THE NRC STAFF HAS PREPARED THIS DRAFT WHITE PAPER AND IS RELEASING IT TO SUPPORT AN UPCOMING ADVANCED REACTOR STAKEHOLDER MEETING. THE NRC STAFF INTENDS THIS DRAFT WHITE PAPER TO FACILITATE DISCUSSION AT THE MEETING, BUT IS NOT SOLICITING WRITTEN COMMENTS ON IT. THE CONTENTS OF THIS DOCUMENT ARE SUBJECT TO CHANGE AND SHOULD NOT BE INTERPRETED AS OFFICIAL AGENCY POSITIONS. FOLLOWING THE MEETING, THE NRC STAFF PLANS TO COMPLETE ITS ANALYSIS OF THE APPLICABILITY OF CURRENT NRC REGULATIONS TO NON-LIGHT WATER REACTORS IN THE FORM OF A WHITE PAPER OR SOME OTHER DOCUMENT, AND WILL CONSIDER OPTIONS FOR INVITING PUBLIC PARTICIPATION.

September 2020

NRC Staff Draft White Paper
Analysis of Applicability of NRC Regulations for Non-Light Water Reactors

Background

This draft white paper is an update to Attachment 1 of the "Draft Non-Light Water Review Strategy Staff White Paper" (Agencywide Documents Access and Management System (ADAMS) Accession No. ML19275F299) released September 2019 to support discussions at previous advanced reactor stakeholder meetings. The Draft Non-Light Water (non-LWR) Review Strategy was intended to facilitate discussion on possible approaches for the U.S. Nuclear Regulatory Commission (NRC) staff review of the licensing basis information of a non-LWR application independent of the specific design or methodology used. Due in part to recent accelerated interest in licensing non-LWRs using Title 10 of the *Code of Federal Regulations* (10 CFR) Parts 50 and 52, NRC staff determined it would be useful to update and issue Attachment 1 of that draft review strategy as a white paper separate from the draft review strategy. This draft white paper expands upon Attachment 1 to the draft review strategy and states the staff position on the applicability of various regulations to non-LWR applicants under either Part 50 or Part 52. At this point, there are no plans to finalize the draft review strategy.

Analysis

The NRC staff has analyzed which regulations are generally applicable to all non-LWR applications for construction permits and operating licenses under 10 CFR Part 50 and standard design certifications, combined licenses, and standard design approvals under 10 CFR Part 52.[1] Applicable, in this context, refers to regulations currently in force from which non-LWR designs cannot be generically excluded by the terms of the regulations. In all of our actions, the NRC staff is committed to following the NRC's Principles of Good Regulation (independence, openness, efficiency, clarity, and reliability) while performing our mission. In accordance with these principles, the NRC staff has prepared this document to aid in facilitating clear, open, and efficient review of non-LWR reactor designs.

This document presents the NRC staff's generic analysis of regulations, and does not constitute a new interpretation of existing regulations. The staff intends to implement any generic changes in the regulations as part of more suitable future efforts, such as the anticipated Part 53

[1] The NRC staff did not include regulations associated with early site permits, limited work authorizations, and manufacturing licenses under 10 CFR Part 52.

rulemaking. The NRC staff acknowledges that some of the regulations identified as generally applicable in the tables below may not serve a purpose for certain non-LWR designs due to their unique design attributes. Prospective applicants should engage as soon as practicable with the NRC staff to determine the need for exemptions from specific requirements for a particular design or technology.

Applicants may request exemptions from the applicable NRC regulations on a case-by-case basis depending on the nature of the specific design and associated determination of regulatory applicability. In reviewing an exemption request, in accordance with the regulations, the NRC must determine that the proposed exemption is authorized by law, will not present an undue risk to the public health and safety, and is consistent with the common defense and security. In addition, the proposed exemption must provide at least one special circumstance identified in 10 CFR 50.12(a)(2). The NRC staff anticipates that non-LWRs applicants will request exemptions from some of the NRC's regulations. In some cases, the reasoning for an exemption will be clear, as the underlying purpose of the regulation clearly relates to technical issues arising from LWR technology. In other cases, based on design or technology-specific considerations, a non-LWR applicant may request an exemption, and NRC staff will review these requests on their merits on a case-by-case basis.

An exemption request may not always be required, in many cases the NRC staff expects that non-LWR designs may meet a rule through design and application-specific implementations. Depending on the specific regulation, compliance could be achieved either through an exemption or by justifying that the rule is met when applied to the specific design. In other cases, such as defining terms or listing codes and standards, the regulations may be applicable but do not pose requirements. For example, 10 CFR §§ 50.55a(a) provides a list of standards approved for incorporation by reference into NRC regulations but does not itself impose requirements and is applicable to non-LWRs. Regulations in 10 CFR §§ 50.55a(b)-(h) and (z) prescribe the use of the codes and only 10 CFR §§ 50.55a(h) and (z) are applicable to non-LWRs. A designer of a non-LWR or applicant for a license for a non-LWR design may elect to apply American Society of Mechanical Engineers (ASME) Code, OM Code, or ASME NQA-1 requirements, but § 50.55a does not impose those requirements on non-LWR designs.

