should amend 10 CFR 50.109 to include a new section that consists of the provisions of the existing backfitting language relevant to a decommissioning licensee.

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Revising the Backfit Rule would not constitute “backfitting” as that term is defined in 10 CFR 50.109(a)(1) or violate any issue finality provision in Part 52 because the Backfit Rule is a set of process requirements that the NRC imposes on itself, not on a holder of a Part 50 or Part 52 license.

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Appendix J - Aging Management

Current Regulatory Requirements and Technical Basis

An initial operating license is issued for up to 40 years of plant operation. Title 10 of the *Code of Federal Regulations* (10 CFR) Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants," allows for a license renewal of up to 20 years. Current regulations do not limit the number of 20-year renewal terms that may be issued. While no licensee has yet applied for a second 20-year renewal, the industry is exploring the possibility. Therefore, the NRC staff considers it prudent to consider the scenario where a reactor, and its SFP, are in commercial operation for 80 years. The requirement in 10 CFR 50.82, "Termination of license," allows the licensee up to 60 years to decommission the site, with a provision for extensions. While no licensee has yet approached the full 60 years allowed for decommissioning, the NRC staff considers it prudent to consider the scenario where a licensee does use the full 60 years, following 80 years of reactor operation. Therefore, the NRC staff is basing this evaluation on the potential for a SFP being in operation for up to 140 years.

When a licensee enters decommissioning, it removes all fuel from the reactor vessel. That fuel is moved to the SFP, where it is stored with other fuel until it is either moved to an independent spent fuel storage installation (ISFSI) or completely removed from the site. Until all nuclear fuel is removed from the SFP, the SFP performs the same functions as it performs during commercial operation. This is highlighted in 10 CFR 50.51, "Continuation of license," which states in paragraph (b) that each licensee for a plant that has permanently ceased operation shall continue to take actions to maintain the facility, including, where applicable, the storage, control and maintenance of spent fuel, in a safe condition beyond the license expiration date until the Commission notifies the licensee in writing that the license is terminated. Accordingly, the following pertinent regulations (among others) still apply when a licensee enters the decommissioning phase:

- 10 CFR 50.68, "Criticality accident requirements," especially paragraph (b)(4), which states, "If no credit for soluble boron is taken, the k-effective of the spent fuel storage racks loaded with fuel of the maximum fuel assembly reactivity must not exceed 0.95, at a 95 percent probability, 95 percent confidence level, if flooded with unborated water. If credit is taken for soluble boron, the k-effective of the spent fuel storage racks loaded with fuel of the maximum fuel assembly reactivity must not exceed 0.95, at a 95 percent probability, 95 percent confidence level, if flooded with borated water, and the k-effective must remain below 1.0 (subcritical), at a 95 percent probability, 95 percent confidence level, if flooded with unborated water."
- 10 CFR 50.36, "Technical specifications," which states in paragraph (c)(6): "*Decommissioning*. This paragraph applies only to nuclear power reactor facilities that have submitted the certifications required by § 50.82(a)(1) and to non-power reactor facilities which are not authorized to operate. Technical specifications involving safety limits, limiting safety system settings, and limiting control system settings; limiting conditions for operation; surveillance requirements; design features; and administrative controls will be developed on a case-by-case basis."
- 10 CFR 50.65, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants," which states in-part in paragraph (a)(1): "For a nuclear power plant for which the licensee has submitted the certifications specified in § 50.82(a)(1) or

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52.110(a)(1) of this chapter, as applicable, this section shall only apply to the extent that the licensee shall monitor the performance or condition of all structures, systems, or components associated with the storage, control, and maintenance of spent fuel in a safe condition, in a manner sufficient to provide reasonable assurance that these structures, systems, and components are capable of fulfilling their intended functions.”

- 10 CFR Part 50, Appendix A, “General Design Criteria for Nuclear Power Plants,” particularly those in section I, “Overall Requirements,” and section VI, “Fuel and Radioactivity Control.”

These regulations clearly indicate a licensee has an obligation to protect the nuclear fuel, and by extension the structures, systems, and components it relies upon to meet that obligation throughout the decommissioning process until the fuel has been removed from the SFP. Therefore, the NRC staff does not believe any new regulations are required.

Recent Experience with Decommissioning

Currently, the provisions in 10 CFR 50.51 require that licensees for decommissioning plants continue to take actions to maintain the facility, including, where applicable, the storage, control and maintenance of spent fuel, in a safe condition beyond the license expiration date until the Commission notifies the licensee in writing that the license is terminated. The provisions in 10 CFR 50.65(a)(1) require that systems, structures and components (SSCs) associated with the storage, control, and maintenance of spent fuel remain capable of fulfilling their intended functions throughout the decommissioning period.

These regulations are sufficient for providing reasonable assurance that long-lived, passive SCs that serve to support SFP operation (e.g., neutron absorbing materials, SFP liner, SFP cooling system) continue to perform their intended function throughout the decommissioning period. However, there is no guidance that outlines how the licensee will (i) meet the provisions in 10 CFR 50.51 and 50.65(a)(1), or (ii) manage the effects of aging for decommissioning plants (specifically for plants, that did not receive a renewed operating license, as described below).

The decommissioned plants fall into three categories:

1. Plants that no longer have spent fuel in the SFP (e.g., Zion, Fermi Unit 1)
2. Plants that have spent fuel in the SFP and transitioned to decommissioning prior to the expiration of the initial 40-year license. These plants did not obtain a renewed operating license and, therefore, have not implemented any aging management programs (AMPs) (e.g., San Onofre Nuclear Generating Station (SONGS), Crystal River, and Millstone Unit 1).
3. Plants that have spent fuel in the SFP and transitioned to decommissioning after issuance of a renewed operating license. These plants implemented AMPs and other aging management activities (e.g., Kewaunee, Vermont Yankee).

The decommissioning license amendments for these plants were reviewed on a case-by-case basis and resulted in various outcomes.

SONGS Units 2 and 3 permanently shut down in 2013. The licensee agreed via a license condition to implement relevant activities for its SFP and apply appropriate change controls in accordance with the requirements of 10 CFR 50.90.

