



POSITION PAPER

NRC INSURANCE AND LIABILITY REQUIREMENTS
FOR SMALL REACTORS

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I. SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) has recognized that technical, licensing and policy questions relating to small reactors (SMRs) are triggered by the “key differences” (e.g., planned size, moderator, coolant, fuel design, projected operational parameters) between SMR designs and existing light water reactors (LWRs).¹ The 104 nuclear power reactors currently licensed to operate in the United States have licensed power limits ranging from 482 MWe to 1317 MWe; SMRs are expected to have rated capacities (per module) ranging from 25 to 300 MWe. Moreover, some SMRs may not generate electric power but instead may be used to generate process heat for industrial applications. These differences have prompted NEI and the SMR industry to develop a number of proposals concerning SMR licensing.

This position paper focuses on the extent to which the different expectations relating to reactor size and thermal power for SMRs may affect nuclear insurance and liability requirements for SMRs. To address this question, this analysis summarizes existing nuclear insurance and liability requirements for SMRs, as set forth in the Price-Anderson Act (PA or Act) and NRC regulations in 10 CFR Part 140. This current legal and regulatory framework for insurance and liability coverage, which is focused on LWRs, may not fully reflect unique SMR design features being developed, or deployment configurations. Thus, the position paper also considers whether changes to those statutory and regulatory provisions are warranted at this time.

As discussed below, existing financial protection requirements do take into account several of the unique characteristics of SMRs (e.g., the potential for deployment of small and multi-unit reactors, and the different rated capacities for proposed SMR designs). We believe that the financial protection mechanisms described in the Price-Anderson Act and NRC regulations are sufficiently flexible to accommodate the proposed SMR designs that (to our knowledge) are now being contemplated in the U.S. Overall, these provisions do not appear to pose significant obstacles to commercialization of SMRs. (This conclusion is necessarily based on current information and currently-proposed designs.) Consequently, this position paper concludes that existing financial protection requirements for SMRs are adequate, and does not recommend statutory or regulatory changes at this time.

This conclusion does not preclude the possibility of future discussions on this topic that reach a different conclusion. As work continues on SMRs, and as the numbers, configurations, and timing of the first U.S. SMR deployments become clear, SMR vendors and/or SMR license applicants may be better positioned to demonstrate that the potential liabilities associated with SMRs are of less concern than those associated with LWRs. Similarly, they may develop a compelling showing that existing financial protection and insurance provisions should more

¹ For the purposes of this paper, the term SMR includes reactors with a rated capacity less than 300 MWe or similarly sized non-electricity generating reactors.

clearly reflect this difference, to avoid the imposition of unwarranted financial burdens upon SMR developers.

II. INTRODUCTION

The Price-Anderson Act, codified at 42 U.S.C. § 2210, establishes a liability and indemnification scheme to benefit and protect the public in the event of a nuclear power plant accident, including nuclear incidents that the NRC deems to be an “extraordinary nuclear occurrence.”² The Act requires all reactor licensees to maintain financial protection to cover public liability claims. 42 U.S.C. § 2210(a). In this context, “financial protection” means the ability to compensate the public for damages from a nuclear incident and to meet the cost of investigating and defending claims and settling suits for such damages. 42 U.S.C. § 2014.k. Price-Anderson requirements are implemented by NRC regulations in 10 CFR Part 140, which set forth procedures and requirements for determining the financial protection, indemnification, and limitation of liability provisions applicable to affected NRC licensees and other persons under the Act. Congress enacted the Price-Anderson legislation in 1957, as an amendment to the Atomic Energy Act of 1954 (AEA). Price-Anderson has been amended and extended several times, most recently in the Energy Policy Act of 2005, which extended PA coverage for 20 years.