The goal of this white paper is to provide a comprehensive list of regulatory requirements that apply to non-LWRs, but omission of any given regulation from the tables below should not be interpreted as an indication that the omitted regulation does not apply to a specific design. As part of any future application review, the NRC staff nonetheless intends to continue to evaluate current NRC regulations that do not apply to non-LWR designs to ensure that any particular non-LWR design achieves the underlying safety purpose of each such regulation if needed for adequate protection of public health and safety or the common defense and security.

In developing the tables provided below, references are made to both 10 CFR Parts 50 and 52, which represent different possible licensing pathways for non-LWR applicants. In performing this regulatory review, the NRC staff comprehensively addressed 10 CFR Part 50, as it contains the full set of regulations applicable to power reactors and is referenced in 10 CFR Part 52 directly in many instances. Separately, the NRC staff reviewed 10 CFR Part 52 as there are instances in which application of 10 CFR Part 50 versus Part 52 would yield a different result for the same regulation, as discussed in more detail below.

The NRC staff notes that it may be possible to draft templates or guidance for certain exemptions expected to apply to non-LWRs generally or to specific non-LWR technologies.

However, each applicable exemption request will need to be included in the individual licensing action or design certification applications.

Table 1 provides regulations and additional context for areas where exemptions may be expected for non-LWR designs because the applicable regulatory requirements apply to all reactor designs, but they provide a description of conditions found in LWRs that may not be expected in non-LWRs. Table 2 identifies Part 52 regulations for which an exemption is expected for non-LWRs because although the regulations do not state that they are applicable to LWRs only, they cross-reference Part 50 regulations that are applicable to LWRs only. Table 3 provides a list of 10 CFR Part 50 regulations to be considered by non-LWR designers, with expected applicability for each regulation in the table. Table 4 provides a list of 10 CFR 50.34(f) [i.e., Three Mile Island (TMI)] requirements deemed applicable to non-LWRs. Table 5 provides a list of 10 CFR Part 52 regulations to be considered by non-LWR designers, with expected applicability for each regulation in the table. Table 6 provides a list of regulations by part outside of 10 CFR Part 50 and Part 52 that may apply to non-LWRs. Tables 3, 5 and 6 are intended to be a comprehensive list of regulations expected to be part of the scope of a non-LWR reactor application, but omission of any regulation should not be interpreted as a non-applicability. In Tables 3 through 6, the expected applicability of a regulation to a non-LWR is indicated by “Y” for Yes, or “N” for No. Table 4 also provides a description of “entry conditions” that if met for a given design would make a regulation applicable; if the “entry conditions” are not met then the regulations are considered not applicable.

Since 2017, the NRC staff has engaged on the Licensing Modernization Project (LMP) being led by Southern Company and coordinated by the Nuclear Energy Institute (NEI). Accordingly, in support of this effort, in June 2020, NRC staff issued Regulatory Guide 1.233, “Guidance for a Technology Inclusive, Risk-informed, and Performance-based Methodology to Inform the Licensing Basis and Content of Applications for Licenses, Certifications, and Approvals for Non-Light-Water Reactors,” which endorses the LMP methodology. Use of the LMP could also prompt an applicant to request exemptions from certain regulations, such as the 10 CFR 50.2 definition of “safety-related structures, systems and components.”

Tables

Table 1 lists the regulations associated with three topical areas (fission product release, criticality, and the reactor coolant pressure boundary) that the NRC staff has identified for which the underlying regulatory basis applies to all reactor designs, but the regulations contain language that is specific to light water reactor designs. At the present time, a generic resolution for these items is complicated by design-specific considerations and the relative importance of each concept in the overall safety demonstration of the specific design. As such, the NRC staff anticipates that non-LWR applicants will request exemptions from these regulations, but the precise nature of each requested exemption will depend on the specific technology and how other regulations are being met. The NRC staff will engage with non-LWR applicants with the goal of affording applicants as much flexibility as possible in implementing solutions to meet the underlying purpose of these regulations. The staff emphasizes the importance of early engagement on these topics to facilitate an efficient and effective review.

Table 1 – Areas with anticipated exemptions

Topical Area	Regulation	Discussion
Fission Product Release	10 CFR 50.34(a)(1)(ii)(D) 10 CFR 52.47(a)(2)(iv) 10 CFR 52.79(a)(1)(vi)	These provisions require that an applicant shall assume a fission product release from the core into the containment and that the applicant perform an evaluation and analysis of the postulated fission product release using the expected demonstrable containment leak rate and any fission product cleanup systems intended to mitigate the consequences of the accidents. This language is LWR-centric and the prescriptive nature is not consistent with the Commission policy in SRM-SECY-18-0060 that would allow functional containment for fission product retention rather than assuming that the facility would include a traditional pressure retaining containment. Further, the concept of a "substantial meltdown of the core" for a non-LWR design may differ dramatically from that normally described for an LWR design. These regulations still require an applicant to demonstrate how it will "mitigate the radiological consequences of accidents." Further, addressing the regulation will likely involve addressing defense-in-depth considerations.
Criticality	10 CFR 50.68(b) 10 CFR 52.47(a)(17) 10 CFR 52.79(a)(43) 10 CFR 52.137(a)(17)	Paragraph (b) of 10 CFR 50.68 provides LWR-centric conditions for criticality safety in lieu of monitoring to detect criticality. Non-LWR fuel differs significantly from traditional fuel types used in LWRs and in many cases has higher enrichment. Regulations in 10 CFR 50.68(a) require that licensees meet the requirements in 10 CFR 70.24 or the requirements in 10 CFR 50.68(b), which contains LWR-specific criteria for acceptable criticality prevention. The NRC staff recognizes that the requirements in 10 CFR 50.68(b) were added to provide clear methods for precluding criticality that would obviate the need for monitoring criticality in stored fuel and anticipates that non-LWR applicants could provide similar criteria for specific non-LWR fuel designs as necessary through exemptions. The corresponding regulations in 10 CFR Part 52 that cite 10 CFR 50.68 would be included in the exemption if applicable.