Crystal River permanently shut down in 2013. The licensee made a regulatory commitment to implement relevant activities for its SFP and apply appropriate change controls in accordance with the guidance contained in the Nuclear Energy Institute (NEI) document NEI 99-04, "Guidelines for Managing NRC Commitment Changes," which contains acceptable guidance for controlling regulatory commitments.

Millstone Unit 1 permanently shut down in 1988 and will continue to store spent fuel in the SFP until the licensee implements the ISFSI in 2048. At present, there is not enough space in the ISFSI to store spent fuel from the Unit 1 pool. NRC inspection reports indicate that the licensee monitors the condition of the spent fuel using testing methods similar to those recommended in license renewal AMPs. The NRC inspection report number 05000245/2014010 (ADAMS Accession No. ML14328A190) stated that in July 2013, a vendor performed Boron Areal Density Gauge for Evaluating Racks (BADGER) testing on certain spent fuel racks in the SFP. The test concluded that some degradation of neutron absorber material had occurred, but the SFP racks were capable of performing their design function. The next BADGER test is planned for the third quarter of 2018 to further evaluate the rate of degradation of the SFP racks.

Kewaunee agreed to implement relevant AMPs and other activities for the SFP, and to apply the appropriate change controls in accordance with the requirements of 10 CFR 50.59 because the AMPs and other activities are described in the facility's updated final safety analysis report (UFSAR). Additionally, the NRC conditioned Kewaunee's defueled license to state the licensee will submit a license amendment request to include the activities in its technical specifications if spent fuel is not removed from the pool by the date listed in the licensee's post-shutdown decommissioning activities report.

Vermont Yankee has a neutron absorber monitoring program for the SFP in place and described in the UFSAR. The NRC reviewed and approved this program and the UFSAR description of the program as part of Vermont Yankee's license renewal application review. The licensee plans to remove all fuel from the SFP to dry fuel storage by December 31, 2020. In the NRC's safety evaluation that reviewed Vermont Yankee's decommissioning license amendment and defueled technical specifications request (ADAMS Accession No. ML15117A551), the NRC staff concluded that the monitoring program is sufficient to provide reasonable assurance until all fuel is moved to dry storage, based on the timeline presented by the licensee.

The issuance of guidance that recommends methods for demonstrating how the effects of aging will be managed for passive, long-lived SCs will reduce the level of regulatory uncertainty and burden associated with a case-by-case review and provide the acceptable approaches for meeting the regulatory requirements already included in 10 CFR Part 50. Such methods may or may not be comparable to those recommended in the Generic Aging Lessons Learned (GALL) Report aging management programs (AMPs), such as AMPs XI.M22, "Boraflex Monitoring," or XI.M40, "Monitoring of Neutron-Absorbing Materials other than Boraflex."

Once a licensee adopts an acceptable approach for managing the aging of its passive, long-lived SCs necessary to meet its decommissioning regulatory requirements, that approach becomes subject to inspection. Therefore, the NRC staff would review, and update as

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necessary, its own inspection procedures for decommissioning power reactors to ensure adequate and consistent oversight of aging management.

Relevance to the Operating Fleet

The NRC staff acknowledges that there is currently regulatory uncertainty in this area with regard to the operating fleet. The NRC staff is actively working to reduce that regulatory uncertainty.

- The NRC issued Generic Letter (GL) 2016-01, “Monitoring of Neutron Absorbing Materials in Spent Fuel Pools” (ADAMS Accession No. ML16097A169). In the GL, the NRC staff asks licensees to provide information regarding their monitoring of SFP neutron-absorbing materials (NAM). The NRC staff is currently reviewing the licensees’ responses.
 - The GL lists several examples of licensees that had failed to adequately monitor their NAM. For example, in September 2009, the licensee for Turkey Point Nuclear Generating Station, Unit 3 received a violation for a failure of its SFP neutron absorber monitoring program (ADAMS Accession No. 101730313), and in May 2012, Peach Bottom Atomic Power Station, Units 2 and 3 received a violation for an inadequate SFP neutron absorber monitoring program (ADAMS Accession No. ML12129A016).
- The NRC staff is currently reviewing NEI 16-03, “Guidance for Monitoring of Fixed Neutron Absorbers in Spent Fuel Pools” (ADAMS Accession No. ML16147A078). This guidance is intended to establish acceptable NAM monitoring programs (in the form of AMPs).

The NRC staff anticipates that once work is completed on these efforts, the current regulatory uncertainty in this area will be reduced and the guidance could be applied to the decommissioning process. The guidance for decommissioning plants would be consistent with that developed for operating plants.

Proposed Regulatory and Rulemaking Options

To provide reasonable assurance that spent fuel is maintained in a safe condition, the NRC is reviewing the need for aging management of certain long-lived, passive structures and components (SCs) (e.g., neutron absorbing materials, spent fuel pool (SFP) liner, SFP cooling system) during the decommissioning period while nuclear fuel is in the SFP. The purpose of this section is to provide a regulatory basis for the regulatory and rulemaking options that are being considered:

- Option 1, no action: There would be no changes to requirements for decommissioning power reactors to implement aging management activities
- Option 2, develop regulatory guidance and ensure the adequacy of inspection programs: There would be no changes to requirements for decommissioning power reactors to implement aging management activities. However, the NRC staff would issue regulatory guidance to explain adequate methods for implementing the regulations, and update the

inspection procedures for decommissioning power reactors to ensure adequate and consistent oversight of aging management.

Response to Public Comments

Public comments were received regarding whether aging management activities should be required to support the decommissioning period. The industry believes that new requirements for licensees to perform aging management activities throughout the decommissioning period are not needed. Members of the public commented that new aging management requirements are needed to provide reasonable assurance that (1) SCs supporting SFP operation are properly monitored and continue to function, and (2) provisions are consistently applied across all decommissioning plants.

