

September 6, 2011

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)
)
NUCLEAR INNOVATION NORTH)
AMERICA LLC) Docket Nos. 52-012 & 52-013
)
(South Texas Project, Units 3 & 4))

NRC STAFF ANSWER TO INTERVENORS' MOTION TO ADMIT NEW CONTENTION
REGARDING THE SAFETY AND ENVIRONMENTAL IMPLICATIONS OF THE NRC TASK
FORCE REPORT ON THE FUKUSHIMA DAI-ICHI ACCIDENT

INTRODUCTION

Pursuant to the Atomic Safety and Licensing Board's (Board's) "Initial Scheduling Order" dated October 20, 2009, the staff of the U.S. Nuclear Regulatory Commission (Staff) hereby answers the "Motion to Admit New Contention Regarding the Safety and Environmental Implications of the [NRC] Task Force Report on the Fukushima Dai-ichi Accident" (Motion) and "Contention Regarding NEPA Requirement to Address Safety and Environmental Implications of the Fukushima Task Force Report," (Proposed Contention) filed by the Intervenor¹ on August 11, 2011. *See South Texas Project Nuclear Operating Co.* (South Texas Project Units 3 & 4), at *8 (Oct. 20, 2009) (unpublished order). For the reasons set forth below, the Proposed Contention should be dismissed because it fails to comply with the contention admissibility requirements in 10 C.F.R. § 2.309(f)(1) and the requirements for new and amended contentions in 10 C.F.R. § 2.309(f)(2) and (c).

PROCEDURAL BACKGROUND

The background to this proceeding has been discussed in numerous filings and Board orders and the Staff will not repeat it here. *See Nuclear Innovation North America LLC* (South

¹ The Intervenor¹ are Sustainable Energy and Economic Development Coalition, Public Citizen, and South Texas Association for Responsible Energy.

Texas Project Units 3 & 4), LBP-11-07, 73 NRC ___, ___ (Feb. 28, 2011) (slip op. at 2-5); NRC Staff Initial Statement of Position (May 9, 2011). Currently, there are two admitted contentions remaining in this proceeding, Contention CL-2 and DEIS-1. A hearing was held on Contention CL-2 on August 18-19, 2011, and a hearing on Contention DEIS-1 will be held on a later date to be determined by the Board. There is also one other pending contention in this proceeding. On May 16, 2011, the Intervenor filed a new contention based on foreign ownership, control, and domination restrictions (Contention FC-1). See Intervenor's Motion for Leave to File a New Contention Based on Prohibitions Against Foreign Control (May 16, 2011). Oral argument on Contention FC-1 was held on August 17, 2011.

Between April 14-18, 2011, an "Emergency Petition to Suspend All Pending Reactor Licensing Decisions and Related Rulemaking Decisions Pending Investigation of Lessons Learned from Fukushima Daiichi Nuclear Power Station Accident" (Emergency Petition) was filed in various NRC proceedings before the Commission. The Emergency Petition was never filed in this proceeding, although this proceeding was listed in the caption and Robert Eye signed the Emergency Petition as counsel for the Intervenor in this proceeding. Accompanying the Emergency Petition was a "Declaration of Dr. Arjun Makhijani in Support of Emergency Petition to Suspend All Pending Reactor Licensing Decisions and Related Rulemaking Decisions Pending Investigation Of Lessons Learned From Fukushima Daiichi Nuclear Power Station Accident" (First Makhijani Declaration). See, e.g., First Makhijani Declaration (Apr. 19, 2011) (ML111100633) (filed on April 20, 2011, in the Vogtle COL proceeding). The Staff and Applicant filed answers to the Emergency Petition on May 2, 2011. The Commission has not yet issued a ruling on the Emergency Petition.

The Near Term Task Force reviewing insights from the events at Fukushima Dai-ichi issued the "Recommendations for Enhancing Reactor Safety in the 21st Century" (Task Force Report) (ML111861807), dated July 12, 2011. On August 11, 2011, the Intervenor filed the Motion and Proposed Contention before the Board. Along with their Motion and Proposed

Contention, the Intervenor filed a “Declaration of Dr. Arjun Makhijani Regarding Safety and Environmental Significance of NRC Task Force Report Regarding Lessons Learned from Fukushima Daiichi Nuclear Power Station Accident,” (Second Makhijani Declaration) and the standing declarations of Tom Smith and Karen Hadden.² Additionally, the Intervenor filed a “Rulemaking Petition to Rescind Prohibition Against Consideration of Environmental Impacts of Severe Reactor and Spent Fuel Pool Accidents and Request to Suspend Licensing Decision” (Petition for Rulemaking).

LEGAL STANDARDS

The admissibility of new and amended contentions is governed by 10 C.F.R. § 2.309(f)(2) and 2.309(f)(1). New or amended contentions filed after the initial filing period may be admitted only with leave of the presiding officer if, in accordance with 10 C.F.R. § 2.309(f)(2), the contention meets the following requirements:

- (i) The information upon which the amended or new contention is based was not previously available;
- (ii) The information upon which the amended or new contention is based is materially different than information previously available; and
- (iii) The amended or new contention has been submitted in a timely fashion based on the availability of the subsequent information.

