Regulatory Analysis for the Alignment of Licensing Processes and Lessons Learned from New Reactor Licensing Proposed Rule

NRC Docket ID NRC-2009-0196 / RIN Number 3150-AI66

U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards
Division of Rulemaking, Environmental, and Financial Support

Enter date when ready to issue, 2022

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ABSTRACT

The U.S. Nuclear Regulatory Commission (NRC) is proposing to amend its regulations for the licensing of new nuclear power reactors. These changes are necessary to ensure consistency in new reactor licensing reviews, promote a more effective and efficient new reactor licensing process, reduce the need for exemptions from existing regulations and license amendment requests, address other new reactor licensing issues deemed relevant by the NRC, and support the NRC's Principles of Good Regulation, specifically, openness, clarity, and reliability.

This document presents a regulatory analysis of the proposed rule, "Alignment of Licensing Processes and Lessons Learned from New Reactor Licensing," and the following draft guidance documents. The NRC welcomes public comment on this analysis.

- Draft Regulatory Guide DG-1384, "Nuclear Power Plant Simulation Facilities for Use in Operator Training, License Examinations, and Applicant Experience Requirements," which is Revision 5 to Regulatory Guide 1.149
- Draft Regulatory Guide DG-1394, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," which is Revision 4 to Regulatory Guide 1.174
- Draft Regulatory Guide DG-1395, "Acceptability of Probabilistic Risk Assessment Results for Risk-Informed Activities," which is Revision 4 to Regulatory Guide 1.200
- Draft Regulatory Guide DG-1398, "Guidance for Implementation of 10 CFR 50.59, 'Changes, Tests, and Experiments,'" which is Revision 4 to Regulatory Guide 1.187
- Draft Regulatory Guide DG-1399, "Applications for Nuclear Power Plants," which is Revision 2 to Regulatory Guide 1.206
- Draft Regulatory Guide DG-4031, "General Site Suitability Criteria for Nuclear Power Stations," which is Revision 4 to Regulatory Guide 4.7
- Draft Regulatory Guide DG-5069, "Fitness-for-Duty for New Nuclear Power Plant Construction Sites," which is Revision 1 to Regulatory Guide 5.84
- NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," Section 1.0, "Introduction and Interfaces"
- NUREG-0800, Section 13.3, "Emergency Planning"
- NUREG-0800, Section 13.6.1, "Physical Security—Combined License and Operating Reactors"
- NUREG-0800, Section 13.6.4, "Access Authorization Operational Program"
- NUREG-0800, Section 19.0, "Probabilistic Risk Assessment and Severe Accident Evaluation for New Reactors"

- NUREG-0800, Section 19.1, “Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities”

- NUREG-1021, “Operator Licensing Examination Standards for Power Reactors”

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ABBREVIATIONS AND ACRONYMS

ABWR	Advanced Boiling-Water Reactor
ADAMS	Agencywide Documents Access and Management System
AEA	Atomic Energy Act of 1954, as amended
AP1000	Advanced Passive 1000 (reactor design)
AP600	Advanced Passive 600 (reactor design)
APR1400	Advanced Power Reactor 1400 (reactor design)
ASME	American Society of Mechanical Engineers
BPV	boiler and pressure vessel
CFR	*Code of Federal Regulations*
COL	combined license
CP	construction permit
DC	design certification
DCD	design control document
DG	draft regulatory guide
EA	environmental assessment
EAL	emergency action level
ECCS	emergency core cooling system
EM	evaluation model
EP	emergency planning
EPZ	emergency planning zone
EQ	environmental qualification
ETE	evacuation time estimate
ESBWR	Economic Simplified Boiling-Water Reactor
ESP	early site permit
FEMA	Federal Emergency Management Agency
FFD	fitness for duty
FR	*Federal Register*
FSAR	final safety analysis report
FTE	full-time equivalent (employee)
GDC	general design criterion
GE Hitachi	GE Hitachi Nuclear Energy
GSI	generic safety issue
ITAAC	inspections, tests, analyses, and acceptance criteria
LAR	license amendment request
LWA	limited work authorization
LWR	light-water reactor
MD	Management Directive
ML	manufacturing license
MRO	medical review officer
NEI	Nuclear Energy Institute

NPV	net present value
NRC	U.S. Nuclear Regulatory Commission
OL	operating license
PA	protected area
PERT	program evaluation and review technique
PRA	probabilistic risk assessment
PSAR	preliminary safety analysis report
RAI	request for additional information
RG	regulatory guide
SAMDA	severe accident mitigation design alternative
SAT	systems approach to training
SDA	standard design approval
SECY	paper; the written issue paper and primary decisionmaking tool submitted by the NRC staff to the Commission about policy, security, rulemaking, and adjudicatory matters, and general information
SNC	Southern Nuclear Operating Company
SNM	special nuclear material
SPDS	safety parameter display system
SRP	Standard Review Plan (NUREG-0800)
SSAR	site safety analysis report
SSC	structure, system, and component
TMI	Three Mile Island
Toshiba	Toshiba Corporation
TS	technical specification(s)
U.S.C.	United States Code
USI	unresolved safety issue
VEGP	Vogtle Electric Generating Plant
Westinghouse	Westinghouse Electric Company

EXECUTIVE SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) is proposing to amend its regulations for the licensing of new nuclear power reactors. In SRM-SECY-15-0002, "Staff Requirements—SECY-15-0002—Proposed Updates of Licensing Policies, Rules, and Guidance for Future New Reactor Applications," dated September 22, 2015 (Agencywide Documents Access and Management System Accession No. ML15266A023), the Commission directed the NRC staff to proceed with a rulemaking on the alignment of licensing requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," and 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants." The Commission also directed the NRC staff to pursue rulemaking to incorporate lessons learned from recent new power reactor licensing reviews. The NRC is combining the alignment and lessons learned rulemakings into a single, coordinated effort.

The NRC has identified several items to evaluate in this rulemaking, including corrections, clarifications, and new requirements, primarily based on 10 CFR Part 52 licensing reviews carried out since 2007.

The NRC's goals in amending these regulations are to ensure consistency in new reactor licensing reviews; promote an efficient new reactor licensing process; reduce the need for exemptions from existing regulations and license amendment requests; address other new reactor licensing issues deemed relevant by the NRC; and support the Principles of Good Regulation, including openness, clarity, and reliability.

The proposed rule would result in net averted costs to the industry and the NRC of approximately $16.1 million using a 7-percent discount rate and $25.4 million using a 3-percent discount rate, making the overall proposed rule cost beneficial.

Table ES-1 Total Benefits (Costs) of Proposed Rule

	Undiscounted	**7% NPV**	**3% NPV**
Industry Benefit	$22,604,000	$12,049,000	$17,219,000
NRC Benefit	$22,603,000	$11,762,000	$17,052,000
Total Benefit	**$45,207,000**	**$23,811,000**	**$34,271,000**
Industry Cost	($5,998,000)	($4,519,000)	($5,298,000)
NRC Cost	($3,784,000)	($3,165,000)	($3,501,000)
Total Cost	**($9,782,000)**	**($7,684,000)**	**($8,799,000)**
Net Benefit (Cost)	**$35,425,000**	**$16,127,000**	**$25,472,000**

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1.0 INTRODUCTION

The U.S. Nuclear Regulatory Commission (NRC) is proposing to amend its regulations for nuclear power plant licensing. These changes are to ensure consistency in new reactor licensing reviews, promote a more effective and efficient new reactor licensing process, reduce the need for exemptions from existing regulations and license amendment requests (LARs), address other new reactor licensing issues deemed relevant by the NRC, and support the Principles of Good Regulation, including openness, clarity, and reliability. Concurrently, to support the implementation of the proposed rule, the NRC is issuing for comment seven draft regulatory guides (DGs); six revised sections of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition" (SRP) (NRC, 2019c); and a revision to NUREG-1021, "Operator Licensing Examination Standards for Power Reactors." Revision 12 issued September 2021 (NRC, 2021c).

2.0 STATEMENT OF THE PROBLEM AND OBJECTIVE

2.1 Background

The regulatory framework for new reactor licensing has evolved over the years, as have several Commission policies and directions related to new reactors. This section describes this evolution and the lessons learned from new reactor licensing actions, as well as the changes the NRC staff has determined would improve the efficiency of the licensing process.

Initially, the NRC licensed all nuclear power plants under a two-step process described in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities." This process requires both a construction permit (CP) and an operating license (OL). To improve regulatory efficiency and add greater predictability to the process, in 1989, the NRC established alternative licensing processes in 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants," that include the issuance of a single combined license (COL). The COL process combines a CP and an OL with conditions for plant operation.

The 10 CFR Part 52 process includes other licensing options. An early site permit (ESP) allows an applicant to obtain NRC approval for a reactor site without specifying the design of the reactor(s) that could be built at that site. An applicant can reference a standard plant design in a license application. The design can be either approved by the NRC staff (a standard design approval (SDA)) or certified by the Commission in a rulemaking (design certification (DC)). The NRC has also included in 10 CFR Part 52 a process to grant a license to manufacture a nuclear power plant (manufacturing license (ML)). Such a plant would be fabricated at one location but sited and operated elsewhere.

Since publishing the 2007 update to 10 CFR Part 52 in Volume 72 of the *Federal Register* (FR), page 49352 (72 FR 49352; August 28, 2007), the NRC has identified corrections, clarifications, and new requirements to evaluate in the rulemaking. These items were identified primarily as a result of 10 CFR Part 52 licensing reviews, and some are listed in SECY-15-0002, Enclosure 2, "10 CFR Part 52 New Reactor Licensing Lessons Learned Rulemaking" (NRC, 2015d). In SRM-SECY-15-0002, "Staff Requirements—SECY-15-0002—Proposed Updates of Licensing Policies, Rules, and Guidance for Future New Reactor Applications," dated September 22, 2015 (NRC, 2015e), the Commission directed the NRC staff to proceed with a rulemaking on the alignment of licensing requirements of 10 CFR Part 50 and 10 CFR Part 52. The Commission

also directed the NRC staff to pursue rulemaking to incorporate lessons learned from recent new power reactor licensing reviews. In accordance with the NRC's standard rulemaking practices, the staff committed to informing the Commission and other stakeholders about the specific rule changes that the staff would consider.

The NRC explored multiple alternatives for each area identified to align 10 CFR Parts 50 and 52, including developing guidance, pursuing rulemaking, and maintaining the status quo. In accordance with 10 CFR 50.12, "Specific exemptions," the Commission may grant exemptions from regulations in 10 CFR Part 50 if it determines the exemptions are authorized by law, will not present an undue risk to public health and safety, and are consistent with the common defense and security, as well as when special circumstances are present, such as when application of the regulation is not necessary to achieve the underlying purpose of the rule. Experience has demonstrated that applicants for power reactor licenses seek multiple exemptions to acquire a CP, OL, or COL. Through this rulemaking, the NRC would be able to modify its regulations to align 10 CFR Parts 50 and 52 and maintain safety and security, while eliminating the need to grant specific exemptions or approvals, or issue license amendments related to certain subject matters once licenses or approvals are issued.

2.2 Statement of the Problem

For many years, new reactor licensing and guidance development activities have focused on the licensing processes in 10 CFR Part 52 rather than those in 10 CFR Part 50. As a result, the NRC has incorporated some decisions on new reactor licensing issues into 10 CFR Part 52, but similar requirements have not been incorporated into 10 CFR Part 50. For example, 10 CFR Part 52 includes requirements derived from the Commission's "Policy Statement on Severe Reactor Accidents Regarding Future Designs and Existing Plants" (50 FR 32138; August 8, 1985) (Severe Accident Policy Statement), with explicit requirements related to the Three Mile Island (TMI) items in 10 CFR 50.34(f), severe accidents, probabilistic risk assessment (PRA), and other topics, without similar requirements being incorporated in regulations for new 10 CFR Part 50 power reactor applications. These policies and requirements should apply to all new power reactor applications, regardless of the selected licensing approach, to ensure that equivalent designs submitted for NRC review under either process are assessed against consistent technical standards that yield outcomes with equivalent demonstrations of adequate safety, security, and environmental protection.

Guidance updates are also needed to implement the Commission's direction and to ensure the alignment of technical positions for the review of new reactor applications. These updates need to address issues affecting new reactor licensing reviews for which the NRC has not yet developed guidance for new 10 CFR Part 50 applications, such as the consideration of severe accident issues for environmental reviews.

In addition, the NRC could revise 10 CFR Parts 50 and 52 and supporting regulations to reflect lessons learned from recent COL, DC, ESP, and OL reviews. The proposed changes would improve the clarity and effectiveness of these regulations for the review of future new reactor license applications without the need to grant specific exemptions, approvals, or license amendments related to certain subject matters.

2.3 Objectives

The NRC is issuing a proposed rule that would amend the current requirements for new nuclear power reactor license applicants and some existing power reactor license holders. In recent years, several potential applicants have informed the NRC of their intentions to use the 10 CFR Part 50 licensing process. Preapplication interactions have begun, and regulatory clarity is needed for prospective applicants' decisionmaking and to support NRC planning and interactions with applicants.

By issuing a rule that aligns 10 CFR Parts 50 and 52 based on lessons learned, the NRC would be able to establish regulations to ensure consistency in new reactor licensing reviews, regardless of which licensing process an applicant chooses to use. By addressing lessons learned from new reactor licensing reviews, the NRC would also be able to improve the clarity and effectiveness of these regulations for the preparation and review of future new reactor license applications.

3.0 IDENTIFICATION AND ANALYSIS OF ALTERNATIVES

The NRC considered the following two approaches to address the regulatory problem identified in Section 2.2:

(1) Alternative 1: Take No Action
(2) Alternative 2: Rulemaking

This analysis considers 11 technical topics. The discussion of each topic and subtopic covers the specific regulatory issues and the alternatives, including whether the alternative involves issuing revised guidance with the rule. Guidance may be affected in six of the 11 topics. For each individual topic, the NRC also considered a guidance-only alternative where feasible.

3.1 Severe Accident Requirements

3.1.1 Regulatory Issue

The NRC expects that new nuclear power plant designs will achieve a higher standard of severe accident safety performance than earlier designs. Under 10 CFR Part 52, light-water reactor (LWR) DC, COL, SDA, and ML applicants are required to describe and analyze design features for the prevention and mitigation of severe accidents. However, for new power reactor applicants under 10 CFR Part 50, the regulations do not include analogous criteria for an LWR CP or an LWR OL.

3.1.2 Regulatory Alternatives

Alternative SA-1: No-Action Alternative

This alternative would maintain the current regulatory framework and not require a new 10 CFR Part 50 LWR CP or OL applicant to describe and analyze design features for the prevention and mitigation of severe accidents. Although these 10 CFR Part 50 applicants would not be required by regulation to comply with the additional requirements imposed on applicants under 10 CFR Part 52, they would need to address the severe accident issues analogous to the

requirements of 10 CFR Part 52 for the NRC to make its adequate protection determination under the Atomic Energy Act of 1954, as amended (AEA) (42 U.S.C. 2011 et seq.).

Alternative SA-2: Rulemaking

Under Alternative SA-2, the NRC would pursue rulemaking to require applicants for LWR designs under 10 CFR Part 50 to describe and analyze severe accident design features. Modifications to these plants would also be assessed for their potential to increase the frequency or severity of ex-vessel severe accidents (i.e., severe accidents in which material from a damaged core escapes the reactor pressure vessel). This change would require 10 CFR Part 50 applicants to address the Commission's Severe Accident Policy Statement (50 FR 32138; August 8, 1985) by submitting a PRA with consideration of severe accident vulnerabilities. Also, the NRC would revise SRP Section 19.0, "Probabilistic Risk Assessment and Severe Accident Evaluation to New Reactors," to add the applicability of severe accident requirements to LWR CPs and OLs submitted under 10 CFR Part 50.

3.2 Probabilistic Risk Assessment Requirements

3.2.1 Regulatory Issue

The NRC's "Uses of Probabilistic Risk Assessment Methods in Nuclear Regulatory Activities; Final Policy Statement" (60 FR 42622; August 16, 1995) (PRA Policy Statement) encourages the use of PRA in the design of all new power reactors. In addition, 10 CFR Part 52 requires the use of PRA in the design of reactors, and the results of the PRA are factored into the NRC's review of the proposed design. However, 10 CFR Part 50 does not contain an equivalent requirement (except for certain licensing actions that have been withdrawn), so the NRC's reviews of CP and OL applications do not benefit from the results and insights of a PRA for a proposed design. In addition, unless this information is reported, the NRC may not be able to risk-inform its review of 10 CFR Part 50 applications. This inconsistency in the NRC's regulatory framework also poses a conflict with the PRA Policy Statement, in which the Commission affirmed that PRA should be used in the design of new reactors.

Another issue that arises from the lack of a PRA relates to the Commission's policy statement on "Safety Goals for the Operations of Nuclear Power Plants" (51 FR 30028; August 21, 1986) (Safety Goals Policy Statement), which delineates quantitative objectives of keeping reactor accident fatality risk to local individuals below 0.1 percent of general U.S. accident risk and cancer fatality risk to the population below 0.1 percent of all cancers. For LWRs, the NRC has used surrogates for these objectives (i.e., core damage frequency and release frequencies[1]). Without a PRA, these surrogates cannot be quantified for new LWRs licensed under 10 CFR Part 50.

In addition, as seen with other first-of-a-kind applications (e.g., the Economic Simplified Boiling-Water Reactor (ESBWR) DC (79 FR 61943; October 15, 2014)), the NRC's access to PRA results allows it to risk-inform its licensing reviews. This substantially increases the safety focus of the review. Furthermore, 10 CFR Part 52 requires the use of a plant-specific PRA in licensing a new reactor; 10 CFR Part 50 does not. The 10 CFR Part 50 license application may include risk-significant structures, systems, and components (SSCs) (e.g., the ultimate heat sink) that are outside the scope of the design-specific PRA (if there is one). Also, a

[1] Before the operational phase, applicants and licensees use large release frequency. After loading fuel, licensees use large early release frequency.

plant-specific PRA should address site-specific parameters (e.g., external hazards), and the CP application should report the results and insights so the NRC can confirm the suitability of the design for the proposed site. The NRC may not be able to assess departures from the design in the CP appropriately without having access to the PRA.

Furthermore, to be useful in the operating phase, the plant-specific PRA required of a 10 CFR Part 52 COL holder must accurately reflect the as-built plant. Even if it has a PRA, a 10 CFR Part 50 OL holder has no requirement to maintain it to accurately reflect the as-built, as-operated plant. Before loading fuel, OL holders should perform walkdowns to confirm that the plant-specific PRA models the as-built plant. The PRA should be upgraded to cover all initiating events and modes for which the NRC has endorsed consensus standards. Subsequently, it should be maintained and upgraded as necessary until the permanent cessation of operations.

3.2.2 Regulatory Alternatives

Alternative PRA-1: No-Action Alternative

Alternative PRA-1 would continue to allow applicants for new reactors under 10 CFR Part 50 to apply for a CP without developing a PRA for the proposed design and would allow the holder of a new OL to enter the operational phase without a plant-specific PRA. This alternative is not consistent with the Commission policy that calls for the increased use of PRA in all regulatory matters to the extent supported by a state-of-the-art PRA and does not incorporate the lessons learned during the licensing of plants under 10 CFR Part 52, for which a PRA was used to improve a proposed design on more than one occasion. Results and insights from the PRA allow the applicant to identify design improvements and for the NRC to focus its safety review on areas of greatest significance.

Alternative PRA-2: Rulemaking

Under this alternative, the NRC would pursue rulemaking to apply current PRA requirements under 10 CFR Part 52 to applications made under 10 CFR Part 50. Specifically, this alternative would amend 10 CFR 50.34(a) to add a new requirement that future applicants for CPs under 10 CFR Part 50 must develop a plant-specific PRA and describe the plant-specific PRA and its results in the preliminary safety analysis report (PSAR). This alternative would also amend 10 CFR 50.34(b) to add a new requirement that future applicants for OLs under 10 CFR Part 50 must include a description of the plant-specific PRA and its results in the final safety analysis report (FSAR).

The NRC would amend 10 CFR 50.69, “Risk-informed categorization and treatment of structures, systems and components for nuclear power reactors,” to allow CP and COL holders and applicants for DCs to make use of this regulation. The regulations in 10 CFR 50.69 allow certain entities to categorize SSCs according to safety significance and, for safety-related SSCs of low safety significance, the ability to adopt alternatives to certain special treatment requirements that are in addition to the customary treatment of SSCs in industrial applications. The regulations permit this for holders of an OL; holders of a renewed license under 10 CFR Part 54, “Requirements for Renewal of Operating Licenses for Nuclear Power Plants”; applicants for a CP or OL under 10 CFR Part 50; and applicants for an SDA, COL, or ML under 10 CFR Part 52. The NRC would amend its regulations to permit holders of a CP under 10 CFR Part 50, as well as applicants for a DC and holders of a COL granted under the 10 CFR Part 52 licensing process, this ability to adopt alternatives to certain special treatment

requirements. In addition, the NRC is proposing to clarify 10 CFR 50.69(b) to make the applicability of the regulation more explicit.

The NRC would also revise 10 CFR 50.71, "Maintenance of records, making of reports," such that holders of OLs issued after the effective date of this final rule and COL holders must develop plant-specific PRAs, and all licensees required to have a PRA must maintain and upgrade the PRA. The NRC would define the scope of the PRA for the particular reactor type in regulatory guidance.

Additionally, the staff would revise the following guidance to cover applications for CPs or OLs under 10 CFR Part 50.

- Regulatory Guide (RG) 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," Revision 3, issued January 2018 (NRC, 2018a)

- RG 1.200, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities" (NRC, 2020d)

- RG 1.206, "Applications for Nuclear Power Plants," Revision 1, issued October 2018 (NRC, 2018b)

3.3 Three Mile Island Requirements

3.3.1 Regulatory Issue

An inconsistency exists between 10 CFR Part 50 and 10 CFR Part 52 on the submittal of information under 10 CFR 50.34(f). This paragraph requires 10 CFR Part 52 applicants for a DC, SDA, COL, or ML to provide information necessary to demonstrate compliance with any technically relevant positions of the requirements in 10 CFR 50.34(f)(1) through (3), with the exception of 10 CFR 50.34(f)(1)(xii), (f)(2)(ix), and (f)(3)(v). The regulation in 10 CFR 50.34(f)(1)(xii) requires an applicant to evaluate alternative hydrogen control systems, 10 CFR 50.34(f)(2)(ix) requires an applicant to provide a system for hydrogen control that can safely accommodate hydrogen generated by the equivalent of a 100-percent fuel-clad metal-water reaction, and 10 CFR 50.34(f)(3)(v) requires that containment integrity be maintained during an accident that releases hydrogen generated from a 100-percent fuel-clad metal-water reaction accompanied by either hydrogen burning or the added pressure from post-accident inerting.

In the "Combustible Gas Control in Containment" final rule (68 FR 54123; September 16, 2003), the Commission consolidated, in 10 CFR 50.44, "Combustible gas control for nuclear power reactors," the combustible gas control requirements for all future applicants for or holders of a CP or an OL under 10 CFR Part 50, and all future applicants for DCs, SDA, COLs, and MLs under 10 CFR Part 52. In the 2007 10 CFR Part 52 final rule (72 FR 49352; August 28, 2007), the Commission included, in several new sections of 10 CFR Part 52, specific exceptions from the combustible gas control requirements in 10 CFR 50.34(f) for DC, SDA, COL, and ML applicants because 10 CFR 50.44 already mandates that they comply with these requirements. Furthermore, 10 CFR 52.47(a)(8) (for DC applicants), 10 CFR 52.137(a)(8) (for SDA applicants), 10 CFR 52.79(a)(17) (for COL applicants), and 10 CFR 52.157(f)(12) (for ML applicants) contain the 10 CFR 50.34(f) requirements and exceptions.

Under 10 CFR 52.79(a)(17), applicants for a COL are excepted from 10 CFR 50.34(f)(2)(xxv). Instead, the requirements in Section IV.E.8.a(i) of Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities," to 10 CFR Part 50 apply as required under 10 CFR 52.79(a)(21). The regulation in 10 CFR 50.34(f)(2)(xxv) requires any CP or ML applicant whose application was pending on February 16, 1982, or a DC, SDA, COL, or ML applicant under 10 CFR Part 52, to describe how it will provide an onsite technical support center and an onsite operational support center. It also requires that any CP applicant whose application was pending on February 16, 1982, describe how it will provide a near-site emergency operations facility.

Also, 10 CFR 50.34(f)(2)(i) requires applicants for a DC, SDA, COL, or ML to provide simulator capability that correctly models the control room and includes the capability to simulate small-break loss-of-coolant accidents. Similar requirements appear in 10 CFR 55.46, "Simulation facilities," for CP, OL, and COL applicants and licensees.

3.3.2 Regulatory Alternatives

Alternative TMI-1: No-Action Alternative

This alternative would maintain the current regulatory framework. The inconsistencies between 10 CFR Part 50 and 10 CFR Part 52 described above would remain, and the intent of SECY-15-0002, "Proposed Updates of Licensing Policies, Rules, and Guidance for Future New Reactor Applications," dated January 8, 2015 (NRC, 2015f), to align 10 CFR Parts 50 and 52 on the requirements of 10 CFR 50.34(f) would not be fulfilled. Also, the requirement in 10 CFR 50.34(f)(2)(i) would continue to be redundant to 10 CFR 55.46 for COL applicants, and an inconsistency between 10 CFR Part 50 and 10 CFR Part 55 would remain for DC, SDA, and ML applicants.

Alternative TMI-2: Rulemaking

Under Alternative TMI-2, the NRC would pursue rulemaking to revise 10 CFR 50.34(f) such that it would apply to new power reactor applications submitted under 10 CFR Part 50. For example, 10 CFR Part 52 applicants are currently exempt from 10 CFR 50.34(f)(1)(xii), (f)(2)(ix), (f)(2)(xxv), and (f)(3)(v), and the NRC would delete these provisions. By aligning these regulations, a 10 CFR Part 50 applicant would provide the same information as a 10 CFR Part 52 applicant.

3.4 Fire Protection Requirements

3.4.1 Regulatory Issue

An inconsistency exists between 10 CFR Parts 50 and 52 as to how the NRC requests information about fire protection from an applicant. Regulations in 10 CFR Part 52 require COL, DC, SDA, and ML applicants to describe and analyze the fire protection design features necessary to comply with General Design Criterion (GDC) 3, "Fire protection," in Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50 and with 10 CFR 50.48, "Fire protection." Under 10 CFR Part 50, for the CP phase, 10 CFR 50.34(a)(3)(i) only requires that the PSAR contain the preliminary design of the facility, including the principal design criteria. Although the principal design criteria include the GDC, and therefore GDC 3, the requirement in 10 CFR 50.34(a)(3)(i) lacks the specificity of the requirements in 10 CFR Part 52

to provide a description and analysis of the fire protection design features necessary to comply with GDC 3.

A similar lack of clarity exists as to the application requirements under 10 CFR Part 50 for the OL phase. The regulations in 10 CFR 50.34(b) state that each application for an OL shall include an FSAR, but unlike 10 CFR Part 52, 10 CFR 50.34(b) has no specific requirement stating that the applicant needs to provide information about how it meets GDC 3 or 10 CFR 50.48 requirements not addressed at the CP stage. In addition, unlike for COL applicants in 10 CFR 52.79(a)(40), there is no clear requirement for OL applicants to describe the implementation of the fire protection program required by 10 CFR 50.48.

3.4.2 Regulatory Alternatives

Alternative FP-1: No-Action Alternative

This alternative would maintain the current regulatory framework. Although 10 CFR Part 50 applicants would provide fire protection information to enable the NRC to make its adequate protection determination, inconsistencies between 10 CFR Parts 50 and 52 would preclude meeting the regulatory objective of aligning fire protection requirements in 10 CFR Parts 50 and 52. These inconsistencies could lead to inefficiencies and unpredictability for the 10 CFR Part 50 applicant and the possibility of the NRC issuing requests for additional information (RAIs) after an application is submitted. Maintaining the status quo may also require the NRC to have more interactions with a future applicant in presubmittal meetings to discuss the information the NRC needs to make its safety finding.

Alternative FP-2: Rulemaking

Under Alternative FP-2, the NRC would pursue rulemaking to revise 10 CFR 50.34(a) and (b). The changes would amend 10 CFR 50.34(a) to add a section requiring the applicants for a CP to provide information about how the fire protection design features comply with GDC 3, and the agency would amend 10 CFR 50.34(b) to add a section requiring the applicants for an OL to provide information about how the fire protection design features comply with GDC 3 and 10 CFR 50.48. These changes would improve the clarity, consistency, and alignment of new nuclear power reactor licensing requirements between 10 CFR Part 50 and 10 CFR Part 52. Making this change by rulemaking would ensure the greatest degree of public participation in amending the requirements and provide greater clarity on the standards and processes to be used for a new 10 CFR Part 50 license application. Setting clear requirements in the NRC's regulations would also help stakeholders considering new nuclear power reactor license applications to make well-informed decisions about which licensing process is best suited to their specific needs.

3.5 Operators' Licenses Requirements

3.5.1 Regulatory Issue

NRC regulations governing the issuance of licenses to operators of utilization facilities do not discuss the issuance of operator licenses to individuals at such facilities that are under construction and not yet operating (i.e., "cold" plants). The NRC recently gained experience implementing the operator licensing program at a cold plant—Vogtle Electric Generating Plant (VEGP) Units 3 and 4—which was under construction at the time of the written examinations and operating tests. In some cases, the NRC approved exemptions from the Commission's regulations to facilitate the administration of these examinations and applicants' performance of experience requirements because design and construction of the utilization facilities at VEGP Units 3 and 4 were not complete.

The NRC has observed that, in some cases, because of construction schedules, months and years may pass after an applicant for an operator's license passes the NRC examination and before the applicant can complete all of the experience requirements for an operator license. At VEGP Unit 3, some applicants took and passed an NRC examination in 2015, but as of the end of calendar year 2019, the NRC had not yet issued them operator licenses because they had not yet been able to complete all of the experience requirements (e.g., participation in preoperational testing). Because operator license applicants are not yet licensed, they are not required to be enrolled in a continuing training program that meets the requirements of 10 CFR 55.59, "Requalification," to retain their knowledge, skills, and abilities and to remain cognizant of design and procedure changes. The NRC has observed at VEGP Unit 3 that the facility licensee has made changes to the plant design and procedures since 2015, some of which directly affected the tasks that licensed operators will perform at the plant. The NRC has also observed that the facility licensee has voluntarily established and implemented a continuing training program based on a systems approach to training (SAT) that closely models a requalification program for applicants who have passed the NRC initial licensing examinations administered to date at VEGP Unit 3, and that these applicants are participating in that program.

The current regulatory framework could foster a decline in the applicants' level of knowledge, skills, and abilities required to safely operate the plant when a significant amount of time will have passed between when the applicant successfully completes the NRC initial licensing examination and when the applicant can complete all the other requirements to be licensed. Applicants for operator licenses at cold plants also may not be trained on the design and procedure changes that may affect tasks that they will be licensed to perform when the plant begins operation and they have completed all the other requirements to be licensed.

This section discusses alternatives for improving the efficiency and effectiveness of the operator licensing program at cold plants based on lessons learned from this experience. The lessons learned are related to criteria for simulation facilities used to administer the operating test and meet experience requirements at cold plants, permit the use of suitable alternatives in lieu of the plant walkthrough portion of the operating test while the plant is under construction, permit a licensee to ask for a waiver of examination and test requirements for multiple unit sites of the same design, and require actions that would ensure that an operator license applicant's knowledge, skills, and abilities are maintained up to date when a significant amount of time has elapsed between successfully passing the licensing exam and completing the remaining requirements to be licensed.

3.5.2 Regulatory Alternatives

Alternative OL-1: No-Action Alternative

This alternative would maintain the approach used most recently at VEGP Units 3 and 4, which was to rely on the use of regulatory exemptions as necessary to support operator licensing activities at cold plants. As such, the NRC would make no changes to the current requirements in 10 CFR Part 55 and undertake no efforts to develop additional guidance related to these topics.

Alternative OL-1 has several disadvantages. Facility licensees would continue to need to request an exemption from the plant walkthrough requirement in 10 CFR 55.45(b) to conduct operator licensing examinations at the facility before the completion of construction. Also, facility licensees would continue to need to request an exemption from the experience requirement in 10 CFR 55.31(a)(5) for applicants to complete the required control manipulations. Therefore, Alternative 1 would not relieve the burden imposed on both the facility licensees and the NRC resulting from a case-by-case exemption process.

Also, a lack of clarity would continue about whether and how a simulation facility at a cold plant may be used in the administration of operating tests, for requalification, and for the performance of control manipulations. The current regulations allow for the licensee to request Commission approval of a simulator that does not meet the definition of a plant-referenced simulator for use on initial license examinations. However, this approach is not well defined, and although the NRC has developed draft guidance and criteria to improve the efficiency of the process of requesting Commission approval for a simulation facility, it has not yet been incorporated into the applicable guidance document.

In addition, this alternative would not ensure that applicants for operator licenses maintain the knowledge, skills, and abilities gained during initial training and remain cognizant of any plant design and procedure changes that may occur before they would otherwise be enrolled in the requalification program. Although a facility licensee may voluntarily establish a continuing training program for applicants who have passed the initial NRC operator licensing examination, there would continue to be no requirement to do so. Also, a continuing training program for applicants that may be established voluntarily by a facility licensee would still not be subject to any of the existing regulatory requirements for SAT-based training programs and, therefore, the quality and content of such programs may not be adequate to retain essential knowledge, skills, and abilities and ensure that applicants are trained in plant design and procedure changes. As a result, a voluntarily established continuing training program may not adequately maintain the knowledge, skills, and abilities of the personnel that the facility licensee intends to license to operate the plant after initial fuel load. If a facility licensee of a cold plant chooses not to enroll its applicants for operator licenses in an SAT-based continuing training program that closely models a requalification program after the applicants' successful completion of the NRC examination, and if a significant amount of time passes before the applicants receive licenses and begin the requalification program, they may not retain knowledge from the initial training program or learn new information related to operationally important topics.

Alternative OL-2: Rulemaking

In this alternative, the NRC would pursue rulemaking to address simulation facilities at cold plants, to allow for suitable alternatives to the plant walkthrough portion of the operating test while the plant is under construction, and to establish a new requirement for facility licensees at

cold plants to maintain the knowledge, skills, and abilities of operator's license applicants who have successfully completed the NRC initial licensing examination, as well as add criteria for waiving examinations at multiunit sites that are under construction.

To address simulation facilities at cold plants, the NRC would amend 10 CFR 55.46(c)(2)(i) to allow applicants for operator licenses to perform the control manipulations required by 10 CFR 55.31(a)(5) on a simulation facility that uses a suitable alternative to "models relating to nuclear and thermal-hydraulic characteristics that replicate the most recent core load," such as using models related to nuclear and thermal-hydraulic characteristics that replicate the intended first core load for the plant. The NRC would also amend two definitions in 10 CFR 55.4. It would amend the definition of "reference plant" to state that it is not necessary for the reference plant to be actually constructed, and the definition of "plant-referenced simulator" to state that, for a cold plant, a plant-referenced simulator means a simulator modeling the systems of the reference plant with which the operator would interface in the as-built control room.

To allow for suitable alternatives to the plant walkthrough portion of the operating test while the plant is under construction, the NRC would amend 10 CFR 55.45(b) to give facility licensees of new reactors under construction the option of developing plant walkthrough test items (i.e., job performance measurements used for the in-plant portion of the operating test), using suitable alternatives to in-plant testing while the plant is under construction.

To establish a new requirement for facility licensees at cold plants to maintain the knowledge, skills, and abilities of operator license applicants who have successfully completed the NRC initial licensing examination, the NRC would amend 10 CFR 55.31(a)(4) to require facility licensees of new reactors under construction to provide information on NRC Form 398 to explain how the knowledge, skills, and abilities of applicants for operator licenses would be maintained when the facility licensee requests an NRC examination to be administered well before the applicants would be expected to complete all requirements to receive operator licenses.

The NRC would also amend 10 CFR 55.47, "Waiver of examination and test requirements," to add a new set of criteria that would justify a waiver of any or all of the written examination and operating test for applicants to be licensed on subsequent units at a multiunit site that is under construction.

Additionally, the staff would revise the following guidance for implementing the proposed changes:

- NUREG-1021

- RG 1.149, "Nuclear Power Plant Simulation Facilities for Use in Operator Training, License Examinations, and Applicant Experience Requirements," Revision 4, issued April 2011

Other Alternatives Considered

In the draft regulatory basis, the NRC considered, and then rejected, two other alternatives for this topic—a broader scope rulemaking alternative and a guidance-only alternative—because they would not address all the regulatory issues of concern or would result in higher costs that could not be justified by an offsetting increase in benefits.

3.6 Physical Security and Fitness-for-Duty Requirements

3.6.1 Physical Security Requirements

3.6.1.1 Regulatory Issue

The NRC has identified an issue in 10 CFR Part 73, "Physical Protection of Plants and Materials," specifically 10 CFR 73.55(a)(4) and 10 CFR 73.56(a)(3), that may result in an unnecessary burden on power reactor applicants and licensees under 10 CFR Parts 50 and 52. Regulations in 10 CFR 73.55(a)(4) and 10 CFR 73.56(a)(3) require applicants for a power reactor OL under 10 CFR Part 50 or holders of a COL under 10 CFR Part 52 to implement the requirements of 10 CFR 73.55, "Requirements for physical protection of licensed activities in nuclear power reactors against radiological sabotage," and 10 CFR 73.56, "Personnel access authorization requirements for nuclear power plants," before unirradiated fuel is allowed on site at nuclear power reactors (i.e., within the protected area (PA)). The NRC is proposing to amend these requirements to explain that applicants and licensees may bring unirradiated nuclear fuel on site and protect it in accordance with 10 CFR 73.67, "Licensee fixed site and in-transit requirements for the physical protection of special nuclear material of moderate and low strategic significance," before implementing the requirements of 10 CFR 73.55 and 10 CFR 73.56. In addition, the NRC is considering changes to the language in 10 CFR 70.22(k) and 10 CFR 73.67(d) and (f) to clarify the appropriate security requirements for special nuclear material (SNM) of moderate or low strategic significance at nuclear power reactors. Currently, holders of a COL, not holders of an OL, are subject to the physical security requirements for this SNM when the SNM is located inside the owner-controlled area but outside the protected area.

3.6.1.2 Regulatory Alternatives

Alternative PS-1: No-Action Alternative

Under this alternative, the NRC would make no changes to the existing regulatory language in 10 CFR 73.55(a)(4) or 10 CFR 73.56(a)(3). Therefore, 10 CFR Part 50 and 52 applicants and licensees would have to fully implement the physical security requirements in 10 CFR 73.55 and the access authorization requirements in 10 CFR 73.56 before unirradiated nuclear fuel, which is SNM of low strategic significance, could be stored in the PA. Alternatively, if adopting the interpretation that unirradiated nuclear fuel could be stored on site outside the PA, licensees would have to store the fuel in the owner-controlled area and protect it in accordance with the applicable security requirements in 10 CFR 73.67 or request an exemption from, or propose an alternative measure to, the requirements in 10 CFR 73.55(a)(4) and 10 CFR 73.56(a)(3). Furthermore, the exceptions in 10 CFR 70.22(k) and 10 CFR 73.67(d) and (f) would not be clarified to address the disparate treatment of 10 CFR Part 50 and 52 licensees.