The NRC and the nuclear industry have demonstrated similar concerns for aging degradation of passive, long-lived SCs, regardless of whether a plant is operating or decommissioning. It is possible for certain SCs to operate for up to 140 years (40-year initial operating period plus two or more 20-year renewals, in addition to the 60 year decommissioning period). Therefore, it is reasonable and appropriate to develop regulatory guidance regarding the monitoring and management of passive, long-lived SCs that are expected to operate throughout the decommissioning period. The NRC staff has determined that sufficient regulatory basis already exists to provide reasonable assurance that licensees adequately protect the nuclear fuel, and by extension the structures, systems, and components they rely upon to meet that obligation. Therefore, the NRC staff does not believe any new regulations are necessary.

POTENTIAL BACKFIT CONSIDERATIONS

The guidance would establish, for the first time, generic, NRC-approved means of complying with the regulatory requirements for long-lived, passive SCs that are necessary to protect the nuclear fuel for the decommissioning period. Licensees could voluntarily implement this guidance, and the NRC could use this guidance in its review of license amendment requests related to these regulatory requirements and requests for exemptions from these regulatory requirements. Thus, the guidance would be a “forward fit” and would not constitute “backfitting” as defined in 10 CFR 50.109.

NRC STAFF RECOMMENDATION

The NRC staff is publishing a *Federal Register* notice for this regulatory basis to obtain stakeholder feedback on the options considered. The decision on which option the NRC staff recommends will be informed by public comments received on this draft regulatory basis document. The NRC staff’s recommendation, along with a full assessment of the rulemaking options described above, will be documented in the final regulatory basis.

Appendix K - Fatigue Management

Currently, the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 26, Subpart I, “Managing Fatigue,” apply to all 10 CFR Part 50 licensees authorized to operate a nuclear power plant and all holders of a combined license under 10 CFR Part 52 after the Commission makes its 10 CFR 52.103(g) finding.

The remainder of this section considers the existing regulatory framework and the technical basis for options to establish an appropriate level of fatigue management to ensure public health and safety for nuclear power reactors that have been permanently shut down and defueled. The options considered are No Action, Voluntary Industry Initiatives, and Rulemaking.

Current Regulatory Requirements

When 10 CFR Part 26 was issued in a final rule, “Fitness-for-Duty Programs,” on June 7, 1989 (54 FR 24468), it focused on establishing requirements for preventing and detecting personnel impairment from drugs and alcohol. However, several requirements addressed other causes of impairment, including fatigue. Those requirements included general performance objectives [10 CFR 26.10(a) and (b)] that provided for “reasonable assurance that nuclear power plant personnel are not under the influence of any substance, legal or illegal, or mentally or physically impaired from any cause” and “early detection of persons who are not fit to perform activities within the scope of this part.” A requirement was also included in 10 CFR 26.20(a) for licensee policies to “address other factors that could affect fitness for duty such as mental stress, fatigue and illness.” In its SRM on the final rule, the Commission directed the NRC staff to continue to analyze licensee programs, assess the effectiveness of the rule, and recommend appropriate improvements or changes. The 1989 rule did not address licensees decommissioning their power reactors.

The U.S. Nuclear Regulatory Commission (NRC) observed an increase in concerns (e.g., allegations, media and public stakeholder reports) related to the workload and fatigue of security personnel at licensee facilities following the terrorist attacks of September 11, 2001. Subsequent to an NRC review of the control of work hours for security force personnel, and informed by public interactions with stakeholders, the NRC issued Order EA-03-038, “Issuance of Order for Compensatory Measures Related to Fitness-for-Duty Enhancements Applicable to Nuclear Facility Security Force Personnel,” (Agencywide Documents Access and Management System (ADAMS) Accession No. ML030940198), on April 29, 2003, requiring power reactor licensees to implement certain security measures to address issues that may arise from fatigue of security force personnel, including work hour limits to mitigate cumulative fatigue from prolonged periods of extended work hours. Order EA-03-038 did not apply to licensees with decommissioning reactors.

In the staff requirements memorandum (SRM) to COMSECY-04-0037, “Staff Requirements: Fitness-For-Duty Orders to Address Fatigue of Nuclear Facility Security Force Personnel,” (ADAMS Accession No. ML042450533), the Commission disapproved the issuance of Orders concerning fitness-for-duty (FFD) enhancements to address fatigue concerns for security force personnel at decommissioning reactors and other facilities, and determined that FFD program enhancements related to the fatigue of security force personnel at decommissioning reactors should be pursued as a separate rulemaking activity with additional stakeholder interactions. Therefore, power reactor licensees that had permanently shut down and defueled were not considered within the scope of a then-ongoing FFD rulemaking effort.

On March 31, 2008, the NRC published a final rule in the *Federal Register* (73 FR 16966) to, among other things, add Subpart I, "Managing Fatigue," to 10 CFR Part 26. Licensees' compliance with Subpart I within the scope of an overall FFD program provides reasonable assurance that the effects of fatigue and degraded alertness on an individual's ability to safely and competently perform his or her duties are managed commensurate with maintaining public health and safety. The fatigue management provisions also reduce the potential for security officer fatigue to adversely affect the common defense and security.

For power reactor licensees, the scope of 10 CFR Part 26 is limited in 10 CFR 26.3(a) to those licensees that are authorized to operate under 10 CFR 50.57 or hold a combined license (COL) under 10 CFR Part 52 after the Commission makes its 10 CFR 52.103(g) finding. Once the NRC docket the Part 50 power reactor licensee's certifications under 10 CFR 50.82(a), or the Commission orders the licensee to cease operations, the Part 50 licensee is not authorized to operate and is outside the scope of 10 CFR Part 26. Therefore, Part 26, including the fatigue management provisions of Subpart I, does not directly and explicitly apply to Part 50 licensees no longer authorized to operate, which includes decommissioning reactor licensees. However, COL holders are still subject to Part 26 during the decommissioning of their facilities.

Technical Basis

The Statement of Considerations (SOC) for the 2008 Part 26 final rule provides the technical basis for requiring certain licensees to have fatigue management programs. The technical basis for the 2008 Part 26 final rule focused primarily on current and future operating reactors but also included COL holders during the decommissioning of their facilities. The justification for the Subpart I fatigue management provisions, which considered factors including extensive work hours, stressful working conditions, sleep disorders, accumulation of sleep debt, and the disruptions of circadian rhythms associated with shift work, may also apply to personnel at decommissioning power reactors if similar work practices and scheduling occur.