The legal framework governing financial protection for NRC-licensed reactors reflects a balancing of competing interests. Early in the development of nuclear technology, it became apparent that “the national interest would be best served if the Government encouraged private sector participation . . . in the development of atomic energy for peaceful purposes under a program of federal regulation and licensing.”³ Congress enacted the AEA to “encourage widespread participation in the development and utilization of atomic energy for peaceful purposes to the maximum extent consistent with the common defense and security and with the health and safety of the public.” 42 U.S.C. § 2013.d.⁴ However, significant industry concern about the potential for liability resulting from the employment of nuclear power for civilian uses

² The AEA defines a “nuclear incident” as any occurrence, including an extraordinary nuclear occurrence, within the United States causing, within or outside the United States, bodily injury, sickness, disease, or death, or loss of or damage to property, or loss of use of property, arising out of or resulting from the radioactive, toxic, explosive or other hazardous properties of source, special nuclear, or byproduct material. 42 U.S.C. § 2014.q. (For a complete definition, see AEA Section 11.q.) An “extraordinary nuclear occurrence” is defined as any event causing a discharge or dispersal of source, special nuclear, or byproduct material from its intended place of confinement in amounts off-site, or causing radiation levels off-site, that NRC or DOE (i) determines is “substantial” and (ii) determines “has resulted or will probably result in substantial damages to persons off-site or property off-site.” 42 U.S.C. § 2014.j.

³ *Pacific Gas & Elec. Co. v. State Energy Res. Conservation & Dev. Comm’n*, 461 U.S. 190, 207 (1983) (citing H.R. Rep. No. 2181, 83d Cong., 2d Sess. 1-11) (1954).

⁴ *In re TMI Litig. Cases Consol. II*, 940 F.2d 832, 852 (3d Cir. 1991), *cert. denied*, 503 U.S. 906 (1992); *Pacific Gas*, 461 U.S. at 194.

threatened to undermine such industry participation.⁵ Congress addressed this concern by enacting the Price-Anderson Act, which both protects the public (by creating a reliable compensation funding mechanism) and encourages private industry participation (by imposing specific limitations on liability). *See* 42 U.S.C. § 2012.⁶

A 1998 NRC report to Congress explains how the Price-Anderson Act balances the needs of the public and the nuclear industry in the area of financial protection:

Congress designed the Price-Anderson Act to equitably balance the public's needs with the industry's. Specifically, Congress decided to require that licensees provide financial protection for risks of liability for nuclear damage, to indemnify the nuclear power industry as necessary, and to cap total liability in the event of an incident.

The Price-Anderson Act has been successful in removing impediments for firms to enter, and then remain, as participants in the civilian nuclear sector. Companies representing both utilities and support service and equipment suppliers indicated they would likely not participate in the nuclear industry without some method of liability limitation, such as that provided under the Price-Anderson Act. Public testimony submitted during its initial enactment and its subsequent renewals supported this viewpoint.

The Act requires licensees to provide financial protection. Financial protection under the Act means the ability to respond in damages for public liability (including costs of incident response or precautionary evacuation) and to meet the costs of investigating and defending claims and settling suits for such damages. The scope of Price-Anderson coverage includes any nuclear incident in the course of transportation of nuclear fuel to a reactor site, the storage of nuclear fuel at a site, the operation of reactors including discharges of radioactive emissions or effluents, the storage of nuclear wastes at reactor sites, and the transportation of radioactive material from reactors.

The Price-Anderson system channels to the operator the obligation to pay compensation for damages and provides "omnibus" coverage. This means that the same protection available for a covered facility extends through indemnification to any person who may be legally liable, regardless of the identity of the person liable or his relationship to the licensed activity. Thus, those who are injured are assured of the availability of funds to pay their claims, and firms that contribute in some manner to the construction (including design), operation, and/or maintenance of covered licensees are all protected. For example, each defendant company that, at the time of the accident, was an owner or operator of the Three Mile Island facility, together with each company that supplied design, engineering, or maintenance services, or that was a vendor of systems or equipment incorporated in the facility, was indemnified through the Price-Anderson

⁵ *Duke Power Co. v. Carolina Env'tl. Study Group, Inc.*, 438 U.S. 59, 64 (1978).