Alternative PS-2: Rulemaking

Under this alternative, the NRC would undertake rulemaking to amend 10 CFR 73.55(a)(4) and 10 CFR 73.56(a)(3). This rulemaking would replace the current rule language, "before fuel is allowed onsite (protected area)," with new rule language, "before initial fuel load into the reactor."

The rulemaking would also add new language to 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material," specifically 10 CFR 70.22(k), and to 10 CFR 73.67(d) and (f) to clarify

the applicability of the security requirements in 10 CFR 73.67 to licensees of both 10 CFR Part 50 and 10 CFR Part 52. Specifically, the rulemaking would amend 10 CFR 70.22(k) and 10 CFR 73.67(d) and (f) to explain that the existing exception from the security requirements applies to licensees of both 10 CFR Part 50 and 10 CFR Part 52 when the material in located in the protected area and protected under the requirements of 10 CFR 73.55.

The NRC would also revise the following guidance to make it clear that licensees should provide the NRC with sufficient time to conduct the necessary inspections of the licensee's facility to determine that the licensee has fully implemented the security requirements in 10 CFR 73.55:

- RG 1.206
- SRP Section 13.6.1, "Physical Security—Combined License and Operating Reactors"
- SRP Section 13.6.4, "Access Authorization Operational Program"

3.6.2 Fitness-for-Duty Requirements

3.6.2.1 Regulatory Issue

The NRC is considering several changes to address lessons learned from implementation of fitness-for-duty (FFD) programs at nuclear power plant construction sites. These issues concern access to the construction site, medical review officer (MRO) procedures, clarifications to regulatory language, and a change to the implementation of 10 CFR Part 26, "Fitness for Duty Programs," based on risk insights learned from operating experience.

Escorting Construction Workers

Under the 10 CFR Part 26 requirements for a licensee described in 10 CFR 26.3(a) and (b), an individual who would otherwise be subject to the licensee's FFD program can be escorted at the licensee's site and not be subject to the licensee's FFD program. The regulations applicable to a licensee described in 10 CFR 26.3(c) do not allow for certain individuals to be escorted on site. Furthermore, 10 CFR 26.4(f) requires individuals who construct or direct the construction of safety- or security-related SSCs to be subject to a licensee's FFD program. If these individuals are performing those duties at a power reactor construction site, then the individuals must be subject to the FFD program and cannot be escorted. This can unnecessarily restrict a licensee's work planning and execution. If an individual will be on site for only a short period of time, then escorting the individual can save time and allow for scheduling flexibility.

The burden that this requirement places on a licensee's work planning and execution became evident during Southern Nuclear Operating Company's (SNC's) construction of VEGP Units 3 and 4. By letter dated December 6, 2018 (SNC, 2018), as supplemented by letter dated March 8, 2019 (SNC, 2019), SNC requested that the NRC approve an exemption from 10 CFR 26.4(f). The licensee claimed that the burden of requiring these individuals to be subject to the SNC FFD program, such as pre-assignment drug testing, would be costly and unnecessary when an equivalent, less burdensome alternative was available. The licensee requested approval to exclude from 10 CFR 26.4(f) individuals who would construct or direct the construction of safety- or security-related SSCs, as long as they would perform their duties for 30 days or less in a 60-day period and would be under the control of an escort at VEGP Units 3 and 4.

In granting the exemption, the NRC found that it affords the licensee increased flexibility in the management of its construction workforce and the conduct of construction activities by enabling SNC to implement process and procedural changes in a manner that leverages immediately available workers for short-duration construction activities. This flexibility could enable SNC to use public finances more effectively and efficiently to construct the facility, while maintaining reasonable assurance that the escorted construction workers would be trustworthy and reliable and fit to perform assigned duties and responsibilities safely and competently. The NRC wrote the exemption to automatically terminate before the establishment of a PA because, under 10 CFR 73.55(a)(4), with the establishment of the PA, the visitor-escort provisions of 10 CFR 73.55(g)(7) and (8) would apply.

10 CFR Part 26 Implementation Issues Based on Risk Insights Learned from Reactor Plant Construction

Based on operating experience and associated insights learned from the construction of VEGP Units 3 and 4 and Virgil C. Summer Nuclear Station Units 2 and 3, the NRC reassessed the risks presented during the construction of these commercial nuclear power reactors and finds that implementation of 10 CFR 26.3(a) and (c) is not commensurate with current risk insights. Regulations in 10 CFR 26.3(a) require licensee implementation of an FFD program that meets all 10 CFR Part 26 requirements, except those in Subpart K, "FFD Programs for Construction," after the licensee is authorized to operate the commercial power reactor plant. Also, 10 CFR 26.3(a) requires holders of a COL to implement an FFD program that meets all 10 CFR Part 26 requirements, except those in Subpart K, after the Commission has made the finding under 10 CFR 52.103(g) and before the receipt of SNM in the form of fuel assemblies. Under 10 CFR 26.3(c), licensees and other entities constructing a nuclear power plant must implement their FFD program no later than receipt of SNM in the form of fuel assemblies. These provisions are associated with the risk created by reactor operation in the first case, and receipt of unirradiated nuclear fuel on site in the second case.

The security risk associated with unirradiated fuel does not increase when the fuel is on site because its engineered safety features, storage, and configuration have not changed from when the fuel was in transit. For transit and receipt on site, the same physical protection requirements are applied to protect the fuel.[2] Therefore, safety and security risks associated with unirradiated nuclear fuel only begin to increase after the nuclear fuel begins to be placed in the reactor vessel following the authorization to operate or the Commission's finding under 10 CFR 52.103(g). There is also some operational risk when the nuclear fuel is moved from transit, dry storage, and finally to the reactor vessel, but this risk is mitigated by security, operator training and qualification, and the safety- and security-related SSCs designed to provide for safe wet storage and safe transfer of fuel into the reactor vessel.

The conduct of construction activities after the authorization to operate (or the Commission's 10 CFR 52.103(g) finding) and before initial fuel load would also be expected to present a very low risk. This risk level is based on a significant reduction in the number, type, and complexity of construction activities being performed during this period. As such, extending the implementation milestone of an FFD program that meets all 10 CFR Part 26 requirements, except those in Subpart K, would not present an undue risk to safety and security. For example, although individuals may continue fabricating, erecting, integrating, and testing safety-and security-related SSCs in accordance with licensee-approved procedures that ensure

[2] The NRC gives the physical protection requirements for unirradiated commercial reactor fuel in 10 CFR 73.67.

design requirements are met, these activities will have a significantly low chance of causing an unreviewed safety question, a condition adverse to quality, an adverse safety impact, a security impact, an environmental impact, or an unreviewed change to an NRC-approved plan (e.g., quality assurance, security, fire protection, or emergency preparedness). This assessment is based on the defense-in-depth regulatory framework established in 10 CFR Parts 26, 50, 52, and 73; licensee procedures and controls; NRC reviews conducted to support of the authorization to operate and the Commission's 10 CFR 52.103(g) finding; and NRC oversight of licensee activities as the plant transitions from construction to reactor operation.

The NRC finds that the implementation of an FFD program that is not informed by risk is inconsistent with one of the NRC's Principles of Good Regulation (NRC, 2014c), reliability, which states, in part, that NRC regulations should be based on the best available knowledge from research and operational experience, and the NRC's Strategic Plan (NRC, 2018f), Safety Strategy 2, which states, as a Contributing Activity, that the NRC uses "risk-informed approaches to enhance the effectiveness and efficiency of the regulatory framework that appropriately consider defense-in-depth, risk insights, and margins of safety." In addition, requiring implementation of a more robust FFD program without a corresponding regulatory need is inconsistent with the graded approach incorporated into FFD requirements. This approach imposes requirements that are commensurate with the potential risks to public health and safety and the common defense and security that construction activities may pose when a plant begins operations.

Implementation of an FFD program that meets all 10 CFR Part 26 requirements except those in Subpart K during this period of construction would also place an unnecessary burden and cost on the licensee or other entity if it elects to receive nuclear fuel on site very shortly after the 10 CFR 52.103(g) finding but before any significant change in risk, warranting the need to implement an FFD program that meets all 10 CFR Part 26 requirements except those in Subpart K. This burden and cost occur because a more comprehensive FFD program would be implemented on a larger population of construction workers for a longer period.

Medical Review Officer Evaluation of a Donor's Urine Specimen

Under 10 CFR 26.401(a), a licensee has the option to implement two FFD programs on its construction site—one applicable to individuals who perform the duties specified in 10 CFR 26.4(e) and one applicable to individuals who perform the duties specified in 10 CFR 26.4(f). Based on operating experience gained from FFD program implementation at nuclear power plant construction sites, the NRC identified a process difference between the protections afforded to these two groups of individuals if a drug testing laboratory reports a donor's urine specimen as "dilute." Even though all these individuals are subject to essentially the same FFD drug and alcohol testing program requirements and sanctions under 10 CFR Part 26, individuals described in 10 CFR 26.4(f) are not afforded the same protection as those individuals described in 10 CFR 26.4(e) because, under a Subpart K FFD program applicable to 10 CFR 26.4(f) individuals, the MRO is not provided the option to review a dilute urine specimen. Instead, under an FFD program applicable to 10 CFR 26.4(e) individuals who are subject to an FFD program that implements all 10 CFR Part 26 requirements except Subpart K, the MRO can review a dilute urine specimen at the licensee's discretion under 10 CFR 26.183(c). The MRO's review of a dilute specimen benefits the tested individual because laboratory identification of dilute urine could indicate an adverse physiological condition related to the donor's muscular metabolism or kidney function. Further, for 10 CFR 26.4(e) individuals, urine specimens can be subject to an additional evaluation, which informs the

licensee's or other entity's assessment of the donor's trustworthiness, reliability, and FFD. Regulatory consistency would benefit individuals subject to the licensee's Subpart K FFD program because these individuals could then be afforded equivalent worker protection from an unjustified 10 CFR Part 26 sanction that could originate from an incomplete MRO evaluation of a drug testing result involving a dilute urine specimen.

This is also important because a dilute urine specimen is an indication that the individual may have attempted to subvert the drug test through excessive hydration (before providing the urine specimen) in an attempt to lower in situ drug metabolite concentrations to below 10 CFR Part 26 cutoff levels, and testing for dilute urine specimens is only one of a few tests that are conducted to determine whether someone has attempted to subvert the drug test.[3] This could be significant for licensees and other entities who are constructing a commercial power reactor because these facilities have a higher incidence of subversion attempts than operating facilities. For example, from 2012 to 2017, approximately 42 percent per year on average of all subversion attempts in the commercial nuclear industry occurred at power reactor construction sites.

Clarifying Regulatory Language

Operating experience learned from the industry and from NRC inspections has not suggested that the issues described in the following paragraphs have resulted in safety or security concerns. However, clarifying regulatory language to address the issues would be consistent with the NRC's Principles of Good Regulation.

Use of the Word "Entities": Unlike 10 CFR 26.401(a), which uses a form of the phrase "licensee or other entity" three times, and 10 CFR 26.401(c), which also uses the phrase "licensee or other entity," 10 CFR 26.401(b) only refers to "entities." As described in the preamble of the 2008 10 CFR Part 26 final rule, the NRC intended for the 10 CFR 26.401(b) provision to apply to "licensees and other entities," and not just "entities." Consequently, the rule text is inconsistent with related provisions and the stated intent of the Commission.

Individuals Directing the Construction of Safety- or Security-Related SSCs: The NRC has learned that 10 CFR 26.419, "Suitability and fitness evaluations," is not clear. Under 10 CFR 26.419, licensees and other entities must develop, implement, and maintain procedures for evaluating whether to assign individuals to construct safety- or security-related SSCs. However, 10 CFR 26.419 does not address those individuals who direct the construction of safety- and security-related SSCs. In the 2008 10 CFR Part 26 Final Rule preamble, the Commission explained that 10 CFR 26.419 is supposed to require licensees and other entities to have the procedures for evaluating individuals for assignment to "the duties specified in § 26.4(f)." Those duties in 10 CFR 26.4(f) are constructing and directing the construction of safety- or security-related SSCs.

Consequently, the rule text of 10 CFR 26.419 is inconsistent with the stated intent of that provision in the preamble to the 2008 Part 26 final rule. Furthermore, the unclear language in 10 CFR 26.419 could have an adverse impact on licensees or other entities because, depending on the types of construction activities being performed, a significant population of the construction site workforce (i.e., those individuals who direct the construction of safety-and security-related SSCs) would not be subject to fitness determinations.

[3] A subverted drug test may also be identified by, for example, temperature, adulteration, substitution, and validity testing.

"Reviewing Official" in 10 CFR Part 26, Subpart K: Based on operating experience, the NRC has learned of a regulatory inconsistency affecting a "reviewing official" as defined in 10 CFR 26.5, "Definitions." This definition states that the reviewing official is an "employee of a licensee or other entity specified in 10 CFR 26.3(a) through (c), who is designated by the licensee or other entity to be responsible for reviewing and evaluating any potentially disqualifying FFD information about an individual, including, but not limited to, the results of a determination of fitness, as defined in 10 CFR 26.189, in order to determine whether the individual may be granted or maintain authorization." A licensee or other entity specified in 10 CFR 26.3(c) that implements a Subpart K FFD program is not required to use a reviewing official to disposition potentially disqualifying information or evaluate an individual's fitness to perform his or her duties safely and competently. However, these licensees or other entities must also implement an FFD program that meets all of 10 CFR Part 26, except Subpart I, "Managing Fatigue," and Subpart K, for those individuals who perform the construction-related activities specified in 10 CFR 26.4(e), and licensees or other entities must use a reviewing official in an FFD program that meets all of 10 CFR Part 26, except Subparts I and K. There is no regulatory reason for requiring the use of a reviewing official in one FFD program but not the other.

Nuclear Energy Institute (NEI) 06-06, "Fitness-for-Duty Program Guidance for New Nuclear Power Plant Construction Sites," Revision 6, (NEI, 2013) as endorsed by RG 5.84, "Fitness-for-Duty Programs at New Reactor Construction Sites," Revision 0, issued July 2015 (NRC, 2015a), correctly uses the reviewing official terminology in that it provides for the licensee or other entity to rely on a reviewing official to make FFD authorization determinations for individuals specified in 10 CFR 26.4(e) and, at the licensee's or other entity's discretion, in accordance with 10 CFR 26.4(f). The FFD programs at power reactor construction sites demonstrated this use. These licensees and other entities implemented the guidance in RG 5.84 and used the phrase "reviewing official," whether referring to construction site access adjudications under an FFD program for construction or under the collocated operating reactor FFD program that implements all 10 CFR Part 26 requirements, except Subpart K.

3.6.2.2 Fitness-for-Duty Alternatives

Alternative FFD-1: No-Action Alternative

This alternative would not incorporate lessons learned from nuclear reactor construction sites. Therefore, future licensees and other entities would have to request regulatory relief from the NRC to enhance the flexibility afforded to construction planning and execution that was approved for the VEGP construction site. In addition, implementation of an FFD program that meets all 10 CFR Part 26 requirements, except Subpart K, by future licensees and other entities would not be commensurate with risk and would result in unnecessary costs unless the licensee requests an exemption. This alternative also would neither improve worker protections associated with an MRO review of dilute urine specimens nor clarify rule language.

Alternative FFD-2: Rulemaking

Under Alternative FFD-2, the NRC would pursue rulemaking to address the regulatory issues discussed about escorting construction workers, changing 10 CFR Part 26 implementation based on risk insights learned from reactor plant construction, allowing MRO evaluation of a donor's urine specimen, and clarifying regulatory language.

The NRC would address the escorting of construction workers who perform the duties specified in 10 CFR 26.4(f) by amending 10 CFR 26.4(e) to add a new requirement that the escort be subject to an FFD program that meets all 10 CFR Part 26 requirements, except Subparts I and K; 10 CFR 26.4(f) to state that individuals who are escorted need not be subject to the licensee's FFD program; 10 CFR 26.5 to define "escort" as a person who is designated by the licensee or other entity to be responsible for directly observing an individual who has been assigned to perform duties and responsibilities or maintain the type of access described in 10 CFR 26.4(f) but is not subject to the requirements in 10 CFR Part 26; and 10 CFR 26.403(a) and (b) to require the licensee or other entity to establish, implement, and maintain procedures for escorts and individuals under escort. The NRC would also propose a conforming change to regulatory guidance.

The NRC would require implementation of an FFD program that meets all 10 CFR Part 26 requirements, except Subpart K, at initial fuel load by amending 10 CFR 26.3(a) and (c) to replace the words "before the receipt of special nuclear material in the form of fuel assemblies" with "before initial fuel load into the reactor."

The NRC would address the issue with MRO evaluation of a donor's urine specimen by amending 10 CFR 26.405(g) in a manner that is consistent with the MRO review of dilute specimens under 10 CFR 26.183(c). This would enhance worker protections and licensee or other entity assessment of the individual's trustworthiness, reliability, and fitness. The agency would address the issue to clarify regulatory language by amending 10 CFR 26.401(b) to replace "entities" with "licensees and other entities"; amending 10 CFR 26.419 to include the category of individuals who direct the construction of safety- and security-related SSCs; and amending 10 CFR 26.5 and 10 CFR 26.405(g) to explain that suitability and fitness evaluations required under 10 CFR 26.419 would be performed by a licensee's or other entity's designated reviewing official.

Additionally, the staff would revise the guidance in RG 5.84 and DG-5040, "Urine Specimen Collection and Test Result Review under 10 CFR Part 26, 'Fitness for Duty Programs,'" to address the escorting of individuals and the MRO review of dilute urine specimens and make other conforming changes.

Other Alternatives Considered

In the draft regulatory basis, the NRC considered and then rejected a more focused rulemaking alternative for this topic because it did not address the subversion of urine specimens—a significant issue for licensees and other entities that are constructing a commercial power reactor because of the relatively high number of subversion attempts at construction sites.

3.7 Emergency Planning Requirements

3.7.1 Regulatory Issue

Emergency Plan Change Process

At a January 15, 2019, Category 3 public meeting, NEI representatives discussed the lack of clarity on whether the emergency plan change process in 10 CFR 50.54(q) applies to 10 CFR Part 52 licensees before the Commission's 10 CFR 52.103(g) finding. 10 CFR 50.54(q)(2) provides an exception for holders of a COL from the requirements of 10 CFR 50.54(q)(2) to follow and maintain the effectiveness of the licensee's emergency plan

before the 10 CFR 52.103(g) finding. So, a COL holder could have an approved emergency plan, but the licensee would not be required to implement that plan, and the plan would not be "in effect," at the time the COL is issued. For example, the plan may state that the licensee will have a fully staffed and trained fire brigade. The licensee likely will not have the fire brigade established when the COL is issued. However, if the licensee, before a finding under 10 CFR 52.103(g), decides to eliminate the fire brigade and rely on a local fire department, then the licensee would need to evaluate that change under 10 CFR 50.54(q)(3) and (4).

The introductory text of 10 CFR 50.54, "Conditions of licenses," which lists the paragraphs within 10 CFR 50.54 that are excepted for COL holders before the 10 CFR 52.103(g) finding, does not include any portion of 10 CFR 50.54(q). Not identifying this exception in the introduction was an oversight during the 2011 emergency preparedness rulemaking (76 FR 72560; November 23, 2011) and could introduce some confusion as to whether other paragraphs of 10 CFR 50.54(q) are applicable before the 10 CFR 52.103(g) finding.

Emergency Preparedness Exercises

The NRC has identified an issue in Section IV.F.2.a.(iii) of Appendix E to 10 CFR Part 50 as it relates to the requirement for a full participation exercise to be conducted for each subsequent reactor constructed at a site with an existing licensed nuclear power reactor. Exercises for each subsequent reactor at a site may not be needed for certain licensees if there are no significant differences between the operating reactor and the new reactor with respect to reactor technology and the emergency preparedness and response resources, procedures, equipment, facilities, and emergency response organizations. In these circumstances, requiring a subsequent exercise may not provide any additional benefits to either regulatory oversight or the protection of public health and safety because previous exercises, conducted as part of the existing reactor's exercise cycle, may be adequate to establish reasonable assurance.

Significant Impediments to the Development of Emergency Plans

Extent of Siting Analysis: In the preamble for the reactor siting criteria final rule (61 FR 65157; December 11, 1996), the Commission highlighted a concern that confusion may arise about the scope of the area surrounding the site:

> It is sufficient for an applicant to identify any physical site characteristics that could represent a significant impediment to the development of emergency plans, primarily to assure that "A range of protective actions have been developed for the plume exposure pathway emergency planning zone for emergency workers and the public," as stated in the planning standards.

Accordingly, the NRC modified the appropriate sections of 10 CFR Part 100, "Reactor Site Criteria" (e.g., 10 CFR 100.21(g)) to state that "physical characteristics unique to the proposed site that could pose a significant impediment to the development of emergency plans must be identified." This language is identical to that in 10 CFR 52.17(b)(1), except 10 CFR 52.17(b)(1) also contains the phrase, "such as egress limitations from the area surrounding the site." The agency removed this phrase from 10 CFR 100.21(g) in an attempt to eliminate any confusion that might arise concerning its scope.

However, the statement, "such as egress limitations from the area surrounding the site," does not go far enough to distinguish whether the exact area under consideration is the site, the plume exposure pathway emergency planning zone (EPZ) within which prompt protection

actions may be warranted, or some other area. In addition, because the phrase, "such as egress limitations from the area surrounding the site," appears in 10 CFR 52.17(b)(1), that language remains unclear with respect to what extent the "site" should be evaluated, particularly if the size of the EPZ has not yet been determined at the ESP stage.

Aside from the regulations in 10 CFR 52.17(b)(1), the guidance associated with siting criteria does not define the site area under consideration. RG 4.7, "General Site Suitability Criteria for Nuclear Power Stations," Revision 3, issued March 2014 (NRC, 2014a), describes a method the NRC considers acceptable to implement the site suitability requirements for nuclear power stations. RG 4.7 states the following:

> The site and its vicinity, including the population distribution and transportation routes, should be examined and evaluated to determine whether there are any characteristics that would pose a significant impediment to taking actions to protect the public in an emergency.

However, RG 4.7 does not define the terms "site" and "vicinity." In RG 4.7, the NRC recommends that an evacuation time estimate (ETE) be made for the entire plume exposure pathway EPZ. NUREG-0654/FEMA-REP-1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," Revision 2, issued December 2019 (NRC and FEMA, 2019), provides similar guidance. This guidance recommends that an ESP applicant identify unique physical characteristics of the site by performing a preliminary analysis of the time required to evacuate various sectors and distances within the plume exposure pathway EPZ for transient and permanent populations, noting major impediments to the evacuation or to taking other protective actions.

While this is one acceptable method of demonstrating the suitability of the site, both guidance documents assume a 10-mile EPZ is appropriate for the site. However, as described 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," issued December 1978 (NRC and Environmental Protection Agency (EPA), 1978), the EPZ is only a planning tool to aid in the development and implementation of predetermined prompt protective actions. In addition, EPZs are scalable in-size, as appropriate to the facility (e.g., a site-boundary EPZ, a 5-mile EPZ), as allowed by the regulations in 10 CFR 50.33(g). Furthermore, as discussed in NUREG-0396, protective actions, in general, are not constrained to areas within the EPZ, nor does the capability for taking protective actions rely solely on the establishment of an EPZ. Thus, the EPZ may not necessarily be the same area under consideration for the siting requirements.

Review of Early Site Permit Emergency Plans: While the reactor siting criteria relate to components of the emergency plan, none of the siting factors and criteria are planning standards for emergency plans, such as those in 10 CFR 50.47(b). More importantly, the site characteristics are not material to findings on the adequacy of the emergency plan. This distinction was made in the preamble for the reactor siting criteria final rule, in which the Commission stated the following:

> emergency planning is required as a matter of prudence and for defense-in-depth, and that the adequacy of an emergency plan was to be judged on the basis of its meeting the 16 planning standards given in 10 CFR 50.47(b). Hence, the characteristics of the site, which determine the evacuation time for the plume exposure pathway emergency planning zone, have not entered into the

> determination of the adequacy of an emergency plan. Emergency plans developed according to the above planning standards will result in reasonable assurance that adequate protective measures can be taken in the event of emergency.

An ESP applicant may propose major features of its emergency plan under 10 CFR 52.17(b)(2)(i) or propose a complete and integrated emergency plan under 10 CFR 52.17(b)(2)(ii). Both 10 CFR 52.17(b)(2)(i) and (ii) require the NRC's review and approval, to include consultation with the Federal Emergency Management Agency (FEMA).

Regulations in 10 CFR 52.18, "Standards for review of applications," also require consultation with FEMA during the NRC review of the acceptability of emergency plans. These consultation requirements are consistent with the regulations in 10 CFR 50.47(a) describing how the NRC and FEMA will make their findings and determinations on the adequacy of emergency plans. However, 10 CFR 52.18 could be interpreted to impose an additional requirement for consultation with FEMA on the information required by 10 CFR 52.17(b)(1), without clarifying whether the consultation is for purposes of siting or emergency planning.

The NRC review conducted "in consultation with FEMA" is an explicit requirement of 10 CFR 52.17(b)(2)(i) and (ii), but it is not a requirement of 10 CFR 52.17(b)(1). The first part of 10 CFR 52.17(b)(1) is a siting criterion: "The site safety analysis report must identify physical characteristics of the proposed site, such as egress limitations from the area surrounding the site, that could pose a significant impediment to the development of emergency plans." This is aligned with the siting criteria of 10 CFR Part 100. However, unlike 10 CFR 52.18, which requires consultation with FEMA on the information required by 10 CFR 52.17(b)(1), 10 CFR Part 100 does not require consultation with FEMA to support the NRC finding on the suitability of the site. Under 10 CFR Part 50, the mitigation of physical impediments would be addressed in the PSAR during the application for a CP. In accordance with Section II.G of Appendix E to 10 CFR Part 50, applicants are required to perform a preliminary analysis of the time required to evacuate various sectors and distances within the plume exposure pathway EPZ for transient and permanent populations, noting major impediments to the evacuation or implementation of protective actions. As stated in the introductory paragraph to Section II of Appendix E to 10 CFR Part 50, the PSAR must contain sufficient information to ensure the compatibility of proposed emergency plans for both onsite areas and the EPZs with respect to considerations such as access routes, surrounding population distributions, land use, and local jurisdictional boundaries for the EPZs. As such, any identified major impediments would be reviewed for compatibility with offsite plans, and the NRC would consult with FEMA as required by 10 CFR 50.47(a)(2).

After the siting criteria, 10 CFR 52.17(b)(1) contains additional language stating that if significant impediments to the development of emergency plans are identified, then the applicant must determine the measures that would, when implemented, mitigate or eliminate the significant impediments. This part of 10 CFR 52.17(b)(1) relates directly to the development of emergency plans because, if significant impediments are identified, then consultation with FEMA would be needed in accordance with 10 CFR 52.18. But 10 CFR 52.18 does not make the distinction between the two parts of 10 CFR 52.17(b)(1) or specify which part requires consultation with FEMA and why. Also, confusion may arise from the use of a double negative to identify significant impediments. Specifically, 10 CFR 52.18 states, in part, the following:

> The Commission shall determine, after consultation with FEMA, whether the information required of the applicant by § 52.17(b)(1) shows that there is not

> significant impediment to the development of emergency plans that cannot be mitigated or eliminated by measures proposed by the applicant….

Consequently, 10 CFR 52.18 could be interpreted to impose a requirement to consult with FEMA on the ESP application that is not consistent with the review that would be performed under 10 CFR Part 100 for reactor siting.

Offsite Contacts, Arrangements, and Certifications: The NRC determined that the requirements for contents of ESP applications in 10 CFR 52.17(b)(4) do not effectively differentiate between the level of emergency plan approval sought and the corresponding contacts, arrangements, and certifications that are necessary to support the review of the application.

Generally, contacts and arrangements are developed as necessary to support an applicant's emergency preparedness functions that depend on offsite agencies. The requirement that contacts and arrangements be described in the site safety analysis report (SSAR) for an application with no emergency plan or major features of an emergency plan is subject to multiple interpretations. For example, does the applicant need to make contacts and arrangements to describe them, or does the applicant only need to describe any contacts and arrangements with offsite agencies that occurred while determining whether any significant impediments exist under 10 CFR 52.17(b)(1)? If the applicant is not seeking approval of emergency preparedness elements that involve offsite agencies, then requiring the applicant to develop contacts and arrangements that are not material to their application may present an undue regulatory burden. It also acts to limit the flexibility afforded to applicants and may have associated negative impacts. For example, it could be more efficient to establish contacts and arrangements in the development of a complete and integrated emergency plan as part of the COL application than to develop them for an application with no emergency plan or major features of an emergency plan.

Regulations in 10 CFR 52.17(b)(4) require ESP applications complying with 10 CFR 52.17(b)(1) or (b)(2)(i) to include any certifications that have been obtained, and if they cannot be obtained, then an adequate compensatory utility plan must be included. The certifications requirement in 10 CFR 52.17(b)(4) can be broken down into two separate issues: (1) when certifications should be required and (2) when compensatory plans should be required when certifications cannot be obtained.

The need for an applicant to provide certifications is clearly dependent on the need for contacts and arrangements. If contacts and arrangements are not needed to establish support from an agency or organization, then an applicant should not need a certification committing the offsite agency or organization to provide that support. Certifications are needed in two cases: (1) to show that any plans that were developed to mitigate a significant impediment to the development of emergency plans can be implemented or (2) when the ESP application describes emergency preparedness functions that rely on a response from offsite organizations. As such, any amendments to the regulations to address the need for contacts and arrangements should clarify the requirements for when certifications and compensatory utility plans must be submitted with an ESP application.

Applications submitted under 10 CFR 52.17(b)(2)(ii) must provide complete plans such that the Commission can find that there is reasonable assurance that, in the event of an emergency, there will be adequate protection of public health and safety. Complete and integrated plans in an ESP application must meet the same standards and regulations that are required of COL applications because the ESP would establish a similar amount of finality to the proposed

emergency plans as would a COL. As such, all certifications and, when necessary, compensatory utility plans submitted under 10 CFR 52.17(b)(2)(ii) must be fully developed. This level of finality is not being sought by applications under 10 CFR 52.17(b)(1) and 10 CFR 52.17(b)(2)(i), and compensatory utility plans may not be necessary as part of an ESP application. For applications submitted under 10 CFR 52.17(b)(1) and 10 CFR 52.17(b)(2)(i), if certifications are not or cannot be obtained, then issuing an ESP without a compensatory plan could still be warranted, after which the COL application would have to provide sufficient compensatory plans.

3.7.2 Regulatory Alternatives

Alternative EP-1: No-Action Alternative

This alternative would maintain the current regulatory framework and would not pursue any amendments to regulations or revisions to guidance to address clarity issues concerning the emergency plan change process and emergency preparedness exercises, impediments to the development of emergency plans, and the need to establish offsite contacts, arrangements, and certifications.

Alternative EP-2: Rulemaking

Under this alternative, the NRC would pursue rulemaking and associated guidance to address clarity issues concerning the emergency plan change process and the emergency preparedness exercises, impediments to the development of emergency plans, and the need to establish offsite contacts, arrangements, and certifications.

To clarify the emergency plan change process, the NRC would amend the introduction of 10 CFR 50.54 to reference 10 CFR 50.54(q)(2) as being inapplicable before the Commission makes a 10 CFR 52.103(g) finding.

To clarify the emergency preparedness exercises, the NRC would amend the requirements in Sections IV.F.2.a.(i)-(iii) and j. of Appendix E to 10 CFR Part 50 to include provisions that would provide additional clarity on the timing for conducting an initial exercise, to standardize the language in Section IV.F.2.a.(ii), and to relieve COL holders from the requirement to conduct an emergency preparedness exercise for each subsequent reactor built at an operating reactor site.

To clarify the review of emergency plans in 10 CFR Part 52 and to align with the review of emergency plans under 10 CFR Part 50, the NRC would revise 10 CFR 52.18 to clarify the emergency preparedness information to be reviewed under 10 CFR 52.17(b)(1).

In addition, the NRC would revise existing guidance to clarify the extent of the analysis needed by the applicant to demonstrate compliance with the siting criteria to identify the physical characteristics of the proposed site that could pose significant impediments to the development of emergency plans created under 10 CFR 52.17(b)(1).

The guidance would provide an acceptable method for the NRC to make findings on site suitability for an ESP when applicants choose not to include the optional emergency preparedness information under 10 CFR 52.17(b)(2) or when the size of the EPZ appropriate to the facility has not yet been determined. This approach could also provide a consistent basis for comparing the suitability of one site to another. The revised guidance would define and

clarify the area that should be considered when determining site suitability and would explain techniques acceptable for use in evaluating sites for significant impediments. Using guidance to address the issue would allow applicants to propose alternate methods or solutions to meet the siting analyses under 10 CFR 52.17(b)(1).

The NRC would revise the requirements in 10 CFR 52.17(b)(4) to provide added clarity on what contacts and arrangements with offsite organizations are needed for ESP applications submitted in accordance with 10 CFR 52.17(b)(1), (2)(i), or (2)(ii). The revised regulations would differentiate the requirements for each ESP application commensurate with the level of emergency preparedness content for which finality is being sought. For an ESP application complying with 10 CFR 52.17(b)(1), the applicant would be required to include in the SSAR a description of contacts and arrangements that have been made to mitigate or eliminate any significant physical impediments to the development of emergency plans that the applicant has identified. The SSAR would also need to include certifications of those arrangements if they have been obtained. Applicants under 10 CFR 52.17(b)(2)(i) would be required to include a description of all contacts and arrangements, and associated certifications (or compensatory utility plans) for major features of the emergency for which finality is sought. Under 10 CFR 52.17(b)(1) or (2)(i), if certifications or compensatory utility plans have not been established at the ESP application stage, then they would need to be provided in the subsequent application for a COL under 10 CFR 52.79(a)(22). Applications under 10 CFR 52.17(b)(2)(ii) would continue to require complete descriptions of all contacts and arrangements, and all certifications and/or compensatory utility plans that are necessary for implementation of the emergency plan and for the Commission to make its reasonable assurance determination on the applicant's complete and integrated emergency plan.

Other Alternatives Considered

In the draft regulatory basis, the NRC considered, and then rejected, a guidance-only alternative to address the significant impediments to the development of emergency plans. Although the guidance would provide a level of detail and clarity that does not currently exist in the regulations or in guidance and would serve to enhance the accessibility of the current regulations and be of significant benefit to future ESP applicants, the staff rejected this alternative because it is not consistent with the NRC's goal to provide clear and consistent regulations.

3.8 10 CFR Part 52 Licensing Process

3.8.1 Regulatory Issue

Design Certification, Standard Design Approval, and Manufacturing License Process Changes

Current regulations establish the duration of DCs in 10 CFR 52.55, "Duration of certification," for a period of 15 years from the date of issuance of the DC. The NRC sets the requirements for applicants seeking to renew the DCs in 10 CFR 52.57, "Application for renewal," and requirements for the NRC to grant a renewal in 10 CFR 52.59, "Criteria for renewal." Section 52.61, "Duration of renewal," sets the duration for a DC renewal. The DCs that are currently in effect are in Appendix A, "Design Certification Rule for the U.S. Advanced Boiling Water Reactor," Appendix D, "Design Certification Rule for the AP1000 Design," Appendix E, "Design Certification Rule for the ESBWR Design," and Appendix F, "Design Certification Rule for the APR1400 Design," to 10 CFR Part 52. Appendices B, "Design Certification Rule for the System

80 + Design," and C, "Design Certification Rule for the AP600 Design," have expired because no timely renewal applications were submitted in accordance with 10 CFR 52.57.

Because of the inflexibility of the DC renewal regulations, application for renewal of the DC under the timely renewal provisions must be done, or else the design certification expires. This is an unnecessary regulatory burden on design vendors. Additionally, the 15-year certification period poses a problem if there is no license applicant referencing the design prior to DC renewal. In this situation, both the DC renewal applicant and the NRC expend resources to review a design renewal application that does not reflect additional insights derived from the implementation of a DC within the context of a license application.

SDAs and MLs also have duration limits that can place burdens on the holders of those approvals and the NRC similar to those of DCs. SDAs are issued for 15 years under 10 CFR 52.147 and may not be renewed. MLs are issued for not less than five, and no more than 15 years after the date of issuance under 10 CFR 52.173 and can be renewed under 10 CFR 52.177.

Change Process

Process for Making Changes to the Plant-Specific Certification Document Organization and Section Numbering: Currently, a COL applicant licensee must request an exemption to depart from the organization and numbering in the generic DCD that it is referencing in its plant-specific DCD. A process that would allow a COL applicant referencing a certified design to include in its COL application a plant-specific DCD that has an organization and numbering that depart from the organization and numbering in the generic DCD that it is referencing, without the need for an exemption request, would improve regulatory efficiency. The NRC recognizes that the organization and numbering of a plant-specific DCD is an administrative requirement not related to safety that was established to facilitate the use and review of the plant-specific DCD (or FSAR). The current requirement in Section IV.A.2 (a) of the 10 CFR Part 52 DC appendices, while intended to facilitate the review by having information presented "at appropriate points" and making the FSAR "easier to use," as discussed in SECY-96-077, "Certification of Two Evolutionary Designs," dated April 15, 1996 (NRC, 1996), may not provide sufficient flexibility to COL applicants because it requires the organization and numbering of FSAR sections to be "the same" as in the generic DCD.

For the 19 COL applications submitted to the NRC for review, eight COL applicants referencing one certified design requested exemptions from the organization and numbering requirement, primarily to include information organized according to topics identified in the NRC SRP, which the NRC uses to guide its review. This represents 14 of the 27 units for which the NRC received COL applications. The remaining 11 COL applications referencing three other designs did not request any exemptions from this regulatory requirement.

Include 10 CFR 50.59(c) Provisions in 10 CFR Part 52 Change Process: Regulations in 10 CFR 50.59(c)(4) state that 10 CFR 50.59, "Changes, tests and experiments," does not apply to changes to the facility or procedures when the applicable regulations establish more specific criteria for accomplishing such changes. The regulations in 10 CFR Part 52 do not include a similar provision. Having different change process applicability requirements for FSARs and

plant-specific DCDs in 10 CFR Part 50 and 10 CFR Part 52, respectively, may be unnecessary and could lead to confusion.

Approval Process for Changes While the Plant Is Being Constructed: Licensees of 10 CFR Part 50 commercial power reactors that propose to make changes to their facilities as described in their respective FSARs face different requirements than licensees of commercial power reactors licensed under 10 CFR Part 52 as to when they are allowed to begin making those physical changes to their facilities. For changes requiring NRC approval, licensees subject to change processes in 10 CFR 50.59 are allowed to begin making physical changes to the facility before the NRC approves the changes. However, for similar changes proposed by a licensee referencing a certified design and subject to the change processes in Section VIII.B.5 of the applicable 10 CFR Part 52 DC appendix, the licensee is allowed to begin making physical changes to the facility only after the NRC approves the change.