As discussed in the 2008 SOC, many studies have shown that fatigue impairs human alertness and performance. A lack of adequate days off and extended workdays (overtime) can result in a cumulative sleep debt (i.e., the difference between the amount of sleep an individual needs and the amount of sleep that individual actually obtains) and performance impairment. Across a broad range of industries, studies concerning extended work hours suggest that fatigue-induced personnel impairment can increase human error probabilities by a factor of more than 2 to 3 times.

The NRC noted in the 2008 SOC that studies of the operating nuclear power reactors conducted in the 1990s indicated that normal daily variations in alertness associated with human circadian rhythms (i.e., physiological processes that vary on an approximate 24-hour cycle) may be responsible for daily variations in the incidence of personnel errors at nuclear power plants. These studies, along with surveys of more than 100 nuclear power plant shift supervisors indicated that there are certain times of day, and days in the schedule, during which control room operators are less alert, less vigilant, or make more mistakes. These studies suggested that despite controls, such as standardized work practices and independent verification, to ensure correct and reliable human performance, factors that influence alertness may increase the incidence of human errors in nuclear power plants. Because shift work practices will continue to be used at decommissioning power reactors, concerns related to fatigue-related impairment of human alertness and performance at decommissioning power reactors may warrant regulatory consideration.

As explained in the 2008 SOC, fatigue has generalized effects on human performance capabilities, and is associated with performance decrements at a base level, across a variety of tasks. Fatigue can impair both physical and cognitive (i.e., mental) functioning. Generally, cognitive task performance is affected more readily by fatigue than physical or psychomotor tracking performance. General cognitive fatigue decreases an individual's ability to remain alert, process complex information, and correctly grasp a complex set of circumstances. Fatigue has been shown to cause memory problems, slowed responses, lapses and false responses.

The NRC showed in the 2008 SOC that nuclear power plant personnel who perform cognitive tasks that are important to the protection of public health and safety and the common defense and security rely on their ability to sustain attention, analyze problems, make rapid, accurate decisions, and communicate and work as a team. Thus, the NRC identified the following effects of fatigue on cognitive abilities as the primary focus of the fatigue management requirements:

- (a) Sustaining attention – Vigilance and attention to detail are fundamental for plant safety, whether an individual is operating or maintaining equipment important to plant safety, monitoring system status in the control room, or monitoring plant security systems or barriers. Tasks requiring sustained attention (e.g., vigilance tasks) are among the most susceptible to fatigue-induced degradation.
- (b) Decision making--Conservative decision-making is central to safe nuclear power plant operations. Fatigue is associated with more risky strategies and decreases in the effort individuals exert in decision-making. Sleep deprivation impairs decision-making even if individuals try to compensate for lack of sleep when responding to heightened stimulation.
- (c) Problem solving – Perseveration is a term used to describe poor problem solving performance, characterized by an individual or group of individuals maintaining a faulty diagnosis or mitigation plan despite contrary information. Sleep-deprived workers fail to appropriately allocate attention, set task priorities, or sample for sources of potentially faulty information. Mental fatigue also contributes to decreased originality and flexibility in problem solving and sub-optimal planning.
- (d) Communication and teamwork – Fatigue affects skills important to written and oral communication and teamwork. Fatigue degrades speech articulation, verbal fluency, the ability to process oral and written instructions, and memory. Fatigued individuals also tend to be less communicative and have greater difficulty performing multiple tasks concurrently.

The 2008 SOC also states that fatigue may result from an individual remaining awake continuously for an excessive period of time, or from the individual obtaining an inadequate amount or quality of sleep, or both. Conditions that contribute to worker fatigue include:

- (a) Extended work shifts with five or more consecutive work days – Although the effects of shift length on worker performance are influenced by the nature of the task, various studies have shown that task performance declines after 12 hours on a task. Other studies have shown that the relative risk of having an accident increases dramatically after 9 consecutive hours on the job. The effects of extended working hours on worker performance can be exacerbated when many extended shifts are scheduled in succession.

- (b) Extensive Overtime – Many research studies have reported that excessive working hours cause worker fatigue. If a decommissioning power reactor site makes extensive use of overtime, workers may be subject to fatigue resulting from a combined effect of long work hours with reduced break periods.
- (c) Shiftwork – Decommissioning power reactors continue to require round-the-clock presence of personnel, thus requiring individuals to be awake and working at times when they would normally be asleep. Although individuals can function in these circumstances, human alertness and task performance are cyclically affected by a daily biological clock. Numerous studies have demonstrated the significant roles that worker fatigue, sleep loss, and circadian rhythms play in contributing to errors and accidents. Shift workers generally obtain less sleep, and report a higher incidence of sleepiness and sleep-related complaints and many studies have demonstrated that decreased performance and increased errors and accidents are associated with night work and are affected by varying sleep schedules and durations of sleep periods.
- (d) Early start times and extended commutes – Start times before 7 a.m. can interfere with a worker's ability to obtain adequate rest if the schedule is not aligned with his or her circadian cycle and naturally occurring tendency for sleep and wakefulness. Such start times typically cause workers to wake before 6 a.m., thereby reducing the amount of sleep that can be obtained between midnight and 6 a.m., the most effective time period for most people to sleep. In addition, long commutes to remote work sites such as nuclear power plants, which are frequently located in rural areas and distanced from major population centers, contribute to the potential for fatigue associated with early start times.
- (e) Sleep disorders – Sleep disorders are conditions that can significantly reduce the quantity and quality of sleep that individuals are able to obtain, affect an individual's ability to remain alert, and ultimately degrade an individual's ability to safely and competently perform his or her duties. These factors are not effectively addressed by limits on working hours in the absence of other fatigue management practices.

When considering the impact of worker motivation on the effects of fatigue, the 2008 SOC concluded that although worker motivation can mitigate to a limited degree the effects of fatigue, fatigue has a physiological basis, including changes in glucose metabolism in the brain. These changes are beyond the individual's control. In addition, several studies have suggested caution with regard to the abilities of individuals to self-monitor their capacity to safely and competently perform their duties when fatigued. These studies note that individuals experience microsleeps without being aware of their lapses in attention and underestimate their propensity for uncontrolled sleep episodes. As a consequence, a worker's motivation to remain alert does not provide reasonable assurance that an individual will be able to safely and competently perform his or her duties.