Topical Area	Regulation	Discussion
Reactor Coolant Pressure Boundary	10 CFR 50.2 (Definitions – Basic Component) 10 CFR 50.2 (Definitions – Safety-related Structure, Systems and Components (SSCs)) 10 CFR 50.36(c)(2)(ii) 10 CFR 50.49(b) 10 CFR 50.65 10 CFR Part 50 Appendix S	The reactor coolant pressure boundary for an LWR provides a fission product retention barrier for the release of radionuclides. However, in some non-LWRs, the reactor coolant boundary would not serve this function. Fission product retention is provided by the functional containment. Therefore, for these designs, the statement in 10 CFR 50.2 (2 instances), 10 CFR 50.49(b), and 10 CFR 50.65, "The integrity of the reactor coolant pressure boundary" is not applicable and an exemption is anticipated. In 10 CFR 50.36(c)(2)(ii), "significant abnormal degradation of the reactor coolant pressure boundary" is not applicable and can be replaced by "significant abnormal degradation of the functional containment" via an exemption. The corresponding regulations in 10 CFR Part 52 that cite 10 CFR Part 50 regulations to the left would also need to be included in the exemption if applicable. For simplicity, the 10 CFR Part 52 regulations are not included in the listing.

Table 2 provides a list of the regulations in 10 CFR Part 52 that apply to all power reactors, but reference a 10 CFR Part 50 regulation that refers specifically to LWRs. As such, to address the regulations as written, an exemption would be required. The NRC staff believes it would be straightforward to justify such exemptions because, as documented in Table 2, the referenced 10 CFR Part 50 regulations do not apply to non-LWRs.

When a non-LWR design, by virtue of its unique attributes, need not comply with one or more of the requirements of a regulation listed in Table 2, the applicant should request an exemption or exemptions from the specific subsection or subsections of each such regulation. Any such request should include the following information:

- a statement that the design need not comply with the requirements of a specific subsection or subsections below; and
- a statement or reference to associated docketed application material explaining why the design need not comply with the regulation (e.g., a design overview that makes it clear the reactor is not an LWR and the technology type employed need not include the safety function required by the regulation or accomplishes a required safety function through a means other than that required by the regulation).

The NRC, upon request from individual applicants, will use the provided information to review and evaluate exemptions from these regulations under 10 CFR 50.12 or 52.7 as applicable. If the application includes the above information, the NRC staff will not normally expect to consider additional information in connection with the exemptions.

Table 2 – Part 52 Regulations Referencing Part 50 Regulations Limited to LWRs

Topical Area	Regulation	Discussion
Analysis of SSCs and Emergency Core Cooling System (ECCS) Evaluation	10 CFR 50.34(a)(4) 10 CFR 50.34(b)(4) 10 CFR 52.47(a)(4) 10 CFR 52.79(a)(5) 10 CFR 52.137(a)(4)	The second sentence of each provision requires a description of the analysis and evaluation of the ECCS cooling performance in accordance with 10 CFR 50.46, which is only applicable to LWRs. Therefore, non-LWR applicants will need an exemption for the reference to 10 CFR 50.46 in these regulations.
Anticipated Transient Without Scram (ATWS)	10 CFR 52.47(a)(15) 10 CFR 52.79(a)(42) 10 CFR 52.137(a)(15)	These provisions reference 10 CFR 50.62, which is only applicable to LWRs. Therefore, non-LWR applicants will need an exemption from these regulations.
Station Blackout (SBO)	10 CFR 52.47(a)(16) 10 CFR 52.79(a)(9) 10 CFR 52.137(a)(16)	These provisions reference 10 CFR 50.63, which is only applicable to LWRs. Therefore, non-LWR applicants will need an exemption from these regulations.
Pressurized Thermal Shock Events	10 CFR 50.34(b)(9) 10 CFR 52.47(a)(14) 10 CFR 52.79(a)(7) 10 CFR 52.137(a)(14)	These provisions require a description of protection against pressurized thermal shock events and reference 10 CFR 50.60 and/or 10 CFR 50.61, which are only applicable to LWRs. All non-LWRs designs the NRC staff is aware of operate at near atmospheric conditions and cannot experience pressurized thermal shock events. Therefore, non-LWR applicants will need an exemption to these regulations.
Containment Leak Rate	10 CFR 52.79(a)(12)	The regulation references 10 CFR Part 50 Appendix J, which is only applicable to LWRs; therefore, non-LWR applicants will need an exemption to this regulation.
Reactor Vessel Surveillance Program	10 CFR 52.79(a)(13)	The regulation references 10 CFR Part 50 Appendix H which is only applicable to LWRs; therefore, non-LWR applicants will need an exemption to these regulations.
Effluent Monitoring and Sampling Program	10 CFR 52.79(a)(16)(ii)	The regulation references 10 CFR Part 50 Appendix I which is only applicable to LWRs, therefore non-LWR applicants will need an exemption to these regulations.