SDA Variance Process: No regulation in 10 CFR Part 52 provides a process for an applicant for a CP, OL, COL, or ML that references an SDA to propose a variance from the SDA. The NRC anticipates that CP, OL, COL, and ML applicants may seek to depart from referenced SDAs and that developing such regulations in 10 CFR Part 52 would provide a predictable regulatory process for the applicants and would facilitate the staff's review of requests by applicants to take variances from referenced SDAs.

Generic SDA Change Process: Similarly, 10 CFR Part 52 does not provide a process for an SDA holder to make generic changes or amend an SDA. Separately in this rulemaking, the NRC is proposing to remove 10 CFR 52.147, "Duration of design approval," which specifies a 15-year duration for SDAs and provides no opportunity to renew an SDA. With SDAs that do not expire, the NRC anticipates that SDA holders may wish to amend their SDAs, and that developing such regulations in 10 CFR Part 52 would provide a predictable regulatory process for the SDA holders and would facilitate the staff's review of requests by SDA holders to amend their SDAs.

Referencing MLs and SDAs while They Are Under Review: Regulations in 10 CFR Part 52 allow CP or COL applicants, at their own risk, to reference in their application a site for which an ESP or a design for which a DC application, respectively, has been docketed but not granted. However, 10 CFR Part 52 does not contain similar provisions for MLs or SDAs. Separately in this rulemaking, the NRC is proposing to remove the duration of SDAs, extend the maximum duration for initial and renewed MLs from 15 years to 40 years, and add an amendment process for SDAs. The NRC anticipates that CP or COL applicants, at their own risk, may desire to reference in their application a design for which an SDA or an ML application or amendment has been docketed but not granted. Revising the regulations for MLs and updating the guidance for SDAs would provide a predictable regulatory process for CP or COL applicants and would facilitate the staff's review of a CP or COL applicant that references an SDA or an ML application or amendment under review.

Design Scope and Standardization

Add Definitions of Tier 1, Tier 2, and Tier 2:* Placing identical tier definitions in each 10 CFR Part 52 DC appendix is repetitive; the tiers should be defined once, and this definition should be consistent across future 10 CFR Part 52 appendices. With regard to the content of the individual tiers, when developing DCs, applicants weigh the costs and benefits of the often-competing objectives of "standardization" and "flexibility." Deviations (i.e., departures) from Tier 1 and Tier 2* information require NRC approval, whereas some departures from Tier 2

information do not. Tier 1 and Tier 2* information should contain fundamental functional requirements, whereas Tier 2 information should contain detailed supporting technical information for Tier 1. Experience has shown that some applications have included more information in Tier 1 than necessary; therefore, licensees have had to request NRC approval for departures that, because of their minimal safety significance, would more appropriately have been handled under a procedure such as that in 10 CFR 50.59. As a result, deviations from the certified design of minimal safety significance that could have been made without NRC approval actually required NRC approval and the attendant time and effort of both the applicant and the NRC.

Currently, DC applicants are not required to include tiers in their applications. DC applicants can include no tier information, more than the three tiers as defined in the 10 CFR Part 52 DC appendices, or tiers with definitions that are different from those in current 10 CFR Part 52 DC appendices. This can lead to inconsistencies and an increased burden for DC and COL applicants in preparing applications and for the NRC in reviewing applications.

Clarify the Phrase "Essentially Complete Design": The term "essentially complete" nuclear power plant design is mentioned in 10 CFR 52.41(b)(1) and 10 CFR 52.47(c)(1) and (2), but the term is not defined in those sections or in 10 CFR 52.1, "Definitions," with other definitions of terms used in 10 CFR Part 52. In 10 CFR 52.47(c)(1) and (2), the regulations state that 10 CFR 52.47(c) relates to applicants that provide an "essentially complete" nuclear power reactor design "except for site-specific elements such as service water intake structure and the ultimate heat sink." However, the context of the use of the term in 10 CFR 52.47(c)(1) and (2) implies that a design cannot be considered "essentially complete" if it omits any element that cannot specifically be identified as site specific. That is, the term implies that the scope of the application includes all SSCs that are not considered to be site specific. The NRC also discusses this term in the 1989 final rule issuing 10 CFR Part 52, which describes it as including "all of a plant which can affect safe operation of the plant except its site-specific elements."

However, such a definition of "essentially complete design" may be considered overly restrictive. For example, during the review of the application for the DC for the Advanced Power Reactor 1400 (APR1400), the NRC and the applicant discussed whether the design of the turbine control and overspeed protection system, as presented in the DC application without many specifics, was consistent with the definition of an "essentially complete design." The proposed APR1400 design did not specify a turbine, thus giving any future COL applicant the flexibility to choose any turbine that fit within the envelope of the NRC's safety evaluation.

Requiring a detailed turbine control and overspeed protection system at the DC stage would have put limitations on the turbine design that future COL applicants would be able to choose. The NRC determined that the functional description of the turbine control and overspeed system that the applicant provided was sufficient to allow for the resolution of all safety concerns. The choice of a turbine design is not necessarily site specific, so an interpretation of "essentially complete design" as requiring detailed information about design features other than those that can be shown to be dependent on physical site characteristics could have caused the applicant to undertake design work that would more appropriately be done at the COL stage.

On some occasions, the scope of the application included some of the nonsite-specific SSCs, and the level of detail in the application was at an appropriate level to resolve all safety issues without limiting future design choices. If the NRC were to define the term "essentially complete design," it could reduce potential ambiguity in future 10 CFR Part 52 applications.

Modifying Restrictions on Changes to a DC or COL Referencing a DC for Reasons of Standardization: The NRC's experience with LARs involves the submittal of exemption requests during construction of VEGP Units 3 and 4, which referenced the AP1000 DC. Lessons learned from these licensing activities indicate that the need for the submittal and an evaluation of how standardization is maintained do not result in significant insights that support the implementation of the policy; rather, experience shows that the requirement for maintaining standardization as a criterion for allowing changes is often burdensome to a licensee without significant benefit. Additionally, experience has shown that it is challenging to evaluate whether any one particular change proposed in an LAR will decrease safety solely as a result of a reduction in standardization. The NRC recognizes that standardization is a goal of 10 CFR Part 52, and any changes made to those requirements should strive to maintain that goal when there is an appropriate safety benefit to doing so.

Revise Section IV.A.2.D of the Appendices to 10 CFR Part 52 To Clarify the Terms "Site Parameters" and "Site Characteristics": Regulations in 10 CFR 51.50(c)(2) require a COL applicant to include in its environmental report "information to demonstrate that the site characteristics for the combined license site fall within the site parameters in the design certification environmental assessment." In Section IV.A.2(d) of Appendices A through D to 10 CFR Part 52, a COL applicant referencing the DC is required to include in its application "information demonstrating compliance with the site parameters and interface requirements." During the issuance of Appendix E, the NRC recognized that the requirement, as written in Appendices A through D, described the use of site parameters and site characteristics slightly differently than in 10 CFR 51.50(c)(2). As a result, the NRC wrote Section IV.A.2(d) to be consistent with the language in 10 CFR 51.50(c)(2) and 10 CFR 52.79(d) when it issued Appendices E and F. However, the agency did not make this conforming change to Appendices A through D. Clarifying the regulatory language in Appendices A and D (the NRC is proposing to remove and reserve the expired DC Appendices B and C) would ensure consistency across DC appendices for future applicants that might reference the affected designs.

Relocate Requirements from DC Appendices Section IV to 10 CFR 52.79(d): When the NRC issued the first DC rules, it was not clear whether the requirements in Sections IV.A.1 and IV.A.2.a through IV.A.2.f of the DC appendices should be applicable to all DCs. Therefore, the NRC included them within each individual DC rule. The NRC has now issued six DC rules, and each rule includes the same requirements in Sections IV.A.1 and IV.A.2.a through IV.A.2.f. Continuing to issue DC rules with these same requirements would be an inefficient and unnecessarily repetitive method of regulating.

Design Certification Rule Section IX, Inspections, Tests, Analyses and Acceptance Criteria (ITAAC): In the final rule for the ESBWR DC (79 FR 61943; October 15, 2014), the NRC found that Section IX of that draft DC (i.e., 10 CFR Part 52, Appendix E) would be redundant to 10 CFR 52.99, "Inspection during construction; ITAAC schedules and notifications; NRC notices," and 10 CFR 52.103, "Operation under a combined license," and that it did not include any substantive requirements. In that same rulemaking, the NRC stated its intent to remove Section IX from Appendices A through D to 10 CFR Part 52 in future amendments to the regulations, separate from the ESBWR rulemaking.

SDA: Some reactor designers have informed the NRC that they are considering submitting applications for SDAs for the design of an entire reactor facility or major portions thereof. The NRC's regulations do not specify whether only one or more than one SDA may be referenced in a CP, COL, or ML application, although it is implicit that more than one SDA could cover the

final design of major portions of an entire facility. If more than one SDA exists for a particular design, and the scope of each of those SDAs covers only a major portion of the design as permitted under 10 CFR 52.135(a), then a CP, COL, or ML applicant may want to reference more than one SDA. The lack of clarity in the regulations on this matter could result in unnecessary expenditures of time and resources by both the NRC and applicants while trying to ascertain whether a CP, COL, or ML applicant can reference more than one SDA. Additionally, 10 CFR 52.133(a) is not fully consistent with 10 CFR 52.153(b); 10 CFR 52.133(a) states that a CP or COL may reference an SDA while 10 CFR 52.153(b) states that an ML may reference an SDA.

Content of Applications

Modify Requirements to Evaluate Conformance with the SRP: An applicant is required to identify differences between the design features, analytical techniques, and procedural measures proposed for its facility and the SRP acceptance criteria and evaluate how the proposed alternatives to the SRP acceptance criteria provide an acceptable method for complying with the NRC regulations. Recent experience with new reactor licensing highlighted the fact that applicants expend significant resources to evaluate the differences between their applications and the SRP. Such an extensive evaluation was not necessary because the information in the application described how the applicant's proposal met the regulations.

However, unless the SRP is up to date and customized (or technology inclusive) for the specific application, its use as a guide for reviewing some applications could impact the efficiency and effectiveness (including safety focus) of the licensing process for those applicants as well as the NRC. Although removing the requirement to compare the application to the SRP could have an adverse effect on the efficiency of the NRC acceptance review to assess the adequacy of the submittal before the application is docketed, there is no evidence that, overall, the NRC evaluations of the applications' conformance with the SRP provided a corresponding increase in staff efficiency sufficient to justify the burden expended by applicants to comply with this requirement.

Align Requirements for Timely Completion of Construction: The regulations in 10 CFR 50.100, "Revocation, suspension, modification of licenses, permits, and approvals for cause," can be read to imply that a COL could be revoked, suspended, or modified for failure to achieve timely completion of the licensee's proposed construction or alteration of the facility. This regulation is inconsistent with 10 CFR 50.55, "Conditions of construction permits, early site permits, combined licenses, and manufacturing licenses," which does not require conditioning the COL to state the earliest and latest dates for completion of the construction or modification of the facility. In addition, in the 2007 10 CFR Part 52 final rule (72 FR 49352; August 28, 2007), the Commission stated that this requirement excludes COLs given the amendment to Section 185 of the AEA that was made by Section 2801 of the Energy Policy Act of 1992 (Pub. L. 102-486, 106 Stat. 2776). The Energy Policy Act established separate requirements for COLs, such that requirements for ''standalone'' CPs, including the need to specify the earliest and latest date for completion of construction, do not apply to the CP portion of a COL. Although 10 CFR 50.100 and 10 CFR 50.55(b) are clearly inconsistent, there is no evidence that this inconsistency has caused any problems for COL applicants or holders. The requirements in 10 CFR 50.55(b) are the controlling requirements for the timely completion of the proposed construction or alteration of a facility, and those requirements are clear about which sections apply to COLs. Nevertheless, the existing inconsistency could cause confusion about the Commission's intent.

Clarify Applicable Regulatory Parts for Certified Designs: Section V.A of the design certification rules in Appendices D and E of 10 CFR Part 52 lists the applicable regulatory parts for the reactor designs the NRC certified by rule in Appendices D and E. Although 10 CFR Part 52 includes technically relevant regulations applicable to the designs certified in Appendices D and E, section V.A of these two design certification rules omitted inclusion of 10 CFR Part 52 from the list of applicable regulations. Section V.A of Appendix A includes 10 CFR Part 52 in the list of applicable regulations, so no change is proposed for Appendix A. In this proposed rule, the NRC is proposing to remove and reserve the expired Appendices B and C. Section V.A of Appendix F includes 10 CFR Part 52 in the list of applicable regulations. Including this reference in section V.A of Appendices D and E would provide greater regulatory clarity and consistency between the design certification appendices in 10 CFR Part 52.

Clarify the Requirements for EQ Program for MLs: Regulations in 10 CFR 50.49(a) require a 10 CFR Part 52 ML application to include a 10 CFR 50.49(b) program for environmental qualification (EQ) of electric equipment in its FSAR, but 10 CFR 52.157(f)(6) omits this requirement. In the 2007 10 CFR Part 52 final rule (72 FR 49352; August 28, 2007), the Commission revised 10 CFR 50.49(a) to clarify that EQ programmatic requirements apply to COLs and MLs under 10 CFR Part 52. The 2007 10 CFR Part 52 final rule also revised 10 CFR 52.79(a)(10) to include a description of the program and its implementation, required by 10 CFR 50.49(a), for the EQ of electric equipment important to safety, but the agency did not make a corresponding revision to 10 CFR 52.157(f)(6). Because MLs authorize the holder to procure certain electric equipment subject to 10 CFR 50.49, "Environmental qualification of electrical equipment important to safety for nuclear power plants," the ML applicant should be required to have a verified 10 CFR 50.49(b) EQ program like a COL applicant to ensure the equipment that can be procured will function as intended.

3.8.2 Regulatory Alternatives

Alternative LP-1: No-Action Alternative

This alternative would maintain the current regulatory framework and would not pursue any amendments to regulations or revisions to guidance to change or clarify the DC renewal process, the 10 CFR Part 50 and 10 CFR Part 52 change processes, the DCD design scope and standardization, or the content of 10 CFR Part 50 and 10 CFR Part 52 applications.

Alternative LP-2: Rulemaking

Under this alternative, the NRC would pursue the following rulemaking and associated guidance changes to modify or clarify the DC renewal process, the 10 CFR Part 50 and 10 CFR Part 52 change processes, the DCD design scope and standardization, and the content of 10 CFR Part 50 and 10 CFR Part 52 applications.

Design Certification, Standard Design Approval, and Manufacturing License Process Changes

The NRC is proposing to remove the 15-year duration for DCs established in 10 CFR 52.55 and DC renewal requirements in 10 CFR 52.57, 10 CFR 52.59, and 10 CFR 52.61, "Duration of renewal," and 10 CFR Part 52 DC appendices. This would result in DCs that never expire and, therefore, do not need to be renewed every 15 years. By eliminating these requirements, DC vendors would not be required to provide all information necessary to bring up to date the

information and data contained in previous DC applications as currently required in 10 CFR 52.57(a). Because the NRC is proposing to eliminate the 15-year duration of DCs, DC vendors would continue to be subject to DC information maintenance requirements, such as applicable requirements in Section X in each 10 CFR Part 52 DC appendix, unless the design certification is rescinded. The NRC notes that a DC vendor may seek rescission of the design certification by submitting a request under current requirements in 10 CFR 52.63(a)(1); if a rescission request is granted, this would eliminate the burden of maintaining the DC information for an extended period of time.

The NRC is proposing to remove the 15-year duration for SDAs in 10 CFR 52.147 and to revise 10 CFR 52.173 and 10 CFR 52.181 to extend the maximum duration of new and renewed MLs from 15 years to 40 years. The NRC cannot eliminate the duration of MLs because the AEA requires that licenses shall be issued for a specified period, as determined by the Commission, depending on the type of activity to be licensed, but not exceeding 40 years from the authorization to commence operations and may be renewed upon the expiration of such period.

Change Process

Process for Making Changes to the Plant-Specific Certification Document Organization and Section Numbering: The proposed changes in the rule will eliminate the organization and numbering requirement in section IV.A.2.a in each of the existing 10 CFR Part 52 DC appendices, and future appendices could be developed without this requirement. Under the proposed rule, a COL applicant could follow any organization and numbering scheme for the FSAR in their COL application without needing to ask for an exemption.

Include 10 CFR 50.59(c) Provisions in 10 CFR Part 52 Change Process: The NRC is proposing to revise section VIII.B.5 in each of the 10 CFR Part 52 DC appendices to include provisions similar to those in 10 CFR 50.59(c)(4).

Approval Process for Changes While the Plant Is Being Constructed: The NRC proposes to modify section VIII.B.5 of each 10 CFR Part 52 DC appendix to add a new paragraph to permit a licensee to make a change before the 10 CFR 52.103(g) finding. The proposed new paragraph would permit a licensee to construct an SSC in accordance with a proposed departure from Tier 2 or Tier 2* information, excluding the Tier 2* departures covered under section VIII.B.6.b., without first obtaining a license amendment.

SDA Variance Process: The NRC is proposing to add regulations to 10 CFR Part 52, subpart C, in new 10 CFR 52.93(c) and to 10 CFR Part 52, subpart E, in 10 CFR 52.145(c) and (d) that would govern how variances can be taken from one or more SDAs that are referenced in an application for a CP, an OL, a COL, or an ML.

Generic SDA Change Process: The NRC is proposing to amend regulations in 10 CFR 2.100, "Scope of subpart," 2.101, "Filing of application," 2.110, "Filing and administrative action on submittals for standard design approval or early review of site suitability issues," and 52.3(b)(1) and add a new 10 CFR 52.145(e) to allow SDA holders to make generic changes to SDAs.

Referencing MLs and SDAs while They Are Under Review: The NRC is proposing to amend regulations in 10 CFR 52.173 to allow an applicant for a CP or a COL, at its own risk, to reference in its application a design for which an ML application has been docketed but not granted. The NRC also is proposing to update its guidance to clarify that an applicant for a

COL, at its own risk, may reference in its application a design for which an SDA application has been docketed but not granted.

Design Scope and Standardization

Add Definitions of Tier 1, Tier 2, and Tier 2:* The NRC is proposing to change its regulations to add the definitions of tier information to 10 CFR 52.1 and to make the definitions consistent with the principles in SECY-19-0034, "Improving Design Certification Content." In addition, the NRC proposes to amend 10 CFR 52.47, "Contents of applications; technical information." to require DC applicants to identify Tier 1, Tier 2, and Tier 2* information in their applications.

Clarify the Phrase "Essentially Complete Design": The NRC proposes to amend 10 CFR 52.1 to add a definition of "Essentially complete nuclear power plant design," and amend 10 CFR 52.41(b)(1) to provide clarity.

Modifying Restrictions on Changes to a DC or COL Referencing a DC for Reasons of Standardization: The NRC is proposing to amend its regulations to remove the requirement to consider standardization as a criterion to justify requested changes in a standard design. Specifically, the NRC proposes to revise 10 CFR 52.63(b)(1) to remove the requirement to discuss standardization as a criterion to justify making changes to a standard design through applicant or licensee exemption requests.

Revise Section IV.A.2.D of the Appendices to 10 CFR Part 52 To Clarify the Terms "Site Parameters" and "Site Characteristics": The NRC is proposing to amend section IV.A.2.d of DC Appendices A and D to make them similar to existing language in DC Appendices E and F.

Relocate Requirements from DC Appendices Section IV to 10 CFR 52.79(d): The NRC is proposing to move to 10 CFR 52.79(d) the requirements in sections IV.A.1 and IV.A.2.a through f of Appendices A, D, E, and F to 10 CFR Part 52 with one exception. For Appendices A, D, and F, the NRC is proposing to remove and reserve sections IV.A.1 and IV.A.2 and renumber sections IV.A.3 and IV.A.4 as sections IV.A.1 and IV.A.2. For Appendix E, the NRC is proposing to remove and reserve sections IV.A.1 and IV.A.2.a through f and renumber section IV.A.2.g and h as section IV.A.1.a and b and sections IV.A.3 and IV.A.4 as sections IV.A.2 and IV.A.3.

Design Certification Rule Section IX, Inspections, Tests, Analyses and Acceptance Criteria (ITAAC): The NRC is proposing to change the regulations in Appendix D of 10 CFR Part 52. Specifically, the NRC proposes to remove and reserve section IX, "Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC)," in this appendix.

Content of Applications

Modify Requirements to Evaluate Conformance with the SRP: The NRC is proposing to remove and reserve 10 CFR 50.34(h), 52.17(a)(1)(xii), 52.47(a)(9), 52.79(a)(41), 52.137(a)(9), and 52.157(f)(30). The NRC is proposing to remove these requirements, which apply to applications for light-water cooled nuclear power plants, that require an applicant to include an evaluation of conformance with the Standard Review Plan in effect 6 months before docketing of an application.

Align Requirements for Timely Completion of Construction: The NRC is proposing to remove from 10 CFR 50.100 the phrase about the applicability of provisions of 10 CFR 50.55(b) to combined licenses.

Clarify Applicable Regulatory Parts for Certified Designs: The NRC is proposing to amend section V.A of the design certification rules in Appendices D and E of 10 CFR Part 52 to include 10 CFR Part 52 in the list of applicable regulations.

Clarify the Requirements for EQ Program for MLs: The NRC is proposing to amend 10 CFR 52.157(f)(6) to require a description of a 10 CFR 50.49(b) EQ program.

3.9 Environmental

Regulations in 10 CFR 51.50(a) do not specify that a CP applicant can incorporate by reference the environmental document prepared by the NRC staff for a different approval. This represents an inconsistency and lack of clarity in the regulations because 10 CFR 51.50(c) affirmatively states that COL applicants may reference in their environmental reports information contained in a final environmental document prepared by the NRC (e.g., an EA in the case of an application referencing a DC). Section 10 CFR 51.50(a) does not specify whether a CP applicant may reference such a document. Although 10 CFR 51.50(a) does not explicitly forbid CP applicants from referencing final NRC environmental documents, the differing language raises the question of whether the NRC intended for different reference requirements to apply to CP and COL applicants.

Alternative EN-1: No-Action Alternative

The regulation would continue the current potentially divergent regulatory approach with respect to COL and CP applicants and their ability to rely on an environmental document prepared by the NRC staff for a different approval. Although the current regulatory framework would allow the CP applicant to base its severe accident mitigation design alternative (SAMDA) analysis in the CP environmental report on what was done in a referenced DC EA (to show that the applicant fits the conditions for relying on the DC EA's results), the differing language raises the question of whether the NRC intended different reference requirements to apply to CP and COL applicants. Because the regulations do not provide for the CP applicant to directly reference the DC EA, the CP applicant and the NRC would need to repeat the preparation of the EA done for the DC. This regulatory structure unnecessarily treats two classes of applicants differently, creating unnecessary burden and lack of clarity for CP applicants by not providing them with the ability to reference the analysis of an existing EA.

Alternative EN-2: Rulemaking

Under this alternative, the NRC would pursue rulemaking to bring 10 CFR 51.50(a) into conformance with 10 CFR 51.50(c) to explain that an applicant for a CP can incorporate by reference an environmental document prepared by the NRC staff for a different approval. By revising 10 CFR 51.51(a), the NRC would explicitly give CP applicants the same regulatory option provided to COL applicants with respect to the ability to rely on environmental report information contained in a final environmental document prepared by the NRC. For example, ff the DC EA is referenced, then similar to COL applicants that reference a DC EA, the CP applicant must include information in its environmental report to demonstrate that the site characteristics for the CP site fall within the site parameters in the DC EA. This would obviate the need for a CP applicant to perform a full SAMDA analysis.

3.10 Applicability of Other Processes to the Part 52 Progress

3.10.1 Definition of Contested Proceeding in 10 CFR 2.4

The regulation in 10 CFR 52.103(a) requires the NRC to issue a notice of opportunity of a hearing on compliance with the acceptance criteria in a COL (i.e., an ITAAC hearing) not less than 180 days before the scheduled date of fuel load. Although an ITAAC hearing is treated as a contested proceeding under some regulations (e.g., 10 CFR 2.340(c)), the definition of "contested proceeding" in 10 CFR 2.4, "Definitions," does not currently include ITAAC hearings within its scope. The inconsistency in regulatory language and ambiguity in the applicable hearing process could lead to disputes that would unnecessarily consume time and resources.

Alternative 1: No-Action Alternative

Under this alternative, the NRC would not pursue amending the regulations and would retain the current language of 10 CFR 2.4.

Alternative 2: Rulemaking to Amend 10 CFR 2.4

Under this alternative, the NRC would pursue amending 10 CFR 2.4 to include ITAAC hearings in the definition of "contested proceeding." This alternative would align the definition of "contested proceeding" with the ITAAC hearings in other parts of the regulations. This amendment would advance several regulatory interests. As part of the NRC's Principles of Good Regulation, the NRC commits to clarity and transparency in regulation; clarifying regulatory definitions when there is an opportunity to do so is consistent with this commitment. The clarification would advance stakeholders' understanding of the ITAAC hearing process and, in doing so, minimize the potential for disputes on what the applicable hearing process is during the period when an opportunity for hearings on ITAAC closure occurs (e.g., filings to the Commission seeking clarification on procedures may be avoided, which would save time and resources).

3.10.2 Maintenance of Records for Combined License Holders

The regulation in 10 CFR 50.71(e)(3)(iii) requires annual updates to the FSAR following the docketing of an application for a COL until the Commission finds that the acceptance criteria in the COL are met under 10 CFR 52.103(g). The applicability of requirements in 10 CFR 50.71 to a COL applicant that has asked the NRC to suspend its review of the application or to a COL holder that has notified the NRC that the COL holder is not pursuing construction may create an unnecessary burden on the COL applicant or holder. The regulation requires annual updates to the FSAR for new information or reevaluated conditions, but an applicant that has asked the NRC to suspend its review would not have new information or reevaluated conditions, so an update—even a submittal explaining the lack of any updates—would be an unnecessary burden on the applicant. Similarly, a COL holder that is maintaining its COL but has notified the NRC that it is not undertaking, or plans to suspend, construction of the facility is subject to the same requirement and, therefore, the same burden.

Alternative 1: No-Action Alternative

Under this alternative, the NRC would not pursue amending its regulations and would retain the current requirements in 10 CFR 50.71(e)(3)(iii). COL holders that are not pursuing construction, and COL applicants that have requested suspension of the application review, would continue

to send in an annual letter stating that no FSAR information has been revised, deleted, or added since the last submittal and that there have been no new departures or changes to the departures described in the application. This alternative would retain the reporting burden on a COL applicant that has requested that the NRC suspend its review and a COL holder that is not pursuing construction.

Alternative 2: Rulemaking to Amend 10 CFR 50.71

Under Alternative 2, the NRC would pursue rulemaking to amend the regulations so that a COL applicant that requested suspension of the NRC review and a COL holder that is not pursuing construction are not required to update the FSAR until the NRC is notified to resume its review of the application or until the COL holder has notified the NRC that it plans to begin construction, or, in the case of construction cessation, plans to resume construction. This alternative would decrease the reporting burden on the COL applicant with an application in suspended status and the COL holder that is not pursuing construction.

3.10.3 Backfitting and Issue Finality

The regulation in 10 CFR 50.109(a)(3) allows the NRC to take a backfitting action only if the proposed action is justified with a backfit analysis or meets one of the three exceptions to the requirement to perform a backfit analysis listed in 10 CFR 50.109(a)(4): (1) when the NRC's proposed action is necessary to bring a facility into compliance (10 CFR 50.109(a)(4)(i)), (2) when the NRC's proposed action is necessary to ensure adequate protection (10 CFR 50.109(a)(4)(ii)), and (3) when the NRC's proposed action defines or redefines the level of protection deemed adequate to ensure public health and safety or the common defense and security (10 CFR 50.109(a)(4)(iii)).

The regulations in 10 CFR 50.109(a)(1)(iv) and (v) specify the date upon which SDAs and MLs are considered within the scope of the 10 CFR Part 50 backfitting provisions. In addition, 10 CFR 50.109(a)(1)(vii) addresses the applicability of the 10 CFR Part 50 backfitting provisions to COLs that reference an SDA, ESP, or ML.

For a COL that references an SDA, 10 CFR 50.109(a)(1)(vii) states that the provisions in 10 CFR 52.145, "Finality of standard design approvals; information requests," apply with respect to design matters resolved in the SDA. For holders of COLs referencing an ML, 10 CFR 50.109(a)(1)(vii) states that the provisions of 10 CFR 52.171, "Finality of manufacturing licenses; information requests," apply with respect to matters resolved in the ML proceeding. For a COL that references an ESP, 10 CFR 50.109(a)(1)(vii) states that the provisions of 10 CFR 52.39, "Finality of early site permit determinations," apply with respect to the site characteristics, design parameters, and terms and conditions specified in the ESP.

For SDAs, the regulations in 10 CFR 52.145(a) provide for issue finality under certain conditions. This provision requires the NRC and the Advisory Committee on Reactor Safeguards to use an SDA when reviewing a facility license application that incorporates the SDA by reference "unless there exists significant new information that substantially affects the [SDA's approval] or other good cause."

For ESPs, the regulations in 10 CFR 52.39(a) provide for issue finality after the ESP has been issued and during the term of a renewed ESP, when making findings for issuance of a CP or COL or any enforcement hearing, and when conducting hearings as specified in 10 CFR 52.39(c).

For MLs, issue finality is provided in 10 CFR 52.171(a)(1), which states that such issue finality extends through the term of the ML.

In addition, 10 CFR 52.171(a)(2) provides that any modification to the design of a manufactured power reactor that is imposed by the Commission under 10 CFR 52.171(a)(1) will apply to "all reactors manufactured under the license...except...[cases where] the modification has been rendered technically irrelevant by [a license amendment or departure.]" The discussion in 10 CFR 52.171(a)(3) delineates the nature of finality associated with the referencing of a manufactured power reactor in subsequent NRC licensing proceedings. This regulation describes how, when making findings to support the issuance of a CP, OL, or COL for an application that references an ML, or in most enforcement hearings for which a power reactor manufactured under 10 CFR Part 52, Subpart F, "Manufacturing Licenses," is referenced or used, issue finality applies to all matters resolved in the issuance or renewal of the ML.

These requirements pertaining to backfitting and issue finality in 10 CFR Part 50 and 10 CFR Part 52, respectively, overlap in some areas and create inconsistencies. The current inconsistencies in the regulations may lead to confusion about the applicable criteria for imposing changes to SDAs, MLs, and ESPs.

Alternative 1: No-Action Alternative

Under this alternative, the NRC would not pursue amending its regulations and would retain the current regulatory language in 10 CFR 50.109, "Backfitting"; 10 CFR 52.145; 10 CFR 52.39; and 10 CFR 52.171. The existing backfitting requirements related to SDAs, ESPs, and MLs would be retained in 10 CFR 50.109, while the more specific provisions would continue to appear in 10 CFR Part 52. This alternative would not resolve the current inconsistencies in backfitting and issue finality requirements for SDAs, ESPs, and MLs, and therefore would not resolve the underlying concerns.

Alternative 2: Rulemaking to Eliminate Certain 10 CFR 50.109 Provisions for SDAs, ESPs, and MLs

Under this alternative, the NRC would pursue rulemaking to make the following changes to its regulations:

- Delete 10 CFR 50.109(a)(1)(v) for MLs and remove the words "or manufacturing license" from the definition of "backfitting" in 10 CFR 50.109(a)(1).
- Delete the phrase in 10 CFR 50.109(a)(vii) referencing how 10 CFR 52.39 applies to a COL referencing an ESP.
- Delete the sentence in 10 CFR 50.109(a)(vii) on how 10 CFR 52.145 applies to a COL referencing an SDA.
- Delete the sentence in 10 CFR 50.109(a)(vii) on how 10 CFR 52.171 applies to a COL using a reactor manufactured under an ML.

Alternative 2 would correct inconsistencies in the NRC's regulations and provide clarity on the backfitting and issue finality requirements applicable to SDAs, ESPs, and MLs. For an SDA referenced by a COL, 10 CFR 50.109 would apply with respect to the design matters resolved in

the SDA. For an ESP referenced by a COL, 10 CFR 50.109 would apply to the site characteristics, design parameters, and terms and conditions specified in the ESP and subsumed into the COL once the COL is issued. For an ML, 10 CFR 52.171 would apply in all cases.

3.10.4 Remove and Reserve Subpart E of 10 CFR Part 2

There are two types of basic hearing-related notices for license applications under 10 CFR Part 2, "Agency Rules of Practice and Procedure," in which 10 CFR 2.104, "Notice of hearing," requires a "notice of hearing" and governs applications for which a hearing is required by the AEA, NRC regulations, or Commission discretion. This section governs, among other licenses and permits, COLs, CPs, and ESPs, for which a mandatory hearing is required. The requirement in 10 CFR 2.105, "Notice of proposed action," is for a "notice of proposed action" and governs applications for which an opportunity to ask for a hearing is provided but there is no mandatory hearing, such as OLs and reactor license amendments.

In the 2006 proposed revisions to 10 CFR Part 52 (71 FR 12782), the Commission suggested requiring a mandatory hearing for MLs as a matter of discretion (71 FR at 12836–12837). The proposed rule had provisions for the mandatory hearing in 10 CFR 2.104(f), and 10 CFR 52.163, "Administrative review of applications; hearings," stated that a notice of hearing under 10 CFR 2.104 would be issued. However, in the 2007 final 10 CFR Part 52 rule (72 FR 49352; August 28, 2007), the Commission explicitly decided not to hold a mandatory hearing for ML applications (72 FR at 49367–49368). The final rule did not include a notice of hearing provision in 10 CFR 2.104 for MLs. Instead, the NRC added 10 CFR 2.105(a)(13) so that a notice of proposed action would be issued for MLs. Also, the agency revised 10 CFR 52.163 to refer to a notice of proposed action under 10 CFR 2.105. However, the final rule erroneously repeated the changes to 10 CFR 2.501, "Notice of hearing on application under subpart F of 10 CFR part 52 for a license to manufacture nuclear power reactors," that were in the proposed rule. Thus, 10 CFR 2.501 currently states that a notice of hearing will be issued for an ML application and references 10 CFR 2.104(f) for the contents of this notice. But 10 CFR 2.104(f) does not exist, and 10 CFR 2.501 is otherwise contrary to the explicit decision the Commission made in the 2007 final rule, as well as to the current 10 CFR 2.105 and 10 CFR 52.163. Finally, with the removal of 10 CFR 2.501, 10 CFR 2.500, "Scope of subpart," becomes unnecessary and should also be removed because its purpose is to describe the scope of 10 CFR Part 2, Subpart E, "Additional Procedures Applicable to Proceedings for the Issuance of Licenses To Manufacture Nuclear Power Reactors To Be Operated at Sites Not Identified in the License Application and Related Licensing Proceedings," which consists solely of 10 CFR 2.500 and 2.501.

<u>Alternative 1: No-Action Alternative</u>

Under this alternative, the NRC would not pursue amending its regulations and would retain the errors in the current regulatory structure. This alternative would not resolve the current inconsistencies and, therefore, would not resolve the underlying concerns.

<u>Alternative 2: Rulemaking</u>

Under this alternative, the NRC would pursue rulemaking to delete the content of Subpart E of 10 CFR Part 2 (i.e., 10 CFR 2.500 and 10 CFR 2.501) and keep Subpart E as reserved. This

change would correct an error in the 2007 10 CFR Part 52 rule in which the NRC's regulations do not fully reflect the Commission's decision not to hold mandatory hearings for MLs.

3.10.5 Amend Section VIII.C.5 of the Design Certification Rules Addressing Contention Requirements for Certain Challenges to Operational Requirements

Section VIII.C.5 of the DC rules in Appendices A through F to 10 CFR Part 52, among other things, sets out the requirements that apply to a petition to admit a contention in an adjudicatory proceeding for the issuance, amendment, or renewal of a license, or for operation under 10 CFR 52.103(a), alleging that an operational requirement approved in the DCD or a technical specification (TS) derived from the generic TS must be changed. The second sentence of this section states that such a petition must comply with the general requirements of 10 CFR 2.309, "Hearing requests, petitions to intervene, requirements for standing and contentions," and must also demonstrate either that special circumstances as defined in 10 CFR 2.335, "Consideration of Commission rules and regulations in adjudicatory proceedings," are present or that the change sought by the petitioner is necessary for compliance with the NRC regulations in effect at the time of the DC rulemaking. However, the current language in this sentence omits several words, leading to a lack of clarity on the nature of the requirement on showing compliance with NRC regulations in effect at the time the DC rulemaking was approved. Revising this section to clearly set out the requirements that apply to a petition seeking to admit a contention that an operational requirement approved in the DCD or a TS derived from the generic TS must be changed will improve the regulatory clarity of Section VIII.C.5 of the DC appendices.

Alternative 1: No-Action Alternative

Under this alternative, the NRC would not pursue amending its regulations; this would retain the errors in the current regulatory language and would not resolve the underlying concerns.

Alternative 2: Rulemaking

Under this alternative, the NRC would pursue rulemaking to amend Section VIII.C.5 of the DC rules in Appendices A, D, E, and F to 10 CFR Part 52. This change corrects an error in the NRC's regulations.

3.11 Miscellaneous Topics

3.11.1 Notice of Issuance in 10 CFR 2.106(b)(2)(ii)

The language of 10 CFR 52.103(g) states, in part, the following:

> The licensee shall not operate the facility until the Commission makes a finding that the acceptance criteria in the combined license are met, except for those acceptance criteria that the Commission found were met under 10 CFR 52.97(a)(2).

In comparison, the requirements of 10 CFR 2.106(b)(2)(ii) provide that a notice of issuance of a finding under 10 CFR 52.103(g) will be issued when the Commission has not only determined that the acceptance criteria have been met but also that the applicable ITAAC have been performed and the licensee complies with the requirements of the AEA and 10 CFR Chapter I, "Nuclear Regulatory Commission," which encompasses the entirety of the NRC's regulations.

The requirements in 10 CFR 2.106(b)(2)(ii) that go beyond finding that the acceptance criteria have been met (i.e., a finding that the license complies with the requirements of the AEA and 10 CFR Chapter I) are findings that are made upon the issuance of the COL under 10 CFR 52.97, "Issuance of combined licenses," and need not be made again during the 10 CFR 52.103(g) ITAAC verification process. The regulation in 10 CFR 52.103(b) provides the public with an opportunity to request a hearing under 10 CFR 52.103(a) that one or more of the acceptance criteria of the ITAAC in the COL have not been met, or will not be met, and the specific operational consequences of such nonconformance with the ITAAC would mean that there would not be reasonable assurance of adequate protection of public health and safety if the facility were to operate. Although ITAAC hearings are supposed to be narrowly focused on the status of the acceptance criteria, a litigant wishing to challenge operation of the facility under 10 CFR 52.103(b) may misread 10 CFR 2.106(b)(2)(ii) to mean that a broad, additional opportunity to raise challenges under the AEA and the Commission's regulations is available during the ITAAC verification process. Even if such challenges may not be within the scope of an ITAAC hearing, if raised, they may require the parties to unnecessarily expend resources to address them.