⁶ *In re TMI II*, 940 F.2d at 852; *O'Conner v. Commonwealth Edison Co.*, 13 F.3d 1090, 1096 (7th Cir.), *cert. denied*, 512 U.S. 1222 (1994).

financial protection system. Because Price-Anderson channels the obligation to pay compensation for damages, a claimant need not sue all of these parties but can bring its claim to the reactor licensee.⁷

The Price-Anderson Act does not provide a subsidy to the nuclear industry. The costs of obtaining the insurance required under the Act are borne by the industry, unlike the corresponding costs of some other power sources (e.g., dam failure and resultant flooding costs are borne by the public). To date, the public has paid nothing under the Price-Anderson framework for commercial nuclear activities. American Nuclear Insurers (ANI) has paid approximately \$307 million in indemnity and defense costs associated with claims, as of 2010. The nuclear industry has paid about \$21 million to the federal government in indemnity fees. NRC reactor licensees (not the taxpayers, and not the federal government) pay an annual premium for each reactor site. For 2011, annual premiums for single unit sites, including the primary insurance and worker policy coverage, average about \$900,000; for two unit sites, about \$1.3 million; and for three unit sites, about \$1.8 million.

Under the Act, the nuclear industry provides a total of up to \$12.6 billion in insurance coverage to compensate the public in the event of a nuclear accident. The insurance protection consists of two tiers. The first tier provides \$375 million in liability insurance coverage per incident. The first tier limit of \$375 million is based on the maximum private insurance available. This coverage consists of the liability insurance provided by insurance pools—groups of insurance companies pledging insurance capacity that enables them to provide substantially higher coverage than an individual company could offer.

If this primary coverage is not sufficient to cover claims arising from an incident, a second tier of financial protection applies, which can provide *additional* liability insurance coverage up to \$12.6 billion per incident. In second-tier protection, each NRC licensee of a reactor that is licensed to operate, designed for the production of electrical energy, and with a rated capacity of 100 MWe or more, must pay a retrospective premium equal to its proportionate share of the excess loss, up to a maximum of \$111.9 million per reactor per accident.⁸ 10 CFR 140.11(a)(4).⁹ The maximum retrospective premium is adjusted for inflation on an ongoing basis. 42 U.S.C. § 2210(t). All 104 commercial reactors operating in the United States participate in the second-tier financial protection program.

⁷ NUREG/CR-6617, *The Price-Anderson Act--Crossing the Bridge to the Next Century: A Report to Congress* (1998), pp. xii-xiii.

⁸ \$12.6 billion is the total of both the primary and secondary layers of financial protection under Price-Anderson, including the maximum 5% surcharge. See 42 U.S.C. § 2210o.(1)(E). This increases the per-reactor amount to \$117.5 million.

⁹ The language in 10 CFR 140.11(a)(4) regarding secondary liability coverage is specific to reactors “designed for the production of electrical energy,” and, thus, would not apply to reactors intended for other uses such as provision of process heat for industrial purposes.

The combination of primary and secondary coverage provides substantial funds to compensate the public in the event of damages from a nuclear incident. If the entire insurance pool, including the initial \$375 million and the additional \$12.2 billion, is exhausted, responding organizations such as state and local governments may petition Congress for additional disaster relief under the Act.¹⁰ On several occasions, Congress has also modified the insurance liability coverage limits.

III. SCOPE OF ISSUE

In SECY-10-0034, *Potential Policy, Licensing, and Key Technical Issues for Small Modular Nuclear Reactor Designs* (Mar. 28, 2010), the NRC Staff encouraged industry to generically address “issues common to all nuclear designs, SMRs, or specific technology groups (i.e., integral PWRs) in order to focus the issues, propose and obtain consistent resolutions, and effectively use resources.” SECY-10-0034, Enclosure, p. 2. That SECY paper acknowledges that differences between SMR designs and existing light water reactor designs (e.g., planned size, moderator, coolant, fuel design, projected operational parameters) could reasonably prompt technical, licensing and policy questions relating to SMRs. This position paper addresses nuclear insurance and financial protection requirements for SMRs, one of the topics addressed in SECY-10-0034.¹¹

This position paper summarizes existing nuclear insurance and liability requirements for SMRs and considers whether changes to those statutory and regulatory provisions are warranted at this time. It is not industry’s intent in this position paper to alter any statutory or regulatory insurance and liability requirements applicable to existing or new light water reactors (non-SMRs).