Table 3 provides a list of 10 CFR Part 50 regulations to be considered by non-LWR designers, with expected applicability for each regulation in the table.

Table 3 – 10 CFR Part 50 Requirements, as applicable to applications under Part 50 for non-LWRs[2]

Regulation	Topic	Presumed applicability to non--LWRs
10 CFR 50.2	Definitions	Y, all definitions are applicable to all designs but most definitions do not themselves create requirements.
10 CFR 50.3	Interpretations	Y
10 CFR 50.4	Written communications	Y
10 CFR 50.5	Deliberate misconduct	Y
10 CFR 50.7	Employee protection	Y
10 CFR 50.9	Completeness and accuracy of information	Y
10 CFR 50.10	License required; Limited work authorization (LWA)	Y
10 CFR 50.11	Exceptions and exemptions from licensing requirements	Y
10 CFR 50.12	Specific exemptions	Y
10 CFR 50.13	Attacks and destructive acts by enemies of the United States; and defense activities	Y
10 CFR 50.20	License classification	Y
10 CFR 50.21	Class 104 licenses for commercial and industrial facilities	Y
10 CFR 50.22	Class 103 licenses for commercial and industrial facilities	Y

[2] Omission of any given regulation from the tables should not be interpreted as a non-applicability.

Regulation	Topic	Presumed applicability to non--LWRs
10 CFR 50.23	Construction permits (CPs)	Y
10 CFR 50.30	Filing of application; oath or affirmation	Y
10 CFR 50.31	Combining applications	Y
10 CFR 50.32	Elimination of repetition	Y
10 CFR 50.33	Applicant information	Y
10 CFR 50.34(a)(13)	Aircraft impact	Y
10 CFR 50.34(b)	FSAR	Y
10 CFR 50.34(b)(1)	Site Evaluation (10 CFR Part 100) for Operating License Applications	Y
10 CFR 50.34(b)(2)	FSAR description of SSCs	Y
10 CFR 50.34(b)(3)	Kinds and quantities of radioactive materials (10 CFR Part 20)	Y
10 CFR 50.34(b)(4)	Analysis of SSCs and ECCS evaluation	See Analysis of SSCs and ECCS Evaluation in Table 2
10 CFR 50.34(b)(5)	Description and evaluation of applicable programs including research and development	Y
10 CFR 50.34(b)(6)	Facility operation documentation (programs, TS, etc.)	Y
10 CFR 50.34(b)(7)	Technical qualifications	Y
10 CFR 50.34(b)(8)	Operator requalification program	Y
10 CFR 50.34(b)(9)	Description of pressurized thermal shock	See Pressurized Thermal Shock Events in Table 2
10 CFR 50.34(b)(10)	Earthquake engineering criteria in Appendix S of 10 CFR Part 50	Y

Regulation	Topic	Presumed applicability to non--LWRs
10 CFR 50.34(b)(11)	Siting criteria	Y
10 CFR 50.34(b)(12)	Aircraft impact	Y
10 CFR 50.34(c)	Physical security plan	Y
10 CFR 50.34(d)	Safeguards contingency plan	Y
10 CFR 50.34(e)	Protection against unauthorized disclosure	Y
10 CFR 50.34(f)	TMI requirements	See footnote [3]
10 CFR 50.34(g)	Combustible gas control	Y
10 CFR 50.34(h)	Conformance with the Standard Review Plan (SRP)	N
10 CFR 50.34(i)	Mitigation of beyond-design-basis events	Y
10 CFR 50.34a	Design objectives for equipment to control releases of radioactive material in effluents	Y
10 CFR 50.36	Technical specifications	Y
10 CFR 50.43(e)(1)	Additional standards and provisions affecting class 103 licenses and certifications for commercial power	Y
10 CFR 50.43(e)(2)	Additional standards and provisions affecting class 103 licenses and certifications for commercial power	Y

[3] Although not required for applications under 10 CFR Part 50, the Commission direction in the Staff Requirements Memorandum to SECY-15-0002 confirmed that its earlier directions for the 10 CFR Part 52 new power reactor applications be applied consistently to 10 CFR Part 50 new power reactor applications. In addition, the Commission approved revision of the regulations in 10 CFR Part 50 for new power reactor applications to more closely align with requirements in 10 CFR Part 52, incorporating the requirements identified by the staff in SECY-15-002, including the TMI-related items under 10 CFR 50.34(f).