Alternative 1: No-Action Alternative

Under Alternative 1, the NRC would not pursue amending the regulations and would retain the current language of 10 CFR 2.106(b)(2)(ii). This alternative would maintain the status quo of differing language concerning regulatory findings in 10 CFR 2.106(b)(2)(ii) and 10 CFR 52.103(g). This is contrary to one of the NRC's Principles of Good Regulation, clarity, in that it provides conflicting information about the applicable regulatory finding. Moreover, although no practical issues have yet occurred as a result of the conflicting language, because no 10 CFR 52.103(g) findings have been issued and no ITAAC hearings have occurred, a dispute about the applicable regulatory findings could arise during the ITAAC hearing process, which might cause delay and unnecessary resource expenditure.

Alternative 2: Rulemaking to Amend 10 CFR 2.106(b)(2)(ii)

Under Alternative 2, the NRC would pursue amending 10 CFR 2.106(b)(2)(ii) to conform to the language of 10 CFR 52.103(g) with respect to the necessary regulatory findings. This would harmonize the language in 10 CFR 2.106, "Notice of issuance," with the language in 10 CFR 52.103(g) and promote clarity in the applicable requirements for the issuance of a notice of a finding under 10 CFR 52.103(g) and legal standards for a 10 CFR 52.103(g) finding, thereby avoiding unnecessary litigation about whether the requirements are met.

3.11.2 Definitions in 10 CFR 21.3

During the revision of 10 CFR Part 21 to address its applicability to 10 CFR Part 52 licensees (72 FR 49352; August 28, 2007), the NRC unintentionally omitted "10 CFR Part 52," from the definitions of "Commercial grade item," "Critical characteristics," "Dedicating entity," and "Dedication" in 10 CFR 21.3, "Definitions." This omission created inconsistencies with other definitions in 10 CFR 21.3 that are applicable to 10 CFR Part 52 licensees. In addition, the inconsistencies may result in confusion and expenditure of unnecessary resources to address the applicability of these terms to an ESP, COL, or ML.

Alternative 1: No-Action Alternative

Under Alternative 1, the NRC would not pursue amending its regulations and the language in the current regulations would remain. This alternative would maintain the applicability of the terms “Commercial grade item,” “Critical characteristics,” “Dedicating entity,” and “Dedication” to nuclear power plants licensed only under 10 CFR Part 50.

Alternative 2: Rulemaking to Amend 10 CFR 21.3

Under Alternative 2, the NRC would pursue amending the regulations in 10 CFR 21.3 to add 10 CFR Part 52 to the definitions of “Commercial grade item,” “Critical characteristics,” “Dedicating entity,” and “Dedication.” In addition, this alternative would reduce confusion and resources expended to address the existing inconsistencies in the regulations, including 10 CFR 50.55, “Conditions of construction permits, early site permits, combined licenses, and manufacturing licenses,” which references the definitions in 10 CFR 21.3. The NRC would not need to make any changes to the guidance in RG 1.234, “Evaluating Deviations and Reporting Defects and Noncompliance Under 10 CFR Part 21,” Revision 0, issued April 2018 (NRC, 2018c), and NEI 14-09, “Guidelines for Implementation of 10 CFR Part 21 Reporting of Defects and Noncompliance,” Revision 1, issued February 2016 (NEI, 2016)) because the revised regulations would be aligned with the existing guidance in RG 1.234 and NEI 14-09.

3.11.3 Requirement for Safety Parameter Display System Console in 10 CFR 50.34(f)(2)(iv)

The current regulatory language in 10 CFR 50.34(f)(2)(iv) requiring a “console” does not clearly convey the range of safety parameter display system (SPDS) design options acceptable to the NRC. The primary purpose of the SPDS is to present information that personnel can use to determine the safety status of a nuclear power plant during normal, abnormal, and emergency conditions, including severe accidents, and to determine whether conditions warrant corrective actions by operators to avoid or mitigate a degraded core. Revising the regulation to remove the term “console” will better convey that the purpose of the SPDS requirements is functional and not necessarily focused on whether there is a dedicated console. Multiple DC applicants have previously requested and been granted exemptions from the console requirement, and the APR1400 DC proceeding (84 FR 23439; May 22, 2019) was the first in which the NRC found an SPDS design without a standalone console to be acceptable. For the APR1400 design, the NRC found that sufficient functions for processing and displaying information in the control room digital display obviated the need for a separate SPDS console. Amending the regulations to remove the term “console” would avoid creating a perceived need for exemptions in the future and, therefore, reduce an unnecessary burden on applicants and the NRC.

Alternative 1: No-Action Alternative

Under Alternative 1, the NRC would not pursue rulemaking and the current rule language in 10 CFR 50.34(f)(2)(iv) that uses the terminology “Provide a plant safety parameter display console…” would remain. Therefore, the current regulatory language’s uncertainty about whether an applicant with a non-standalone SPDS design that meets applicable functional requirements may require an exemption, because some past DC applicants have read the requirement that way, would remain unchanged. In addition, because the language does not clearly communicate the functional requirement, inefficient communications among the NRC, applicants, and stakeholders may result.

Alternative 2: Rulemaking to Amend 10 CFR 50.34(f)(2)(iv)

Alternative 2 involves the NRC pursuing rulemaking to amend 10 CFR 50.34(f)(2)(iv) to remove the requirement for an SPDS console but retain the SPDS functional requirement. Under this rulemaking alternative, the regulations would address the regulatory issue by retaining the overarching purpose of the console requirement while removing technology-specific terminology and alleviating the need for an applicant to pursue an exemption.

3.11.4 Requirements for Reporting Errors and Changes in Emergency Core Cooling System Models

The 2007 rulemaking that significantly updated 10 CFR Part 52 and revised various other parts of the NRC's regulations extended the requirement to report ECCS EM changes or errors to applicants for DCs and applicants for or holders of SDAs, COLs, or MLs issued under 10 CFR Part 52. In addition, 10 CFR 50.46(a)(3)(iii) requires that applicants or holders of SDAs and applicants for DCs report, at least annually, the nature of each change or error to an acceptable evaluation model and its estimated effect on the limiting ECCS analysis. The report must be provided to both the Commission and any applicant or licensee referencing the SDA or DC.

Under 10 CFR 50.46(a)(3)(iii), applicants for or holders of SDAs and applicants for DCs are required to report changes and errors to the ECCS EM before an applicant for the construction or operation of a reactor has submitted to the NRC an application that references the SDA or DC. Reporting such changes and errors to the NRC before the design is referenced in an application for a CP, an OL, a COL, or an ML does not produce a tangible public health and safety benefit because the change or error does not impact the operation of an operating reactor or even the NRC's safety review of an application. If, however, the cumulative effect of changes or errors is sufficiently large to result in an inability to assure compliance with the acceptance criteria in 10 CFR 50.46(b), the basis for the NRC's original approval of the affected standard DC or approval may be impacted. In this case, reporting of the underlying changes or errors and associated corrective actions remains appropriate so that the NRC may evaluate the potential for impacts on the affected standard DC or approval.

Alternative 1: No-Action Alternative

This alternative would maintain the current reporting requirements for ECCS EM changes and errors for applicants for or holders of SDAs and applicants for DCs. Although the NRC understands that ECCS EM errors or changes are not safety-significant until an application for a license references the standard design, these entities would continue to be required to report ECCS EM changes and errors. This represents an unnecessary regulatory burden.

Alternative 2: Rulemaking to Amend Section 50.46

Under this alternative, the NRC would pursue rulemaking to relax the reporting requirements in 10 CFR 50.46 for applicants for DCs or applicants for or holders of SDAs. This alternative would result in entities only needing to report ECCS EM changes or errors to the NRC (1) once a license or application for a license referenced the standard design or (2) if the cumulative effect of changes or errors results in an inability to assure compliance with the acceptance criteria in 10 CFR 50.46(b). The proposed change would modify 10 CFR 50.46(a)(3)(i) and (iii).

This alternative would reduce the regulatory burden for the holders of and applicants for SDAs and applicants for standard DCs when the standard design is not referenced in a license or license application. However, these entities would still need to identify and assess errors in the ECCS EM, so they could be appropriately reported (1) once a license or license application references the design or (2) if the cumulative effect of changes or errors results in an inability to assure compliance with the acceptance criteria in 10 CFR 50.46(b).

3.11.5 Notification to the NRC of Significant Information

The current regulations require applicants and holders of SDAs and applicants for a DC to inform the Regional Administrator of information that has a significant implication for public health and safety or the common defense and security. However, the Regional Administrator is not involved in the issuance of either SDAs or DCs, nor is the Regional Administrator responsible for the receipt or review of applications for 10 CFR Part 52 permits, certifications, or licenses. Therefore, there may be a delay in assessing and acting upon the information because the cognizant and responsible organization for these applications and approvals has not been notified.

Alternative 1: No-Action Alternative

This alternative would maintain the current notification to the Regional Administrator of information that has a significant implication for public health and safety or the common defense and security from applicants for and holders of SDAs and applicants for DCs, which could result in the potential delay in the NRC assessing and acting upon the information because the notification is required to be provided to an organization that is not responsible for these approvals and applications.

Alternative 2: Rulemaking to Require the Applicant or Licensee to Notify the Director of the Office of Nuclear Reactor Regulation

Under this alternative, the NRC would pursue rulemaking to revise the regulations in 10 CFR 52.6(b) to require the affected applicants or licensees to notify the Director of the Office of Nuclear Reactor Regulation (NRR) of information that has a significant implication for public health and safety or the common defense and security for those 10 CFR Part 52 applications or approvals that are not the responsibility of a Regional Administrator. Alternative 2 would also revise 10 CFR 52.6(b) to require notification of the Director of NRR within 2 working days of identifying the information.

This alternative would ensure that the Director of NRR would be promptly notified of information that has a significant implication for public health and safety or the common defense and security for those 10 CFR Part 52 applications or approvals (SDAs and DCs) that are not the responsibility of a Regional Administrator.

3.11.6 Discontinue Use of Priority Ranking Model for Generic Issues

The regulations in 10 CFR 52.47(a)(21) and 10 CFR 52.79(a)(20), as well as 10 CFR 52.137(a)(21) and 10 CFR 52.157(f)(28), identify a priority ranking model for GSIs that the NRC revised with an alternative risk-informed assessment approach for generic issues that were processed under the guidelines approved for MD 6.4, “Generic Issues Program,” in 2009 (NRC, 2009a) and described in NUREG-0933, “Resolution of Generic Safety Issues” (NRC, 2011c). Because the NRC did not change the regulations to reflect the new assessment

approach, not only does an applicant have to address applicable USIs and medium- and high-priority GSIs but it must also address all issues that were determined to be legitimate generic issues after the process was changed in 1999.

Alternative 1: No-Action Alternative

This alternative would maintain the current requirement for DC and COL applicants to provide information about the technical resolution of the applicable USIs and medium- and high-priority GSIs that are identified in the version of NUREG-0933 current on the date up to 6 months before the docket date of the application.

The "no-action" alternative is no longer appropriate because the NRC has discontinued the use of a priority ranking model for addressing GSIs in lieu of a risk-informed approach. Therefore, this alternative would not address the procedures described in the current version of MD 6.4, dated January 2, 2015 (NRC, 2015b), that classify safety issues that are determined to be legitimate GSIs by the generic issue process without using the "high" and "medium" designation. This clarity is needed to avoid omissions by DC, COL, SDA, and ML applicants. In addition, the current inefficient review of all older generic issues prioritized as medium and high would continue.

Alternative 2: Rulemaking to Allow a Risk-Informed Approach

Under this alternative, the NRC would revise the current regulations in 10 CFR 52.47(a)(21), 10 CFR 52.79(a)(20), 10 CFR 52.137(a)(21), and 10 CFR 52.157(f)(28) to identify risk-significant GSIs required to be addressed by DC, COL, SDA, and ML applicants after MD 6.4 changed the process in 1999. Future updates to RG 1.206 and NUREG-0933 would capture this process.

Alternative 2 would allow applicants to screen GSIs based on risk. More specifically, applicants would still not need to address pre-1999 GSIs identified as low risk but would be able to apply a risk-based process for considering those pre-1999 GSIs identified as medium and high risk. This change would reflect the NRC's replacement of the priority ranking in the regulations with a risk-informed screening model of GSIs after 1999. It would allow applicants to address the resolution of GSIs consistent with the agency's risk-informed process described in NUREG-0933 and would ensure that the scope of generic issues addressed by DC, COL, SDA, and ML applicants is complete.

3.11.7 Status of the Completion of Inspections, Tests, Analyses, and Acceptance Criteria

Section 185.b of the AEA requires the Commission to make a finding that the acceptance criteria in a COL "are met" before a licensee begins operation of its facility. Similarly, the regulation in 10 CFR 52.103(g) requires, in part, that before the licensee operates the facility, the Commission makes a finding that the acceptance criteria in the COL "are met."

The regulation in 10 CFR 52.97(a)(2) allows for a Commission finding that "certain acceptance criteria in one or more of the [ITAAC] in a referenced early site permit or standard design certification have been met" at the time the COL is granted. This section also notes that such a finding will preclude any required finding under 10 CFR 52.103(g), which sets out requirements for operation under a COL, with respect to that ITAAC.

The "have been met" language in 10 CFR 52.97(a)(2) does not align with the "are met" language of Section 185.b of the AEA and 10 CFR 52.103(g). The finding made pursuant to 10 CFR 52.103(g) is that the acceptance criteria "are met" at the time of the finding. The words "have been met" can mean that the ITAAC were met at some earlier time but may not have been maintained, so they are no longer met at the time of the 10 CFR 52.97(a)(2) finding. This language could call into question whether ITAAC have been maintained when the 10 CFR 52.97(a)(2) finding is made.

Alternative 1: No-Action Alternative

Under this alternative, the NRC would take no action and would retain the current wording of 10 CFR 52.97(a)(2). This alternative would leave the language in 10 CFR 52.97(a)(2) inconsistent with that in the AEA and 10 CFR 52.103(g) and not eliminate the ambiguity about the ITAAC being met at the time of COL approval versus having been met at some prior time and possibly not having been maintained.

Alternative 2: Rulemaking

Under this alternative, the NRC would change the language in 10 CFR 52.97(a)(2) from "have been met" to "are met." This alternative would align the criteria for the Commission's ITAAC finding made at the time of COL issuance under 10 CFR 52.97(a)(2) with the criteria for the Commission's ITAAC finding made pursuant to 10 CFR 52.103(g) and AEA Section 185.b. This change would also explain that the finding under 10 CFR 52.97(a)(2) is that the applicable acceptance criteria "are met" at the time of the finding.

3.11.8 Reporting Requirements at Completion of Power Ascension Testing—Start of Assessment of Annual Fees

Under 10 CFR Part 171, "Annual Fees for Reactor Licenses and Fuel Cycle Licenses and Materials Licenses, Including Holders of Certificates of Compliance, Registrations, and Quality Assurance Program Approvals and Government Agencies Licensed by the NRC," specifically 10 CFR 171.15(a), the NRC begins to assess annual fees for a 10 CFR Part 50 power reactor licensee or a 10 CFR Part 52 COL holder on the date when the licensee or COL holder notifies the NRC that the power ascension testing has been completed. No regulation requires a 10 CFR Part 50 power reactor licensee or 10 CFR Part 52 COL holder to notify the NRC of the completion of the licensee's power ascension testing. The NRC's practice has been to add a license condition to each new COL to require the licensee to notify the NRC of the completion of power ascension testing. This license condition is one of a series of conditions requiring the licensee to inform the NRC when it reaches certain milestones so the NRC can begin related inspection activities. Continuing to issue license conditions to require each new licensee to notify the NRC of completion of power ascension testing would prolong a case-by-case approach rather than addressing it generically.

Alternative 1: No-Action Alternative

This alternative would maintain the current regulatory framework in which the NRC includes a license condition in each new 10 CFR Part 52 COL to require the licensee to notify the NRC upon successful completion of power ascension testing, so the NRC knows when to begin assessing annual fees. The NRC would also have to include a license condition for future 10 CFR Part 50 licensees to notify the NRC upon completion of power ascension testing.

Under this alternative, the NRC would continue to rely on license conditions in each power reactor license as the means for requiring licensees to inform the NRC to begin assessing annual fees. This case-by-case approach is less efficient than addressing the issue generically.

Alternative 2: Rulemaking

Under this alternative, the NRC would pursue rulemaking to revise 10 CFR Part 50 to add a requirement in 10 CFR 50.71 for a future 10 CFR Part 50 power reactor licensee or 10 CFR Part 52 COL holder to provide a written notification to the NRC of the successful completion of power ascension testing.

This alternative would ensure that the NRC receives prompt written notification from licensees, which would enable the NRC to begin assessing 10 CFR Part 171 annual fees. The NRC could also use this notification to initiate its related inspection activities rather than rely on the notification currently required by a license condition. By including a generic requirement in the regulations applicable to all 10 CFR Part 50 power reactor licensees and 10 CFR Part 52 COL holders, the NRC would not need to depend on the inclusion of license conditions to determine when the trigger that starts the assessment of 10 CFR Part 171 annual fees has been achieved.

3.11.9 Conditions of Licenses

In the 2007 10 CFR Part 52 final rule (72 FR 49352; August 28, 2007), the NRC amended its regulations to clarify the applicability of and relationship between various requirements in 10 CFR Parts 50 and 52 for nuclear power plants. Various provisions in 10 CFR 50.54 are deemed to be conditions in every license issued for nuclear power plants as well as production and utilization facilities other than nuclear power plants. As part of the 2007 10 CFR Part 52 final rule, the NRC revised the introductory text of 10 CFR 50.54 to explicitly refer to OLs and COLs for nuclear power plants and to indicate which provisions are applicable only after the Commission makes its finding under 10 CFR 52.103(g). However, by only referring to nuclear power reactor licenses, this revision introduced uncertainty in the applicability of certain paragraphs of 10 CFR 50.54 to production and utilization facilities other than nuclear power plants.

Alternative 1: No-Action Alternative

This alternative would maintain the current regulatory language. The NRC staff would continue to explain the applicability of several provisions to production and utilization facility licensees and applicants. This case-by-case approach is less efficient than addressing the issue generically.

Alternative 2: Rulemaking

Under this alternative, the NRC would pursue rulemaking to revise 10 CFR Part 50 to amend the introductory text of 10 CFR 50.54 to explain that those paragraphs not explicitly limited in their applicability to nuclear power plants are applicable to nonpower production and utilization facilities. The NRC would amend 10 CFR 50.54(j), (k), and (m)(1) to explain that the requirements of 10 CFR Part 55 apply to all utilization facilities. The NRC would amend 10 CFR 50.54(n), (s)(2)(ii), and (ee)(1) to clarify the applicability of the current generic language to all production and utilization facilities, including nuclear power plants and nonpower production and utilization facilities. Finally, the NRC would amend 10 CFR 50.54(z) to explain

that the requirements of 10 CFR 50.72, “Immediate notification requirements for operating nuclear power reactors,” apply only to nuclear power reactors.

This alternative would ensure that production and utilization facility licensees and applicants understand the applicability of these provisions. By addressing the regulatory issue through rulemaking, the NRC would apply a generic solution to the problem. This is more efficient than addressing the issue on a case-by case basis.

3.12 Other Topics Considered

Based on the technical evaluation performed in the regulatory bases (NRC, 2021a) and on public comments, the NRC concludes that the topics below can be addressed by using other regulatory alternatives.

The NRC recommends maintaining the status quo for the following items:

- 10 CFR 52.39(e)—The NRC considered establishing a 10 CFR 50.59-like change process for ESPs and limited work authorizations (LWAs). This process would have allowed certain changes to be made without NRC approval. The NRC found that conducting rulemaking for this item would incur costs to both the NRC and licensees, while the future benefit, if any, would likely involve only a small number of avoided licensing actions and would not be likely to outweigh the costs. (See Section 5.0, “Change Process for ESP SSARS and LWA SARS,” of Appendix H.2 to the regulatory basis for comment (NRC, 2021a).)

- 10 CFR 2.101(a)(5)—The requirements of this paragraph provide the applicant an option to submit an application under the requirements of 10 CFR Part 50 or 10 CFR Part 52 in two parts. The staff considered modifying the requirements of this paragraph to permit the first part of a phased COL or CP application to consist solely of the environmental report plus the general administrative information specified in 10 CFR 50.33(a) through (e). The NRC concluded that no changes to the regulations are needed (See Section 1.0, “Revising the Application Requirements in 10 CFR 2.101(a)(5),” of Appendix I to the regulatory basis for comment (NRC, 2021a).)

- 10 CFR 51.75(c)(1) and conforming changes in 10 CFR 51.92(b) and (e)—These paragraphs specify the requirements for the content of an environmental report at the COL stage with or without referencing an ESP. The NRC considered modifying these requirements to clarify under what conditions the NRC shall prepare an EA in lieu of an environmental impact statement for a COL referencing an ESP. Upon evaluation of the item, the NRC decided to address the issue under another rulemaking.

- 10 CFR 50.55a, “Codes and standards”—The current requirements in this section include a provision to require American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (BPV) Code repairs to the facility to be conducted in accordance with ASME BPV Code, Section III, until the 10 CFR 52.103(g) finding is made. The NRC considered removing the condition from 10 CFR 50.55a that requires maintaining Section III for all systems until the 10 CFR 52.103(g) finding is made. The NRC was considering this change to permit transition to ASME BPV Code, Section XI, for repair and replacement activities once all Section III activities had been completed for each individual system. The NRC decided not to make any changes in this regulation because the small number of potential COL holders that might implement this regulatory

relaxation does not support the expense of rulemaking at this time. COL holders may continue to use the provisions in ASME BPV Code, Section XI, as long as they do not conflict with the Section III requirements (essentially meeting Section III through reconciliation), or they may submit a request to apply the provisions in ASME BPV Code, Section XI, before the 10 CFR 52.103(g) finding as an alternative to meeting the requirements in 10 CFR 50.55a (See Section 6.0, "Generic Application of ASME BPV Code, Section XI, to Nuclear Power Plants Licensed Under 10 CFR Part 52," to Appendix K to the regulatory basis for comment (NRC, 2021a).)

- Paragraph VIII.C.6 of Each DC Appendix—The NRC recommends no change to these paragraphs in 10 CFR Part 52 to address changes to the TS before the 10 CFR 52.103(g) finding. The regulations do not address changes to plant-specific TS bases. For a COL, the plant-specific TS administrative controls become effective after the Commission's 10 CFR 52.103(g) finding. The NRC considered amending paragraph VIII.C.6 of each DC appendix to address this matter. The NRC decided not to recommend any changes to the regulations because the agency believes COL holders already have an incentive to maintain the plant-specific TS bases consistent with changes to the design and licensing basis, and to the plant-specific TS before the 10 CFR 52.103(g) finding, without the need for rulemaking or additional guidance.

- Move the 10 CFR 50.59-Like Change Process from 10 CFR Part 52 Appendices to Subpart B, "Standard Design Certifications"—In the regulatory basis for this proposed rule, the NRC recommended that the agency revise the regulations to add a paragraph to 10 CFR 52.63, "Finality of standard design certifications." The purpose of this change was to provide some efficiency in the regulations, by eliminating the need to describe the Tier 2 change process in every DC appendix. However, during the development of this proposed rule, the staff recognized that the requirements in Section VIII.B.5.b are integrated with other sections in the change process in DC appendices in such a way that they are not easily separable from other sections in the appendix. The staff also determined that moving only a small portion of a change process described in the appendices will not provide much efficiency. The new regulation would be more difficult to follow than the existing regulations. Based on this new assessment of the proposed change, the NRC is not proposing any changes to these regulations.

4.0 EVALUATION OF BENEFITS AND COSTS

This section examines the benefits and costs estimated to result from this rulemaking when compared to Alternative 1 (No-Action alternative). Section 4.1 identifies attributes expected to be affected by the rulemaking. Section 4.2 describes how the NRC staff analyzed benefits and costs.

4.1 Identification of Affected Attributes

This section identifies the factors within the public and private sectors that the regulatory alternatives discussed in Section 2 are expected to affect. These factors are classified as attributes using the list of potential attributes provided in Chapter 5 of NUREG/BR-0058, "Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission," draft final Revision 5, issued January 2020 (NRC, 2020a). Each of the following attributes is quantified when possible and an uncertainty analysis is performed to report benefit and cost estimate confidence levels and to identify those variables that most affect the variation in the results distribution:

- Industry Implementation. This attribute measures the projected net economic effect on the industry of implementing the regulatory action for all affected licensees. Activities would include the industry reviewing the regulations and updating its processes and procedures as necessary.

- Industry Operation. This attribute accounts for the projected net economic effect caused by routine and recurring activities required by the proposed changes in guidance or regulations. Activities currently performed but that would no longer be required if the alternative is implemented are treated as averted costs.

- NRC Implementation. This attribute accounts for the projected net economic effect on the NRC if the rule is implemented. It includes NRC implementation costs and potential savings relative to those expected under the regulatory baseline. The primary source of NRC implementation costs comes from the rulemaking process for this rule itself. This regulatory analysis calculates the rulemaking costs individually for the various provisions and describes those costs in the separate sections for each provision.

- NRC Operation. This attribute measures the projected net economic effect on the NRC after the regulatory action is implemented. Additional inspection, evaluation, and enforcement activities are examples of such costs.

- Regulatory Efficiency. This attribute attempts to measure regulatory and compliance improvements resulting from the proposed action. These may include changes in industry reporting requirements and the NRC's review efforts. This attribute is qualitative in nature. Efficiency actions that are quantifiable are addressed under other attributes.

- Increased Public Confidence. This attribute attempts to measure the change in public confidence in the NRC's ability to improve its regulations, adapt to regulatory needs identified by stakeholders, provide opportunities for stakeholders to provide input to the changes to the new reactor licensing process, and maintain the NRC's role as an effective industry regulator. This attribute is qualitative in nature.

4.2 Analytical Methodology

This section describes the process used to evaluate benefits and costs associated with the identified alternatives. Benefits include any desirable changes in affected attributes (e.g., monetary savings, improved safety, improved security), while costs include any undesirable changes in affected attributes (e.g., monetary costs, increased exposures).

Of the affected attributes discussed in Section 4.1, the following four attributes could be evaluated on a quantitative basis—industry implementation, industry operation, NRC implementation, and NRC operation. Quantitative analysis requires a baseline characterization of the affected universe, including the characterization of factors such as the number of affected entities, the nature of the activities being conducted, and the types of systems and procedures that licensees implement or no longer implement if the rulemaking alternative is chosen. Because the vast majority of the incremental industry costs and benefits are operations costs, and similarly the vast majority of incremental NRC costs and benefits are implementation costs (due to rulemaking), this regulatory analysis discusses both implementation and operations costs together in each provision, separated as industry cost impacts and NRC cost impacts.

The analysis relies on nonquantitative techniques for other considerations (which include regulatory efficiency and increased public confidence). Nonquantitative techniques are used because monetizing the full impact of each attribute is not possible or practical.

To estimate the costs associated with the evaluated alternative, the NRC staff used a work breakdown approach to deconstruct the activities for each requirement. For each required activity, the NRC staff further subdivided the work across labor categories (e.g., manager, worker). The NRC staff estimated the necessary level of effort for each required activity and labor rates for personnel performing these activities to develop cost estimates.

The NRC staff gathered data to develop levels of effort and unit cost estimates and applied several cost estimation methods in this analysis. The NRC staff used professional knowledge and judgment to estimate some of the costs and benefits. Additionally, the staff used an engineering buildup method, solicitation of input, and extrapolation techniques to estimate costs and benefits. The engineering buildup method used a step-by-step, bottom-up description of task requirements and estimated resources for labor, materials, and other direct costs to estimate a total cost. The NRC staff also consulted subject matter experts within the agency to develop inputs used in the analysis.

The NRC staff uses analogy to estimate some cost activities, which rely on past or current costs to estimate the future cost of similar activities. However, for steps in which the staff has no data, the NRC staff estimated the level of effort based on similar steps in the process for which data are available.

To evaluate the effect of uncertainty in the model, the NRC staff employed a Monte Carlo simulation, which is an approach to uncertainty analysis in which input variables are expressed as distributions. The simulation was run 10,000 times, and values were chosen at random from the distributions of the input variables provided in Section 5.6. The result is a distribution of values for the output variable of interest. The Monte Carlo simulation makes it possible to determine the input variables that have the greatest effect on the value of the output variable. Section 5.6 gives a detailed description of the Monte Carlo simulation methods and the results.

4.2.1 Baseline for Analysis

This regulatory analysis measures the incremental impacts of the rulemaking alternative relative to a baseline that reflects the anticipated behavior if the NRC undertakes no other regulatory action (Alternative 1: No-Action alternative). As part of the regulatory baseline used in this analysis, the staff assumes licensee compliance with existing NRC regulations. Section 5.0 presents the estimated incremental costs and benefits of the rule relative to this baseline.

4.2.2 Affected Entities

For use in this analysis, the NRC staff created the following groupings based on the specifics of each alternative.

Some or all of the rule alternatives would affect the following license holders:

- current nuclear power reactors licensed under 10 CFR Part 50
- current nuclear power reactors licensed under 10 CFR Part 52
- current nonpower production and utilization facilities licensed under 10 CFR Part 50

Some or all of the rule alternatives would affect the following 10 CFR Part 50 or 10 CFR Part 52 license applicants:

- applicants for future nuclear power plants licensed under 10 CFR Part 50
- applicants for future nuclear power plants licensed under 10 CFR Part 52
- construction permit and operating license applicants for future nonpower production and utilization facilities licensed under 10 CFR Part 50

Some or all of the rule alternatives would apply to the following applicants:

- applicants for future nuclear power reactor CPs under 10 CFR Part 50
- applicants for future nuclear power reactor certifications and approvals under 10 CFR Part 52

This regulatory analysis uses an assumption of one Part 50 or 52 applicant in 2024, a second in 2027, and a third in 2030 throughout the cost estimate. This is based on historical performance of applicants vs. expected applications and provides a uniform approach for the cost model. Given that the rule is cost beneficial, if the NRC receives more applications, there will be more averted costs. Portions of the rule may affect State, local, or Tribal entities; however, the staff does not expect the alternatives associated with this rulemaking to affect these stakeholders more than the general public. Rulemaking alternatives might involve slight costs to these stakeholders for reviewing the proposed rule and draft guidance, submitting comments on the proposed rule or draft guidance to the NRC, or reading the final rule and guidance. The NRC plans to continue to employ a broad and diverse outreach strategy on this rulemaking. This strategy includes opportunities for the public, States, and Tribes to participate and have their voices heard by the NRC, which will conduct a public meeting during the comment period for the proposed rule.

4.3 Cost and Benefit Calculations

This section presents the process for, and results of, evaluating the costs and benefits expected to result from Alternative 2 relative to the regulatory baseline (Alternative 1). All costs and benefits are monetized, when possible. The total costs and benefits are then summed to determine whether the difference between the costs and benefits results in a positive benefit. In some cases, costs and benefits are not monetized because meaningful quantification is not possible. Note that rounding within the cost model (e.g., before certain totals are calculated or after certain totals are calculated) may result in values in tables throughout this document appearing to have summation errors. This is a result of the types of cost modeling used and does not affect the results in a meaningful way.

The sign conventions used in this analysis are that all favorable consequences for the alternative are positive and all adverse consequences for the alternative are negative. Negative values are shown using parentheses (e.g., negative $500 is displayed as ($500)). The NRC used an analysis horizon extending from issuing the proposed rule for public comment in 2022 through 2030 for most items, determining that years beyond 2030 became too speculative. A few items (such as changes to DC regulations) necessitated calculations beyond 2030 due to the long time scale of the affected activities.

This regulatory analysis describes the incremental impacts of each alternative relative to a baseline that reflects anticipated behavior if the NRC does not undertake regulatory or

nonregulatory action. The regulatory analysis assumes full compliance with existing NRC requirements, including current regulations and relevant orders. This is consistent with NUREG/BR-0058, draft Revision 5, which states that "in evaluating a new requirement, the staff should assume that all existing NRC and Agreement State requirements have been implemented."

The staff used best available information for the number and type of future reactor applicants, considering factors such as trends in new applications, known potential applications, the part of the regulations under which each applicant would apply, and the types of reactors involved. The staff used a combination of those factors in determining the future licensees or applicants for each cost estimate. The NRC continues to engage with potential new and advanced reactor applicants about their licensing plans.

Industry labor rates are based on 2020 Bureau of Labor Statistics data. The staff used the current NRC labor rate of $143 per hour throughout this analysis.

4.3.1 Severe Accident Requirements

Under Alternative SA-2, the NRC would pursue rulemaking to amend 10 CFR 50.34(a) to require applicants for LWR CPs to provide descriptions and analyses of severe accident design features. The NRC also proposes to amend 10 CFR 50.34(b) to require similar information in applications for an LWR OL issued under 10 CFR Part 50.

The NRC proposes to amend 10 CFR 50.59 to require licensees of plants that are licensed under 10 CFR Part 50 after the effective date of this proposed rule to seek an amendment to the OL if a proposed change, test, or experiment would significantly increase the probability or consequence of an ex-vessel severe accident. This requirement has no effect on current holders of an OL.

For an LWR, 10 CFR Part 52 requires each applicant for a DC, SDA, or ML to address the prevention and mitigation of severe accidents. Regulations in 10 CFR Part 52 also require applicants for amendments to 10 CFR Part 52 COLs to evaluate the impact of the modification on the facility's ability to mitigate severe accidents. The proposed revisions to 10 CFR 50.34, "Contents of applications; technical information," and 10 CFR 50.59(c)(2) would align these requirements to consider certain severe accidents for changes to LWRs with CPs or OLs under 10 CFR Part 50. The revised regulations would specify that this technical information must be supplied with future applications under 10 CFR Part 50. These changes to the regulations would fulfill the intent of SECY-15-0002 by aligning 10 CFR Part 50 and 10 CFR Part 52 on design requirements to mitigate severe accidents.

4.3.1.1 Industry Implementation and Operations

The NRC expects that the additional requirements for the contents of applications related to severe accident design and analysis will lead to incremental costs for future LWR applicants under 10 CFR Part 50. Applicants under 10 CFR Part 50 would be required to describe and analyze design features for the prevention and mitigation of severe accidents (i.e., station blackout, anticipated transient without scram, combustible gas control, and beyond-design-basis external events) approximately 3 years earlier than under current regulations. This results in a net increase in costs to applicants due to the time value of money.

For this analysis, the staff assumes one applicant in 2024 (unaffected by this rule), another in 2027 (with the incremental costs occurring in 2024), and a third in 2030 (with the incremental costs in 2027). As shown in Appendix A, Table A-1, this results in incremental costs to applicants of ($181,000) using a 7-percent discount rate and ($214,000) using a 3-percent discount rate.

4.3.1.2 NRC Implementation and Operations

By revising 10 CFR Part 50 to be consistent with the current review of severe accidents under the 10 CFR Part 52 process, the NRC expects to reduce the number of RAIs and potentially extraneous interactions with the applicant about the contents of an application. This would result in a more efficient process and save NRC staff time and resources; these benefits are considered qualitatively. The regulation would achieve adequate protection of public health and safety in the same way for all LWR applications. The NRC would incur rulemaking costs to develop the final rule and make changes to SRP Section 1.0; Section 19.0; and Section 19.1, "Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities." These costs are estimated to be ($113,000) using a 7-percent discount rate and ($125,000) using a 3-percent discount, as shown in Appendix A, Table A-2.

4.3.2 Probabilistic Risk Assessment Requirements

Under Alternative PRA-2, the NRC would amend 10 CFR 50.34(a) to require applicants for future 10 CFR Part 50 CPs to describe the plant-specific PRA and its results in the CP application and amend 10 CFR 50.34(b) to require applicants for future 10 CFR Part 50 OLs to describe the plant-specific PRA and its results in the OL application.

Construction permit applicants would be required to describe this PRA and report its results in the PSAR. In the design phase, CP applicants would have the opportunity to develop their designs to avoid or mitigate severe accident vulnerabilities found using the PRA.

OL applicants would have to amend the description of the plant-specific PRA and its results in the FSAR to reflect any differences from the PRA described in the PSAR. The OL applicant would have the opportunity to avoid or mitigate vulnerabilities identified using PRA during construction.

Under Alternative PRA-2, the NRC would amend 10 CFR 50.69 to allow CP and COL holders and applicants for DCs to risk-inform the categorization of SSCs. This change would permit holders of a CP under 10 CFR Part 50 and applicants for a DC and holders of a COL granted under 10 CFR Part 52 the ability to adopt alternatives to certain special treatment requirements. In addition, the NRC would clarify 10 CFR 50.69(b) to make the applicability of the regulation more explicit.

Under Alternative PRA-2, the NRC would amend 10 CFR 50.71(h) to make it applicable to those license holders under 10 CFR Part 50 that are required to develop a PRA. The NRC would also change 10 CFR 50.71(h)(2) to establish a more flexible schedule for PRA upgrades to promote a more stable and equitable regulatory environment. In some cases, it would allow license holders to defer upgrading the plant-specific PRA to cover initiating events and modes for which the NRC endorses new or revised consensus standards in PRA during the construction phase. Because the NRC has already endorsed consensus standards to address all initiating events at full power, and because other regulations address the management of risk in other modes, there is adequate assurance that risk will be managed. In addition, this change would make

requirements for subsequent upgrades apply more uniformly to all licensees that rely on PRA for plant design changes, operation, and maintenance. The change would simplify the upgrading of PRA models for multiple units licensed at the same time over the life of the plant because most PRA upgrade schedules currently are tied to the date for initial loading of fuel.

4.3.2.1 Industry Implementation and Operations

CP applicants would incur the cost of having the reactor vendor develop a PRA, to use it in the design phase, and to include its description and results in the PSAR. The staff estimates that approximately 15,000 hours would be required for this activity. However, the PRA would allow the applicant to make use of risk insights earlier in the design of the plant, which would contribute to cost savings in both construction and operation of the plant. In addition, the applicant would be able to take advantage of risk-informed licensing actions significantly earlier in the process, allowing for reduced regulatory costs. All 10 CFR Part 50 OL holders, to date, have voluntarily developed and maintained PRAs without the requirement in the regulations, and the regulatory changes in Alternative PRA-2 are consistent with the Commission's PRA policy. The NRC quantified the costs of developing the PRA and maintaining it during construction for each construction applicant, assuming an application in 2024 after the issuance of the final rule at approximately ($1.96 million) using a 7-percent discount rate and ($2.23 million) using a 3-percent discount rate, as shown in Appendix A, Table A-3. This cost estimate models the costs for a single applicant to avoid excessive conservatism (costs) because it is unknown whether future applicants would have used 10 CFR Part 50 or Part 52, and whether these applicants would have performed a PRA regardless of the current regulatory language in 10 CFR Part 50.

COL holders might choose to incur the cost of maintaining and upgrading the PRA even earlier than required by 10 CFR 50.71(h)(1). These costs would be offset by allowing COL holders to use 10 CFR 50.69 during the design of the plant. This has the potential to reduce the cost of special treatment for safety-related SSCs that only perform functions of low safety significance. It would improve the focus on safety-significant SSCs. Because this regulatory provision would be voluntary, the licensees would decide whether it is cost effective to risk-inform the categorization of their SSCs. As a result, the NRC did not estimate the effects of this change quantitatively.