The 104 nuclear power reactors currently licensed to operate in the United States have licensed power limits ranging from 482 MWe to 1317 MWe. By contrast, SMRs are expected to have rated capacities (per module) ranging from 25 to 300 MWe. Moreover, some SMRs may not

¹⁰ (104 plants * \$111.9 million per reactor per accident) + a maximum 5% surcharge = \$12.2 billion. With the addition of the \$375 million in primary coverage, the total available is \$12.6 billion.

¹¹ SECY-10-0034 acknowledged the importance of nuclear insurance and liability issues for small modular reactors as well as the possible need for changes to the existing framework:

[The nuclear insurance and liability] issue is applicable to license applications for new, first-of-a-kind SMR designs, including the NGNP. . . . However, the likely timing for subsequent Commission papers on this issue provided above is based on the need to determine early whether legislation or rulemaking is necessary to address this issue, and how much lead time is necessary to conduct these activities. The NRC staff will consider white papers concerning this issue that it receives from DOE and potential SMR applicants, and determine whether legislation or rulemaking is appropriate to address this issue. Should it be necessary, the staff will propose changes to existing legislation or regulations in a timeframe consistent with the licensing schedule. (Enclosure, p. 21).

generate electric power but instead may be used to generate process heat for industrial applications. SECY-10-0034, Enclosure, p. 19. These different expectations relating to reactor size and thermal power usage affect the treatment of SMRs under Price-Anderson, and could suggest the need for statutory amendments or revised regulations tailored to the needs of SMRs.

The current NRC regulatory framework for insurance and liability coverage is focused on large light water reactors. As a result, that framework may not fully reflect unique SMR design features or deployment configurations. Both the NRC and the SMR industry recognize that clarity on the nuclear insurance and liability requirements for SMRs is important to the business case of the SMR license applicant. It is industry's view that license applicants are entitled to as much certainty as possible, as early in the licensing process as possible, regarding this and other aspects of regulatory compliance.

IV. CURRENT STATUTORY AND REGULATORY FRAMEWORK GOVERNING SMR FINANCIAL PROTECTION AND INDEMNITY

Price-Anderson Act coverage for public liability claims arising from nuclear incidents at nuclear power plants is implemented through a combination of private financial protection provided by commercial insurance companies, retrospective premiums from licensees, and government indemnification. The Act and related NRC regulations in 10 CFR Part 140 establish the required coverage based on the size and operating status of a nuclear reactor. Of interest to SMRs, the Act distinguishes between nuclear power plants having a rated capacity of 100 MWe or more and those having a lower rated electrical capacity. The Act and NRC implementing regulations also contain special provisions for determining coverage for multiple small reactors at a single site.

For the purposes of this discussion, it is assumed that the provisions of the Price-Anderson Act and NRC regulations in Part 140 are applicable to entities that have applied for or hold NRC reactor operating licenses. This designation would include combined license or operating license applicants and licensees utilizing an SMR design.¹²

The following sections describe the current financial protection requirements and their implications for SMRs. Table 1 (page 9) then provides a summary depiction of required liability coverage values for a range of rated capacities.