Regulation	Topic	Presumed applicability to non--LWRs
10 CFR 50.44(a)	Combustible gas control for nuclear power reactors	Y
10 CFR 50.44(b)	Combustible gas control for nuclear power reactors	N
10 CFR 50.44(c)	Combustible gas control for nuclear power reactors	N
10 CFR 50.44(d)	Combustible gas control for nuclear power reactors	Y
10 CFR 50.45	Standards for construction permits, operating licenses, and combined licenses	Y
10 CFR 50.46	Acceptance criteria for emergency core cooling systems	N
10 CFR 50.46a	Acceptance criteria for reactor coolant system venting systems	Y, but only required (per the text in the regulation) for a design where the accumulation of non-condensible gases would cause the loss of function of the core cooling systems
10 CFR 50.46a(a)	Acceptance criteria for reactor coolant system venting systems	See Analysis of SSCs and ECCS Evaluation in Table 2
10CFR 50.46a(b)	Acceptance criteria for reactor coolant system venting systems	See Analysis of SSCs and ECCS Evaluation in Table 2
10 CFR 50.46a(c)	Acceptance criteria for reactor coolant system venting systems	See Analysis of SSCs and ECCS Evaluation in Table 2
10 CFR 50.47	Emergency plans	Y
10 CFR 50.48(a)	Fire protection plan	Y
10 CFR 50.48(b)	Fire protection (Appendix R)	N
10 CFR 50.48(c)	National Fire Protection Association Standard (NFPA) 805	N, NFPA 805 is specific to Light Water Reactors

Regulation	Topic	Presumed applicability to non--LWRs
10 CFR 50.49	Environmental qualification of electric equipment important to safety for nuclear power plants	Y, except as noted below
10 CFR 50.49(g)	Environmental qualification of electric equipment important to safety for nuclear power plants	N
10 CFR 50.49(h)	Environmental qualification of electric equipment important to safety for nuclear power plants	N
10 CFR 50.49(i)	Environmental qualification of electric equipment important to safety for nuclear power plants	N
10 CFR 50.49(k)	Environmental qualification of electric equipment important to safety for nuclear power plants	N
10 CFR 50.50	Issuance of licenses and construction permits	Y
10 CFR 50.51	Continuation of license	Y
10 CFR 50.52	Combining licenses	Y
10 CFR 50.53	Jurisdictional limitations	Y
10 CFR 50.54	Conditions of licenses	Y, as applicable
10 CFR 50.54(a)	Quality assurance	Y
10 CFR 50.54(j)	Reactivity manipulation	Y
10 CFR 50.54(k)	Operator at the controls	Y
10 CFR 50.54(m)	Staffing requirements	Y
10 CFR 50.54(o)	Primary containment/Appendix J applicability	N
10 CFR 50.54(ff)	Seismic	Y

Regulation	Topic	Presumed applicability to non--LWRs
10 CFR 50.54(hh)	Aircraft Impact	Y
10 CFR 50.55	Conditions of construction permits, early site permits, combined licenses, and manufacturing licenses	Y
10 CFR 50.55a(a)	Codes and standards	Y, the provision provides a list of standards approved for incorporation by reference but does not itself impose requirements
10 CFR 50.55a(b)	Codes and standards - use and conditions on the use of standards	N
10 CFR 50.55a(c)	Codes and standards - reactor coolant pressure boundary	N
10 CFR 50.55a(d)	Codes and standards - Quality Group B components	N
10 CFR 50.55a(e)	Codes and standards - Quality Group C components	N
10 CFR 50.55a(f)	Codes and standards – preservice and inservice testing requirements	N
10 CFR 50.55a(g)	Codes and standards – Preservice and inservice inspection requirements	N
10 CFR 50.55a(h)(2)	Codes and standards	N
10 CFR 50.55a(h)(3)	Codes and standards	Y
10 CFR 50.55a(z)	Codes and standards	Y
10 CFR 50.56	Conversion of construction permit to license; or amendment of license	Y
10 CFR 50.57	Issuance of operating license	Y

Regulation	Topic	Presumed applicability to non--LWRs
10 CFR 50.58	Hearings and report of the Advisory Committee on Reactor Safeguards	Y
10 CFR 50.59	Changes, tests and experiments	Y
10 CFR 50.60	Acceptance criteria for fracture prevention measures for LWRs for normal operation	N
10 CFR 50.61	Fracture toughness requirements for protection against pressurized thermal shock events	N
10 CFR 50.61a	Alternate fracture toughness requirements for protection against pressurized thermal shock events	N
10 CFR 50.62	Requirements for reduction of risk from ATWS events for LWRs	N
10 CFR 50.63	Loss of all alternating current power	N
10 CFR 50.65	Maintenance rule	Y; also see Reactor Coolant Pressure Boundary in Table 1 as applicable
10 CFR 50.66	Requirements for thermal annealing of the reactor pressure vessel	N
10 CFR 50.67	Accident source term	N
10 CFR 50.68	Criticality accident requirements	Y, See Criticality in Table 1
10 CFR 50.69	Risk-informed categorization and treatment of SSCs	Y, optional
10 CFR 50.70	Inspections	Y
10 CFR 50.71	Maintenance of records, making of reports	Y