The scope of Subpart I of 10 CFR Part 26 ensures that appropriate work hour controls are applied to personnel who perform functions that are significant to the protection of public health and safety or the common defense and security, including: individuals performing risk significant operations or maintenance duties; health physics, chemistry, and fire brigade duties important to emergency response; and individuals performing security duties important to maintaining the security of the plant.

The NRC staff recognizes that the spectrum of possible accidents is significantly smaller, and the risk of an offsite radiological release is significantly lower at a nuclear power reactor that has permanently ceased operations and removed fuel from the reactor vessel, than at an operating power reactor. The number of tasks that may have significance to the protection of public health and safety or the common defense and security are likewise reduced at a decommissioning reactor. Nevertheless, considering the above factors that can contribute to fatigue, a subset of personnel at a decommissioning power reactor may be subject to working conditions that can result in fatigue.

Analysis of the functions of personnel performing duties at decommissioning reactors indicates the remaining functions that are significant to the protection of public health and safety or the common defense and security are performed by certified fuel handlers (CFHs) and security personnel.

Although the target sets are significantly reduced at a decommissioning reactor, security personnel must react sufficiently, using the same level of alertness, to counter the design basis threat at operating nuclear reactors. It should be noted that there are significant uncertainties with respect to the frequency of such threats. Successful completion of the cognitive and behavioral tasks performed by decommissioning facility security officers to deter, prevent, and respond to malicious threats, which are important to the protection of public health and safety and the common defense and security, depends on the ability of these personnel to sustain attention, analyze problems, make rapid and accurate decisions, and communicate and work effectively as a team. Additionally, security officers must be able to initiate a timely response and interdict an external threat that may require the security officer to use deadly force. Decisions regarding the use of deadly force are not amenable to many of the work controls (e.g., peer checks, independent verification, post-maintenance testing) that are implemented for other personnel actions at a nuclear plant to ensure correct and reliable performance.

Once a licensee transitions to decommissioning, licensed operators are replaced with CFHs as the on-shift management representative responsible for supervising and directing the monitoring, storage, handling, and cooling of irradiated nuclear fuel in a manner consistent with ensuring the health and safety of the public. Successful completion of the cognitive and behavioral tasks performed by CFHs at a decommissioning facility depends on the ability of these personnel to remain alert, analyze problems, make accurate decisions, and communicate and work effectively as a team. Activities completed by CFHs at decommissioned sites are generally similar to those performed by personnel at operating reactors as described in either 10 CFR 26.4(a)(1) or 10 CFR 26.4(a)(4) depending on the specific circumstances. As compared to an operating reactor, issues requiring a complex and rapid response are significantly reduced or eliminated at a decommissioning plant. This is primarily due to the slowly evolving nature of the spectrum of possible events at a decommissioning plant.

Recent activity on fatigue management at decommissioning power reactors

Recent experience with decommissioning power reactors has demonstrated that fatigue management practices vary by licensee after permanent cessation of operations. For example, of the five reactors that entered decommissioning status in 2013 and 2014, two reactor sites have changed their physical security plan under 10 CFR 50.54(p) to remove the requirements to comply with 10 CFR Part 26, Subpart I. These sites replaced their fatigue management program with less stringent programs to manage fatigue for security officers. The other reactor sites have, to date, maintained 10 CFR Part 26, Subpart I fatigue management programs for security officers within their physical security plans. Without applicable regulations for CFHs,

licensees may inconsistently apply fatigue management provisions for those personnel across the set of decommissioning reactors. The NRC staff is not aware of any adverse safety impacts resulting from inconsistent fatigue management at decommissioning plants.

The Nuclear Energy Institute (NEI) submitted NEI 15-08, "Managing Personnel Fatigue at Decommissioning Reactors," for NRC staff review and potential endorsement on November 30, 2015. NEI 15-08 proposes administrative work hour controls on security personnel when unforeseen problems require significant amounts of overtime. The document also addresses policy requirements and approval for deviations from the guidelines. The NRC staff responded to NEI in a letter dated June 22, 2016 (ADAMS Accession No. ML16125A374), declining to fully review and/or endorse NEI 15-08 but stating that the NRC considered the submitted document informational and may use elements of the document in support of the proposed decommissioning rulemaking effort.

Stakeholder Feedback on the Advance Notice of Proposed Rulemaking

In response to the Advance Notice of Proposed Rulemaking (ANPR), the NRC received public comments for and against changes to the fatigue management requirements for decommissioning power reactors. The public comments received on the ANPR were considered in the development of the rulemaking options presented in this Appendix.

Several commenters stated that FFD programs, including provisions for fatigue management, should continue to apply to decommissioning power reactors. Some commenters suggested that all fatigue management requirements set forth in 10 CFR Part 26, including Subpart I, should remain applicable to workers at decommissioning power reactor sites until license termination. These commenters cited concerns with the vulnerability and potential consequences of an attack or accident at decommissioning power reactors.

The NRC also received comments that given the reduced risks, the requirements of Part 26, Subpart I should not be applied to licensees once the 10 CFR part 50 license no longer authorizes operation of the reactor or emplacement or retention of fuel into the reactor vessel pursuant to 10 CFR 50.82(a)(2).

NRC Staff Evaluation

The spectrum of possible accidents is significantly smaller, and the risk of an offsite radiological release is significantly lower at a nuclear power reactor that has permanently ceased operations and removed fuel from the reactor vessel, than at an operating power reactor. As discussed in detail in Section 2.2 and Appendix A of this document, the NRC staff has concluded that after a cooling period of 10 months for boiling-water reactors (BWRs) or 16 months for pressurized water reactors (PWRs), the spent fuel reasonably cannot heat up to clad ignition temperature within 10 hours of a significant draindown event in the spent fuel pool (SFP). This time after shutdown corresponds to the decommissioning plant's transition from Level 1 to Level 2 as described in Appendix A. Once the spent fuel has reached this level of decay, the potential consequences of an accident or security event are further reduced because there are no design basis events at a Level 2 decommissioning plant that could result in an offsite radiological release exceeding the limits established by the U.S. Environmental Protection Agency (EPA).