Changing the schedule requirements for upgrading plant-specific PRAs would reduce costs on applicants and licensees by allowing them to defer addressing PRA standards endorsed during construction without an exemption request. The NRC estimates that this exemption request would take licensees 200 hours to prepare and submit. The NRC assumed that one exemption request would be submitted in 2027 and another in 2030. The averted costs to licensees are approximately $36,000 using a 7-percent discount rate and $48,000 using a 3-percent discount rate, as shown in Appendix A, Table A-3.

4.3.2.2 NRC Implementation and Operations

Under Alternative PRA-2, the NRC would incur rulemaking costs of approximately ($194,000) using a 7-percent discount rate and ($214,000) using a 3-percent discount rate to prepare the final rule and revise RGs 1.174, 1.200, and 1.206. The NRC would not need to expend resources on reviewing exemption requests as discussed above, for an averted cost of $18,000 using a 7-percent discount rate and $23,000 using a 3-percent discount rate, as shown in Appendix A, Table A-4.

4.3.3 Three Mile Island Requirements

Under Alternative TMI-2, the NRC would amend 10 CFR 50.34(f) so that the TMI requirements would apply to new power reactor applications submitted under 10 CFR Part 50 in the same way as it does to 10 CFR Part 52 applicants. In addition, the NRC would delete redundant requirements in 10 CFR 50.34(f) that are covered by other regulations.

4.3.3.1 Industry Implementation and Operations

Under Alternative TMI-2, 10 CFR Part 50 applicants would be required to follow 10 CFR 50.34(f), as 10 CFR Part 52 applicants already have to do, resulting in some additional requirements for 10 CFR Part 50 applicants. However, some of the provisions in 10 CFR 50.34(f) exist elsewhere in 10 CFR Chapter I and are already required of 10 CFR Part 50 applicants. Based on a review of these requirements, the NRC staff estimates that approximately 10 requirements would need to be addressed in the application process, with applicants needing approximately 57 hours to address each item. Throughout this regulatory analysis, where applicable, the staff assumes one applicant in 2024, another in 2027, and a third in 2030. This results in estimated incremental costs of ($167,000) using a 7-percent discount rate and ($207,000) using a 3-percent discount rate, as shown in Appendix A, Table A-5. The staff considers these costs to be justified by the benefit of aligning the 10 CFR Part 50 and 52 processes by requiring the use of 10 CFR 50.34(f) for both, providing regulatory certainty and clarity. This alternative would also reduce the regulatory burden for COL, CP, and OL applicants because the requirement in 10 CFR 50.34(f)(2)(i) that is redundant to requirements under this alternative would be deleted. Therefore, applicants would not need to address this requirement multiple times in their applications. This alternative would also reduce the regulatory burden for DC, SDA, and ML applicants by deleting the requirement in 10 CFR 50.34(f)(2)(i), which these applicants do not need to address.

4.3.3.2 NRC Implementation and Operations

Under Alternative TMI-2, the NRC would incur rulemaking costs of approximately ($41,000) using a 7-percent discount rate and ($45,000) using a 3-percent discount rate to prepare the final rule, as shown in Appendix A, Table A-6. In addition, the NRC would review applications submitted under 10 CFR Part 50 using the same TMI requirements as the NRC uses to review an application submitted under 10 CFR Part 52. For each TMI requirement that an applicant would be required to address, the NRC would have a corresponding review of the applicant's response that would take approximately 23 hours per response. The NRC would incur costs for this alternative, estimated to be approximately ($67,000) using a 7-percent discount rate and ($83,000) using a 3-percent discount rate, assuming an application containing 10 TMI responses submitted in years 2024, 2027, and 2030, as shown in Appendix A, Table A-6.

4.3.4 Fire Protection

Under Alternative FP-2, the NRC would amend 10 CFR 50.34(a) to add a section requiring the applicants for a CP to provide information about how the fire protection design features comply with GDC 3 and amend 10 CFR 50.34(b) to add a section requiring the applicants for an OL to provide information about how the fire protection design features comply with GDC 3 and 10 CFR 50.48.

These changes would improve the clarity, consistency, and alignment of new nuclear power reactor licensing requirements between 10 CFR Part 50 and 10 CFR Part 52 and would help stakeholders considering new nuclear power reactor license applications to make well-informed decisions on which licensing process is best suited to their specific needs.

4.3.4.1 Industry Implementation and Operations

Under Alternative FP-2, the NRC proposes no technical changes. The NRC did not quantify any benefits or costs associated with this change.

4.3.4.2 NRC Implementation and Operations

Under Alternative FP-2, the NRC would incur rulemaking costs of approximately ($41,000) using a 7-percent discount rate and ($45,000) using a 3-percent discount rate to prepare the final rule, as shown in Appendix A, Table A-7.

4.3.5 Operators' Licenses Requirements

Under Alternative OL-2, the NRC would amend 10 CFR Part 55 to address simulation facilities at cold plants and allow for suitable alternatives to the plant walkthrough portion of the operating test while the plant is under construction. It would also establish a new requirement for facility licensees at cold plants to maintain the knowledge, skills, and abilities of operator license applicants who have successfully completed the NRC initial licensing examination, and it would add criteria for waiving examinations at multiunit sites that are under construction.

To allow applicants for operators' licenses to perform the control manipulations required by 10 CFR 55.31(a)(5) on a simulation facility, the NRC would amend the criteria in 10 CFR 55.46(c)(2)(i) that a plant-referenced simulator must meet for nuclear power plants that are under construction. The NRC would also amend the definitions of "plant-referenced simulator" and "reference plant" in 10 CFR 55.4, "Definitions," to clarify that these terms are also applicable to simulators that model nuclear power plants that are under construction.

To allow for suitable alternatives to the plant walkthrough portion of the operating test while the plant is under construction, the NRC would amend 10 CFR 55.45(b) to give facility licensees of new reactors under construction the option of developing plant walkthrough test items (i.e., job performance measurements used for the in-plant portion of the operating test), using suitable alternatives to in-plant testing while the plant is under construction.

To establish a new requirement for facility licensees at cold plants to maintain the knowledge, skills, and abilities of operator license applicants who have successfully completed the NRC initial licensing examination, the NRC would amend 10 CFR 55.31(a)(4) to require facility licensees of new reactors under construction to provide information on NRC Form 398 to explain how the knowledge, skills, and abilities of applicants for an operator license would be maintained when the facility licensee requests an NRC examination to be administered well before the applicants would be expected to complete all requirements to receive operator licenses.

Additionally, the NRC would amend 10 CFR 55.47 to add a new set of criteria that would justify a waiver of any or all of the written examination and operating test for applicants to be licensed on subsequent units at a multiunit site under construction.

Additionally, the staff would revise NUREG-1021 and RG 1.149 to provide guidance for implementing the proposed changes.

4.3.5.1 Industry Implementation and Operations

Alternative OL-2 would eliminate the need to request exemptions to use alternatives to the in-plant method of testing and to perform the required control manipulations, and to not administer licensing examinations for subsequent units at multiunit sites when certain criteria are met. Also, future facility licensees and current facility licensees of plants that have not yet begun construction would avert costs, because Alternative OL-2 would eliminate the need to seek Commission approval of the simulation facility if it meets the amended criteria in 10 CFR 55.46(c). The rule would create predictable regulatory outcomes for facility licensees because it avoids the case-by-case processing of exemptions or conditioning of operator licenses. Because the changes in requirements for simulation facilities would be limited to only those changes necessary to clarify application of the requirements to simulation facilities at cold plants, the NRC does not intend the changes to have any impact on licensees of operating reactors.

In addition, facility licensees of new reactors under construction would incur increased annual costs associated with maintaining the knowledge, skills, and abilities of operator license applicants in the time between when they complete the initial operator licensing examination and when they receive operator licenses. The NRC estimates the cost of administering a continuing training program for operator license applicants that closely models an operator requalification program to be approximately $1–1.3 million annually. This estimate is based on the following assumptions: (1) 7–10 training staff personnel, including instructors, supervisors, and simulator engineers, earning an average of $88,000 per year, (2) costs associated with operating and maintaining the control room simulator, estimated to be approximately ($420,000) per year, and (3) an approximate cost of ($21,000) per year to maintain facilities and other training resources.

If a facility licensee provides continuing training, then before fuel loading, the operator's license applicants would not need to be retrained and reexamined. This would avert costs for ramp-up training before written examinations, a second OL application review, and operating retests.

The NRC estimates the cost to facility licensees of developing additional tests and examinations to be approximately ($1.95 million). This estimate assumes that three to four examinations would need to be developed for three to four classes of 12–20 applicants. The cost to the facility licensee associated with developing additional tests and examinations would be averted if the facility licensee implements a continuing training program for operator license applicants that closely models the operator requalification program. These costs and averted costs and benefits result in estimated incremental costs of ($2.36 million) using a 7-percent discount rate and ($2.83 million) using a 3-percent discount rate, as shown in Appendix A, Table A-8.

Although continued training results in net costs to facility licensees, several unquantified factors make this alternative attractive, as evidenced by VEGP Units 3 and 4 taking this approach. Implementing a continuing training program for applicants provides more control for facility licensees because applicants who pass the initial NRC operator licensing examinations and enroll in the continuing training program would not need to return to the NRC for the reexaminations and operating retests.

Also, implementing a 10 CFR 55.59-like continuing training program for operator license applicants following completion of the initial operator licensing examination reduces the risk for the facility licensee. Without a continuing training program, the NRC would require additional tests or examinations before operation of the facility. Some applicants might not pass the retests or examinations, and they would need to retake and pass these examinations before being licensed to operate the facility. This could result in the facility not having available the required number of licensed operators before fuel loading. In a worst-case scenario, fuel loading and subsequent operation of the facility could be delayed if a sufficient number of licensed operators is not available by the scheduled fuel load date. In addition, if operator license applicants needed to participate in ramp-up training and additional tests and examinations, they would not be available to conduct preoperational testing and other activities that must occur before fuel loading.

Based on these two reasons, facility licensees may decide that implementing a continuing training program for operator license applicants is advantageous. Furthermore, maintaining a continuing training program for operator license applicants is consistent with how facility licensees are currently operating under the regulatory baseline (Alternative OL-1), and codifying it in the regulations is consistent with the NRC's Principles of Good Regulation, specifically, clarity and efficiency.

4.3.5.2 NRC Implementation and Operations

Under Alternative OL-2, the NRC would amend 10 CFR Part 55, which would reduce the number of exemption requests and requests for Commission approval of simulation facilities for use in the operating test and performance of experience requirements at cold plants. This change would result in a more efficient regulatory process. In addition, because the operator license applicants are assumed to participate in a continuing training program, the NRC would not have to perform the reexamination and operating retests or incur the associated travel costs.

Under Alternative OL-2, the NRC would incur rulemaking costs of approximately ($257,000) using a 7-percent discount rate and ($285,000) using a 3-percent discount rate to prepare the final rule and revise RG 1.149 and NUREG-1021, as shown in Appendix A, Table A-9. In addition, the NRC would avert costs to perform reexamination and operating retests of approximately $495,000 using a 7-percent discount rate and $610,000 using a 3-percent discount rate, as shown in Appendix A, Table A-9.

4.3.6 Physical Security and Fitness for Duty

Under Alternative PS-2, the NRC would amend 10 CFR Part 73 to explain that applicants and licensees may bring unirradiated nuclear fuel on site and protect it in accordance with 10 CFR 73.67 before implementing the requirements of 10 CFR 73.55 and 10 CFR 73.56. In addition, the NRC would amend the language in 10 CFR 70.22(k) and 10 CFR 73.67(d) and (f) to clarify the appropriate security requirements for SNM of moderate or low strategic significance brought on site at nuclear power reactors.

Under Alternative FFD-2, the NRC would amend 10 CFR Part 26 to address the regulatory issues for escorting construction workers, 10 CFR Part 26 implementation based on risk insights learned from reactor plant construction, MRO evaluation of a donor's urine specimen, and clarification of regulatory language.

4.3.6.1 Industry Implementation and Operations

Physical Security

Under Alternative PS-2, nuclear power plant licensees could avoid the need for requests for exemptions under 10 CFR 73.5, “Specific exemptions”, and the premature operating costs associated with the security staffing necessary to implement the requirements in 10 CFR 73.55 and 10 CFR 73.56. The NRC has not performed a detailed analysis of the cost and benefit that may be incurred by deferring security staffing operating costs resulting from the premature implementation of the requirements in 10 CFR 73.55 and 10 CFR 73.56.

Under Alternative PS-2, the staff estimates that this licensee could reasonably avoid approximately $3 million in costs for 30 additional security personnel for each reactor unit from prematurely implementing the full 10 CFR 73.55 physical protection program. Alternative PS-2 would also provide averted cost savings by eliminating the need for licensees to implement the 10 CFR 73.56(a)(3) access authorization requirements for site personnel. The NRC estimated 2,000 to 2,500 individuals would be subject to the access authorization requirements when 10 CFR 73.56(a)(3) access authorization requirements for the PA are implemented prematurely.

However, the licensee could potentially avoid these costs by submitting and having the NRC approve an exemption request associated with 10 CFR 73.55(a)(4) and 10 CFR 73.56(a)(3) for each reactor unit. The NRC estimates an averted cost based on 450 labor hours for the licensee to prepare and submit an exemption request for NRC review. For this estimate, the NRC assumed one applicant every 3 years, beginning with the expected issuance of the final rule. Without this exemption request, the licensee would incur the costs associated with security staffing to implement the requirements in 10 CFR 73.55 and 10 CFR 73.56.

The modifications to 10 CFR 70.22(k) and 10 CFR 73.67(d) and (f) would clarify the applicability of the security requirements in 10 CFR 73.67 to operating licensees under 10 CFR Part 50 and 10 CFR Part 52. This issue has typically been addressed via inspections, and licensees have not found it challenging to relocate the SNM into the protected area. Therefore, the staff did not estimate the potential averted costs or increased costs due to this regulatory change.

The NRC estimates that Alternative PS-2 would result in licensee averted costs of approximately $127,000 using a 7-percent discount rate or $159,000 using a 3-percent discount rate, as shown in Appendix A, Table A-10.

Fitness for Duty

Under Alternative FFD-2, licensees would be able to escort personnel and delay the implementation of an FFD program that meets all 10 CFR Part 26 requirements, except those in Subpart K, before initial fuel load into the reactor. These changes would result in a substantial planning and scheduling benefit and an expected lower cost for licensees and other entities subject to 10 CFR Part 26. Additionally, the rule would establish clear and consistent requirements to address the escorting of construction workers. The licensee’s development and implementation of changes to its procedures do constitute a cost, yet this cost is expected to be small. If the NRC recommendations are implemented, future licensees and other entities would not incur these costs because they would not need to request NRC approval of licensing actions to enhance flexibility in the planning and scheduling of construction activities.

Under Alternative FFD-2, licensees and other entities constructing nuclear power plants would have the option to require their MRO to review dilute urine specimens, in addition to a laboratory test result that may find that the individual's urine specimen was positive, adulterated, substituted, or invalid. An MRO's review of a dilute specimen benefits the donor because laboratory identification of dilute urine could find an adverse physiological condition related to the donor's muscular metabolism or kidney function. Also, this change would enhance consistency by better aligning the MRO review requirement under 10 CFR 26.405(g) and that required by 10 CFR 26.183(c) for licensees and other entities subject to 10 CFR 26.3(a) and (b). The additional evaluation also informs the licensee's or other entity's assessment of the donor's trustworthiness and reliability, because a dilute urine specimen, with no acceptable medical explanation, could be indictive of a subversion attempt. This option would add costs to the FFD program because of MRO time spent to evaluate the dilute specimen, the donor's lost time from work, and the cost associated with licensee administration of 10 CFR Part 26-required sanctions (e.g., administrative time and worker replacement costs of the individual who subverted the drug test).

The staff used FFD program data from the VEGP Unit 3 and 4 construction site to estimate the costs to implement an MRO review of dilute urine specimens. From 2013 to 2019, an annual average of 6,937 individuals were subject to the FFD program at the VEGP Unit 3 and 4 construction site, with a maximum of 9,294 individuals. Of this population, SNC conducted 11,583 10 CFR Part 26-required drug and alcohol tests on average per year. The NRC estimates between 0.1 to 0.5 percent of all drug tests will indicate a dilute urine specimen (42 tests per year as a mean estimate). The NRC estimates that the cost to evaluate each dilute urine specimen is 1 hour for the MRO, with no additional cost incurred from the drug testing laboratory. Additionally, the cost to the individual is estimated to be about 2 hours to have a discussion with the MRO and obtain medical records. Based on the low, average, and high number of individuals tested at the VEGP Unit 3 and 4 construction site, the annual cost to a licensee or other entity, as shown in Appendix B, could range from $3,048 to $47,237, with a mean cost estimate of $20,554 per year or approximately $144,000 over 7 years.

Training is not required because the assessment of dilute urine specimens is within the MRO training syllabus. The licensee or other entity would be required to change its FFD policy and procedures; however, these changes would be simple and straightforward and would not require staff training or any read-and-sign material. This would require a minor change to two regulatory guides.

The NRC estimates that the cost to implement procedural changes for the clarification of regulatory language by licensees and other entities is small because the changes are considered simple and easy to understand and implement. Training would not be required. The staff estimates that the cost for these procedure changes ranges from $7,750 to $8,370 with a mean value of $8,020, as shown in Appendix B. Licensees would incur a one-time cost to assess the impact of a change to a rule or guidance and change their procedures; they would not incur annual costs. Licensees and other entities could voluntarily propose changes to their industry guidance (e.g., NEI 06-06) to enhance unclear regulatory language and could ask the NRC to endorse this guidance.

The NRC estimates that Alternative FFD-2 would result in licensee costs of approximately ($60,000) using a 7-percent discount rate or ($79,000) using a 3-percent discount rate, as shown in Appendix A, Table A-11.

4.3.6.2 NRC Implementation and Operations

Physical Security

Under Alternative PS-2, the NRC would incur incremental costs to prepare the final rule that amends 10 CFR 73.55(a)(4), 10 CFR 73.56(a)(3), 10 CFR 70.22(k), and 10 CFR 73.67(d) and (f), and to revise RG 1.206 and SRP Section 13.6.1 and Section 13.6.2, "Physical Security—Review of Physical Security System Designs—Standard Design Certification and Operating Reactor Licensing Applications."

By revising the requirements of 10 CFR 73.55(a)(4) and 10 CFR 73.56(a)(3), the NRC would reduce the need to review exemptions under 10 CFR 73.5. The revised regulation would explain that SNM of moderate or low strategic significance during construction may be protected in accordance with the security requirements in 10 CFR 73.67. The revised regulation would also explain that, during operation of a nuclear power reactor licensed under 10 CFR Part 50 or 10 CFR Part 52, SNM located in the owner-controlled area but outside the protected area would be protected in accordance with the security requirements in 10 CFR 73.67. In addition, these changes would increase the clarity and effectiveness of regulations for the review of future new reactor license applications.

Under Alternative PS-2, the licensees would not make exemption requests, as discussed in Section 4.3.6.1.

The NRC estimates that Alternative PS-2 would result in rulemaking costs to the NRC of approximately ($272,000) using a 7-percent discount rate and ($303,000) using a 3-percent discount rate, and it would avert costs to review unnecessary exemption requests of approximately $65,000 using a 7-percent discount rate or $81,000 using a 3-percent discount rate, as shown in Appendix A, Table A-12.

Fitness for Duty

Under Alternative FFD-2, the NRC would incur incremental costs to prepare the final rule and to revise two regulatory guides. The regulatory changes would be relatively simple and straightforward. Minor changes to NRC inspection program procedures may be required; however, NRC inspector training would not be necessary because the Alternative FFD-2 changes are within the current skills and knowledge of NRC inspectors.

The NRC estimates that Alternative FFD-2 would result in rulemaking costs of approximately ($89,000) using a 7-percent discount rate and ($99,000) using a 3-percent discount rate, and it would avert costs to review unnecessary exemption requests of approximately $24,000 using a 7-percent discount rate or $30,000 using a 3-percent discount rate, as shown in Appendix A, Table A-13.

4.3.7 Emergency Planning

Under Alternative EP-2, the NRC would pursue rulemaking and revise associated guidance to address clarity issues with the emergency plan change process, emergency preparedness exercises, impediments to the development of emergency plans, and offsite contacts, arrangements, and certifications.

4.3.7.1 Industry Implementation and Operations

Under Alternative EP-2, the NRC would clarify the emergency plan change process by amending the introduction of 10 CFR 50.54 to reference 10 CFR 50.54(q)(2) as being inapplicable before the Commission makes a 10 CFR 52.103(g) finding. This clarification would have a positive impact on licensees by explaining the regulations and removing any confusion about the applicability of the requirements in 10 CFR 50.54(q). Industry cost savings would likely be minimal; the NRC did not quantify any industry costs for clarifying the applicability of this regulation.

Under Alternative EP-2, the NRC would clarify when full-participation exercises are necessary for new reactors licensed under 10 CFR Part 52 at sites that have an existing nuclear power reactor. Overall, this change has the potential to result in cost savings for 10 CFR Part 52 applicants. Significant time and expense are associated with conducting an emergency preparedness exercise. The NRC expects that applicants would seek an exemption as a less costly alternative, if they believe that they have already appropriately demonstrated meeting the emergency preparedness functions that would be demonstrated by conducting an exercise. By amending the regulations and creating provisions under which a licensee would not be required to conduct a subsequent exercise, the time and cost associated with requesting an exemption can be avoided.

In terms of the potential future applicants to which this change would apply, the NRC assumed one exemption request from one applicant in 2026 and another in 2029. After 2030, the prediction of a new reactor sited at an existing nuclear power plant in which the new reactor is using the same technology, emergency response organization, and emergency response facilities as the existing reactor becomes too speculative for inclusion in this analysis. The NRC estimates that this change would result in averted license exemption request costs of approximately $89,000 using a 7-percent discount rate and $115,000 using a 3-percent discount rate, as shown in Appendix A, Table A-14.

Under Alternative EP-2 to resolve significant impediments to developing emergency plans, the NRC would revise existing guidance to clarify the extent of the analysis needed by the applicant to demonstrate compliance with the siting criteria to identify physical characteristics of the proposed site that could pose significant impediments to the development of emergency plans. In addition, the NRC would amend 10 CFR 52.18 to distinguish the siting requirements from the EP considerations in 10 CFR 52.17 and to clarify when NRC consultation with FEMA is required. This change would clarify and simplify the current process.

The NRC anticipates that these changes would reduce the burden on impacted applicants by 50 to 100 hours. Standardized approaches for determining whether significant impediments exist and simplified ETEs would reduce application costs. For example, if site characterizations were standardized to a 5-mile evaluation rather than a 10-mile evaluation, in some cases, the ETE studies would not need to include elements to inform protective action strategies of the emergency plan, such as multiple scenarios. This would result in cost savings during initial ETE study development. In addition, this alternative would provide for approval of a site independent of the reactor technology to be selected. Based on submittals in 2026 and 2029, the NRC estimates that this change would result in averted costs of $13,600 (7-percent net present value (NPV)) and $17,400 (3-percent NPV), as shown in Appendix A, Table A-14.

Under Alternative EP-2, the NRC would amend the regulations to effectively differentiate between the level of emergency plan approval sought and the corresponding contacts and

arrangements that are necessary to support the review of the application, and clarify when certifications of these arrangements, including compensatory plans for certifications that cannot be obtained, should be required within the 10 CFR Part 52 licensing process. By clarifying the regulations, licensees would be afforded a higher degree of certainty for the descriptions of contacts, arrangements, and certifications that must be included in their applications. The effects of rulemaking would be ongoing and have incremental impacts, which could potentially save 50 to 100 labor hours of ESP application development for each applicant under 10 CFR 52.17(b)(1) that would no longer be required to make offsite arrangements and certifications for site-only ESP applications. Based on submittals in 2026 and 2029, the NRC estimates that this change would result in averted costs of $13,600 (7-percent NPV) and $17,400 (3-percent NPV), as shown in Appendix A, Table A-14.

4.3.7.2 NRC Implementation and Operations

Under Alternative EP-2, the NRC would incur one-time costs to amend 10 CFR Part 52 and Section IV.B of Appendix E to 10 CFR Part 50 and revise associated guidance. Changes to guidance would likely decrease the need to issue an RAI about emergency planning. However, the NRC estimates that these staff requests would be limited in scope and number and result in negligible averted costs.

Under Alternative EP-2, the NRC would clarify the emergency plan change process by amending the introduction of 10 CFR 50.54 to reference 10 CFR 50.54(q)(2) as being inapplicable before the Commission makes a 10 CFR 52.103(g) finding. The NRC would incur one-time costs to amend the introduction of 10 CFR 50.54. A nonquantified benefit may be the reduction in the number of applicants requesting NRC clarifications of this requirement.

As previously discussed, by amending the regulations and creating provisions under which a licensee would not be required to conduct a subsequent exercise, the time and cost associated with requesting an exemption can be avoided. In terms of the potential future applicants to which this change would apply, the NRC assumed the review of one exemption is averted in 2026 and another in 2029. The NRC estimates that this change would result in averted license exemption request costs of approximately $44,000 using a 7-percent discount rate and $56,000 using a 3-percent discount rate, as shown in Appendix A, Table A-15.

Under Alternative EP-2, to resolve a significant impediment to developing emergency plans, the increased clarity in the requirements and guidance would result in averted costs, depending on the number of future applicants under 10 CFR Part 52. NRC reviews and subsequent licensing would be more efficient and consistent with clearly defined guidelines, and expenditure of resources to conduct externals consultations, when they are not warranted, could be avoided. The staff estimates that this change would result in net averted costs to the NRC of approximately $6,900 using a 7-percent discount rate and $8,900 using a 3-percent discount rate, as shown in Appendix A, Table A-15.

By amending the regulations to differentiate between the level of emergency plan approval sought, and the corresponding contacts and arrangements that are necessary to support the review of the application, the review of ESP applications would be simplified and would likely result in fewer RAIs and a reduction in associated staff hours for each affected ESP application. The NRC estimates that this change would result in averted costs to the NRC of approximately $6,900 using a 7-percent discount rate and $8,900 using a 3-percent discount rate, as shown in Appendix A, Table A-15.

4.3.8 10 CFR Part 52 Licensing Process

4.3.8.1 Industry Implementation and Operations

Design Certification, Standard Design Approval, and Manufacturing License Process Changes

Under Alternative LP-2 to clarify the DC, SDA, and ML processes, the NRC would remove the 15-year duration for DCs established in 10 CFR 52.55 and DC renewal requirements in 10 CFR 52.57, 10 CFR 52.59, and 10 CFR 52.61, and 10 CFR Part 52 DC appendices. This would result in DCs that never expire and, therefore, do not need to be renewed every 15 years, and it would eliminate periodic reviews and associated costs to the DC applicant. For DC applicants and the NRC, the averted costs are estimated to be approximately $14.5 million per renewal period,[4] based on the estimated vendor costs associated with preparing the ABWR DC renewal and responding to NRC questions. Of these averted costs, the staff estimates approximately $7 million would result from reduced costs to DC applicants and the remaining $7.5 million would be from reduced NRC costs. However, the costs for COL applicants may increase if there is a need to depart from the referenced design, and potential inefficiencies in NRC reviews may increase if COL applicants differ in their approach to making design changes that may have otherwise been identified and included in a DC renewal (potential reduction in design standardization). Furthermore, as a result of the elimination of the 15-year duration of DCs, DC vendors would continue to be subject to DC information maintenance requirements, such as applicable requirements in Section X in each 10 CFR Part 52 appendix, unless the design certification is rescinded. To avoid these reporting requirements under the proposed rule language, a vendor would have to submit a request to the NRC to rescind the DC, resulting in minor costs to the vendor and the NRC. The staff did not estimate these minor potential increases in costs quantitatively.

The NRC also would remove the 15-year duration for SDAs in 10 CFR 52.147, add an amendment process for SDAs, and change the maximum duration for initial and renewed MLs from 15 years to 40 years in 10 CFR 52.173 and 10 CFR 52.181, respectively. This would result in SDAs that never expire and would extend the duration of MLs to the duration allowed by Section 103c. of the AEA. Using SDAs and MLs in this way is a novel approach with which the NRC staff has no experience to date, and currently there are no stand-alone SDA or ML holders, making it difficult to quantify costs with accuracy. Therefore, these changes to processes involving SDAs and MLs are considered qualitatively and are expected to result in considerable averted costs to applicants when compared to the status quo, due to SDAs not expiring and the extension of the duration of MLs. Hypothetically, the staff estimates the averted cost to an applicant for not having to renew an SDA or ML (at a 15-year interval) would be approximately $1.40 million (current year dollars). The ML process also includes the possibility of a hearing; therefore, there is a potential averted cost associated with a hearing, but the cost of the hearing process associated with an ML depends on the extent of participation and the complexity of admitted issues. For this reason, the averted cost of a hearing is considered qualitatively. On the high end, the averted cost to a licensee could be as high as the $7 million based on the ABWR renewal costs used elsewhere in this regulatory analysis, for a complex process. The staff assumed that the burden to renew an ML, or to resubmit an SDA after the 15-year expiration period in the status quo, would be similar to a DC renewal burden. Furthermore, the staff assumed that any amending of the SDA under the status quo would occur at the 15 year resubmittal and equated these costs to the amendment process under the

[4] The estimated cost of a DC renewal is based on the estimated cost of GE Hitachi's ABWR DC renewal application discussed at a meeting with the Advisory Committee on Reactor Safeguards (NRC, 2019d).

proposed rule language; therefore, the estimates above do not include the amendment process because it is not considered an incremental cost between the two scenarios. The changes to the proposed rule for SDA and ML durations are expected to result in these averted costs for each renewal period (that would have occurred for an ML, or each resubmittal of an SDA approximately every 15 years), for each applicant for an SDA or ML.

As a simplifying assumption, the staff aggregated the renewal years across all current DCs, resulting in an "average" renewal year of 2032. The staff also assumed that three of the five active DCs would be renewed. Therefore, the industry averted cost from the removal of the DC renewal requirement assumes one averted renewal per DC, for a total of three, which occurs in 2032. The staff estimate assumes COL applicants would reference the designs 8 years later, in 2040. Therefore, each design averts the approximately $14.5 million in renewal costs one time, and then, when the COL applicant assesses the DC in 2040 to determine whether any departures are necessary, the associated costs are estimated to be higher than they would have been if the design had gone through the renewal process under the status quo. The staff estimated approximately 15 percent of the DC renewal cost can reasonably be counted as a benefit toward later reviews, and that amount is listed as a cost in 2040 because of not having the DCs renewed. The NRC estimates that this change would result in averted costs to the industry of approximately $9.80 million using a 7-percent discount rate and $14.4 million using a 3-percent discount rate, as shown in Appendix A, Table A-16.

Change Process

Under Alternative LP-2 to revise the change process, the NRC would undertake a rulemaking and associated guidance changes to change or clarify the 10 CFR Part 50 and 52 change processes. The NRC would amend all DC appendices in effect at the time the final rule is issued, to delete the requirement for the plant-specific DCD to use the same organization and numbering as the generic DCD. This would result in a minor decrease in the reporting burden for applicants that was not quantified.

The NRC would edit Section VIII.B.5 in each of the 10 CFR Part 52 DC appendices to include provisions similar to those in 10 CFR 50.59(c)(4), which the staff does not expect to result in incremental costs or benefits to applicants. The NRC would amend its regulations to align the implementation provisions in the departure process in the 10 CFR Part 52 DC appendices with the implementation provision in the 10 CFR 50.59 process. This could result in considerable averted costs to licensees because it would avoid construction delays for up to 45 days, when the LARs would be submitted under the revised regulation. However, the NRC has already granted this flexibility to licensees in RG 1.237, "Guidance for Changes during Construction for New Nuclear Power Plants Being Constructed under a Combined License Referencing a Certified Design Under 10 CFR Part 52"; therefore, the staff estimates no incremental averted costs for licensees.

The NRC would add regulations to 10 CFR Part 52, Subpart C, "Combined Licenses," in new 10 CFR 52.93(c) and to 10 CFR Part 52, Subpart E, in 10 CFR 52.145(c) and (d) that would govern how variances can be taken from one or more SDAs that are referenced in an application for a CP, OL, COL, or ML. The NRC would amend regulations in 10 CFR 2.100, "Scope of work"; 10 CFR 2.101, "Filing of application"; 10 CFR 2.110, "Filing and administrative action on submittals for standard design approval or early review of site suitability issues;" and 10 CFR 52.3(b)(1) and add a new 10 CFR 52.145(e) to allow SDA holders to make generic changes to SDAs. The NRC would amend regulations in 10 CFR 52.173, "Duration of manufacturing license," to allow an applicant for a CP or a COL, at its own risk, to reference, in

its application, a design for which an ML application has been docketed but not granted. Finally, the NRC would also update its guidance to explain that an applicant for a COL may, at its own risk, reference in its application a design for which an SDA application has been docketed but not granted. These changes to processes involving SDAs are expected to result in considerable averted costs to applicants when compared to the status quo, due to the increased flexibility and regulatory clarity provided by the rule language. However, using SDAs in this way is a novel approach with which the NRC staff has no experience to date, making it difficult to quantify with accuracy. Therefore, these changes are treated qualitatively and are expected to result in averted costs to applicants.

Design Scope and Standardization

Add Definitions of Tier 1, Tier 2, and Tier 2:* Under Alternative LP-2 to revise the design scope and standardize, this change would amend 10 CFR 52.1, "Definitions," to include the definitions for the terms Tier 1, Tier 2, and Tier 2* for future DC applications and would modify those definitions to be consistent with the principles described in SECY-19-0034, "Improving Design Certification Content," dated April 8, 2019 (NRC, 2019f). The Tier 1 definition would include a statement that Tier 1 information referenced by an applicant would contain the type of information that could not be changed by licensees under the provisions of 10 CFR 50.59(c)(2). This rulemaking would also amend the requirements for the contents of application for a DC in 10 CFR 52.47 to require DC applicants to identify Tier 1, Tier 2, and Tier 2* information in the FSAR.

This change would affect licensees during the construction phase of a nuclear power plant that is licensed under 10 CFR Part 52. The NRC estimates that, by revising the definitions of tiered information, the DC applicant appropriately selecting which DCD information goes in each tier, and the differing change processes for each tier, a COL licensee referencing the DC would be expected to need 12 fewer license amendments over the course of construction of the plant. The license amendments avoided would result from information being downgraded from Tier 1 or Tier 2* to Tier 2, for which licensees need not request a license amendment to make changes, provided there is a commensurate level of safety. The NRC estimates the COL licensee would spend approximately 200 hours to prepare and submit each amendment.

Assuming one COL applicant in 2024, another in 2027, and third in 2030, the 12 averted LARs per applicant would be avoided within the first 3 years of receiving a COL license. The averted costs to the industry of avoiding the submittal of these LARs would be approximately $651,000 using a 7-percent discount rate and $841,000 using a 3-percent discount rate, as shown in Appendix A, Table A-16.

Clarify the Phrase "Essentially Complete Design": Under Alternative LP-2, the NRC would amend 10 CFR 52.1 to state that the term "essentially complete nuclear power plant design" refers to a design that includes all structures, systems, and components that can affect safe operation of the plant except for site-specific elements such as the service water intake structure and the ultimate heat sink.

Amending the regulation to give sufficient direction for the scope and level of detail required could save a DC applicant 200 hours of work between the reduced level of effort required when initially developing the application and when responding to any level of detail-related RAIs. The staff assumes that a question about whether a design is "essentially complete" is raised at least once during the review of each DC.

Assuming three DC applications are submitted to the NRC for review (i.e., one every 3 years through 2030), this change would result in averted costs to applicants of approximately $60,000 using a 7-percent discount rate and $75,000 using a 3-percent discount rate, as shown in Appendix A, Table A-16.

Modify Restrictions on Changes to a DC or COL Referencing a DC for Reasons of Standardization: Under Alternative LP-2 to modify restrictions on changes to a DC or COL referencing a DC for reasons of standardization, licensees would expend less effort to justify changes in an approved design for an ML or certified design. In particular, applicants and licensees would not need to include a reason related to the effects on standardization in their evaluation of the acceptability of proposed changes, or to justify any potential reduction in standardization when compared to the safety benefit of the proposed change. The NRC estimates that a licensee would save 4 hours of work on each license amendment or exemption application. A similar benefit would accrue for applicants requesting exemptions. There is currently one two-unit plant under construction, and each unit requests an average of 10 exemptions per year that currently require this standardization consideration.

Under this alternative, there would be a reduction in effort for anyone asking to modify, rescind, or impose new requirements on DC information. There would no longer be a need to justify exemption requests from certified information on the basis of standardization. DC amendment requests occur rarely, in part because of the level of effort and the cost and time to develop the amendment request, for the NRC to review the request and develop a safety evaluation, and for the NRC to complete the rulemaking proceeding to codify the DC amendment. The NRC has received only one such request to amend a certified design since the issuance of 10 CFR Part 52 and certifying six DCs. The NRC does not expect to receive any DC amendment requests through 2030. As a result, the NRC estimates no burden reduction for a DC applicant asking to amend the certified design. Similarly, because it has not issued an ML to date, the NRC estimates no burden reduction to industry for ML-related changes.

The NRC estimates that licensees will avert the effort to prepare 10 license amendments or exemption requests per year from 2024 through 2030. It further estimates that this change would result in averted licensee costs of approximately $25,000 using a 7-percent discount rate and $32,000 using a 3-percent discount rate, as shown in Appendix A, Table A-16.

Revise Section IV.A.2.D of Appendices to 10 CFR Part 52 To Clarify the Terms "Site Parameters"and "Site Characteristics": This change would result in consistency among 10 CFR Part 52 DC appendices and clarify the regulatory language to ensure consistency across DC appendices for future applicants that might reference the affected designs.

This change would result in a more precise and consistent description of the relationship between "site characteristics" and "site parameters" and would clarify the purpose of the information; specifically, that interface requirements shall be met, rather than stating that information demonstrating compliance with interface requirements shall be provided. The staff did not identify any incremental licensee costs resulting from this change.

Relocate Requirements from DC Appendices Section IV to 10 CFR 52.79(d): This change would amend 10 CFR Part 52 to relocate the requirements in Sections IV.A.1 and IV.A.2. through IV.A.2.f of each 10 CFR Part 52 DC appendix to 10 CFR 52.79(d). This change would not substantively modify any current requirements for applicants and licensees. However, it would eliminate an inefficient and unnecessarily repetitive method of regulating, and the NRC

estimates that this benefit would have a minimal cost impact. The staff did not quantify any impacts on applicants or licensees as a result of this change.

Design Certification Rule Section IX ITAAC: This change would amend Section IX of Appendix D of 10 CFR Part 52, to remove and reserve section IX, "Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC)", in this appendix. Because the requirements that would be removed from Appendix D to 10 CFR Part 52 are redundant to other requirements in 10 CFR Part 52, the amendment would not add, change, or remove any substantive requirements for any applicant or licensee referencing the designs in this appendix. In addition, in the context of Section IX, Appendix D to 10 CFR Part 52 would be consistent with Appendices A, E, and F to 10 CFR Part 52. Because this change would remove the redundant requirements in Section IX in 10 CFR Part 52, Appendix D, this change would support regulatory clarity under the NRC's Principles of Good Regulation. The staff did not quantify any impacts on applicants or licensees as a result of this change.