¹² The statute applies to persons who hold NRC licenses issued under AEA sections 53 (Special Nuclear Material), 63 (Source Material), 81 (Byproduct Material), 103 (Commercial licenses) or 104 (Medical Therapy & Research and Development licenses), and construction permit holders under AEA Section 185. See AEA Sec. 170.a., 42 U.S.C. § 2210.a. NRC regulations in 10 CFR Part 140 apply to persons who are applicants for or holders of NRC licenses issued under 10 CFR Parts 50, 52, or 54 to operate nuclear reactors. With respect to an extraordinary nuclear occurrence, Part 140 regulations apply to each applicant for or holder of an NRC license to operate a production or utilization facility (including an operating license issued under Part 50 and a combined license issued under Part 52), and to other persons indemnified with respect to the facilities involved. 10 CFR 140.2(a)(1)-(2). As set forth in 10 CFR 140.2(a)(3)-(4), these provisions also apply to certain other NRC licensees.

Financial Protection for Facilities with Output between 100 MWe and 300 MWe

Tier 1: Primary Liability Insurance Protection

Under the Act, NRC-licensed nuclear power plants with a rated capacity greater than or equal to 100 MWe must maintain primary financial protection against public (off-site) liability claims equal to the maximum amount of liability insurance available at a reasonable cost and on reasonable terms from private sources. 42 U.S.C. § 2210.b(1). The current primary insurance amount, as specified in NRC regulations, is \$375 million per unit. 10 CFR 140.11(a)(4). Additionally, 10 CFR 140.11(b) provides that where a licensee is authorized under 10 CFR Part 50, 52 or 54 “to operate two or more nuclear reactors at the same location, the total primary financial protection required of the licensee for all such reactors is the highest amount which would otherwise be required for any one of those reactors; provided, however, that such primary financial protection covers all reactors at the location.” Thus, primary financial protection for these reactors is required on a “per site” basis. These provisions apply to both large LWRs and SMRs with a rated capacity between 100 and 300 MWe.

Tier 2: Secondary Liability Insurance Protection

In addition to primary liability insurance, every operator of a nuclear power plant with a rated capacity greater than or equal to 100 MWe must participate in a secondary insurance plan. The current maximum deferred (“retrospective”) premium for each licensed nuclear reactor is \$111.9 million per incident, which is payable by the reactor owner or operator at a rate not to exceed \$17.5 million per year (for each unit, per incident). 42 U.S.C. § 2210.b(1). The deferred premium is also subject to a maximum 5% surcharge in the event that the funds are insufficient. 42 U.S.C. § 2210o.(1)(E).

Importantly, where a licensee operates two or more nuclear reactors at a site, each with a rated capacity of at least 100 MWe but not more than 300 MWe with a combined rated capacity of not more than 1,300 MWe, each such combination of reactors is considered a single reactor for the purpose of assessing the retrospective premium. 10 CFR 140.11(a)(4). As a result, a site containing multiple SMRs with a rated capacity between 100 and 300 MWe (but less than 1,300 MWe total) is subject to a single retrospective premium. In contrast, for large LWRs, the retrospective premium is assessed on a per unit basis.

Financial Protection for Facilities with Output Less than 100 MWe

NRC regulations also address reactors with rated capacities below 100 MWe. The financial protection required for reactors with power levels less than 10 MWt ranges from \$1 million to \$2.5 million. 10 CFR 140.11(a)(1)-(3). For reactors with output less than 100 MWe but greater than 10 MWt, the amount of financial protection required is based on power level and the hazards associated with the plant. 10 CFR 140.12. NRC regulations establish a formula for calculating the required financial protection for each unit, which ranges from \$1 million to \$74 million. 10 CFR 140.12. The amount of required financial protection is equal to the base

amount of financial protection, B, times a population factor, P.¹³ As with large LWRs, where two or more nuclear reactors are operated at the same location, the total financial protection required of the licensee for all such reactors is the highest amount which would otherwise be required for any one of those reactors; provided, that such primary financial protection covers all reactors at the location. 10 CFR 140.12(c).

Further, reactors with output less than 100 MWe are not required to maintain secondary financial protection and therefore are not subject to retrospective premiums.