Following the events of September 11, 2001, the NRC issued Order EA 02-026, dated February 25, 2002, which required licensees to develop mitigating strategies related to the key safety functions of core cooling, containment, and SFP cooling. Those mitigating strategies

were developed in the context of a localized event that was envisioned to challenge portions of a single unit. Following the events at the Fukushima Dai-ichi Nuclear Power Plant on March 11, 2011, the NRC issued Order EA 12-049, dated March 12, 2012. The strategies and guidance developed and implemented by licensees or COL holders in response to the requirements imposed by Order EA 12-049 provide the necessary capabilities to supplement those of the permanently installed plant structures, systems, and components that could become unavailable following beyond-design-basis external events. The strategies were developed to add multiple ways to maintain or restore core cooling, containment, and SFP cooling capabilities in order to improve the defense-in-depth of licensed nuclear power reactors. These additional mitigation capabilities put in place by the NRC issued Orders discussed above should be considered when evaluating the potential effects of an accident or security event for decommissioning licensees.

These strategies implemented by licensees in response to Order EA 12-049 significantly enhanced the safety and preparedness capabilities established following September 11, 2001 in Order EA 02-026 and later codified in 10 CFR 50.54(hh)(2). These strategies contribute to additional reductions in the potential risk associated with the spectrum of accidents that may occur at a decommissioned plant and the licensee's ability to respond to those events.

Recognizing the significant reduction in radiological risk and consequences of an accident or security event for a power reactor undergoing decommissioning, and additional reductions to risk due to modifications implemented at sites as a result of Orders EA 12-026 and EA 12-049, the NRC staff has concluded that fatigue management provisions should be limited to functions that are significant to the protection of public health and safety or the common defense and security (i.e., security personnel and CFHs). Recognizing the continuous reduction in decay heat levels and the associated reduction in radiological risks, the NRC staff also concluded that fatigue-related requirements for the limited number of functions should be discontinued when the decay heat levels are significantly reduced. Consequently, the NRC staff concludes it is necessary to limit the effect of fatigue on these key personnel until fuel has sufficiently decayed in the SFP (i.e., 10 months for BWRs and 16 months for PWRs), as discussed in Section 2.2 of this document. This approach to fatigue management is consistent with the graded approach to emergency preparedness (EP), as described in Appendix A of this document.

The following resources were considered by the NRC staff to address potential changes to the current regulatory framework for fatigue management at decommissioning sites:

- 73 FR 16966, "Fitness for Duty Programs; Final Rule"
- 76 FR 43548, "Alternative to Minimum Days Off Requirements; Final Rule"
- RG 5.73, "Fatigue Management for Nuclear Power Plant Personnel" (ADAMS Accession No. ML083450028)
- NEI 06-11, Revision 1, "Managing Personnel Fatigue at Nuclear Power Reactor Sites" (ADAMS Accession No. ML090360158)
- NEI 15-08, Draft Revision 0, "Managing Personnel Fatigue at Decommissioning Reactors" (ADAMS Accession No. ML15350A153)

Rulemaking Options

OPTION 1: NO ACTION

The no-action option would retain the FFD provisions of the current regulations. The fatigue management provisions contained in 10 CFR Part 26, Subpart I would continue to not apply to

decommissioning Part 50 power reactors, but would continue to be applicable to holders of a combined license (COL) under 10 CFR Part 52 after the Commission makes its 10 CFR 52.103(g) finding even after they enter decommissioning.

ASSESSMENT OF OPTION 1

Power reactor licensees under 10 CFR Part 50 that permanently shut down and defuel would continue to be outside the scope of 10 CFR Part 26, Subpart I. It is likely that sites will maintain a fatigue management program of some kind for their security officers as part of their security plan. The lack of regulations in this area may lead to an approach voluntarily chosen by a licensee that does not provide reasonable assurance that fatigue and degraded alertness are managed commensurate with maintaining public health and safety or the common defense and security, as indicated by fatigue-related challenges for security staff. Security personnel need to defend against the design basis threat for the appropriate target sets, just as they do when the reactor is operating. Further, this approach may lead to fatigue-related challenges for CFHs, who have the responsibility to supervise and direct the monitoring, storage, handling, and cooling of nuclear fuel in a manner consistent with the health and safety of the public. While the risk associated with the spectrum of accidents at the decommissioned plants are low, in part due to the significant reduction in radiological risk and consequences of an accident or security event for a power reactor undergoing decommissioning, in comparison to those of an operating reactor, the frequency of some initiators (e.g., security related events) have some uncertainties.

The COL holders under 10 CFR Part 52 would be subject to Part 26 (including Subpart I) requirements during decommissioning. Therefore, the no-action option would continue to maintain the differences in requirements on fatigue management for personnel at 10 CFR Part 50 licensees as compared to 10 CFR Part 52 licensees.

OPTION 2: VOLUNTARY INDUSTRY INITIATIVES

In this option, the NRC staff would consider voluntary implementation of industry initiatives as an appropriate means of applying reasonably consistent measures for the management of personnel fatigue at decommissioning power reactors.

ASSESSMENT OF OPTION 2

In comparison to Option 1, Option 2 has the potential to clarify the NRC's positions and provide greater confidence that decommissioning sites will maintain fatigue-related programs equivalent with the NRC positions.