Standard Design Approval

Under Alternative LP-2 to clarify SDA requirements, the staff would amend 10 CFR Part 52 to explain that more than one SDA may be referenced in DC, CP, and COL applications, as long as each of the referenced SDAs is for different portions of the same reactor design. The change would also clarify the inconsistency between 10 CFR 52.133(a) and 10 CFR 52.135(b).

This rule change would remove any uncertainty in the regulations by explaining that more than one SDA may be referenced in any of the applications. Rule changes that clear up uncertainty could save applicants' resources they might spend trying to understand the scope and flexibility of a rule that might not otherwise be apparent. Although rulemaking would remove the current uncertainty in the rule, the NRC estimates this clarity would result in no substantive cost savings to those applicants referencing multiple SDAs, so the staff did not quantify any impacts on applicants or licensees as a result of this change.

Content of Applications

Modify Requirements To Evaluate Conformance with the SRP: When an application is different than the SRP, the regulations require the applicant to discuss how the proposed alternative in the application provides an acceptable method of complying with the Commission's regulations, or portions thereof, that underlie the corresponding SRP acceptance criteria. This change would amend the regulations to remove requirements for an evaluation against the SRP and provide a more flexible approach to demonstrating compliance with the underlying regulations referenced by the SRP.

New reactor applicants would likely see a reduction in cost because the NRC would remove the requirement to submit an evaluation against the SRP in their applications. The NRC considered the anticipated impacts on applicants for DCs, ESPs, MLs, COLs, and OLs and estimates an average reduction in burden of 2,000 hours per application. Using an estimate of one affected application every 3 years through 2030, beginning in the year of the expected issuance of the final rule, the staff estimates that the averted costs to applicants are approximately $544,000 using a 7-percent discount rate and $677,000 using a 3-percent discount rate, as shown in Appendix A, Table A-16.

Align Requirements for Timely Completion of Construction: This change would align the requirements in 10 CFR 50.100 with 10 CFR 50.55(b) for timely completion of construction. The

regulation in 10 CFR 50.55 does not require conditioning the COL to state the earliest and latest dates for completion of the construction or modification of the facility, while 10 CFR 50.100 can be read to imply that a COL could be revoked, suspended, or modified for failure to achieve timely completion of the licensee's proposed construction or alteration of the facility. The rulemaking would remove this inconsistency and would not change any current requirements for applicants and licensees. The staff did not quantify any impacts on applicants or licensees as a result of this change.

Clarify Applicable Regulatory Parts for Certified Designs: Under Alternative LP-2 to clarify applicable regulatory parts for certified designs, the staff would amend Section V.A of the DC rules in Appendices D and E to 10 CFR Part 52. This section lists the applicable regulatory parts for the reactor designs that the NRC certified by rule in Appendices D and E. Although 10 CFR Part 52 includes technically relevant regulations applicable to the designs certified in Appendices A through E and the applicants and licensees that reference these designs that are not necessarily covered by reference to 10 CFR Part 50, Section V.A of these DC rules omitted inclusion of 10 CFR Part 52 from the list of applicable regulations. The NRC began including a reference to 10 CFR Part 52 in the Section V.A list of applicable regulatory parts beginning with the APR1400 design certified in Appendix F to 10 CFR Part 52. Section V.A of Appendix A includes 10 CFR Part 52 in the list of applicable regulations, so no change is proposed for Appendix A. Including this reference in Section V.A of Appendices D and E will provide greater regulatory clarity and consistency among the DC appendices in 10 CFR Part 52. The staff did not quantify any impacts on applicants or licensees as a result of this change.

Clarify the Requirements for EQ Program for MLs: This change would amend 10 CFR 52.157(f)(6) to address an inconsistency with 10 CFR 50.49(a) and describe a 10 CFR 50.49(b) EQ program. While 10 CFR 50.49(a) requires a 10 CFR Part 52 ML application to describe a program for EQ of electric equipment in its FSAR, 10 CFR 52.157(f)(6) omits this requirement. In the 2007 10 CFR Part 52 final rule (72 FR 49352; August 28, 2007), the Commission revised 10 CFR 50.49(a) to explain that EQ programmatic requirements apply to COLs and MLs under 10 CFR Part 52. The 2007 10 CFR Part 52 final rule also revised 10 CFR 52.79(a)(10) to require a description of the program and its implementation, in accordance with 10 CFR 50.49(a), for the EQ of electric equipment important to safety, but it did not make a corresponding revision to 10 CFR 52.157(f)(6). Because MLs authorize the holder to procure certain electric equipment subject to 10 CFR 50.49, the ML applicant should be required to have a verified 10 CFR 50.49(b) EQ program like a COL applicant to ensure the equipment that can be procured will function as intended. The staff did not quantify any impacts on applicants or licensees as a result of this change.

4.3.8.2 NRC Implementation and Operations

The staff estimated rulemaking costs for all of the changes in Alternative LP-2 combined, at ($1.43 million) using a 7-percent discount rate and ($1.57 million) using a 3-percent discount rate, as shown in Appendix A, Table A-17.

Design Certification, Standard Design Approval, and Manufacturing License Process Changes

Because Alternative LP-2 would remove the requirement to renew the DC every 15 years, this change would eliminate periodic reviews and associated costs to the NRC passed on to the DC renewal applicant. The NRC estimates that the corresponding DC renewal review averted costs are approximately $8.1 million. This is based on the estimated costs associated with reviewing the ABWR DC renewal and completing the associated DC rulemaking. However, whenever a

COL applicant references the design, the NRC may have to review particular items representing departures from the certified design that may have otherwise been addressed in a DC renewal. To the extent that the design as implemented by COL applicants becomes less standardized, there may be more specific review activities during each COL application review. These costs of standardization have not been quantified.

The changes to processes involving SDAs and MLs would reduce new or periodic reviews and associated costs to the NRC and are expected to result in considerable averted costs when compared to the status quo, due to SDAs not expiring and the extension of duration of MLs. As previously discussed, using SDAs and MLs in this way is a novel approach with which the NRC staff has no experience to date, making it difficult to quantify costs with accuracy. Therefore, these changes are considered qualitatively, and the staff did not include any incremental NRC averted costs resulting from this change in the total costs associated with the proposed rule. Hypothetically, the staff estimates the averted cost to the NRC for not having to review an SDA or ML renewal (at a 15-year interval) would be approximately $1.43 million. The ML process also includes the possibility of a hearing, but the cost of the hearing process associated with an ML depends on the extent of participation and the complexity of admitted issues. For this reason, the averted cost of a hearing is considered qualitatively. On the high end, the averted cost to the NRC could be as high as the $7.5 million based on the ABWR renewal costs used elsewhere in this regulatory analysis, for a complex process. The staff assumed that the burden to review the renewal of an ML, or the resubmittal of an SDA after the 15-year expiration period in the status quo, would be similar to a DC renewal burden. Furthermore, the staff assumed that any amending of the SDA under the status quo would occur at the 15 year resubmittal and equated these costs to the amendment process under the proposed rule language; therefore, the estimates above do not include the amendment process because it is not considered an incremental cost between the two scenarios. The changes to the proposed rule for SDA and ML durations are expected to result in these averted costs for each renewal period (that would have occurred for an ML, or each resubmittal of an SDA approximately every 15 years), to the NRC for each applicant for an SDA or ML.

As with applicants, the NRC averted cost from the removal of the DC renewal requirement assumes one averted renewal per DC, which occurs in 2032. Then, in 2040, the staff assumes that COL applicants would reference the DC, and the NRC would review departures from the certified designs, at an additional 15 percent of the cost to the NRC of a DC renewal. The NRC estimates that this change would result in averted costs of approximately $10.6 million using a 7-percent discount rate and $15.5 million using a 3-percent discount rate, as shown in Appendix A, Table A-17.

Change Process

Under Alternative LP-2 to revise the change process, this change would not impose any new requirements or modify or eliminate any existing requirements. However, it would result in a modest burden reduction for each future DC rulemaking because the NRC staff would not include, and the Commission would not need to review, rule language describing the Tier 2 change process in every DC rule. Furthermore, this change would have the added benefit of assuring consistency in the Tier 2 change process across all future and existing certified designs. Specifically, the rulemaking costs would be higher because of the costs associated with revising the appendices for existing certified designs.

Design Scope and Standardization

Modify 10 CFR Part 52 To Add Definitions of Tier 1, Tier 2, and Tier 2:* Under Alternative LP-2 to revise the design scope and standardize, there would be reduced NRC costs to review license amendments during the construction phase of a nuclear power plant licensed under 10 CFR Part 52. The NRC estimates that each COL licensee would prepare 12 fewer LARs over the course of plant construction. The NRC estimates that each license amendment would require approximately 100 NRC staff hours to review and make a regulatory decision. This change would result in averted costs to the NRC associated with NRC reviews of LARs of approximately $334,000 using a 7-percent discount rate and $430,000 using a 3-percent discount rate, as shown in Appendix A, Table A-17.

Clarify the Phrase "Essentially Complete Design": Amending the regulation to give sufficient direction to the scope and level of detail required in a DC application would result in a more efficient NRC review and would likely reduce any questions as to whether the design is essentially complete. The NRC estimates that this clarification could save approximately 130 hours of NRC review time for each DC application. This change would result in averted costs to the NRC for agency reviews of the DC application of approximately $37,000 using a 7-percent discount rate and $46,000 using a 3-percent discount rate, as shown in Appendix A, Table A-17.

Modify Restrictions on Changes to a DC or COL Referencing a DC for Reasons of Standardization: This change would reduce the burden on the NRC, as it would no longer have to consider standardization when developing a safety evaluation for an exemption request for a COL that references a DC. The NRC estimates that this alternative would reduce the NRC's level of effort by 2 hours for every exemption request.

Under this alternative, the NRC's costs to review amendments to a DC would not change because the agency would no longer have to consider increased standardization as a possible reason for amending the design. As described above, the NRC does not expect to receive any DC amendment requests in the near future, and thus estimates no cost reduction for a DC applicant asking to amend the certified design. Similarly, because the NRC has not issued an ML under 10 CFR Part 52, the NRC estimates no burden reduction to it for ML-related changes. The staff estimates that this change would avert costs of $25,000 using a 7-percent discount rate and $33,000 using a 3-percent discount rate due to no longer having to review standardization, as shown in Appendix A, Table A-17.

In addition, the NRC would incur costs to amend its regulations under 10 CFR 52.63(a)(1)(vii) and make conforming changes to 10 CFR 52.63; 10 CFR 52.93, "Exemptions and variances"; and 10 CFR 52.171.

Revise Section IV.A.2.D of Appendices to 10 CFR Part 52 To Clarify the Terms "Site Parameters" and "Site Characteristics": This change would result in consistency among 10 CFR Part 52 DC appendices and would clarify the regulatory language to ensure consistency across DC appendices for future applicants that might reference the affected designs.

This change would result in a more precise and consistent description of the relationship between "site characteristics" and "site parameters" and would clarify the purpose of the information; specifically, that interface requirements shall be met, rather than stating that information demonstrating compliance with interface requirements shall be provided. The staff did not identify any incremental NRC costs beyond rulemaking resulting from this change.

Relocate Requirements from DC Appendices Section IV to 10 CFR 52.79(d): Other than the costs to amend the regulations and revise applicable guidance, the staff did not quantify any NRC impacts as a result of this change.

Design Certification Rule Section IX ITAAC: This change would amend Section IX of Appendix D to 10 CFR Part 52 to remove all of its paragraphs and hold the section in reserve. Because the requirements that would be removed from Appendix D to 10 CFR Part 52 are redundant to other requirements in 10 CFR Part 52, the amendment would not add, change, or remove any substantive requirements for any applicant or licensee referencing the designs in these appendices. In addition, in the context of Section IX, Appendix D to 10 CFR Part 52 would be consistent with Appendices A, E, and F to 10 CFR Part 52. The removal of the redundant requirements in Section IX would support regulatory clarity under the NRC's Principles of Good Regulation. Other than the costs to amend the regulations, the staff did not quantify any NRC impacts as a result of this change.

Standard Design Approval

This change would amend the regulations to allow CP, COL, or ML applicants to reference more than one SDA in their applications. The rule change would remove any uncertainty in the regulations by explaining that more than one SDA may be referenced in any of the applications. The NRC estimates this clarification would result in no substantive cost savings to the NRC. Other than rulemaking costs, the staff did not quantify any NRC impacts as a result of this change.

Content of Applications

Modify Requirements To Evaluate Conformance with the SRP: When an application differs from the SRP, the regulations require the applicant to discuss how the proposed alternative provides an acceptable method of complying with the Commission's regulations, or portions thereof, that underlie the corresponding SRP acceptance criteria. This change would amend the regulations to remove requirements for an evaluation against the SRP and provide a more flexible approach to demonstrating compliance with the underlying regulations referenced by the SRP.

By removing the requirement to submit an evaluation demonstrating conformance with the SRP, the NRC would likely see a reduction in resources to review that portion of the application. However, the NRC would see a corresponding increase in resources to determine whether the applicant followed the guidance in the SRP or met comparable requirements without the benefit of the applicant detailing this in its application. For the purposes of this regulatory analysis, the staff assumes that these costs would essentially offset each other so that there would be no net impacts on the NRC. The NRC would incur rulemaking costs to implement this change, as shown in Appendix A, Table A-17.

Align Requirements for Timely Completion of Construction: This change would align the requirements in 10 CFR 50.100 with those in 10 CFR 50.55(b) for timely completion of construction. The regulation in 10 CFR 50.55 does not require conditioning the COL to state the earliest and latest dates for completion of the construction or modification of the facility, while 10 CFR 50.100 can be read to imply that a COL could be revoked, suspended, or modified for failure to achieve timely completion of the licensee's proposed construction or alteration of the facility. The rulemaking would remove this inconsistency and would not change any current

requirements for applicants or licensees. Other than rulemaking costs, the staff did not quantify any NRC impacts as a result of this change.

Clarify Applicable Regulatory Parts for Certified Designs: Under Alternative LP-2 to clarify applicable regulatory parts for certified designs, the staff would amend Section V.A of the DC rules in Appendices A, D, and E to 10 CFR Part 52. This section lists the applicable regulatory parts for the reactor designs that the NRC certified by rule in Appendices A through E. Although 10 CFR Part 52 includes technically relevant regulations applicable to the designs certified in Appendices A through E and to the applicants and licensees that reference these designs that are not necessarily covered by reference to 10 CFR Part 50, Section V.A of these DC rules omitted inclusion of 10 CFR Part 52 from the list of applicable regulations. Other than rulemaking, the staff did not quantify any NRC impacts as a result of this change.

Clarify the Requirements for the EQ Program for MLs: This change would amend 10 CFR 52.157(f)(6) to address an inconsistency with 10 CFR 50.49(a) and describe a 10 CFR 50.49(b) EQ program. The regulation in 10 CFR 50.49(a) requires a 10 CFR Part 52 ML application to describe an EQ program for electric equipment in its FSAR, but 10 CFR 52.157(f)(6) omits this requirement. Other than rulemaking, the staff did not quantify any NRC impacts as a result of this change.

4.3.9 Environmental

Under Alternative EN-2, the staff would amend 10 CFR Part 51, “Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions,” specifically, 10 CFR 51.50(a), to explain that an applicant for a CP can incorporate by reference an environmental document prepared by the NRC staff for a different approval. This proposed change will make 10 CFR 51.50(a) consistent with 10 CFR 51.50(c), which affirmatively states that COL applicants may reference, in their environmental reports, information contained in a final environmental document prepared by the NRC (e.g., an EA for an application that references a standard DC), while 10 CFR 51.50(a) does not specify whether a CP applicant may reference such a document. Although 10 CFR 51.50(a) does not explicitly forbid CP applicants from referencing final NRC environmental documents, the differing language raises the question of whether the NRC intended for different reference requirements to apply to CP and COL applicants. The proposed change would clarify the NRC’s regulations. Applicants would no longer face uncertainty as to why the regulations are different for CP and COL applicants referencing an EA for a certified design. Because a CP applicant would more clearly be able to incorporate by reference the DC EA, the CP applicant would no longer have to prepare and submit a SAMDA analysis identical to that presented in the DC EA.

4.3.9.1 Industry Implementation and Operations

Under Alternative EN-2, the staff would amend 10 CFR 51.51(a) to give CP applicants the same regulatory option provided to COL applicants with respect to the ability to reference an environmental document prepared by the NRC staff for a different approval. This alternative would clarify the regulations to allow CP applicants to incorporate by reference in its environmental report information contained in a final environmental document prepared by the NRC (e.g., the EA previously prepared by the NRC for the referenced DC). If a DC EA is referenced, then similar to COL applicants that reference a DC EA, the CP applicant must include information in its environmental report to demonstrate that the site characteristics for the CP site fall within the site parameters in the DC EA. The staff estimates that, if a CP applicant could incorporate by reference the DC EA, the CP applicant would save about 1,200 hours,

because this would obviate the need for the CP applicant to perform a full SAMDA analysis. The NRC estimates that this change would result in averted costs to the industry of approximately $343,000 using a 7-percent discount rate and $427,000 using a 3-percent discount rate, as shown in Appendix A, Table A-18.

4.3.9.2 NRC Implementation and Operations

Because a CP applicant would be able to incorporate by reference an environmental document previously prepared by the NRC, the NRC would no longer need to review the SAMDA analysis in addition to that presented in that other environmental document. The staff estimates that this review would require approximately 260 hours to complete. The staff estimates that the resulting process efficiency would result in averted costs of approximately $74,000 using a 7-percent discount rate and $92,000 using a 3-percent discount rate for three CP applicants, as shown in Appendix A, Table A-19.

4.3.10 Applicability of Other Processes to the 10 CFR Part 52 Process

4.3.10.1 Industry Implementation and Operations

Definition of Contested Proceeding in 10 CFR 2.4

Under Alternative OP-2 for contested proceedings, the change would amend the definition of "contested proceeding" in 10 CFR 2.4 to explicitly incorporate hearings on a licensee's compliance with the acceptance criteria that are a part of the ITAAC included in a COL. Although an ITAAC hearing is expressly treated as a contested proceeding under some regulations (e.g., 10 CFR 2.340 is titled, in part, "Initial decision in certain contested proceedings," and 10 CFR 2.340(c) refers to initial decisions on findings in ITAAC hearings under 10 CFR 52.103), the definition of "contested proceeding" in 10 CFR 2.4 does not currently include ITAAC hearings within its scope.

This change would align the definition of "contested proceeding" with the ITAAC hearings in other parts of the regulations, advancing several regulatory interests. As part of its Principles of Good Regulation, the NRC commits to clarity and transparency in regulation; clarifying regulatory definitions when there is an opportunity to do so is consistent with this commitment. The clarification would advance stakeholders' understanding of the ITAAC hearing process and, in doing so, minimize the potential for disputes about the applicable hearing process during the period when an opportunity for hearings on ITAAC closure occurs (e.g., filings to the Commission seeking clarification on procedures may be avoided, which would save time and resources). However, there would be no changes to the ITAAC closure process, the ITAAC hearing notification, or scheduling processes, or in the treatment of the ITAAC hearing as a contested proceeding. Therefore, the staff did not quantify any impacts as a result of this change.

Maintenance of Records for Combined License Holders

Under Alternative OP-2 for maintenance of records for COL holders, the staff would amend 10 CFR 50.71(e)(3)(iii) that requires annual updates to the FSAR following the docketing of an application for a COL until the Commission finds that the acceptance criteria in the COL are met under 10 CFR 52.103(g). Changes to this paragraph would make annual updates to an FSAR applicable to those COL applicants that are actively pursuing a COL and to COL holders

actively pursuing construction. A COL applicant that has asked the NRC to suspend its review of the application or a COL holder that has notified the NRC that the COL holder is not pursuing construction would no longer be required to provide annual updates to the FSAR for new information or reevaluated conditions.

This change would eliminate the requirement for a COL applicant that has an application in suspended status and for a COL holder that has no immediate plans for construction to provide annual FSAR updates. The staff estimates that this change could save affected COL applicants and holders 20 to 40 hours per year in administrative resource costs. The staff estimates that an affected COL applicant or holder would avert costs of approximately $111,000 using a 7-percent discount rate and $144,000 using a 3-percent discount rate, as shown in Appendix A, Table A-20. Once the COL applicant asks the NRC to reinitiate its review of the COL application or the COL holder decides to pursue or resume construction, the COL applicant or COL holder would need to notify the NRC and address changes in its FSAR.

Backfitting and Issue Finality

This change under Alternative OP-2 would amend 10 CFR 50.109 to clarify how backfitting and issue finality apply to SDAs, ESPs, and MLs. This change would correct inconsistencies in the NRC's regulations and provide clarity on the backfitting and issue finality requirements applicable to SDAs, ESPs, and MLs. For an SDA referenced by a COL, 10 CFR 50.109 would apply with respect to the design matters resolved in the SDA. For an ESP referenced by a COL, 10 CFR 50.109 would apply to the site characteristics, design parameters, and terms and conditions specified in the ESP and subsumed into the COL once the COL is issued. For an ML, 10 CFR 52.171 would apply in all cases. The alignment of these regulations would improve clarity and increase regulatory certainty. The staff did not quantify any impacts as a result of this change.

Remove and Reserve Subpart E of 10 CFR Part 2

This change under Alternative OP-2 would delete the content of Subpart E of 10 CFR Part 2 (i.e., 10 CFR 2.500 and 10 CFR 2.501) and would keep Subpart E as reserved. This change corrects an error in the 2007 10 CFR Part 52 rule in which the NRC's regulations do not fully reflect the Commission's decision not to hold mandatory hearings for MLs. The deletion of this regulation would improve clarity and increase regulatory certainty. The staff did not quantify any industry impacts as a result of this change.

Amend Section VIII.C.5 of the Design Certification Rules Addressing Contention Requirements for Certain Challenges to Operation Requirements

This change under Alternative OP-2 would amend Section VIII.C.5 of the DC rules in Appendices A, D, E, and F to 10 CFR Part 52. In part, this section sets out the requirements that apply to a petition to admit a contention in an adjudicatory proceeding for the issuance, amendment, or renewal of a license, or for operation under 10 CFR 52.103(a), alleging that an operational requirement approved in the DCD, or a TS derived from the generic TS must be changed. The second sentence of this section says that such a petition must comply with the general requirements of 10 CFR 2.309 and must also demonstrate either that special circumstances, as defined in 10 CFR 2.335, are present or that the change sought by the petitioner is necessary for compliance with the NRC regulations in effect at the time the DC rulemaking was approved. However, the current language in this sentence omits several words, leading to a lack of clarity on the nature of the requirement for showing compliance with NRC

regulations in effect at the time the DC rulemaking was approved. Revising this section to clearly set out the requirements that apply to a petition seeking to admit a contention that an operational requirement approved in the DCD, or a TS derived from the generic TS must be changed will improve the regulatory clarity of Section VIII.C.5 of the DC appendices. The staff did not quantify any industry impacts as a result of this change.

4.3.10.2 NRC Implementation and Operations

Definition of Contested Proceeding in 10 CFR 2.4

This change would ensure the clarity of NRC regulations consistent with the NRC's Principles of Good Regulation. In addition, limiting the potential for stakeholder confusion may promote efficiency in the ITAAC hearing process. Other than rulemaking costs shown in Appendix A, Table A-21, the staff did not quantify any impacts as a result of this change.

Maintenance of Records for Combined License Holders

This change under Alternative OP-2 would eliminate the requirement for a COL applicant that has an application in suspended status, and for a COL holder that has no immediate plans for construction, to provide annual FSAR updates. Other than rulemaking, the staff did not quantify any substantive NRC impacts as a result of this change.

Backfitting and Issue Finality

With this change, the staff would amend 10 CFR 50.109 and 52.171. The changes would have a beneficial qualitative impact resulting from improved clarity and increased regulatory certainty. Other than rulemaking, the staff did not quantify any impacts as a result of this change.

Remove and Reserve Subpart E of 10 CFR Part 2

This change under Alternative OP-2 would delete the content of Subpart E of 10 CFR Part 2 (i.e., 10 CFR 2.500 and 10 CFR 2.501) and would keep Subpart E as reserved. This change corrects an error in the 2007 10 CFR Part 52 rule, in which the NRC's regulations do not fully reflect the Commission's decision not to hold mandatory hearings for MLs. The deletion of this regulation would improve clarity and increase regulatory certainty. This change would add negligible incremental cost to this rulemaking so, as a result, the staff did not quantify any NRC impacts.

Amend Section VIII.C.5 of the Design Certification Rules Addressing Contention Requirements for Certain Challenges to Operation Requirements

This change under Alternative OP-2 would amend Section VIII.C.5 of the DC rules in Appendices A, D, E, and F to 10 CFR Part 52. The current regulatory language omits several words, as described above, leading to a lack of clarity. This change would add negligible incremental cost to the rulemaking, so the staff did not quantify any NRC impacts as a result of this change.

4.3.11 Miscellaneous Topics

4.3.11.1 Industry Implementation and Operations

Notice of Issuance in 10 CFR 2.106(b)(2)(ii)

To approve a licensee's operation of a facility under a COL, the Commission must make a finding under 10 CFR 52.103(g) that "the acceptance criteria in the combined license are met." The requirements for notices of issuance in 10 CFR 2.106(b)(2) include that a finding has been made under 10 CFR 52.103(g). The 10 CFR 2.106(b)(2)(ii) notice requirements include language about 10 CFR 52.103(g) findings that could be misread to mean that the NRC must make additional findings under 10 CFR 52.103(g) beyond those findings set forth in 10 CFR 52.103(g).

Under Alternative MT-2 for notice of issuance, this change would amend 10 CFR 2.106(b)(2)(ii) to clarify what information must be included in a notice of issuance in the case of a finding under 10 CFR 52.103(g) that the acceptance criteria in the ITAAC for a COL are met. This change would resolve the conflict between the language of 10 CFR 2.106(b)(2)(ii) and 10 CFR 52.103(g) and would promote regulatory clarity. It should avoid stakeholder misreading of the applicable regulatory standards that could result in unnecessary litigation, thereby consuming time and resources because of confusion related to the scope of issues within the proceeding. The staff did not quantify any licensee impacts as a result of this change.

Definitions in 10 CFR 21.3

The regulations in 10 CFR Part 21 apply to individuals and entities that construct a production or utilization facility licensed for manufacture, construction, or operation under 10 CFR Parts 50 and 52. The definitions of "Commercial grade item," "Critical characteristics," "Dedicating entity," and "Dedication" in 10 CFR 21.3 are applicable to holders of licenses issued under 10 CFR Parts 50 and 52; however, these terms do not explicitly state their applicability to 10 CFR Part 52 licensees.

Under Alternative MT-2 for definitions, this change would amend 10 CFR 21.3 to add 10 CFR Part 52 to the definitions of "Commercial grade item," "Critical characteristics," "Dedicating entity," and "Dedication" and add the applicability of these terms to 10 CFR Part 52 licensees. This change would reduce confusion and resources expended to address the existing inconsistencies in the regulations, including 10 CFR 50.55, which references the definitions in 10 CFR Part 21. The staff estimates that this change would have minimal impact on licensees because the existing guidance in RG 1.234 and NEI 14-09 provides clarity on the use of these terms, although this rulemaking change would provide regulatory certainty. The staff did not quantify any licensee impacts as a result of this change.

Requirement for a Safety Parameter Display System Console in 10 CFR 50.34(f)(2)(iv)

Under Alternative MT-2 for the SPDS console, the change would amend 10 CFR 50.34(f)(2)(iv) to remove the requirement for an SPDS console but retain the SPDS functional requirement. This change would eliminate the need for applicants to seek clarification or apply for an exemption from 10 CFR 50.34(f)(2)(iv), which is estimated to require approximately 60 hours to prepare. The NRC assumed that one exemption request would be averted each year from 2024 through 2030, after which the estimate becomes too speculative. This change could facilitate the ability of licensees to better integrate an SPDS into other displays, thereby enabling a more cost-effective design that could better support reliable operator performance and monitoring of plant parameters under accident conditions. The NRC estimates that licensees would not need

to prepare and submit SPDS console exemptions, which would avert costs of approximately $38,000 using a 7-percent discount rate and $49,000 using a 3-percent discount rate, as shown in Appendix A, Table A-22.

Requirements for Reporting Errors and Changes in Emergency Core Cooling System Models

Under Alternative MT-2 for reporting ECCS model errors, the change would amend 10 CFR 50.46(a)(3)(i) and (iii) to relax reporting requirements related to those SDAs and standard DCs that are not referenced in any application for the construction or operation of a reactor.

Changes to 10 CFR 50.46(a)(3) under this alternative would eliminate the annual reporting requirement for applicants for or holders of standard design certifications and standard design approvals. Such applicants and holders would, however, be required to continue to document changes and errors and their impacts on the limiting ECCS analysis. Furthermore, reporting within 30 days would be required in the event that changes or errors result in an inability to assure compliance with the acceptance criteria in 10 CFR 50.46(b). As a result, the cost savings associated with the proposed changes to 10 CFR 50.46(a)(3) would be only those costs associated with the annual reporting of ECCS EM changes and errors rather than the identification and evaluation of such changes and errors.

Standard DCs are currently issued for 15 years, in accordance with 10 CFR 52.55, “Duration of certification.” The NRC therefore considered that the majority of the burden reduction compared to the “no-action” alternative would be from the number of reports that would likely be issued in a 15-year period.

The NRC reviewed current certified designs and found that, to date, the holders of these certified designs have only reported changes or error corrections that have required annual reports under 10 CFR 50.46. The NRC estimates that the burden to a holder of or applicant for an SDA or an applicant for a DC associated with the preparation of a single annual report would be 100 labor hours.

An application for a COL or ML that is the first to reference a DC might incur costs associated with the NRC review of any ECCS EM changes or errors and any actions that might need to be taken to bring the standard design into compliance with 10 CFR 50.46 requirements. The NRC does not expect these costs to be significant, other than for major errors, which are very rare. The NRC review effort associated with ECCS EM changes or errors is usually relatively minor (i.e., on the order of tens of hours of staff time).

The NRC notes that ECCS EM changes and errors are, in general, expected to decrease over time, particularly for new reactor designs. Some of the more recent new reactor designs evaluated by the NRC have no temperature excursion during a design-basis loss-of-coolant accident and therefore have a very simple ECCS evaluation where errors, if they exist at all, are less significant. In addition, many prospective new applicants for DCs or SDAs are not using LWR designs and therefore are not subject to the provisions of 10 CFR 50.46. Based on these insights, the NRC estimates that holders of or applicants for an SDA or applicants for a DC would very rarely experience ECCS EM changes or errors that result in an inability to assure compliance with the acceptance criteria in 10 CFR 50.46(b).

Finally, the NRC notes that the regulation in 10 CFR 50.46, while requiring reporting of ECCS EM errors, also establishes, as part of that reporting, a process that enables ECCS EM changes

without prior NRC review and approval. Removal of the reporting requirements may limit a presumed flexibility on the part of a holder of or applicant for an SDA or an applicant for a standard DC to make discretionary changes without NRC approval.

To simplify the analysis, the NRC estimated the costs and averted costs to licensees on a per licensee basis. To capture the uncertainty associated with the remaining time on a DC approval (before the renewal report would be submitted after the regulatory change), the NRC used three-point estimation techniques that vary the number of years from 5 to 15, and also similarly varied the licensee and NRC review costs of these currently annual reports to capture the possibility that no annual report would be required in some years. The cost model uses 10 years as the average number of years remaining on a DC approval before the design is referenced; therefore, the time horizon the NRC used is from 2024 to 2033, starting the year the final rule is scheduled to be issued. The averted cost of the annual reports is offset in part by the larger report (containing all the updates and error reporting) when the design is referenced, and the time value of money that results from postponing the reporting is a part of the averted cost of this alternative. For this example, the model estimated the design would be referenced approximately 10 years after the rule is issued. Using a different interval of time, the averted costs would change in a proportional ratio and would still be cost beneficial.

With the above inputs and assumptions, the staff estimates that this change would result in averted costs to a holder of or applicant for a DC or SDA of approximately $49,000 using a 7-percent discount rate and $60,000 using a 3-percent discount rate, as shown in Appendix A, Table A-22. Because this estimate is for a single entity (to simplify the cost analysis), the averted cost increases with each additional affected entity.

Notification to the NRC of Significant Information

Under Alternative MT-2 for notification of the Office of Nuclear Reactor Regulation (NRR), the change would amend 10 CFR 52.6(b) to require applicants and licensees under 10 CFR Part 52, including holders of SDAs and applicants for standard DCs, to inform the Director of NRR (instead of the Regional Administrator) within 2 working days of identifying information that has a significant implication for public health and safety or the common defense and security.

Affected applicants and licensees would incur no impact on resources to notify the responsible and cognizant organization of the information that has a significant implication for public health and safety or the common defense and security. Under the Alternative MT-2 for the notification of NRR, the applicant or licensee would still be required to notify the NRC; the individual notified would be the only change. The cost of the applicant's or licensee's actions would be unchanged.

Discontinue Use of Priority Ranking Model for Generic Issues

Regulations in 10 CFR 52.47(a)(21) and 10 CFR 52.79(a)(20) require that the information submitted for a DC and for a COL include technical resolutions of the applicable USIs and medium- and high-priority GSIs that are identified in NUREG-0933. This requirement is also included in 10 CFR 52.137(a)(21) and 10 CFR 52.157(f)(28) for SDA and ML applications. Under Alternative MT-2 for use of priority ranking, the change would amend these requirements because the NRC has discontinued use of a priority ranking model for GSIs. In its place, the NRC has implemented a screening process using the risk criteria in RG 1.174, Revision 3.

Because of the increased clarity in the regulations, the NRC expects that DC, COL, SDA, and ML applicants would need to commit fewer resources to develop applications using the risk-informed approach described in NUREG-0933. The resources needed decrease because the regulations more closely match the description of the information that is needed for NRC review, which the staff did not quantify. This change would align the regulations with existing guidance, resulting in increased clarity and regulatory certainty. The NRC estimates that the incremental impacts on licensees would be negligible.

Status of ITAAC Completion

The regulation in 10 CFR 52.97(a)(2) states that the Commission may find, at the time it issues a COL, that certain acceptance criteria in one or more of the ITAAC in a referenced ESP or standard DC "have been" met. Under Alternative MT-2 for the status of ITAAC completion, the change would revise the language in 10 CFR 52.97(a)(2) from "have been met" to "are met." This change would align the regulations with the requirements in Section 185.b of the AEA and 10 CFR 52.103(g), which state that the acceptance criteria in the COL "are met." The NRC estimates that the incremental impacts on licensees would be negligible and did not quantify them.

Reporting Requirements at Completion of Power Ascension Testing—Start of Assessment of Annual Fees

Under Alternative MT-2 for reporting completion of power ascension testing, the NRC would amend 10 CFR 50.71 for a future 10 CFR Part 50 power reactor licensee or 10 CFR Part 52 COL holder to provide a prompt written notification to the NRC of the successful completion of power ascension testing or startup testing. This change would ensure that the NRC receives prompt written notification from licensees, which would enable the NRC to begin assessing 10 CFR Part 171 annual fees. The NRC could also use this notification to start its related inspection activities currently initiated through the notification required by a license condition. By including a generic requirement in the regulations applicable to all 10 CFR Part 50 power reactor licensees and 10 CFR Part 52 COL holders, the NRC would not need to depend on the inclusion of license conditions to determine when the milestone has been achieved to trigger the start of assessing 10 CFR Part 171 annual fees.

This change would result in establishing clear requirements for future applicants for 10 CFR Part 50 OLs and 10 CFR Part 52 COLs on the written notification of the completion of power ascension testing. This change would not have an impact on currently operating 10 CFR Part 50 power reactor licensees and current 10 CFR Part 52 COL holders. The NRC expects that there would be no increase in regulatory costs associated with providing a one-time written notification by future 10 CFR Part 50 power reactor licensees and 10 CFR Part 52 COL holders because the NRC would otherwise require the licensees to provide the same written notification through a license condition.

The improved clarity of regulatory requirements afforded by the rulemaking would provide more regulatory certainty and improve efficiency. This could result in resource savings for the applicant because the NRC would not have to develop license conditions to require notification of completion of power ascension testing. The staff did not quantify any licensee impacts as a result of this change.

Conditions of Licenses

Under Alternative MT-2 for conditions of licenses, the NRC would revise 10 CFR Part 50 to amend the introductory text of 10 CFR 50.54 to explain that those paragraphs not explicitly limited in their applicability to nuclear power plants are applicable to nonpower production and utilization facilities. The NRC would amend 10 CFR 50.54(j), (k), and (m)(1) to specify that the requirements of 10 CFR Part 55 apply to all utilization facilities. The NRC would amend 10 CFR 50.54(n), (s)(2)(ii), and (ee)(1) to clarify the applicability of the current generic language to all production and utilization facilities, including nuclear power plants and nonpower production and utilization facilities. Finally, the NRC would amend 10 CFR 50.54(z) to specify that the requirements of 10 CFR 50.72 apply only to nuclear power reactors.

These changes would ensure that production and utilization facility licensees and applicants understand the applicability of these provisions, and the NRC would not have to explain it to them on a case-by-case basis. This could result in resource savings for the applicant. The staff did not quantify any licensee impacts as a result of this change.

4.3.11.2 NRC Implementation and Operations

Notice of Issuance in 10 CFR 2.106(b)(2)(ii)

Under Alternative MT-2 for notice of issuance, the staff would resolve the conflict between the language of 10 CFR 2.106(b)(2)(ii) and 52.103(g), which would enable the NRC to clarify the applicable regulatory finding, consistent with one of the NRC's Principles of Good Regulation, clarity. Clarifying this language may also reduce the potential for unnecessary litigation occurring as a result of a misunderstanding of the applicable regulatory findings. Alternative MT-2 would result in rulemaking costs to the NRC of approximately ($21,000) using a 7-percent discount rate and ($23,000) using a 3-percent discount rate, as shown in Appendix A, Table A-23.

Definitions in 10 CFR 21.3

Under Alternative MT-2 for definitions, this change would amend 10 CFR 21.3 to add 10 CFR Part 52 to the definitions of "Commercial grade item," "Critical characteristics," "Dedicating entity," and "Dedication," thereby adding the applicability of these terms to 10 CFR Part 52 licensees. The NRC would incur rulemaking costs to amend 10 CFR 21.3. The NRC estimates that these costs would be approximately ($41,000) using a 7-percent discount rate and ($45,000) using a 3-percent discount rate, as shown in Appendix A, Table A-23.

Requirement for a Safety Parameter Display System Console in 10 CFR 50.34(f)(2)(iv)

Under Alternative MT-2 for the SPDS console, this change would reduce the required NRC resources needed to review and approve SPDS console exemption requests and would incur a one-time cost to amend 10 CFR 50.34(f)(2)(iv). This change would result in an NRC rulemaking cost of approximately ($20,000) using a 7-percent discount rate and ($23,000), using a 3-percent discount rate and avert the cost for reviewing SPDS console exemption requests of approximately $19,000 using a 7-percent discount rate and $25,000 using a 3-percent discount rate, for a net total cost of ($2,000) using a 7-percent discount rate and averted cost of $2,000 using a 3-percent discount rate, as shown in Appendix A, Table A-23.