Regulation	Topic	Presumed applicability to non--LWRs
10 CFR 50.71(h)(1)	Probabilistic risk assessment (PRA)	Y, an exemption may not be required if a Level 3 PRA is done because the scope of the Level 3 PRA encompasses the Level 1 and Level 2 PRAs.
10 CFR 50.72	Immediate notification requirements for operating nuclear power reactors	Y
10 CFR 50.73	Licensee event report system	Y
10 CFR 50.74	Notification of change in operator or senior operator status	Y
10 CFR 50.75	Reporting and recordkeeping for decommissioning planning	Y
10 CFR 50.76	Licensee's change of status; financial qualifications	Y
10 CFR 50.78	Facility information and verification	Y
10 CFR 50.80	Transfer of licenses	Y
10 CFR 50.81	Creditor regulations	Y
10 CFR 50.82	Termination of license	Y
10 CFR 50.83	Release of part of a power reactor facility or site for unrestricted use	Y
10 CFR 50.90	Application for amendment of license, construction permit, or early site permit	Y
10 CFR 50.91	Notice for public comment; State consultation	Y
10 CFR 50.92	Issuance of amendment	Y
10 CFR 50.100	Revocation, suspension, modification of licenses, permits, and approvals for cause	Y

Regulation	Topic	Presumed applicability to non--LWRs
10 CFR 50.101	Retaking possession of special nuclear material	Y
10 CFR 50.102	Commission order for operation after revocation	Y
10 CFR 50.103	Suspension and operation in war or national emergency	Y
10 CFR 50.109	Backfitting	Y
10 CFR 50.110	Violations	Y
10 CFR 50.111	Criminal penalties	Y
10 CFR 50.120	Training and qualification of nuclear power plant personnel	Y
10 CFR 50.150	Aircraft impact	Y
10 CFR 50.155	Mitigation of beyond-design-basis events	Y
10 CFR Part 50 Appendix A	General Design Criteria	N
10 CFR Part 50 Appendix B	Quality assurance	Y
10 CFR Part 50 Appendix C	Financial data and qualifications	Y
10 CFR Part 50 Appendix E	Emergency planning	Y
10 CFR Part 50 Appendix F	Fuel reprocessing plants and related waste management facilities	Y
10 CFR Part 50 Appendix G	Fracture toughness requirements	N
10 CFR Part 50 Appendix H	Reactor vessel material surveillance program requirements	N

Regulation	Topic	Presumed applicability to non--LWRs
10 CFR Part 50 Appendix I	ALARA	N
10 CFR Part 50 Appendix J	Primary reactor containment leakage testing for water-cooled power reactors	N
10 CFR Part 50 Appendix K	ECCS evaluation models	N
10 CFR Part 50 Appendix N	Standardization of nuclear power plant designs	Y
10 CFR Part 50 Appendix Q	Pre-application early review of site suitability issues	Y
10 CFR Part 50 Appendix R	Fire protection	N
10 CFR Part 50 Appendix S	Earthquake engineering criteria	Y

Requirements under 10 CFR 50.34(f) are only applicable for 10 CFR Part 52 applications. See Footnote 3 on Page 2 for a discussion of applicability to 10 CFR Part 50 applicants. Use of the term “technically relevant” as it applies in this case allows for a greater degree of flexibility in meeting the regulation. If a sound case can be made that the requirement in question is not technically relevant to a design under review, the requirement is satisfied without a need for an exemption. Table 4, below, provides a broad scope applicability for non-LWRs, with “entry conditions” for technical relevancy listed for some items. TMI requirements are not applicable to 10 CFR Part 50 non-LWR applicants. Those 10 CFR 50.34(f) provisions considered to be applicable to non-LWRs and those with applicability entry conditions are listed in Table 4. The 10 CFR 50.34(f) citations not listed in Table 4 are considered not applicable.

Table 4 - Applicability of 10 CFR 50.34(f) “TMI Requirements” to non-LWRs under Part 52

Regulation	Topic	Presumed applicability to non--LWRs
10 CFR 50.34(f)(1)(i)	PRA to seek improvements in reliability of heat removal systems	Y
10 CFR 50.34(f)(1)(iii)	Reactor coolant pump seal damage	Y (entry condition: only for reactor designs that have a coolant pump with seals that retain inventory credited for core cooling)
10 CFR 50.34(f)(2)	Technical information for completion of safety analysis or Unresolved Safety Issues	Y
10 CFR 50.34(f)(2)(i)	Control room simulator	Y
10 CFR 50.34(f)(2)(ii)	Plant procedure improvement program	Y
10 CFR 50.34(f)(2)(iii)	Control room human factors	Y
10 CFR 50.34(f)(2)(iv)	Safety parameter display system	Y
10 CFR 50.34(f)(2)(v)	Automatic indication of status of safety systems	Y
10 CFR 50.34(f)(2)(vi)	High point venting of reactor coolant system (RCS)	Y (entry condition: only if reactor coolant flow is credited for core cooling and coolant flow can be impeded by non-condensible gases)
10 CFR 50.34(f)(2)(vii)	Radiation shielding design review	Y