For reactors with a rated capacity less than 100 MWe, where the amount of required financial protection is less than \$560 million the Act requires the NRC to enter into an indemnification agreement with the licensee. 42 U.S.C. § 2210(c). The maximum amount of government indemnity provided under an agreement of indemnification under the Act is \$500 million. This amount is to be reduced dollar for dollar by the excess over \$60 million in financial protection insurance maintained by the licensee.

Financial Protection for Non-Electricity Generating Reactors with Output Greater than 10 MWt

Although many SMRs are designed to generate electricity, other SMRs may instead be used for industrial purposes. For example, SMRs may be used to generate process heat for industrial applications (e.g., the production of hydrogen or provision of high quality steam). For such reactors, the design may have a rated capacity that is expressed only in MWt rather than MWe. As a result, non-electricity-generating reactors with a rated capacity greater than 10 MWt would not be subject to the requirement to maintain the maximum primary insurance required under 10 CFR 140.11(a), which only applies to reactors with rated capacities less than 10 MWt or greater than 100 MWe. Instead, those non-electricity-generating reactors would fall into the “other reactor” category addressed in 10 CFR 140.12. Under section 140.12, the amount of primary financial protection is based on a formula that takes into account thermal power level and the hazards associated with the plant. As with large LWRs, where two or more nuclear reactors are operated at the same location, the total financial protection required of the licensee for all such reactors is the highest amount which would otherwise be required for any one of those reactors; provided, that such primary financial protection covers all reactors at the location. 10 CFR 140.12(c).

In addition, the Act and NRC regulations only require reactors designed for the production of electrical energy with a rated capacity of at least 100 MWe to maintain retrospective premium insurance. 42 U.S.C. § 2210.b(1); 10 CFR 140.11(a)(4). As a result, non-electricity-generating reactors are not currently required to participate in the secondary coverage program.

As noted above for electricity-generating reactors with a rated capacity less than 100 MWe, for non-electricity-generating reactors, where the amount of required financial protection is less than

¹³ The base amount and population factor by which the base amount is to be multiplied are described in 10 CFR 140.12(b)(4).

\$560 million the Act requires the NRC to enter into an indemnification agreement with the licensee. 42 U.S.C. § 2210(c). The maximum amount of government indemnity provided under an agreement of indemnification under the Act is \$500 million. This amount is to be reduced dollar for dollar by the excess over \$60 million in financial protection insurance maintained by the licensee.

Table 1: Examples of Financial Protection for Small Reactors

Output/Unit	#Units/Site	Primary	Secondary**	NRC Indemnification
311 MWe	1	\$375 million	\$111.9 million	\$0
311 MWe	2	\$375 million/site	\$111.9 million/unit	\$0
125 MWe	1	\$375 million	\$111.9 million	\$0
125 MWe	2	\$375 million/site	\$111.9 million/site	\$0
125 MWe	4	\$375 million/site	\$111.9 million/site	\$0
45 MWe*	1	\$50 million	\$0	\$500 million
45 MWe*	12	\$50 million/site	\$0	\$500 million
45 MWe*	24	\$50 million/site	\$0	\$500 million
25 MWe*	1	\$27.8 million	\$0	\$500 million
25 MWe*	2	\$27.8 million/site	\$0	\$500 million

* Assumes MWt is three times the MWe and a population factor of 2.

** The secondary coverage does not include the potential surcharge (maximum 5%).

On-Site Property Insurance: All Licensed Reactors

With respect to on-site property insurance, the amount of required insurance is not set by the Act. Instead, the amount is established by NRC regulations. Under 10 CFR 50.54(w), each licensed reactor must take reasonable steps to obtain insurance available at reasonable cost and on reasonable terms from private sources, or demonstrate to the satisfaction of the NRC that it possesses an equivalent amount of protection covering the licensee's obligation, in the event of an accident, to stabilize and decontaminate the reactor and the reactor station site. The insurance must have a minimum coverage limit for each reactor station site of either \$1.06 billion or whatever amount of insurance is generally available from private sources, whichever is less. This requirement does not differentiate among reactors of different rated capacities.