Requirements for Reporting Errors and Changes in Emergency Core Cooling System Models

Under Alternative MT-2 for reporting ECCS model errors, this change would modify the ECCS EM error and change reporting requirements in 10 CFR 50.46 reporting most changes and errors to the NRC would be deferred until a license application or license references the standard design. Section 4.3.11.1 of this document explains the assumptions of the cost model, and the NRC review of these reports is estimated to be approximately half of the burden of the licensee preparation. The changes to reporting would result in averted costs to the NRC; however, the rulemaking costs would be greater and would result in some NRC incremental costs. This change would result in costs to the NRC of approximately ($16,000) using a 7-percent discount rate and ($14,000) using a 3-percent discount rate, as shown in Appendix A, Table A-23. Because this estimate is for a single holder of, or applicant for, a CP, OL, COL, or ML, the averted cost increases with each additional affected entity.

Notification to the NRC of Significant Information

By changing the notification requirements, the responsible and cognizant NRC individual would be able to assess and act upon information that has a significant implication for public health and safety or the common defense and security in a more timely manner than under the current regulatory framework. However, the cost of the NRC's actions would be unchanged. The NRC would incur rulemaking costs of approximately ($41,000) using a 7-percent discount rate and ($45,000) using a 3-percent discount rate, as shown in Appendix A, Table A-23.

Discontinue Use of Priority Ranking Model for Generic Issues

By allowing applicants to use a risk-informed approach, the process would follow the current Generic Issue Program. This change would eliminate the need for the NRC to provide additional guidance to applicants to explain what information is needed. The NRC would incur rulemaking costs of approximately ($21,000) using a 7-percent discount rate and ($23,000) using a 3-percent discount rate, as shown in Appendix A, Table A-23.

Status of ITAAC Completion

The regulation in 10 CFR 52.97(a)(2) states that the Commission may find, at the time it issues a COL, that certain acceptance criteria in one or more of the ITAAC in a referenced ESP or standard DC "have been" met. Under alternative MT-2 for the status of ITAAC completion, the change would revise the language in 10 CFR 52.97(a)(2) from "have been met" to "are met." This change would align the regulations with the requirements in Section 185.b of the AEA and 10 CFR 52.103(g), which state that the acceptance criteria in the COL "are met." The NRC estimates that the rulemaking cost for this item would be negligible.

Reporting Requirements at Completion of Power Ascension Testing—Start of Assessment of Annual Fees

Under Alternative MT-2 for reporting completion of power ascension testing, the NRC would benefit from reduced administrative costs associated with preparing the license condition, by eliminating the need to include a license condition in future 10 CFR Part 50 power reactor OLs and 10 CFR Part 52 COLs that would require licensees to provide a written notification of completion of power ascension testing or startup testing. Furthermore, adding a requirement in 10 CFR 50.71 would increase the clarity of NRC's regulations by more closely matching the new wording in 10 CFR Part 171 on the start of assessment of annual fees for future 10 CFR Part 50

power reactor licensees and 10 CFR Part 52 COL holders. The staff estimates that the NRC rulemaking costs for this change would be approximately ($21,000) using a 7-percent discount rate and ($23,000) using a 3-percent discount rate, as shown in Appendix A, Table A-23.

Conditions of Licenses

Under Alternative MT-2 for conditions of licenses, the NRC would revise 10 CFR Part 50 to amend the introductory text of 10 CFR 50.54 to explain that those paragraphs not explicitly limited in their applicability to nuclear power plants are applicable to nonpower production and utilization facilities. The NRC would amend paragraphs (j), (k), and (m)(1) of 10 CFR 50.54 to explain that the requirements of 10 CFR Part 55 apply to all utilization facilities. The NRC would amend paragraphs (n), (s)(2)(ii), and (ee)(1) of 10 CFR 50.54 to clarify the applicability of the current generic language to all production and utilization facilities, including nuclear power plants and nonpower production and utilization facilities. Finally, the NRC would amend 10 CFR 50.54(z) to explain that the requirements of 10 CFR 50.72 apply only to nuclear power reactors.

These changes would ensure that production and utilization facility licensees and applicants understand the applicability of these provisions. The NRC estimates that the rulemaking cost for this item would be negligible.

5.0 RESULTS

5.1 Cost Impact on Reactor Licensees

Among the NRC goals in amending these regulations is the goal to align the requirements of the 10 CFR Part 50 licensing process with the 10 CFR Part 52 licensing process. Over the years, much has been learned about the need to review sufficiently detailed information early in the process to avoid costly actions during construction. As such, in certain areas, the NRC will require the submittal of new or more detailed information (e.g., PRA results) as part of future 10 CFR Part 50 applications. The development of this information will likely cause an increase in cost for applicants.

However, several alternatives presented may result in a reduction in licensee costs; these reductions (e.g., fewer licensing actions) are discussed more as part of the analysis above. Alternatives associated with rulemaking may result in small incremental costs to licensees for reviewing and submitting comments on the proposed rule or attending public meetings during preparation of the final rule; the staff did not quantify these costs.

The NRC performed this regulatory analysis to determine the impacts of this rule on the NRC and new reactor licensees, holders, and applicants. This section contains the NRC's evaluation of the estimated costs and benefits associated with each regulatory alternative considered.

With the exception of rulemaking costs to the NRC, all but four of the proposed rule changes in this regulatory analysis are either effectively cost neutral or cost beneficial. Extending 10 CFR Part 52 PRA requirements to 10 CFR Part 50 applicants and licensees would not be cost beneficial, as shown in Table 1. However, the NRC would not expect that a current 10 CFR Part 50 applicant would submit a 10 CFR Part 50 application without developing a PRA. The qualitative benefits of using a PRA in reactor design are significant and could be useful during plant construction.

Similarly, the rule provision for operator licensing is not cost beneficial, in part based on the length of time that VEGP Units 3 and 4 have been under construction and would conduct a continuing training program. However, licensees are choosing to conduct continuing training similar to the suggested new regulatory change. Therefore, the determination that the operator licensing alternative (Alternative OL-2) is not cost beneficial is potentially biased by the recent nuclear power plant construction experience.

For further information, Appendices A and B contain a fuller detailing the costs and benefits inputs and calculations.

The proposed rule changes result in net averted benefits (costs) to industry of approximately $7.53 million using a 7-percent discount rate and $11.9 million using a 3-percent discount rate, as shown in Table 1.

Table 1 Industry Costs and Benefits

Activity	Industry Net Benefit (Cost) (2021$)		
	Undiscounted	7% NPV	3% NPV
1. Severe Accident	$244,000	$181,000	$214,000
2. PRA (a)	($2,403,000)	($1,928,000)	($2,182,000)
3. TMI Requirements	($246,000)	($166,000)	($207,000)
4. Fire Protection Features	$0	$0	$0
5. Operator Licensing (a)	($3,250,000)	($2,365,000)	($2,829,000)
6.1 Physical Security	$189,000	$128,000	$159,000
6.2 Fitness for Duty	($99,000)	($60,000)	($80,000)
7. Emergency Planning	$181,000	$117,000	$149,000
8.1 DC Process Changes (b)	$19,211,000	$9,800,000	$14,394,000
8.2 Change Process	$0	$0	$0
8.3.1 Tier 1, 2, and 2* Definitions	$1,031,000	$652,000	$841,000
8.3.2 Essentially Complete Design	$90,000	$61,000	$75,000
8.3.3 Standardization Restrictions on Design Changes	$39,000	$25,000	$32,000
8.3.4 Clarify Terms “Site Parameters” and “Site Characteristics”	$0	$0	$0
8.3.5 Relocation of Requirements from DC Appendices Section IV to 10 CFR 52.79(d)	$0	$0	$0
8.3.6 ITAAC Requirements	$0	$0	$0
8.4 Referencing Multiple SDAs	$0	$0	$0
8.5.1 Modifying Requirements to Evaluate Conformance with SRPs	$805,000	$544,000	$676,000
8.5.2 Clarify Applicable Regulatory Parts for Certified Designs	$0	$0	$0
8.5.3 Clarify Requirements for EQ Program for MLs	$0	$0	$0

Activity	Industry Net Benefit (Cost) (2021$)		
	Undiscounted	7% NPV	3% NPV
9. Referencing information from another environmental document	$508,000	$343,000	$426,000
10.1 Definition of Contested Proceeding	$0	$0	$0
10.2 Maintenance of Records in 10 CFR 50.71(e)(3)(iii)	$176,000	$111,000	$144,000
10.3 Backfitting and Issue Finality	$0	$0	$0
10.4 Remove and Reserve Subpart E of 10 CFR Part 2	$0	$0	$0
10.5 DC Rules Addressing Contention Requirements	$0	$0	$0
11.1 Notice of Issuance in 10 CFR 2.106(b)(2)(ii)	$0	$0	$0
11.2 Definitions in 10 CFR 21.3	$0	$0	$0
11.3 SPDS Console	$60,000	$38,000	$49,000
11.4 Requirements for Reporting Errors and Changes in ECCS Models (a)	$70,000	$49,000	$60,000
11.5 Notification of Significant Implication for Public Health and Safety or the Common Defense and Security	$0	$0	$0
11.6 Discontinue Use of Priority Ranking Model for Generic Issues and Allow a Risk-Informed Approach	$0	$0	$0
11.7 Reporting Requirements at Completion of Power Ascension Testing	$0	$0	$0
11.8 Conditions of Licenses	$0	$0	$0
Net Benefit (Cost):	**$16,605,000**	**$7,529,000**	**$11,921,000**

(a) These rows represent cost estimates on a per applicant/licensee basis as described above.
(b) This row represents a cost estimate aggregated across all DCs as described above.
(c) Totals may not add up exactly due to rounding; all values rounded to thousands.

The cost estimates for alternatives are estimated to have large industry benefits, as shown in Table 1 and below:

- The cost estimate for 1, “Severe Accident,” results in incremental averted costs for a future 10 CFR Part 50 applicant to address design issues before the application process.

- The estimate for 8.1, “DC Process Changes,” shows very high averted costs to applicants resulting from a change that would eliminate the expiration date for future DCs, obviating the need to submit future DC renewal applications.

- The cost estimate for 8.3.1, “Tier 1, 2, and 2* Definitions,” shows high averted costs to applicants and licensees. The alternative would clarify the scope of information required to be classified as Tier 1.

- The estimate for 8.5.1, “Modifying Requirements to Evaluate Conformance with SRPs,” results in significant averted costs to applicants. The recommendation would eliminate

the requirement for an applicant to develop and submit a detailed analysis of how the application meets each SRP review criterion.

- The cost estimate for 9, "Referencing information from another environmental document," shows considerable averted costs to applicants due to not having to perform an additional SAMDA analysis.

Overall, the proposed rule is shown to have large, quantified benefits primarily from the alternatives listed above.

The cost estimates for the following alternatives are estimated to have large industry costs:

- The cost estimate for 2, "PRA," shows large industry costs related to extending 10 CFR Part 52 PRA requirements to 10 CFR Part 50 applicants or licensees. However, the NRC staff would not expect a current 10 CFR Part 50 licensee to submit an application without a PRA, so these costs are a function of the regulatory analysis process itself that may not ever affect licensees.

- The cost estimate for 3, "TMI Requirements," results in large incremental costs for a future 10 CFR Part 50 applicant having to address the additional requirements in 10 CFR 50.34(f) that are not already found in other NRC regulations.

- The cost estimate for 5, "Operator Licensing," results in high costs to licensees to meet a new requirement for facility licensees at cold plants to maintain the knowledge, skills, and abilities of operator license applicants who have successfully completed the NRC initial licensing examination. However, as mentioned earlier in this regulatory analysis, the continued training approach is likely to be chosen by licensees even without the regulatory requirement, because it reduces risks as the plant prepares for operation. Additionally, the analysis uses VEGP Units 3 and 4 for cost information, and the long construction time for those plants likely biases the costs to be greater than they might be for another licensee's plant(s).

5.2 Cost Impact on the NRC

Overall, this rulemaking would result in a significant one-time cost to the NRC followed by ongoing savings, as described below:

- The NRC would incur incremental costs to undertake the rulemaking process. This includes costs associated with publishing the proposed rule; resolving public comments on the proposed rule; and preparing the final rule, guidance, and supporting documentation. These rulemaking costs were calculated for each item's contribution to the overall rulemaking but are totaled into a single line in Table 2 for clarity.

- By changing the current regulatory framework (e.g., the submission of the results of a PRA in a 10 CFR Part 50 application) to align the relevant regulations with the commensurate safety benefits, the NRC would save resources. The new regulatory framework would provide important design insights to the NRC staff earlier in the licensing process, thereby reducing the number of RAIs during the staff's application review. The revised framework would obviate the need for some exemptions and LARs, thereby reducing both the number and complexity of new reactor licensing action requests. These changes would result in a more efficient process and save the staff time and resources.

Taking rulemaking costs into account, the analyzed alternatives would result in averted costs to the NRC of approximately $8.60 million using a 7-percent discount rate and $13.6 million using a 3-percent discount rate, as shown in Table 2. Therefore, taken as a whole, the rule would be cost beneficial to the NRC. All values are in 2021 dollars.

Table 2 NRC Costs and Benefits

Activity	NRC Net Benefit (Cost) (2021$)		
	Undiscounted	**7% NPV**	**3% NPV**
Rulemaking	($3,684,000)	($3,098,000)	($3,417,000)
1. Severe Accident	$0	$0	$0
2. PRA (a)	$29,000	$18,000	$23,000
3. TMI Requirements	($100,000)	($67,000)	($84,000)
4. Fire Protection Features	$0	$0	$0
5. Operator Licensing (a)	$720,000	$494,000	$611,000
6.1 Physical Security	$97,000	$65,000	$81,000
6.2 Fitness for Duty	$35,000	$24,000	$29,000
7. Emergency Planning	$89,000	$58,000	$74,000
8.1 DC Process Changes (b)	$20,788,000	$10,549,000	$15,533,000
8.2 Change Process	$0	$0	$0
8.3.1 Tier 1, 2, and 2* Definitions	$526,000	$333,000	$429,000
8.3.2 Essentially Complete Design	$54,000	$37,000	$46,000
8.3.3 Standardization Restrictions on Design Changes	$40,000	$25,000	$33,000
8.3.4 Clarify Terms “Site Parameters” and “Site Characteristics”	$0	$0	$0
8.3.5 Relocation of Requirements from DC Appendices Section IV to 10 CFR 52.79(d)	$0	$0	$0
8.3.6 ITAAC Requirements	$0	$0	$0
8.4 Referencing Multiple SDAs	$0	$0	$0
8.5.1 Modifying Requirements to Evaluate Conformance with SRPs	$0	$0	$0
8.5.2 Clarify Applicable Regulatory Parts for Certified Designs	$0	$0	$0
8.5.3 Clarify Requirements for EQ Program for MLs	$0	$0	$0
9. Referencing information from another environmental document	$158,000	$115,000	$137,000
10.1 Definition of Contested Proceeding	$0	$0	$0
10.2 Maintenance of Records in 10 CFR 50.71(e)(3)(iii)	$0	$0	$0
10.3 Backfitting and Issue Finality	$0	$0	$0
10.4 Remove and Reserve Subpart E of 10 CFR Part 2	$0	$0	$0
10.5 DC Rules Addressing Contention Requirements	$0	$0	$0

Activity	NRC Net Benefit (Cost) (2021$)		
	Undiscounted	7% NPV	3% NPV
11.1 Notice of Issuance in 10 CFR 2.106(b)(2)(ii)	$0	$0	$0
11.2 Definitions in 10 CFR 21.3	$0	$0	$0
11.3 SPDS Console	$36,000	$25,000	$31,000
11.4 Requirements for Reporting Errors and Changes in ECCS Models (a)	$36,000	$25,000	$31,000
11.5 Notification of Significant Implication for Public Health and Safety or the Common Defense and Security	$0	$0	$0
11.6 Discontinue Use of Priority Ranking Model for Generic Issues and Allow a Risk-Informed Approach	$0	$0	$0
11.7 Reporting Requirements at Completion of Power Ascension Testing	$0	$0	$0
11.8 Conditions of Licenses	$0	$0	$0
Net Benefit (Cost):	**$18,819,000**	**$8,597,000**	**$13,551,000**

(a) These rows represent cost estimates on a per applicant/licensee basis as described above.
(b) This row represents a cost estimate aggregated across all DCs as described above.
(c) Totals may not add up exactly due to rounding, all values rounded to three significant figures.
(d) Rulemaking costs for all alternatives are consolidated in the row titled “Rulemaking.”

The cost estimates for several alternatives are estimated to result in large NRC benefits, as shown in Table 2 and given below:

- The cost estimate for 5, “Operator Licensing,” shows notable averted costs to the NRC from reduced exemption requests and from no longer needing to oversee examinations and retests due to the licensee’s continued training program, as described above.

- The cost estimate for 8.1, “DC Process Changes,” results in very high averted costs to the NRC. The recommendation would eliminate the need to submit renewal applications for DCs to remain in effect. The total averted cost to the NRC would increase with each affected DC for which renewal would have been required.

- The cost estimate for 8.3.1, “Tier 1, 2, and 2* Definitions,” shows significant averted costs to the NRC. The recommendation would clarify the scope of Tier 1 information, reducing the number of LARs or exemption requests for NRC staff review.

- The cost estimate for 9, “Referencing information from another environmental document,” results in notable averted costs to the NRC. The recommendation would eliminate the need for the NRC to evaluate information that is not required if an environmental report is referenced.

5.3 Regulatory Efficiency

The NRC is pursuing rulemaking to update new reactor regulations. The regulations would accomplish the following:

- Improve alignment between the reactor licensing processes in 10 CFR Parts 50 and 52. The rulemaking alternative analyzed in this document would help ensure consistent safety standards are applied, regardless of the process used to license a new reactor. This alignment would result in a licensing process that has enhanced regulatory stability, predictability, and clarity.

- Update 10 CFR Part 52 and supporting regulations, including 10 CFR Part 50, to address lessons learned from recent new reactor license reviews.

Addressing these changes in a single rulemaking effort would be more efficient than addressing them in separate rulemakings and would help ensure continuity and consistency among reactor licensing regulations. A single rulemaking effort would also make it easier for stakeholders to understand all the changes and provide meaningful input.

The rule would result in a licensing process that has enhanced regulatory stability, predictability, and clarity. The rule would reduce the need to develop and review case-by-case exemption requests, LARs, and RAIs for new reactor license applicants.

Reliance on the exemption and RAI processes to address shortcomings in licensing actions is not ideal because these processes require more resources to treat license application issues on a case-by-case basis. These processes do not provide the same degree of certainty or finality of agency decisions as does rulemaking. In addition, the NRC attempts to avoid regulation by exemption when it can address an issue through generic actions such as rulemaking. The estimated benefits of the recommended rulemaking action include (1) fewer exemption requests than under current regulations, (2) fewer RAIs to address shortcomings, inconsistencies, and gaps in the current regulations, (3) consistent regulatory applicability across the 10 CFR Part 50 and 52 processes, (4) efficiencies gained from lessons learned during license application reviews, and (5) the use of a more risk-informed, performance-based licensing framework for the 10 CFR Part 50 process.

5.4 Increased Public Confidence

In addition to enhancing regulatory efficiency, the rule would align 10 CFR Parts 50 and 52 and address lessons learned from new reactor license reviews, which would increase public confidence in the NRC's ability to improve its regulations, adapt to regulatory needs identified by stakeholders, offer opportunities for stakeholders to provide input to the changes to the new reactor licensing process, and maintain the NRC's role as an effective industry regulator. In addition, the rulemaking process provides the greatest opportunity for Commission and public engagement on the issues related to the new reactor licensing process. Public notice and comment during rulemaking would provide the widest range of viewpoints for Commission consideration before preparation of the final rule.

5.5 Relationship to Non-Light-Water Reactor Technology

The NRC did not perform a comprehensive review of the requirements of 10 CFR Parts 50 and 52 for their suitability or applicability to non-LWR technology but rather focused on the alignment issues and lessons learned outlined in SECY-19-0084, "Status of Rulemaking to Align Licensing Processes and Lessons Learned from New Reactor Licensing (RIN 3150-AI66)," dated August 27, 2019 (NRC, 2019b). The NRC is engaged in a separate rulemaking effort to develop a technology inclusive, risk-informed, performance-based regulatory framework for

advanced reactors as described in SECY-20-0032, "Rulemaking Plan on 'Risk-Informed, Technology-Inclusive Regulatory Framework for Advanced Reactors (RIN-3150-AK31; NRC-2019-0062),'" dated April 13, 2020 (NRC, 2020b). Although the NRC is undertaking these two rulemakings as two separate activities, the agency is coordinating its efforts so that these rulemakings result in appropriate frameworks for license applicants of all types of reactor technologies, which could result in proposed changes to 10 CFR Parts 50 and 52.

5.6 Uncertainty Analysis

The NRC completed a Monte Carlo sensitivity analysis for this regulatory analysis using the specialty software @Risk program.[5] The Monte Carlo approach answers the question, "What distribution of net benefits results from multiple iterations of the probability distribution assigned to key variables?"

5.6.1 Uncertainty Analysis Assumptions

Because this regulatory analysis is based on estimates of values that are sensitive to plant-specific cost drivers and plant dissimilarities, the NRC provides the following Monte Carlo simulation analysis of the variables that have the greatest amount of uncertainty.

Monte Carlo simulations involve introducing uncertainty into the analysis (inputs and results) by replacing the point estimates of the input variables used to estimate base case costs and benefits with probability distributions.

The probability distributions chosen to represent the different variables in the analysis were bounded by the range-referenced input and the NRC staff's professional judgment. When defining the probability distributions for use in a Monte Carlo simulation, summary statistics are needed to characterize the distributions. These summary statistics include (1) the minimum, most likely, and maximum values of a program evaluation and review technique (PERT) distribution,[6] (2) the minimum and maximum values of a uniform distribution, and (3) the specified integer values of a discrete population. The NRC used the PERT distribution to reflect the relative spread and skewness of the distribution defined by the three estimates.

Appendix B to this report identifies the data elements, the distribution and summary statistics, and the mean value of the distribution that the staff used in the uncertainty analysis.

5.6.2 Uncertainty Analysis Results

The NRC performed the Monte Carlo simulation by repeatedly recalculating the results 10,000 times. For each iteration, the cost model chose its values randomly from the probability distributions that define the input variables. The model recorded the values of the output variables for each iteration and used these resulting output variable values to define the resultant probability distribution, in terms of costs and benefits.

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5 Information about the @Risk software is available at https://www.palisade.com.

6 A PERT distribution is a special form of the beta distribution with specified minimum and maximum values. The shape parameter is calculated from the defined "most likely" value. The PERT distribution is similar to a triangular distribution in that it has the same set of three parameters.

Figure 1, Figure 2, and Figure 3 display the histograms of the net incremental costs and benefits from the regulatory baseline of the rule's alternatives.

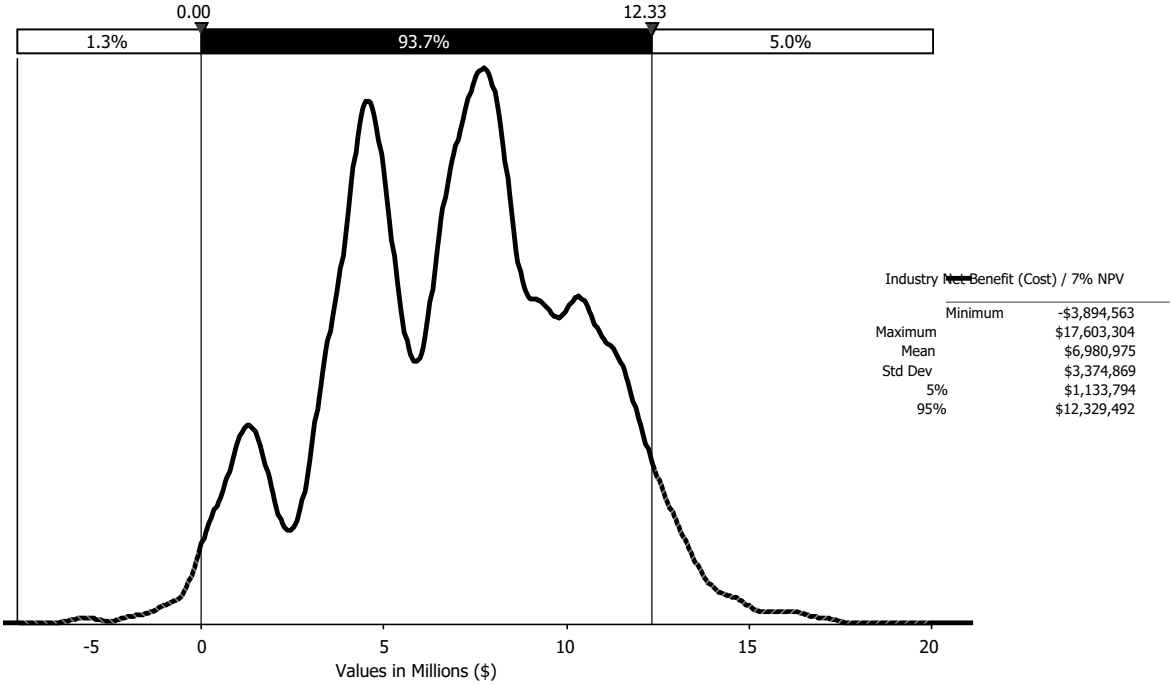

Figure 1 Industry Total (7-Percent NPV)

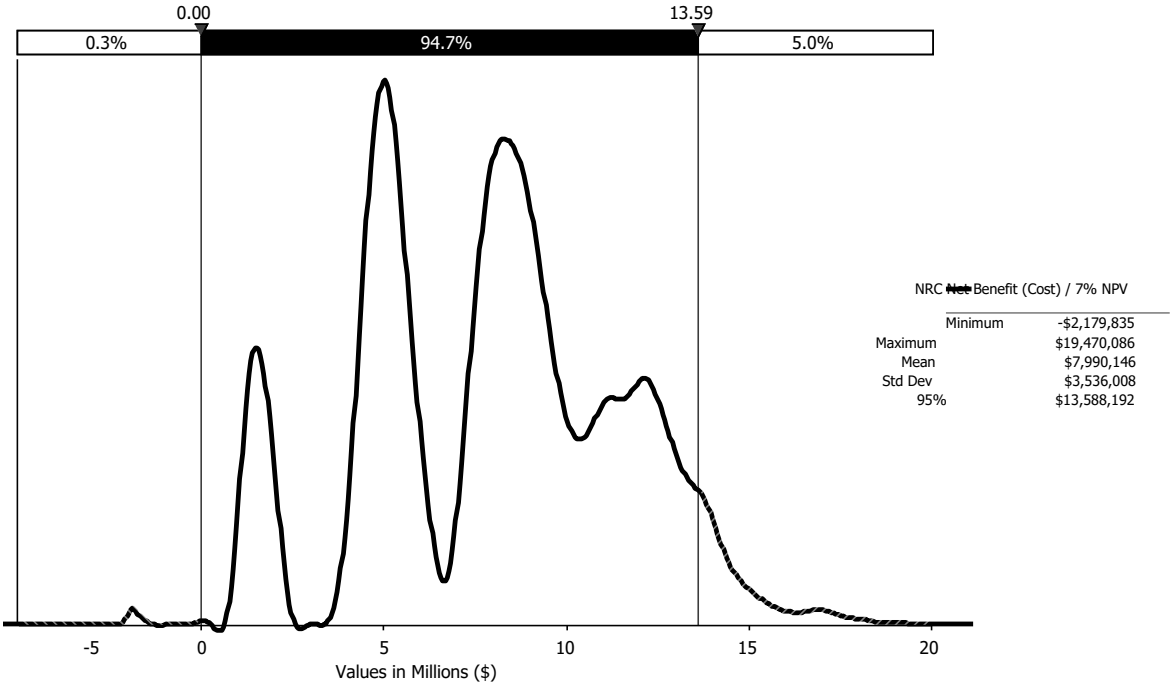

Figure 2 NRC Total (7-Percent NPV)

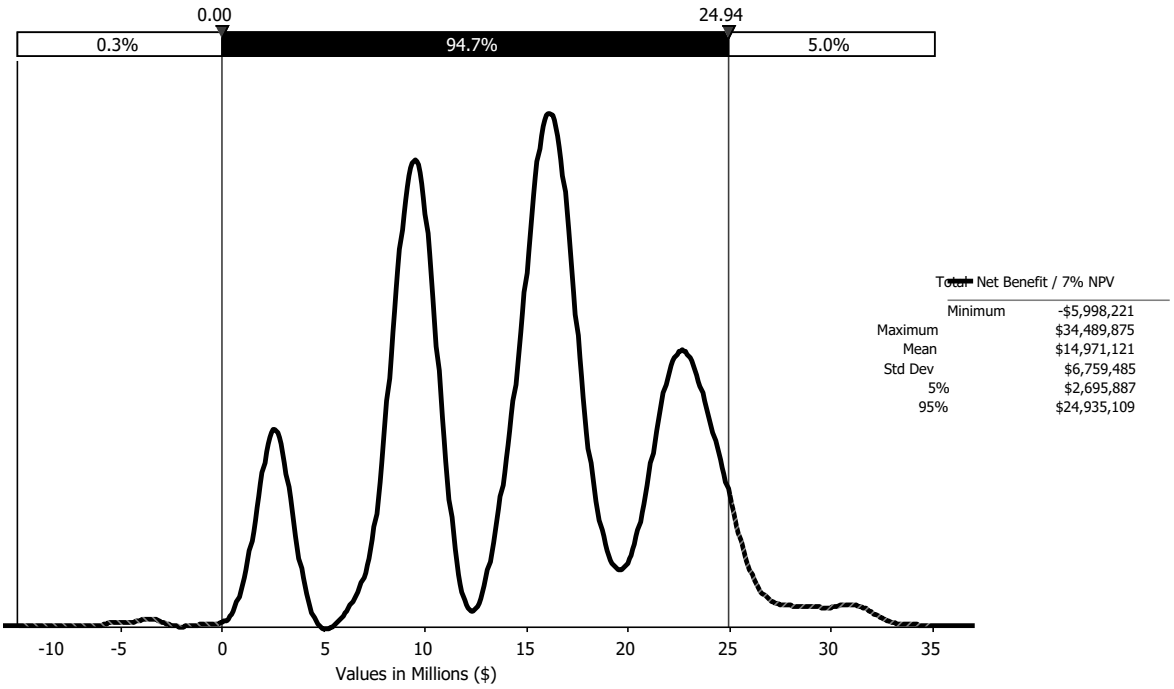

Figure 3 Net Benefit (7-Percent NPV)

As shown in Figure 1, the staff's proposed rule would result in mean averted costs to the industry of approximately $6.98 million using a 7-percent discount rate. The uncertainty analysis indicates that there is a greater than 99-percent chance that these alternatives collectively would have a positive net benefit to the industry. As shown in Figure 2, the proposed rule would result in mean averted costs to the NRC of approximately $7.99 million, including rulemaking costs. There is greater than a 99-percent chance that these alternatives collectively would have a positive net benefit to the NRC. As shown in Figure 3, the proposed rule would result in net averted costs of approximately $15.0 million, and greater than a 99-percent chance that these alternatives collectively would have a positive net benefit.

5.6.3 Sensitivity Analysis

In addition to estimating the probability distributions for the net benefits of the proposed rule, the NRC used Monte Carlo simulation to conduct a sensitivity analysis to determine the variables that have the greatest impact on the resulting net benefits. Variables shown to have a large effect on the resulting net benefits may deserve more attention and scrutiny than variables shown to have a small or minimal effect. The results are compiled into a "tornado diagram," which presents in vertical order the variables that have the greatest influence on net benefits.

Figure 4 presents the tornado diagram for the benefits of the proposed rule and ranks the variables based on their contribution to cost uncertainty. The estimate that has the greatest variation in the overall results is the Alternative LP-2 averted costs related to the number of DCs being renewed. The uncertainty in this variable could result in a change to the mean of $21.5 million, the difference in averted costs that ranges from $2.97 million to $24.4 million with a 90-percent confidence level.

The estimate that has the second greatest variation in the overall results is the Alternative E-2 costs derived from the duration of continuing operator training. The uncertainty in this variable would result in a change to the mean of $2.8 million, a difference in averted costs that ranges between $13.3 million and $16.1 million with a 90-percent confidence level.

The remainder of the variables result in smaller differences.

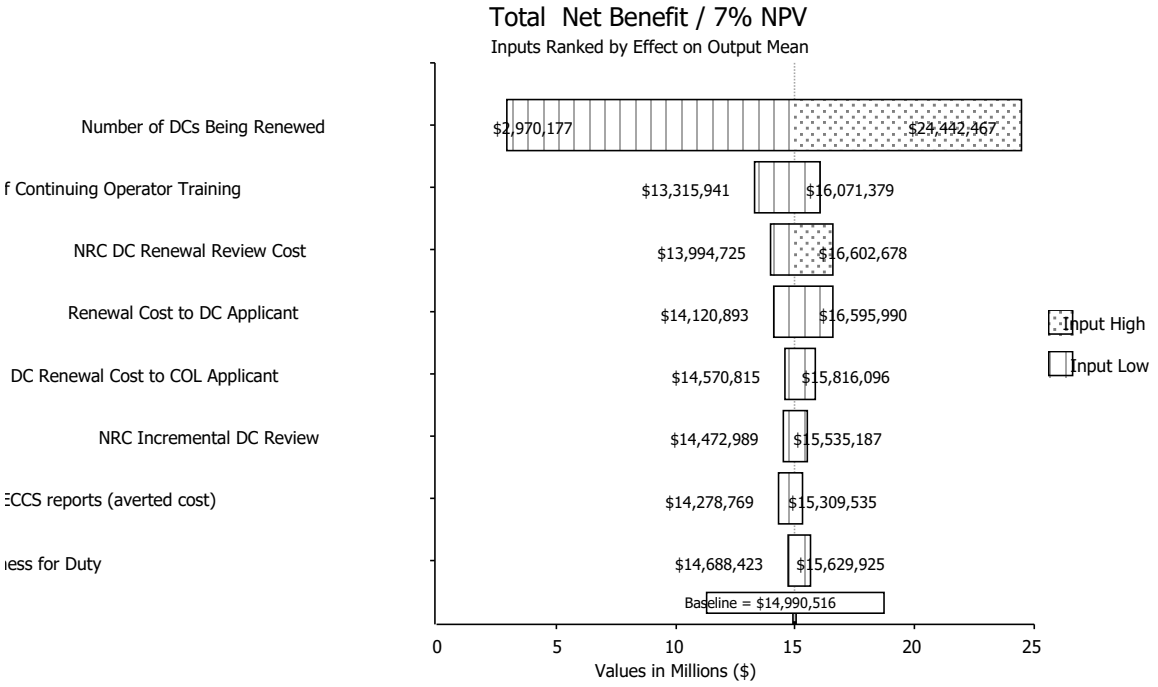

Figure 4 Key Variables Whose Uncertainty Drives the Largest Impact on Costs (7 Percent Net Present Value)

6.0 OTHER IMPACTS AND REGULATORY CONSIDERATIONS

Other impacts and issues related to using rulemaking to align 10 CFR Parts 50 and 52 and address lessons learned from new reactor license reviews include complying with the National Environmental Policy Act (42 U.S.C. 4321 et seq.) and the Regulatory Flexibility Act (5 U.S.C. 601 et seq.) and conducting peer reviews of the regulatory analysis.

6.1 Compliance with the National Environmental Policy Act

When the NRC issued 10 CFR Part 52 in 1989, it determined that the regulation met the eligibility criteria for the categorical exclusion set forth in 10 CFR 51.22(c)(3), as stated in the 10 CFR Part 52 final rule (54 FR 15372; April 18, 1989). Similarly, when it updated 10 CFR Part 52 in 2007 (72 FR 49352; August 28, 2007), the NRC determined that the regulation met the eligibility criteria for the categorical exclusion set forth in 10 CFR 51.22(c)(1), (c)(2), and (c)(3). Similarly, this regulatory analysis contemplates changes to the NRC's new reactor licensing regulatory framework. The NRC has determined that these amendments also fall within the types of actions described as categorical exclusions in 10 CFR 51.22(c)(1), (c)(2), and (c)(3). Therefore, neither an environmental impact statement nor an EA would be required. If the NRC decides to pursue rulemaking that would authorize activities not considered in the

2007 final rule, it will evaluate the environmental impacts of any newly authorized activities. The agency will make any document prepared to comply with the National Environmental Policy Act available for public comment with the proposed rule.

6.2 Regulatory Flexibility Act

The Regulatory Flexibility Act (5 U.S.C. 601 et seq.), 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 by the NRC in 10 CFR 2.810, "NRC size standards." Therefore, the proposed rulemaking would not have a significant economic impact on a substantial number of small entities.

6.3 Peer Review of Regulatory Analysis

The Office of Management and Budget's M-05-03, "Final Information Quality Bulletin for Peer Review," dated December 16, 2004 (OMB, 2004), requires each Federal agency to subject "influential scientific information" to peer review before dissemination. The Office 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." This document does not contain "influential scientific information." Therefore, a peer review of the regulatory analysis is not needed.

7.0 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).

This regulatory analysis does not contain any new regulatory impositions of this type. Rather, it supports a rulemaking that would establish regulations that would ensure consistency in new reactor licensing reviews, regardless of the licensing process an applicant chooses to use. By addressing lessons learned from new reactor licensing reviews, the NRC would also improve the clarity and effectiveness of these regulations for review of future new reactor license applications.

One set of the changes in this rulemaking would constitute backfitting, but these changes would not be subject to the substantial additional protection standard in 10 CFR 50.109(a)(3). The proposed changes to 10 CFR 70.22(k) and 10 CFR 73.67(d) and (f) to clarify the appropriate security requirements for SNM of moderate or low strategic significance stored within the owner-controlled area but outside the protected area at 10 CFR Part 50 nuclear power reactors could impose a change to those licensees required physical security programs, thereby meeting the definition of "backfitting" in 10 CFR 50.109(a)(1). These proposed backfits would be justified under 10 CFR 50.109(a)(4)(ii): they would be necessary to ensure that these facilities provide adequate protection to the health and safety of the public and are in accord with the common defense and security.

8.0 CONCLUSION

The NRC has extensive experience with new reactor licensing, and recent experience has shown that changes to existing requirements are necessary for efficiency, clarity, and openness during the new reactor licensing process. This rulemaking would codify certain exemptions from regulatory requirements associated with operator licensing, security, emergency preparedness, environmental reviews, and other aspects of the 10 CFR Part 50 and 52 licensing process. Alignment of 10 CFR Parts 50 and 52 in the areas of severe accident policy, PRA, TMI requirements, and fire protection design features would ensure consistency in new reactor licensing reviews, regardless of the licensing process an applicant chooses to use. By addressing lessons learned from new reactor licensing reviews, the NRC would also improve the clarity and effectiveness of these regulations for reviewing future new reactor license applications.

In summary, this rulemaking would ensure consistency in new reactor licensing reviews; provide for an efficient new reactor licensing process; reduce the need for exemptions from existing regulations and LARs; address lessons learned from new reactor licensing reviews deemed relevant by the NRC staff; and support the NRC's Principles of Good Regulation, including openness, clarity, and reliability.