Regulation	Topic	Presumed applicability to non--LWRs
10 CFR 50.34(f)(2)(viii)	Post-accident sampling	Y
10 CFR 50.34(f)(2)(x)	Relief and safety valves	Y (entry condition: only if RCS has relief valves and failure of these valves would lead to core cooling challenges)
10 CFR 50.34(f)(2)(xi)	Relief and safety valves	Y (entry condition: only if RCS has relief valves and failure of these valves would lead to core cooling challenges)
10 CFR 50.34(f)(2)(xiv)	Containment isolation	Y (entry condition: only for designs that use a traditional containment rather than a functional containment approach)
10 CFR 50.34(f)(2)(xv)	Containment purging	Y (entry condition: only for designs that use a traditional containment rather than a functional containment approach)
10 CFR 50.34(f)(2)(xvii)	Control room instrumentation for containment functions	Y (entry condition: only for designs that use a traditional containment rather than a functional containment approach)
10 CFR 50.34(f)(2)(xviii)	Coolant instrumentation	Y
10 CFR 50.34(f)(2)(xix)	Post-accident monitoring	Y
10 CFR 50.34(f)(2)(xxvi)	Leakage control outside containment	Y (entry condition: only for designs that have SSCs capable of circulating radioactive materials resulting from an accident outside of qualified barrier(s) to radioactive release)

Regulation	Topic	Presumed applicability to non--LWRs
10 CFR 50.34(f)(2)(xxvii)	In-plant Radiation Monitoring	Y
10 CFR 50.34(f)(2)(xxviii)	Preclude control room habitability issues during accidents	Y
10 CFR 50.34(f)(3)	Technical qualification/management structure	Y
10 CFR 50.34(f)(3)(i)	Industry experience	Y
10 CFR 50.34(f)(3)(ii)	Quality assurance (QA) list includes all SSCs important to safety	Y
10 CFR 50.34(f)(3)(iii)	QA program	Y
10 CFR 50.34(f)(3)(iv)	Dedicated containment penetrations	Y (entry condition: only for designs that use a traditional containment rather than a functional containment approach)
50.34(f)(3)(vi)	Containment	Y (entry condition: only for designs with external hydrogen mitigation systems with a traditional containment)
50.34(f)(3)(vii)	Management plan for design and construction activities	Y

Table 5 provides the anticipated applicability for the regulations for 10 CFR Part 52, Subpart B, "Standard Design Certifications;" Subpart C, "Combined Licenses;" and Subpart D, "Standard Design Approvals;" since these are the type of Part 52 applications expected by the NRC staff for most non-LWRs. Similar or additional requirements may exist for manufacturing licenses.

Table 5 – Selected 10 CFR Part 52 Requirements, as applicable to non-LWR Standard Design Certifications, Combined Licenses and Standard Design Approvals applications[4]

Topic	Regulation	Presumed applicability to non-LWRs
Analysis of SSCs and ECCS Evaluation	10 CFR 52.47(a)(4) 10 CFR 52.79(a)(5) 10 CFR 52.137(a)(4)	See Analysis of SSCs and ECCS Evaluation in Table 1
Applicability of SRP	10 CFR 52.47(a)(9) 10 CFR 52.79(a)(41) 10 CFR 52 137(a)(9)	N
Combustible Gas Control	10 CFR 52.47(a)(12) 10 CFR 52.79(a)(8) 10 CFR 52.137(a)(12)	Y
Pressurized Thermal Shock	10 CFR 52.47(a)(14) 10 CFR 52.79(a)(7) 10 CFR 52.137(a)(14)	See Pressurized Thermal Shock Events in Table 2
ATWS	10 CFR 52.47(a)(15) 10 CFR 52.79(a)(42) 10 CFR 52.137(a)(15)	See ATWS in Table 2
SBO	10 CFR 52.47(a)(16) 10 CFR 52.79(a)(9) 10 CFR 52.137(a)(16)	See SBO in Table 2
Criticality Accident Requirements	10 CFR 52.47(a)(17) 10 CFR 52.79(a)(43) 10 CFR 52.137(a)(17)	See Criticality in Table 1
Fire protection	10 CFR 52.47(a)(18)10 CFR 52.79(a)(6) 10 CFR 52.137(a)(18)	Y, in part – The requirements associated with 10 CFR 50.48 are applicable. The General Design Criteria (GDC) in Appendix A are not a requirement for non-LWRs, but consistent with this regulation and the staff guidance in RG 1.232, staff

[4] Omission of any given regulation from the tables should not be interpreted as a non-applicability.