The NEI submitted a draft of NEI 15-08 that included industry proposed guidelines for decommissioning licensees. This guidance is based on the requirements of Generic Letter (GL) 82-12, "Nuclear Power Plant Staff Working Hours," with specific changes to some work hour rules corresponding to relaxations contained within the overall programmatic requirements in Subpart I to 10 CFR Part 26. The NEI's proposed guidelines would apply to personnel performing assigned security-related job duties but are silent on CFHs. The NRC in its 2008 SOC concludes that with the exception of orders limiting the work hours of security personnel, the NRC's former regulatory framework of GL 82-12 did not include consistent or readily enforceable requirements to address worker fatigue. The 2008 SOC additionally states that the regulatory framework based on GL 82-12 included requirements that were inadequate and incomplete for effective fatigue management. The conclusions reached in development of the 2008 SOC were primarily focused on operating reactors, although decommissioning Part 52

license holders are also included in the rule. An in-depth analysis of the adequacy of GL 82-12 and NEI 15-08 for managing fatigue at 10 CFR Part 50 decommissioning license holders would need to be pursued if this option is taken. In summary, after reviewing the industry's initial proposal, the NRC staff concluded that it needs to perform applicable analyses and hold public meetings to discuss guidance that would be acceptable to the NRC staff.

OPTION 3: RULEMAKING TO CODIFY FITNESS-FOR-DUTY FATIGUE REQUIREMENTS FOR DECOMMISSIONING POWER REACTORS

In this option, the NRC would pursue rulemaking to codify FFD requirements for decommissioning power reactors. The NRC could amend Part 26 to be applicable to security personnel and CFHs for Part 50 and 52 decommissioning power reactors until such time that the fuel in the SFP has decayed so that 10 hours is available to initiate mitigation measures in the event of a zirconium fire scenario (i.e., 10 months for BWRs and 16 months for PWRs), as discussed in Section 2.2 of this document. This time after shutdown corresponds to transition from Level 1 to Level 2, as described in Appendix A of this document.

ASSESSMENT OF OPTION 3

This option would provide regulatory requirements designed to reasonably assure public health and safety of the irradiated fuel in the SFP until the spent fuel has sufficiently decayed and the potential consequences of an accident or security event are significantly reduced. The requirements proposed under this option would provide regulatory stability and enforceability. The NRC staff is proposing that the requirement would only apply to security personnel and CFHs after the plant has decommissioned. This option would maintain the program in place for security individuals and CFHs until the plant transitions from Level 1 to Level 2. This requirement would no longer apply once the fuel in the SFP has sufficiently decayed, as addressed above. It would also provide an opportunity to re-visit requirements for Part 52 COL holders and modify them if appropriate.

POTENTIAL BACKFIT CONSIDERATION

Rulemaking for Part 50 licensees in these areas would constitute backfitting. The fatigue management requirements would be new regulations for Part 50 licensees currently operating or in decommissioning, and therefore would meet the definition of "backfitting" in 10 CFR 50.109(a). Because the proposed fatigue management requirements may not involve adequate protection or be necessary to bring a licensee into compliance with a requirement or commitment, the rulemaking would have to result in a cost-justified, substantial increase in the protection of the public health and safety or common defense and security. Therefore, at this time, the NRC staff can make no conclusion as to what option is viable for addressing the regulatory gap and policy inconsistency.

NRC STAFF RECOMMENDATION

The NRC staff concludes that there is a regulatory gap and policy inconsistency with respect to managing fatigue for security officers and CFHs at Part 50 decommissioning plants, as compared to operating plants. This regulatory gap can be addressed via Option 2 (Voluntary Industry Initiatives) or Option 3 (Rulemaking). The policy inconsistency between 10 CFR Part 52 COL holders and 10 CFR Part 50 license holders, and the potential burden reduction of removing fatigue management programs for COL holders after a certain point in decommissioning, can be addressed only through rulemaking.

Security officers and CFHs both perform critical tasks at decommissioning reactors that could be negatively affected by fatigue. Based on research that led to the 2008 rulemaking, NRC staff has concluded that a fatigue management program, albeit for a limited number of personnel could be beneficial to minimize the potential of fatigue-related events at a decommissioned site. NRC staff has also concluded that the spectrum of initiating events is smaller, and the consequences of those events are substantially lower at a decommissioning plant in comparison to those at an operating plant. As addressed above, this risk has been further reduced as a result of the additional mitigation capabilities established at nuclear sites as a result of Orders EA-02-026 and EA-12-049.

If deemed necessary, the regulatory gap could be addressed either via a rulemaking or by relying on regulatory guidance that recognizes the importance of managing fatigue commensurate with the level of risk at decommissioning sites. In either case, the NRC staff would engage with the public to determine the costs and benefits associated with implementing the NRC staff's recommended option.

The NRC staff encourages the public to provide feedback on this regulatory basis and the options considered above. The decision on which option the NRC staff recommends in the final regulatory basis will be informed by public comments received on this draft regulatory basis document. The NRC staff's recommendation, along with a full assessment of the rulemaking options described above, will be documented in the final regulatory basis.

Regulatory Scope of a Power Reactor Decommissioning Rulemaking Regarding Fatigue

A rulemaking would include revisions to 10 CFR Part 26 to extend fatigue management provisions to security personnel and CFHs at decommissioning power reactors. Additionally, the rulemaking would provide an opportunity to re-visit requirements for COL holders.

NRC Guidance, Policy, and Implementation Issues

NRC Guidance

The following FFD guidance document will need to be updated if the decision is made to pursue rulemaking:

RG 5.73, "Fatigue Management for Nuclear Power Plant Personnel."

Policy Issues on Fitness for Duty

The 10 CFR Part 26 does not apply to decommissioning 10 CFR Part 50 nuclear plants. This has resulted in various licensees adopting different approaches to manage fatigue. If a licensee adopts an inadequate fatigue management program for key personnel at a decommissioned site, it creates a potential for negative impacts to public health and safety. While the NRC staff is not aware of any adverse safety impacts resulting from inconsistent fatigue management at decommissioning plants, the absence of relevant requirements or guidance has the potential to create uncertainty as to what elements a fatigue management program during decommissioning should contain.

There is a policy inconsistency with regard to 10 CFR Part 50 license holders as compared to holders of a combined license under 10 CFR Part 52 after the Commission makes its 10 CFR 52.103(g) finding. Once a 10 CFR Part 50 license holder is no longer authorized to operate the nuclear reactor, compliance with 10 CFR Part 26 is no longer required. Holders of a combined license under 10 CFR Part 52 after the Commission makes its 10 CFR 52.103(g) finding are required to comply with 10 CFR Part 26 unless the NRC grants an exemption from Part 26.