9.0 DECISION RATIONALE

Relative to the "no-action" alternative, rulemaking results in a net benefit of approximately $16.1 million assuming a 7-percent discount rate or $25.5 million assuming a 3-percent discount rate. The NRC has concluded that the proposed rule is cost justified.

10.0 IMPLEMENTATION

The NRC assumes that the final rule would become effective 30 days after its publication in the *Federal Register* in 2024.

11.0 REFERENCES

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Appendix A Cost-Benefit Calculations

Table A-1 Severe Accident Requirements—Industry Operations

Year	Activity	Number of Actions	Incremental Cost to Implement Design Changes 3 Years Earlier	Net Benefit (Cost) (2021$)		
				Undiscounted	7% NPV	3% NPV
2024	Design change costs incurred to submit an application in 2027	1	$122,000	$122,000	$100,000	$112,000
2027	Design change costs incurred to submit an application in 2030	1	$122,000	$122,000	$81,000	$102,000
			Net Benefit (Cost)	**$244,000**	**$181,000**	**$214,000**

Table A-2 Severe Accident Requirements—NRC Implementation

Year	Activity	Number of Actions	Hours	Labor Rate	Net Benefit (Cost) (2021$)		
					Undiscounted	7% NPV	3% NPV
2023	Develop/issue severe accident final rule provisions	1	168	$143	($24,000)	($21,000)	($23,000)
2024	Develop/issue final rule	1	168	$143	($24,000)	($20,000)	($22,000)
2024	Revise SRP Sections 1.0, 19.0, and 19.1 for final rule	3	205	$143	($88,000)	($72,000)	($80,000)
				Net Benefit (Cost)	**($136,000)**	**($113,000)**	**($125,000)**

Table A-3 PRA Requirements—Industry Operations

Year	Activity	Count	Labor Hours	Weighted Hourly Rate	Net Benefit (Cost) (2021$)		
					Undiscounted	7% NPV	3% NPV
2024	PRA development costs to applicant	1	15,333	$140	($2,148,000)	($1,753,000)	($1,965,000)
2025–2027	Maintain PRA during construction	3	750	$140	($315,000)	($210,000)	($264,000)
				Net Benefit (Cost) Subtotal	**($2,463,000)**	**($1,963,000)**	**($2,229,000)**
2027	Averted exemption schedule request to defer PRA upgrade	1	212	$140	$30,000	$20,000	$25,000
2030	Averted exemption schedule request to defer PRA upgrade	1	212	$140	$30,000	$16,000	$23,000
				Net Benefit (Cost) Subtotal	**$60,000**	**$36,000**	**$48,000**
				Net Benefit (Cost) Total	**($2,403,000)**	**($1,927,000)**	**($2,181,000)**

Table A-4 PRA Requirements—NRC Implementation and Operations

Year	Activity	Number of Actions	Hours	Labor Rate	Net Benefit (Cost) (2021$)		
					Undiscounted	7% NPV	3% NPV
2023	Develop/issue PRA final rule provisions	3	168	$143	($72,000)	($63,000)	($68,000)
2024	Develop/issue final rule provisions	3	168	$143	($72,000)	($59,000)	($66,000)
2024	Revise RGs 1.174, 1.200, and 1.206	3	205	$143	($88,000)	($72,000)	($80,000)
Net Benefit (Cost) Subtotal					**($232,000)**	**($194,000)**	**($214,000)**
2027	Averted NRC review of exemption request	1	102	$143	$15,000	$10,000	$12,000
2030	Averted NRC review of exemption request	1	102	$143	$15,000	$8,000	$11,000
Net Benefit (Cost) Subtotal					**$30,000**	**$18,000**	**$23,000**
Net Benefit (Cost) Total					**($202,000)**	**($176,000)**	**($191,000)**

Table A-5 TMI Requirements—Industry Operations

Year	Activity	Number of Actions	Labor Hours	Weighted Hourly Rate	Net Benefit (Cost) (2021$)		
					Undiscounted	7% NPV	3% NPV
2024	Industry address TMI requirements	10	57	$140	($82,000)	($67,000)	($75,000)
2027	Industry address TMI requirements	10	57	$140	($82,000)	($55,000)	($69,000)
2030	Industry address TMI requirements	10	57	$140	($82,000)	($45,000)	($63,000)
Net Benefit (Cost) Total					**($246,000)**	**($167,000)**	**($207,000)**

Table A-6 TMI Requirements—NRC Implementation and Operations

Year	Activity	Number of Actions	Hours	Labor Rate	Net Benefit (Cost) (2021$)		
					Undiscounted	7% NPV	3% NPV
2023	Develop/issue TMI final rule provisions	1	168	$143	($24,000)	($21,000)	($23,000)
2024	Develop/issue TMI final rule provisions	1	168	$143	($24,000)	($20,000)	($22,000)
Net Benefit (Cost) Subtotal					**($48,000)**	**($41,000)**	**($45,000)**
2024	NRC review TMI requirement responses	10	23	$143	($33,000)	($27,000)	($30,000)
2027	NRC review TMI requirement responses	10	23	$143	($33,000)	($22,000)	($28,000)
2030	NRC review TMI requirement responses	10	23	$143	($33,000)	($18,000)	($25,000)
Net Benefit (Cost) Subtotal					**($99,000)**	**($67,000)**	**($83,000)**
Net Benefit (Cost) Total					**($147,000)**	**($108,000)**	**($128,000)**

Table A-7 Fire Protection—NRC Implementation

Year	Activity	Number of Actions	Hours	Labor Rate	Net Benefit (Cost) (2021$)		
					Undiscounted	7% NPV	3% NPV
2023	Develop/issue fire protection final rule provisions	1	168	$143	($24,000)	($21,000)	($23,000)
2024	Develop/issue fire protection final rule provisions	1	168	$143	($24,000)	($20,000)	($22,000)
Net Benefit (Cost) Total					**($48,000)**	**($41,000)**	**($45,000)**

Table A-8 Operator Licensing—Industry Operations

Year	Activity	Count	Labor Hours	Duration	Rate	Net Benefit (Cost) Per Licensee (2021$)		
						Undiscounted	7% NPV	3% NPV
2024–2026	Averted exemption requests from licensee	3	1,483		$140	$623,000	$445,000	$538,000
Net Benefit (Cost) Total						**$623,000**	**$445,000**	**$538,000**
2026	Continuing training staff (aggregated)	8	1,524	2.3	$140	($3,922,000)	($2,797,000)	($3,383,000)
2026	Control room simulator (aggregated)	1		2.3	($416,667)	($938,000)	($668,000)	($809,000)
2026	Other training resources (aggregated)	1		2.3	($20,833)	($47,000)	($33,000)	($40,000)
2027	Averted ramp-up training	7	1,524	0.5	$140	$765,000	$510,000	$641,000
2027	Averted second operating license application cost	1			$20,833	$21,000	$14,000	$17,000
2027	Averted cost to licensees of additional written examinations	1	582		$140	$81,000	$54,000	$68,000
2027	Averted cost to licensees of additional operating retests	1	1,186		$140	$166,000	$111,000	$139,000
Net Benefit (Cost) Subtotal						**($3,874,000)**	**($2,809,000)**	**($3,367,000)**
Net Benefit (Cost) Total						**($3,251,000)**	**($2,364,000)**	**($2,829,000)**
Net Benefit (Cost) Per Operator Per Year							**($27,700)**	**($33,300)**

Table A-9 Operator Licensing—NRC Implementation and Operations

Year	Activity	Number of Actions	Labor Hours	Rate	Net Benefit (Cost) (2021$)		
					Undiscounted	7% NPV	3% NPV
2023	Develop/issue operator licensing final rule provisions	2	336	$143	($96,000)	($84,000)	($90,000)

Year	Activity	Number of Actions	Labor Hours	Rate	Net Benefit (Cost) (2021$)		
					Undiscounted	7% NPV	3% NPV
2024	Develop/issue operator licensing final rule provisions	2	336	$143	($96,000)	($78,000)	($88,000)
2024	Revise RG 1.149 and NUREG-1021	2	408	$143	($117,000)	($95,000)	($107,000)
Net Benefit (Cost) Subtotal					**($309,000)**	**($257,000)**	**($285,000)**
2024–2026	Averted NRC review of exemption requests	3	713	$143	$306,000	$219,000	$264,000
2027	Averted cost of NRC to oversee examinations and retests	1	2,742	143	$392,000	$261,000	$328,000
2027	Averted NRC travel and per diem costs for exams and retests	1		$21,933	$22,000	$15,000	$18,000
Net Benefit (Cost) Subtotal					**$720,000**	**$495,000**	**$610,000**
Net Benefit (Cost) Total					**$411,000**	**$238,000**	**$325,000**

Table A-10 Physical Security—Industry Operations

Year	Activity	Count	Labor Hours	Rate	Net Benefit (Cost) (2021$)		
					Undiscounted	7% NPV	3% NPV
2024	Request for licensing exemption from 10 CFR 73.55(a)(4) averted	1	450	$140	$63,000	$51,000	$58,000
2027	Request for licensing exemption from 10 CFR 73.55(a)(4) averted	1	450	$140	$63,000	$42,000	$53,000
2030	Request for licensing exemption from 10 CFR 73.55(a)(4) averted	1	450	$140	$63,000	$34,000	$48,000
Net Benefit (Cost) Total					**$189,000**	**$127,000**	**$159,000**

Table A-11 Fitness for Duty—Industry Operations

Year	Activity	Count	Labor Hours	Rate	Net Benefit (Cost) (2021$)		
					Undiscounted	7% NPV	3% NPV
2024	Averted LAR	1	163	$140	$23,000	$19,000	$21,000
2027	Averted LAR	1	163	$140	$23,000	$15,000	$19,000
2030	Averted LAR	1	163	$140	$23,000	$12,000	$18,000
2024–2030	Additional dilute urine specimen analysis	7		$20,554	($144,000)	($90,000)	($117,000)
2024	Licensee procedure update	1		$8,020	($8,000)	($7,000)	($7,000)
2027	Licensee procedure update	1		$8,020	($8,000)	($5,000)	($7,000)
2030	Licensee procedure update	1		$8,020	($8,000)	($4,000)	($6,000)
Net Benefit (Cost) Total					**($99,000)**	**($60,000)**	**($79,000)**

Table A-12 Physical Security—NRC Implementation and Operations

Year	Activity	Number of Actions	Hours	Labor Rate	Net Benefit (Cost) (2021$)		
					Undiscounted	7% NPV	3% NPV
2023	Develop/issue final rule	1	336	$143	($48,000)	($42,000)	($45,000)
2024	Develop/issue final rule	1	336	$143	($48,000)	($39,000)	($44,000)
2024	Develop/issue RGs for final rule	4	408	$143	($234,000)	($191,000)	($214,000)
Net Benefit (Cost) Subtotal					**($330,000)**	**($272,000)**	**($303,000)**
2024	Averted NRC review of exemption request	1	225	$143	$32,000	$26,000	$29,000
2027	Averted NRC review of exemption request	1	225	$143	$32,000	$21,000	$27,000
2030	Averted NRC review of exemption request	1	225	$143	$32,000	$18,000	$25,000
Net Benefit (Cost) Subtotal					**$96,000**	**$65,000**	**$81,000**
Net Benefit (Cost) Total					**($234,000)**	**($207,000)**	**($222,000)**

Table A-13 Fitness for Duty—NRC Implementation and Operations

Year	Activity	Number of Actions	Hours	Weighted Hourly Rate	Net Benefit (Cost) (2021$)		
					Undiscounted	7% NPV	3% NPV
2023	Develop/issue final rule	1	168	$143	($24,000)	($21,000)	($23,000)
2024	Develop/issue final rule	1	168	$143	($24,000)	($20,000)	($22,000)
2024	Develop/issue RGs for final rule	2	205	$143	($59,000)	($48,000)	($54,000)
Net Benefit (Cost) Subtotal					**($107,000)**	**($89,000)**	**($99,000)**
2024	Averted NRC review of LAR	1	82	$143	$12,000	$10,000	$11,000
2027	Averted NRC review of LAR	1	82	$143	$12,000	$8,000	$10,000
2030	Averted NRC review of LAR	1	82	$143	$12,000	$6,000	$9,000
Net Benefit (Cost) Subtotal					**$36,000**	**$24,000**	**$30,000**
Net Benefit (Cost) Total					**($71,000)**	**($65,000)**	**($69,000)**

Table A-14 Emergency Planning—Industry Operations

Year	Activity	Count	Labor Hours	Weighted Hourly Rate	Net Benefit (Cost) (2021$)		
					Undiscounted	7% NPV	3% NPV
2026	Averted exemption request for conducting an EP exercise	1	494	$140	$69,000	$49,000	$60,000
2029	Averted exemption request for conducting an EP exercise	1	494	$140	$69,000	$40,000	$55,000

Year	Activity	Count	Labor Hours	Weighted Hourly Rate	Net Benefit (Cost) (2021$)		
					Undiscounted	7% NPV	3% NPV
Net Benefit (Cost) Subtotal					**$138,000**	**$89,000**	**$115,000**
2026	Simplified ESP application	1	75	$140	$10,500	$7,500	$9,100
2029	Simplified ESP application	1	75	$140	$10,500	$6,100	$8,300
Net Benefit (Cost) Subtotal					**$21,000**	**$13,600**	**$17,400**
2026	Simplified ESP application for contacts and arrangements	1	75	$140	$10,500	$7,500	$9,100
2029	Simplified ESP application for contacts and arrangements	1	75	$140	$10,500	$6,100	$8,300
Net Benefit (Cost) Subtotal					**$21,000**	**$13,600**	**$17,400**
Net Benefit (Cost) Total					**$180,000**	**$116,200**	**$149,800**

Table A-15 Emergency Planning—NRC Implementation and Operations

Year	Activity	Number of Actions	Hours	Labor Rate	Net Benefit (Cost) (2021$)		
					Undiscounted	7% NPV	3% NPV
2023	Develop/issue EP final rule provisions	7	168	$143	($168,000)	($147,000)	($158,000)
2024	Develop/issue final rule	7	168	$143	($168,000)	($137,000)	($154,000)
2024	Revise and finalize RG 4.7 and SRP Section 13.3	2	205	$143	($59,000)	($48,000)	($54,000)
Net Benefit (Cost) Subtotal					**($395,000)**	**($332,000)**	**($366,000)**
2026	Averted NRC review of exemption request for conducting an EP exercise	1	238	$143	$34,000	$24,000	$29,000
2029	Averted NRC review of exemption request for conducting an EP exercise	1	238	$143	$34,000	$20,000	$27,000
Net Benefit (Cost) Subtotal					**$68,000**	**$44,000**	**$56,000**
2026	NRC review of simplified ESP application	1	38	$143	$5,400	$3,800	$4,600
2029	NRC review of simplified ESP application	1	38	$143	$5,400	$3,100	$4,200
Net Benefit (Cost) Subtotal					**$10,800**	**$6,900**	**$8,800**
2026	NRC review of simplified ESP application with appropriate level of contacts and arrangements	1	38	$143	$5,400	$3,800	$4,600

Year	Activity	Number of Actions	Hours	Labor Rate	Net Benefit (Cost) (2021$)		
					Undiscounted	7% NPV	3% NPV
2029	NRC review of simplified ESP application with appropriate level of contacts and arrangements	1	38	$143	$5,400	$3,100	$4,200
Net Benefit (Cost) Subtotal					**$10,800**	**$6,900**	**$8,800**
Net Benefit (Cost) Total					**($305,000)**	**($274,000)**	**($292,000)**

Table A-16 10 CFR Part 52 Licensing Process—Industry Operations

Year	Activity	Number of Actions	DC Renewal Cost	Hours	Weighted Hourly Rate	Net Benefit (Cost) (2021$)		
						Undiscounted	7% NPV	3% NPV
2032	Averted industry DC renewal costs	3	$7,533,765			$22,601,000	$10,738,000	$16,328,000
2040	Cost to COL applicant of not having DC renewed	3	($1,130,065)			($3,390,000)	($937,000)	($1,933,000)
Net Benefit (Cost) Subtotal						**$19,211,000**	**$9,801,000**	**$14,395,000**
2024	Averted LARs to revise tier classification	4		213	$140	$115,000	$94,000	$105,000
2025	Averted LARs to revise tier classification	4		213	$140	$115,000	$87,000	$102,000
2026	Averted LARs to revise tier classification	4		213	$140	$115,000	$82,000	$99,000
2027	Averted LARs to revise tier classification	4		213	$140	$115,000	$76,000	$96,000
2028	Averted LARs to revise tier classification	4		213	$140	$115,000	$71,000	$93,000
2029	Averted LARs to revise tier classification	4		213	$140	$115,000	$67,000	$90,000
2030	Averted LARs to revise tier classification	4		213	$140	$115,000	$62,000	$88,000
2031	Averted LARs to revise tier classification	4		213	$140	$115,000	$58,000	$85,000
2032	Averted LARs to revise tier classification	4		213	$140	$115,000	$54,000	$83,000
Net Benefit (Cost) Subtotal						**$1,035,000**	**$651,000**	**$841,000**
2024	Averted DC application level of effort to address essentially complete design	1		213	$140	$30,000	$24,000	$27,000

Year	Activity	Number of Actions	DC Renewal Cost	Hours	Weighted Hourly Rate	Net Benefit (Cost) (2021$)		
						Undiscounted	7% NPV	3% NPV
2027	Averted DC application level of effort to address essentially complete design	1		213	$140	$30,000	$20,000	$25,000
2030	Averted DC application level of effort to address essentially complete design	1		213	$140	$30,000	$16,000	$23,000
Net Benefit (Cost) Subtotal						**$90,000**	**$60,000**	**$75,000**
2024–2030	Reduced design change request burden on licensees to address standardization	7		40	$140	$39,000	$25,000	$32,000
Net Benefit (Cost) Subtotal						**$39,000**	**$25,000**	**$32,000**
2024	Averted application level of effort for licensee	1		1917	$140	$268,000	$219,000	$246,000
2027	Averted application level of effort for licensee	1		1917	$140	$268,000	$179,000	$225,000
2030	Averted application level of effort for licensee	1		1917	$140	$268,000	$146,000	$206,000
Net Benefit (Cost) Subtotal						**$804,000**	**$544,000**	**$677,000**
Net Benefit (Cost) Total						**$21,179,000**	**$11,081,000**	**$16,020,000**

Table A-17 10 CFR Part 52 Licensing Process—NRC Implementation and Operations

Year	Activity	Number of Actions	DC Renewal Review Cost	Hours	Labor Rate	Net Benefit (Cost) (2021$)		
						Undiscounted	7% NPV	3% NPV
2023	Develop/issue 10 CFR Part 52 licensing process final rule provisions	17		336	$143	($816,000)	($713,000)	($769,000)
2024	Develop/issue 10 CFR Part 52 licensing process final rule provisions	17		336	$143	($816,000)	($666,000)	($747,000)
2024	Revise and finalize RG 1.187	1		408	$143	($58,000)	($48,000)	($53,000)
Net Benefit (Cost) Subtotal						**($1,690,000)**	**($1,427,000)**	**($1,569,000)**
2032	Averted NRC DC renewal costs	3	$8,059,377			$24,178,000	$11,487,000	$17,467,000
2040	Cost to the NRC of not having DC renewed	3	($1,130,065)			($3,390,000)	($937,000)	($1,933,000)
Net Benefit (Cost) Subtotal						**$20,788,000**	**$10,550,000**	**$15,534,000**
2024	Averted LAR review for tier information	4		107	$143	$58,000	$48,000	$54,000

Year	Activity	Number of Actions	DC Renewal Review Cost	Hours	Labor Rate	Net Benefit (Cost) (2021$)		
						Undiscounted	7% NPV	3% NPV
2025	Averted LAR review for tier information	4		107	$143	$58,000	$45,000	$52,000
2026	Averted LAR review for tier information	4		107	$143	$58,000	$42,000	$50,000
2027	Averted LAR review for tier information	4		107	$143	$58,000	$39,000	$49,000
2028	Averted LAR review for tier information	4		107	$143	$58,000	$36,000	$48,000
2029	Averted LAR review for tier information	4		107	$143	$58,000	$34,000	$46,000
2030	Averted LAR review for tier information	4		107	$143	$58,000	$32,000	$45,000
2031	Averted LAR review for tier information	4		107	$143	$58,000	$30,000	$44,000
2032	Averted LAR review for tier information	4		107	$143	$58,000	$28,000	$42,000
Net Benefit (Cost) Subtotal						**$522,000**	**$334,000**	**$430,000**
2024	Averted DC application level of effort for essentially complete design	1		127	$143	$18,000	$15,000	$17,000
2027	Averted DC application level of effort for essentially complete design	1		127	$143	$18,000	$12,000	$15,000
2030	Averted DC application level of effort for essentially complete design	1		127	$143	$18,000	$10,000	$14,000
Net Benefit (Cost) Subtotal						**$54,000**	**$37,000**	**$46,000**
2024–2030	Reduced design change review burden on the NRC to review standardization	7		40	$143	$40,000	$25,000	$33,000
Net Benefit (Cost) Subtotal						**$40,000**	**$25,000**	**$33,000**
Net Benefit (Cost) Total						**$19,714,000**	**$9,519,000**	**$14,474,000**

Table A-18 Environmental—Industry Operations

Year	Activity	Count	Labor Hours	Weighted Hourly Rate	Net Benefit (Cost) (2021$)		
					Undiscounted	7% NPV	3% NPV
2024	Averted licensee SAMDA	1	1,208	$140	$169,000	$138,000	$155,000
2027	Averted licensee SAMDA	1	1,208	$140	$169,000	$113,000	$142,000
2030	Averted licensee SAMDA	1	1,208	$140	$169,000	$92,000	$130,000
Net Benefit (Cost) Total					**$507,000**	**$343,000**	**$427,000**

Table A-19 Environmental—NRC Implementation and Operations

Year	Activity	Number of Actions	Labor Hours	Labor Rate	Net Benefit (Cost) (2021$)		
					Undiscounted	7% NPV	3% NPV
2023	Develop/issue final rule	1	168	$143	($24,000)	($21,000)	($23,000)
2024	Develop/issue final rule	1	168	$143	($24,000)	($20,000)	($22,000)
Net Benefit (Cost) Subtotal					**($48,000)**	**($41,000)**	**($45,000)**
2024	NRC averted SAMDA review	1	256	$143	$37,000	$30,000	$33,000
2027	NRC averted SAMDA review	1	256	$143	$37,000	$24,000	$31,000
2030	NRC averted SAMDA review	1	256	$143	$37,000	$20,000	$28,000
Net Benefit (Cost) Subtotal					**$111,000**	**$74,000**	**$92,000**
Net Benefit (Cost) Total					**$63,000**	**$33,000**	**$47,000**

Table A-20 Other Processes—Industry Operations

Year	Activity	Years	Count	Labor Hours	Weighted Hourly Rate	Net Benefit (Cost) (2021$)		
						Undiscounted	7% NPV	3% NPV
2024–2030	Reduced reporting burden for COL holders and applicants	7	6	30	$140	$176,000	$111,000	$144,000
Net Benefit (Cost) Total						**$176,000**	**$111,000**	**$144,000**

Table A-21 Other Processes—NRC Implementation

Year	Activity	Number of Actions	Hours	Labor Rate	Net Benefit (Cost) (2021$)		
					Undiscounted	7% NPV	3% NPV
2023	Develop/issue final rule provisions for contested proceedings	1	84	$143	($12,000)	($10,000)	($11,000)
2024	Develop/issue final rule provisions for contested proceedings	1	84	$143	($12,000)	($10,000)	($11,000)
Net Benefit (Cost) Subtotal					**($24,000)**	**($20,000)**	**($22,000)**
2023	Develop/issue final rule provisions for maintenance of records	1	168	$143	($24,000)	($21,000)	($23,000)
Net Benefit (Cost) Subtotal					**($24,000)**	**($21,000)**	**($23,000)**
2023	Develop/issue final rule provisions to address issue finality	1	168	$143	($24,000)	($21,000)	($23,000)

Year	Activity	Number of Actions	Hours	Labor Rate	Net Benefit (Cost) (2021$)		
					Undiscounted	7% NPV	3% NPV
2024	Develop/issue final rule provisions to address issue finality	1	373	$143	($53,000)	($44,000)	($49,000)
Net Benefit (Cost) Subtotal					**($77,000)**	**($65,000)**	**($72,000)**
Net Benefit (Cost) Total					**($125,000)**	**($106,000)**	**($117,000)**

Table A-22 Miscellaneous Topics—Industry Operations

Year	Activity	Count	Labor Hours	Weighted Hourly Rate	Net Benefit (Cost) (2021$)		
					Undiscounted	7% NPV	3% NPV
2024-2030	Averted SPDS console exemption requests from licensee	7	62	$140	$60,000	$38,000	$49,000
Net Benefit (Cost) Subtotal					**$60,000**	**$38,000**	**$49,000**
2024-2033	Averted annual ECCS reports from licensee	10	100	$140	$140,000	$80,000	$109,000
2033	Develop licensee ECCS report when referencing design	1	500	$140	($70,000)	($31,000)	($49,000)
Net Benefit (Cost) Subtotal					**$70,000**	**$49,000**	**$60,000**
Net Benefit (Cost) Total					**$130,000**	**$87,000**	**$109,000**

Table A-23 Miscellaneous Topics—NRC Implementation and Operations

Year	Activity	Number of Actions	Hours	Labor Rate	Net Benefit (Cost) (2021$)		
					Undiscounted	7% NPV	3% NPV
2023	Develop/issue final rule provision to resolve notice of issuance	1	168	$143	($24,000)	($21,000)	($23,000)
Net Benefit (Cost) Subtotal					**($24,000)**	**($21,000)**	**($23,000)**
2023	Develop/issue final rule provision to definitions in 10 CFR 21.3	1	168	$143	($24,000)	($21,000)	($23,000)
2024	Develop/issue final rule provision to definitions in 10 CFR 21.3	1	168	$143	($24,000)	($20,000)	($22,000)
Net Benefit (Cost) Subtotal					**($48,000)**	**($41,000)**	**($45,000)**
2023	Develop/issue final rule	1	168	$143	($24,000)	($21,000)	($23,000)

Year	Activity	Number of Actions	Hours	Labor Rate	Net Benefit (Cost) (2021$)		
					Undiscounted	7% NPV	3% NPV
2024-2030	Averted NRC review of exemption requests	7	31	$143	$31,000	$19,000	$25,000
Net Benefit (Cost) Subtotal					**$7,000**	**($2,000)**	**$2,000**
2023	Develop/issue final rule provisions for reporting ECCS model errors	1	168	$143	($24,000)	($21,000)	($23,000)
2024	Develop/issue final rule provisions for reporting ECCS model errors	1	168	$143	($24,000)	($20,000)	($22,000)
2024-2033	Averted NRC review of annual ECCS reports	10	50	$143	$72,000	$41,000	$56,000
2033	NRC review ECCS report when referencing design	1	250	$143	($36,000)	($16,000)	($25,000)
Net Benefit (Cost) Subtotal					**($12000)**	**($16,000)**	**($14,000)**
2023	Develop/issue final rule provisions to notify NRR of significant implications	1	168	$143	($24,000)	($21,000)	($23,000)
2024	Develop/issue final rule provisions to notify NRR of significant implications	1	168	$143	($24,000)	($20,000)	($22,000)
Net Benefit (Cost) Subtotal					**($48,000)**	**($41,000)**	**($45,000)**
2023	Develop/issue final rule provisions to discontinue use of priority ranking model for generic issues	1	168	$143	($24,000)	($21,000)	($23,000)
Net Benefit (Cost) Subtotal					**($24,000)**	**($21,000)**	**($23,000)**
2023	Develop/issue final rule	1	168	$143	($24,000)	($21,000)	($23,000)
Net Benefit (Cost) Subtotal					**($24,000)**	**($21,000)**	**($23,000)**
Net Benefit (Cost) Total					**($173,000)**	**($163,000)**	**($171,000)**

Appendix B Analysis Input Variables

Activity	Mean Estimate	Distribution	Low Estimate	Best Estimate	High Estimate	Source or Basis of Estimate
General						
Base year	2021			2021		Year of analysis
NRC labor rate	$143			$143		Calculated value based on fiscal year 2021 actuals
Industry weighted labor rate	$140	PERT	$111	$142	$162	BLS.gov tables
Primary discount rate	7%			7%		OMB A-4 values
Alternative discount rate	3%			3%		OMB A-4 values
NRC Rulemaking						
Final rule preparation begins	2023			2023		Rulemaking schedule
Final rule completed	2024			2024		Rulemaking schedule
Develop/Issue Final Rule per Provision (Minor Effort)						
Hours to develop per year	**168 hours**	PERT	136	163	218	NRC estimate.
Number of years	2			2		NRC estimate
Develop/Issue Final Rule per Provision (Major Effort)						
Hours to develop	**336 hours**	PERT	272	327	435	NRC estimate
Number of years	2			2		NRC estimate
NRC Finalize/Issue Guidance (Minor Effort)						
Hours to develop	**205 hours**	PERT	160	178	356	NRC estimate
Number of years	1			1		NRC estimate
NRC Finalize/Issue Guidance (Major Effort)						
Hours to develop	**408 hours**	PERT	320	355	710	NRC estimate
Number of years	1			1		NRC estimate
NRC FTE for Rulemaking (per year)	6	PERT	5	6	8	NRC estimate
NRC hours per FTE	1,524			1,524		NRC available hours per FTE per year
Number of separate rulemaking provisions	51			51		Current state of proposed rule
Number of complex rulemaking provisions (uses 2 x provision factor)	5			5		NRC estimate
Number of simple rulemaking provisions (uses 1 x provision factor)	46			46		NRC estimate
Baseline rulemaking provision factor	56			56		Complex provisions are assumed to require twice the effort as a simpler provision (46 + 5×2)
1. Severe Accident Requirements						
Incremental cost to implement design changes for application	$541,667	PERT	$250,000	$500,000	$1,000,000	NRC estimate
Incremental cost to implement design changes for application 3 years earlier	$121,898			$121,898		Calculated value based on $541,667 of design changes implemented 3 years earlier assuming a 7% interest rate.

Activity	Mean Estimate	Distribution	Low Estimate	Best Estimate	High Estimate	Source or Basis of Estimate
Industry Exemption Requests						
Hours to generate and submit exemption request	1,483	PERT	1,250	1,500	1,650	NRC estimate
NRC Review Exemption Requests						
Hours to review	713	PERT	620	710	820	NRC estimate
2. PRA						
Industry Develop PRA						
Hours to perform PRA	15,333	PERT	12,000	15,000	20,000	NRC estimate
Industry Maintain PRA						
Hours per year to maintain PRA during construction	750	PERT	500	750	1,000	NRC estimate
3. TMI						
Industry Address TMI Requirements in Applications						
Hours to address new TMI requirements	57	PERT	40	50	100	NRC estimate
Number of items to address	10	PERT	6	10	16	NRC estimate
NRC Review TMI Requirements in Applications						
Hours to review new TMI requirements	23	PERT	15	20	40	NRC estimate
Number of items to address	10	PERT	6	10	16	NRC estimate
5. Operator Licensing						
Continuing Training Staff Costs						
Full-time personnel	8	PERT	7	8	10	NRC estimate
Duration of continuing training (years)	2.3	PERT	1.5	2	4	NRC estimate
Control Room Simulator Costs						
Operations and maintenance per year	($416,667)	PERT	($300,000)	($400,000)	($600,000)	NRC estimate
Facilities	1			1		NRC estimate
Duration of continuing training (years)	2.3	PERT	1.5	2	4	NRC estimate
Other Training Resources						
Facilities and other resources	($20,833)	PERT	($15,000)	($20,000)	($30,000)	NRC estimate
Facilities	1			1		NRC estimate
Duration of continuing training (years)	2.3	PERT	1.5	2	4	NRC estimate
Ramp-Up Training Before Fuel Load (Licensee, Averted)						
Full-time personnel	7	PERT	6	7	9	NRC estimate
Duration of ramp-up training (years)	0.5	PERT	0.4	0.5	0.6	NRC estimate
Additional NRC OL Application Approval (NRC, averted)						
Approve OL application for second licensing action	$20,833	PERT	$15,000	$20,000	$30,000	NRC estimate
Additional Written Examinations Before Fuel Load (Licensee, Averted)						
Development hours	533	PERT	450	500	750	NRC estimate
Approval hours	5	PERT	4	5	6	NRC estimate
Validation hours	26	PERT	22	25	35	NRC estimate

Activity	Mean Estimate	Distribution	Low Estimate	Best Estimate	High Estimate	Source or Basis of Estimate
Administer exam hours	17	PERT	13	16	25	NRC estimate
Additional Operating Retests Before Fuel Load (licensee, averted)						
Development hours	333	PERT	270	320	450	NRC estimate
Approval hours	21	PERT	18	20	30	NRC estimate
Validation hours	85	PERT	70	80	120	NRC estimate
Administer exam hours	747	PERT	600	720	1,000	NRC estimate
Additional Examinations and Retests Before Fuel Load (NRC, averted)						
Examination approval hours	47	PERT	40	45	60	NRC estimate
Retest approval hours	187	PERT	160	180	240	NRC estimate
Validate retests	850	PERT	700	800	1,200	NRC estimate
Administer retests	1,233	PERT	1,100	1,200	1,500	NRC estimate
Grade retests	425	PERT	350	400	600	NRC estimate
NRC per diem and hotel for validation week	$10,033	PERT	$9,000	$9,800	$12,000	NRC estimate
NRC per diem and hotel for administration week	$10,033	PERT	$9,000	$9,800	$12,000	NRC estimate
NRC travel costs for validation week	$933	PERT	$850	$912	$1,100	NRC estimate
NRC travel costs for administration week	$933	PERT	$850	$912	$1,100	NRC estimate
6. Physical Security and Fitness for Duty						
Security Forces for Temporary Refueling Facility (Licensee, Averted)						
Protective security personnel labor rate	$92	PERT	$64	$89	$134	BLS.gov tables
Full-time personnel	31	PERT	25	30	40	NRC estimate
Licensing Actions for Individual Access (Licensee, Averted)						
Hours to generate LAR	163	PERT	140	160	200	NRC estimate
LARs per licensee	3	PERT	2	3	4	NRC estimate
NRC Approve Licensing Actions for Individual Access (NRC, Averted)						
Hours to review LAR	82	PERT	70	80	100	NRC estimate
Licensees Examine Dilute Specimens						
Annual cost of examinations	($20,554)	PERT	($3,048)	($18,260)	($47,237)	Calculation: =-(Hourly Rate x Time x # sites)
Licensee Procedure Update						
Cost to update procedures	($8,020)	PERT	($7,750)	($8,000)	($8,370)	Calculation: =-(Hourly Rate x Time x # sites)
7. Emergency Planning						
Simplified ESP Applications (licensee, averted)						
Hours saved on ESP application	75	PERT	50	75	100	NRC estimate
Simplified ESP applications (NRC, averted)						
Hours saved on ESP review	38	PERT	25	38	50	NRC estimate
Application per licensee	1			1		NRC estimate
8.1. DC Renewal						
Number of DCs being renewed	3	PERT	0	3	5	NRC estimate

Activity	Mean Estimate	Distribution	Low Estimate	Best Estimate	High Estimate	Source or Basis of Estimate
Industry Averted DC Renewals						
Renewal cost to DC applicant from 2015 process	$7,166,667	PERT	$6,000,000	$7,000,000	$9,000,000	NRC estimate
Years after final rule before renewal would have occurred	8	PERT	5	8	13	Aggregate estimate based on existing DCs
Years after final rule before second renewal would have occurred	23	PERT	20	23	28	15 year renewal using aggregate estimate
Renewal cost to DC applicant (2019 dollars)	$7,533,765			$7,533,765		NRC estimate
NRC Averted DC renewals						
NRC DC renewal review cost	$7,666,667	PERT	$6,500,000	$7,500,000	$9,500,000	NRC estimate based on 2015 NRC renewal cost actuals that were inflated
Years after final rule before renewal would have occurred	8	PERT	5	8	13	Aggregate estimate based on existing DCs
Years after final rule before second renewal would have occurred	23	PERT	20	23	28	15 year renewal using aggregate estimate
Renewal cost to NRC (2019 dollars)	$8,059,377	PERT		$8,059,377		NRC estimate
Industry Incremental DC Review						
Incremental review cost to COL applicant (benefit of having a DC renewed)	$1,130,065	PERT	$753,377	$1,130,065	$1,506,753	10 - 20% of the DC Renewal estimate as beneficial to COL Applicants
NRC Incremental DC Review						
Incremental review cost to NRC (benefit of having a DC renewed)	$1,130,065	PERT	$753,377	$1,130,065	$1,506,753	10 - 20% of the DC Renewal estimate as beneficial to COL Applicants
8.3. Design Scope and Standardize						
Industry LARs (Averted)						
Hours to generate and submit LAR	213	PERT	180	200	300	NRC estimate
Number of actions per year (this is a recurring averted cost)	4	PERT	3	4	4	Per COL applicant based on recent data
NRC Review LARs (Averted)						
Hours to review	107	PERT	90	100	150	NRC estimate
Industry DC Application Reduced Level of Effort						
Reduction in DC level of effort	213	PERT	180	200	300	NRC estimate
NRC DC Application Reduced Level of Effort						
Reduction in DC level of effort	127	PERT	100	120	180	NRC estimate
8.5. Application Content						
Industry Application Reduced Level of Effort						
Reduction in DC level of effort	1,917	PERT	1,000	2,000	2,500	NRC estimate
9. Environmental						
Industry Averted SAMDA						
Hours to conduct full SAMDA	1,208	PERT	750	1,250	1,500	NRC estimate

Activity	Mean Estimate	Distribution	Low Estimate	Best Estimate	High Estimate	Source or Basis of Estimate
NRC Averted SAMDA Review						
Hours to review full SAMDA	256	PERT	152.4	250	381	NRC estimate
10. Other Processes						
Industry Reporting Burden						
Reduced reporting burden	30	PERT	20	30	40	NRC estimate
Number of entities	6			6		Per hypothetical reactor
11. Miscellaneous						
Industry Exemption Requests						
Hours to generate and submit exemption request	62	PERT	50	60	80	NRC estimate
Industry Annual ECCS Reports (Averted Cost)						
Hours to generate and submit report	100	PERT	50	100	150	NRC estimate
Number of annual reports submitted	10	PERT	5	10	15	Per hypothetical reactor
NRC Review Annual ECCS Reports (Averted Cost)						
Hours to generate and submit report	50	PERT	25	50	75	NRC estimate
Number of annual reports submitted	10	PERT	5	10	15	Per hypothetical reactor
Industry Generate and Submit ECCS Reports When License Is Referenced (Averted Cost)						
Licensee hours to generate and submit ECCS report when license is referenced	500	PERT	250	500	750	NRC estimate
NRC Review ECCS Reports When License Is Referenced (Averted Cost)						
NRC hours to review ECCS report when license is referenced	250	PERT	125	250	375	NRC estimate
NRC Review Exemption Requests						
NRC hours to review exemption requests for miscellaneous topics	31	PERT	25	30	40	NRC estimate