Topic	Regulation	Presumed applicability to non-LWRs
		anticipates that applicants will provide a Principle Design Criterion (PDC) that is representative of Criterion 3.
Fire Protection Program	10 CFR 52.79(a)(40)	Y
Unresolved Safety Issues (USI) Resolution	10 CFR 52.47(a)(21) 10 CFR 52.79(a)(20) 10 CFR 52.137(a)(21)	Y
Operating Experience	10 CFR 52.47(a)(22) 10 CFR 52.79(a)(37) 10 CFR 52.137(a)(22)	Y
Severe Accident Considerations	10 CFR 52.47(a)(23) 10 CFR 52.79(a)(38) 10 CFR 52.137(a)(23)	N
Conceptual Design Information Not Part of the Certification	10 CFR 52.47(a)(24)	Y
Interface requirements to be met by those portions of the facility that are not part of the certification	10 CFR 52.47(a)(25), (26)	Y
PRA	10 CFR 52.47(a)(27) 10 CFR 52.79(a)(46) 10 CFR 52.137(a)(25)	Y
ITAAC	10 CFR 52.47(b)(1) 10 CFR 52.80(a)	Y
Environmental report	10 CFR 52.47(b)(2) 10 CFR 52.80(b)	Y
Designs that Differ Significantly from LWRs Must Meet 50.43(e)	10 CFR 52.47(c)(2) 10 CFR 52.79(a)(24)	Y
Environmental Qualification of Electrical Equipment	10 CFR 52.47(a)(13) 10 CFR 52.79(a)(10) 10 CFR 52.137(a)(13)	Y
ASME Code Programs	10 CFR 52.79(a)(11)	Y

Topic	Regulation	Presumed applicability to non-LWRs
Maintenance Rule	10 CFR 52.79(a)(15)	Y; also, see Reactor Coolant Pressure Boundary in Table 1 as applicable
Control of Effluents	10 CFR 52.47(a)(10) 10 CFR 52.79(a)(16)(i) 10 CFR 52.137(a)(10)	Y
Effluents Monitoring and Sampling Program	10 CFR 52.79(a)(16)(ii)	See Effluent Monitoring and Sampling Program in Table 2
TMI Requirements	10 CFR 52.47(a)(8) 10 CFR 52.79(a)(17) 10 CFR 52.137(a)(8)	Y
Risk-Informed Categorization of SSCs	10 CFR 52.79(a)(18)	Y, optional
Emergency Plans	10 CFR 52.79(a)(21)	Y
Multi-Unit Sites	10 CFR 52.79(a)(31)	Y
Physical Security Plan	10 CFR 52.79(a)(35)	Y
Safeguards Contingency Plan	10 CFR 52.79(a)(36)	Y
Aircraft Impact Assessment	10 CFR 52.47(a)(28) 10 CFR 52.79(a)(47) 10 CFR 52.137(a)(26)	Y
Limited work authorization	10 CFR 52.80(c)	Y
Mitigation of Beyond-Design-Basis Events	10 CFR 52.80(d)	Y

Table 6 - Other regulations (excluding 10 CFR Parts 50 and 52) that may apply to non-LWRs at some stage in CP/OL/DC/COL/SDA/ML licensing[5]:

Regulation	Topic	Presumed applicability to non-LWRs
10 CFR Part 2	Agency rules of practice and procedure	Y
10 CFR Part 9	Public records	Y
10 CFR Part 11	Criteria and procedures for determining eligibility for access to restricted data or national security information or an employment clearance	Y
10 CFR Part 19	Notices, instructions and reports to workers: inspection and investigations	Y
10 CFR Part 20	Standards for protection against ionizing radiation	Y
10 CFR Part 21	Reporting of defects and noncompliance	Y
10 CFR Part 25	Access authorization	Y
10 CFR Part 26	Fitness for duty programs	Y
10 CFR Part 30	Rules of general applicability to domestic licensing of byproduct material	Y
10 CFR Part 31	General domestic licenses for byproduct material	Y
10 CFR Part 37	Physical protection of Category 1 and Category 2 quantities of radioactive material	Y
10 CFR Part 40	Domestic licensing of source material	Y
10 CFR Part 51	Environmental protection regulations for domestic licensing and related regulatory functions	Y
10 CFR 51.51	Environmental fuel cycle environmental data	N
10 CFR 51.52	Environmental effects of transportation of fuel and waste	N

[5] Omission of any given regulation from the tables should not be interpreted as a non-applicability.

Regulation	Topic	Presumed applicability to non-LWRs
10 CFR Part 54	Requirements for renewal of operating licenses for nuclear power plants	Y
10 CFR Part 55	Operator's licenses	Y
10 CFR Part 70	Domestic licensing of special nuclear material	Y
10 CFR Part 71	Packaging and transportation of radioactive material	Y
10 CFR Part 72	Licensing requirements for the independent storage of spent nuclear fuel and high-level radioactive waste, and reactor-related greater than Class C waste	Y
10 CFR Part 73	Physical protection of plants and materials	Y, as applicable
10 CFR Part 74	Material control and accounting of special nuclear material	Y
10 CFR Part 81	Standard specifications for the granting of patent licenses	Y
10 CFR Part 95	Facility security clearance and safeguarding of national security information and restricted data	Y
10 CFR Part 100	Reactor site criteria	Y
10 CFR Part 110	Export and import of nuclear equipment and material	Y
10 CFR Part 140	Financial protection requirements and indemnity agreements	Y
10 CFR Part 170	Fees for facilities, materials, import and export licenses, and other regulatory services under the Atomic Energy Act of 1954, as amended	Y
10 CFR Part 171	Annual fees for reactor licenses	Y