Implementation Issues

There are no specific implementation issues associated with the NRC staff's recommended amendments to FFD regulations for decommissioning power reactors.

Impacts of a Fitness-for-Duty Fatigue Rulemaking

This section provides an analysis of the alternatives presented in this Appendix. Option 1 is the "no action" alternative and involves the continuation of current practices. Option 2 is an alternative in which the NRC staff would consider voluntary industry initiatives proposed for management of personnel fatigue at decommissioning power reactors. Option 3 is a rulemaking approach that would codify FFD requirements for decommissioning power reactors.

Under the current process, the requirements of 10 CFR Part 26, Subpart I do not apply to Part 50 licensees undergoing decommissioning. The requirements of 10 CFR Part 26, Subpart I do apply to Part 52 COL holders while undergoing decommissioning.

OPTION 1: NO ACTION

Under this option, the NRC staff would continue with the existing practices as described in the current regulations and guidance.

Impacts on public health, safety, and security

This option leaves in place the inconsistencies in fatigue management requirements that apply to security personnel and CFHs that perform the same duties at a decommissioning facility as they do at an operating reactor site, and between Part 50 and 52 licensees in decommissioning. While the requirements of 10 CFR Part 26, Subpart I apply to these individuals at an operating reactor site, they do not apply once a Part 50 licensee is no longer authorized to operate the reactor. This leaves a possibility for a decommissioning plant to refrain from imposing any fatigue-related requirements for plant personnel at a decommissioning site.

Impacts on licensees

Taking no action would likely result in continued inconsistent implementation of fatigue management practices by Part 50 decommissioning reactors, therefore increasing the potential that security personnel and CFHs may be subject to fatigue. Even though there are no regulations that require it, experience has shown that Part 50 licensees are implementing some fatigue requirements for their security officers under their security plan.

Impacts on NRC

At the present time, the NRC stays cognizant of changes to the site security plan (which includes fatigue management for security officers) for each licensee that chooses to decommission. This option would have no incremental impact on the NRC.

Additional considerations

This option would have no incremental impact on State, local, or Tribal governments.

Summary of Benefits and Costs

Benefits

No incremental benefits to licensees or NRC.

Costs

There are no incremental costs to the NRC.

OPTION 2: VOLUNTARY INDUSTRY INITIATIVES

Under this option, the NRC staff would consider voluntary industry initiatives for managing fatigue at decommissioning power reactors. In parallel, industry would need to commit to responding to NRC concerns regarding industry initiatives for fatigue management.

Impacts on Public Health, Safety, and Security

This option would establish industry guidelines for fatigue requirements at decommissioning power reactors.

Impacts on Licensees

This option would promote a more uniform approach to FFD programs among decommissioning power reactors than Option 1. The industry would incur a one-time cost associated with addressing NRC concerns during the development of voluntary industry initiatives related to fatigue management and ongoing costs for implementing the program.

Impacts on NRC

Overall, this option would result in one-time and ongoing costs to the NRC. Initially, there would be incremental costs to the NRC to consider voluntary initiatives for fatigue management programs proposed by industry. These costs include the review of voluntary industry initiatives and public meetings with stakeholders. The costs would include both NRC staff and contractor time to review industry guidance and perform supporting analyses, and public outreach efforts during the guidance development phase. The ongoing costs would be limited to ensuring compliance with the industry initiatives.

Additional Considerations

This option would have no incremental impact on State, local, or Tribal governments.

Summary of Benefits and Costs

Benefits

This option could promote uniformity and standardization in the application of fatigue management programs at decommissioning power reactors. Licensees may see long-term savings due to the use of standard industry guidance vice development of their own guidance on a case-by-case basis.

Costs

The costs associated with this option include development and implementation of voluntary industry initiatives and the ongoing inspection activities. In addition, licensees would incur additional costs of documenting commitments to such initiatives in their licensing basis.

OPTION 3: RULEMAKING TO CODIFY FITNESS-FOR-DUTY FATIGUE REQUIREMENTS FOR DECOMMISSIONING POWER REACTORS

Under this option, the NRC staff would undertake a rulemaking to codify fatigue management requirements for security personnel and CFHs at decommissioning power reactors. The changes to the underlying regulations and guidance would support a robust set of rules and guidance for Level 1 of the decommissioning process with no requirements once Level 2 is reached. The proposed rule would require a specific fatigue management program for decommissioning power reactors.

Impacts on public health, safety, and security

This option would provide regulatory stability, clarity, and enforceability at decommissioning power reactors.

Impacts on licensees

Decommissioning power reactor licensees would need to implement the fatigue management provisions specified in the rule.

Impacts on NRC

Overall, this option would result in one-time costs associated with rulemaking efforts. Initially, there would be incremental costs to the NRC to undertake the rulemaking process. These costs include the preparation of the proposed rule and accompanying guidance. The costs would include both NRC staff and contractor time to prepare proposed rule language, draft guidance, supporting analyses (e.g., a regulatory analysis and Office of Management and Budget Paperwork Burden analysis), a *Federal Register* notice, and public outreach efforts during the rule and guidance development phase. After publishing the proposed rule, the NRC would incur costs associated with public comment resolution and preparation of the final rule, issuance of guidance, and supporting documentation for the rulemaking.

Additional considerations

The proposed rule would have no incremental impact on State, local, or Tribal governments.

Summary of benefits and costs

Benefits

This option would enhance the clarity of the regulatory framework and provide regulatory stability and predictability to the decommissioning process. It would enable the NRC to establish clear requirements that recognize the need for managing fatigue for a limited number of personnel and the reduced risk associated with decommissioning plants in comparison to operating plants. This option would enable NRC staff to examine the basis for the differences in the requirements for Part 52 COL holders and Part 50 license holders and modify any changes that are deemed appropriate.

Costs

This option would have one-time costs to the NRC to develop the rule, revise guidance, and implement the rule. The NRC would incur minimal ongoing costs for ensuring compliance with the rule until Level 2 is reached in the decommissioning process. Licensees would have implementation costs to maintain compliance with the rule for the specified period of time after shutdown.