V. RECOMMENDATIONS REGARDING CHANGES TO CURRENT STATUTORY AND REGULATORY FRAMEWORK GOVERNING SMR FINANCIAL PROTECTION AND INDEMNITY

As discussed above, the Price-Anderson Act and NRC regulations already contain some SMR-specific provisions. For example, the Act and NRC regulations treat a combination of two or more facilities located at a single site, each having a rated capacity between 100 and 300 MWe and a combined rated capacity of no more than 1,300 MWe, as a single facility for purpose of assessing the retrospective premium. NRC regulations also address the requirements for SMRs with rated capacities less than 100 MWe. However, the current legal and regulatory framework does not explicitly acknowledge other attributes of SMRs. As a result, NEI and SMR industry representatives have recently considered whether to recommend revision of this framework to more explicitly recognize that, when compared to LWRs, unique SMR design features and siting characteristics are expected to decrease potential liabilities associated with SMRs. Specifically, this group has evaluated whether statutory and regulatory requirements for nuclear power reactors (e.g., financial protection and insurance provisions) appropriately reflect SMR design features and whether the existing framework may result in unwarranted financial burdens for SMR licensees.

There is still uncertainty regarding the numbers, the configurations, and the timing of the first SMR deployments. There also is uncertainty about the makeup of the commercial SMR market (e.g., numbers and configurations that will comprise a fleet of SMRs, co-existing with large LWRs). NEI is also mindful of the need to consider both the existing LWR reactor fleet and new SMRs in evaluating SMR financial protection requirements as both will likely be part of the future commercial reactor fleet in the United States.

To inform industry proposals on this subject, an NEI-led industry working group reviewed existing statutory and NRC regulatory provisions for nuclear liability insurance protection and property insurance. The working group also assessed the existing statutory and regulatory provisions relevant to SMRs and the bases for current requirements applicable to large LWRs, small reactors, and research and test reactors. The assessment evaluated existing requirements for planned deployment configurations, including rated capacity thresholds, financial protection formulas, and the treatment of multi-module sites. The review of financial protection issues

included input from a number of industry sources, including NEI staff, SMR vendors, potential utility users, and nuclear insurance providers.

Based on that review, several scenarios were identified for consideration. These scenarios were evaluated based on a number of factors, including potential commercial significance, the need for legislative action and/or agency action, the availability of technical or other information to support any proposals for change, and the effects, if any, of any proposed changes upon current financial protection arrangements for existing commercial reactors. The primary options included the following:

- Changing the existing 100 MWe threshold for requiring maximum primary financial protection and participation in the secondary financial protection program;
- Changing the existing 300 MWe threshold for treating a combination of facilities as a single facility for financial protection purposes;
- Developing variable requirements for primary¹⁴ and/or retrospective premiums (e.g., a sliding scale for reactors with output between 100 MWe and 500 MWe);
- Preparing guidance for seeking NRC exemptions under 10 CFR 140.8;
- Creating new thresholds for non-electricity generating reactors; and
- Changing the amount of property insurance required under 10 CFR 50.54(w).

Based on available information and currently-proposed SMR designs, the evaluation concluded that, in general, the Price-Anderson Act and existing NRC regulations adequately address SMR-specific considerations, including modularization, multi-unit deployment at a site, rated capacity thresholds, and financial protection formulas.

The evaluation did identify one concern with current requirements. For a single-unit deployment of a unit with a rated capacity greater than 100 MWe, the operator may bear disproportionate costs for retrospective premiums relative to current LWR licensees. For example, one 125 MWe unit would be responsible for the same retrospective premium as a 1000 MWe unit under the current statutory and regulatory framework. This inequity is lessened as more units are deployed at a site under the existing SMR-related provisions in the Act and NRC regulations.

Notwithstanding this concern, no changes to the Act or NRC regulations are recommended at this time. However, further consideration may be warranted as the SMR deployment picture

¹⁴ ANI insurance premiums for primary financial protection are variable based on ANI's rating methods. NEI understands that ANI's ratings for new reactor types will depend on many factors, including a technical evaluation of the technology and application of current and any new underwriting criteria that may evolve as the technology develops and is proposed for siting.

becomes better understood and if the number of affected units increases beyond current expectations.

In addition, the evaluation concluded that revisions to the Act and/or NRC regulations applicable to non-electricity generating reactors (e.g., reactors used to generate process heat) may be necessary in the future, if industry interest materializes. Currently, the Act and NRC regulations only specify the required financial protection and retrospective premiums for reactors intended to generate electricity (except at very low thermal power levels). In SECY-10-0034, the NRC Staff noted that legislation amending the Price-Anderson Act or regulatory changes may be necessary to treat non-electricity generating SMRs with no rated electrical generation capacity in a comparable fashion to electricity-generating nuclear facilities. To our knowledge, no vendors are actively pursuing non-electricity generating SMR designs as part of the anticipated first wave of SMR license applications. If interest in non-electricity generating SMRs materializes, the need for changes could be evaluated in the future. However, no changes are recommended at this time to address non-electricity generating reactors.

With respect to on-site property insurance, the amount of required insurance is not set by the Act. The amount is established through regulation. Current NRC regulations do not establish varying insurance requirements based upon the rated capacity of reactors or other licensee-specific factors. On-site property damage insurance required by 10 CFR 50.54(w) is available from the industry mutual insurance company, Nuclear Electric Insurance Limited (NEIL). NEIL is a private insurance company that sets its premiums based on proprietary evaluations. As a result, the cost of on-site property insurance for an SMR cannot be evaluated generically. Instead, the premium would be set through NEIL's underwriting process and could vary based on a number of factors, including rated capacity, number of units at a site, SMR technology, and other factors. Due to the lack of specific cost information at present, changes to NRC on-site insurance requirements are not recommended at this time. If, in the future, licensees identify a need to revisit the on-site property insurance requirements based on actual site- and design-specific premium information, the need for changes could be addressed either generically or on a licensee-specific basis (e.g., through a exemption).

VI. CONCLUSION

Current financial protection requirements in the Price-Anderson Act and NRC regulations take into account several of the unique characteristics of SMRs. This framework recognizes the potential for deployment of small and multi-unit reactors. It also accounts for the different rated capacities for proposed SMR designs. NEI concludes that the financial protection mechanisms described in the Act and NRC regulations are sufficiently flexible to accommodate the proposed SMR designs currently being contemplated in the United States. Overall, these provisions do not appear to pose significant obstacles to commercialization of SMRs based on current information and currently-proposed designs. Consequently, this position paper concludes that existing financial protection requirements for SMRs are adequate, and does not recommend statutory or regulatory changes at this time.

However, this conclusion is in no way intended to preclude the possibility that a different conclusion could be reached in a future evaluation, as work continues on SMRs, and as the numbers, configurations, and timing of the first U.S. SMR deployments become clear. At that time, SMR vendors and license applicants may be better positioned to show that the potential liabilities associated with SMRs are of less concern than those associated with LWRs. Similarly, they may develop a compelling showing that existing financial protection and insurance provisions should more clearly reflect this difference, to avoid the imposition of unwarranted financial burdens upon SMR developers.

Should that eventuality occur, it might be appropriate for the industry and the NRC to re-examine possible statutory and regulatory changes, such as:

- Changing the existing 100 MWe threshold for requiring maximum primary financial protection and participation in the secondary financial protection program;
- Changing the existing 300 MWe threshold for treating combination of facilities as single facility for financial protection purposes;
- Developing variable requirements for primary and/or retrospective premiums (e.g., a sliding scale for reactors with output between 100 MWe and 500 MWe);
- Creating new thresholds for non-electricity generating reactors; and
- Changing the amount of property insurance required under 10 CFR 50.54(w).