10 C.F.R. § 2.309(f)(2)(i)-(iii).

Additionally, a new or amended contention must also meet the general contention admissibility requirements of 10 C.F.R. § 2.309(f)(1). *Id.* In accordance with 10 C.F.R. § 2.309(f)(1), an admissible contention must:

- (i) Provide a specific statement of the issue of law or fact to be raised or controverted . . . ;
- (ii) Provide a brief explanation of the basis for the contention;
- (iii) Demonstrate that the issue raised in the contention is within the scope of the proceeding;

² Because the Intervenor has already established standing, these declarations are unnecessary and will not be further discussed in this pleading.

- (iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding;
- (v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue and on which the petitioner intends to rely at hearing, together with references to the specific sources and documents on which the requestor/petitioner intends to rely to support its position on the issue;
- (vi) . . . provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of law or fact. This information must include references to specific portions of the application (including the applicant's environmental report and safety report) that the petitioner disputes and the supporting reasons for each dispute, or, if the petitioner believes that the application fails to contain information on a relevant matter as required by law, the identification of each failure and the supporting reasons for the petitioner's belief. . . .

10 C.F.R. § 2.309(f)(1)(i)-(vi). The Commission has emphasized that the rules on contention admissibility are “strict by design.” *Dominion Nuclear Connecticut, Inc.* (Millstone Nuclear Power Station, Units 2 and 3), CLI-01-24, 54 NRC 349, 358 (2001), *petition for reconsideration denied*, CLI-02-01, 55 NRC 1 (2002). Failure to comply with any of these requirements is grounds for the dismissal of a contention. *Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), CLI-99-10, 49 NRC 318, 325 (1999). “Mere ‘notice pleading’ does not suffice.” *Amergen Energy Co., LLC* (Oyster Creek Nuclear Generating Station), CLI-06-24, 64 NRC 111, 119 (2006) (internal quotation omitted).

Finally, a contention that does not qualify for admission as a new contention under § 2.309(f)(2) may still be admitted if it meets the provisions governing nontimely contentions set

forth in 10 C.F.R. § 2.309(c)(1).³ Pursuant to 10 C.F.R. § 2.309(c)(2), each of the factors is required to be addressed in the requestor's nontimely filing. The first factor, whether good cause exists for the failure to file on time, is the "most important" and entitled to the most weight. *Amergen Energy Co., LLC* (License Renewal for Oyster Creek Nuclear Generating Station), CLI-09-07, 69 NRC 235, 261 (2009). Where no showing of good cause for the lateness is tendered, "petitioner's demonstration on the other factors must be particularly strong." *Texas Utilities Electric Co.* (Comanche Peak Steam Electric Station, Units 1 & 2), CLI-92-12, 36 NRC 62, 73 (1992) (quoting *Duke Power Co.* (Perkins Nuclear Station, Units 1, 2 & 3), ALAB-431, 6 NRC 460, 462 (1977)).

DISCUSSION

According to the Intervenor, the Proposed Contention is based on a conclusion in the Task Force Report that the level of protection currently provided by NRC regulations is inadequate to ensure protection of public health, safety, and the environment. Proposed Contention at 2; see *also* Second Makhijani Declaration ¶ 11. From this starting point, the Intervenor argues that "[t]he conclusions and recommendations presented in the Task Force Report constitute 'new and significant information,' the environmental implications of which must

³ 10 C.F.R. § 2.309(c)(1) requires a balancing of the following factors to the extent that they apply to a particular nontimely filing:

- (i) Good cause, if any, for the failure to file on time;
- (ii) The nature of the requestor's/petitioner's right under the Act to be made a party to the proceeding;
- (iii) The nature and extent of the requestor's/petitioner's property, financial or other interest in the proceeding;
- (iv) The possible effect of any order that may be entered in the proceeding on the requestor's/petitioner's interest;
- (v) The availability of other means whereby the requestor's/petitioner's interest will be protected;
- (vi) The extent to which the requestor's/petitioner's interests will be represented by existing parties;
- (vii) The extent to which the requestor's/petitioner's participation will broaden the issues or delay the proceeding; and
- (viii) The extent to which the requestor's/petitioner's participation may reasonably be expected to assist in developing a sound record.

be considered before the NRC may make a decision” on any new reactor licensing. Proposed Contention at 10. The Intervenor therefore claim that any conclusions in environmental documents associated with the STP COL application must be revisited, because compliance with NRC safety regulations is no longer sufficient to ensure that environmental impacts of accidents are acceptable. *Id.* at 13; see also Second Makhijani Declaration ¶ 11.

The Intervenor also make several distinct claims regarding both the content of the Task Force Report and the deficiencies they allege in environmental documents issued in this proceeding. First, the Intervenor claim that the STP Environmental Impact Statement (EIS) and Environmental Report (ER) do not adequately address the environmental analysis of design basis accidents, severe accidents, and severe accident mitigation alternatives (“SAMAs”). Proposed Contention at 11-13. Second, the Intervenor assert that the Task Force Report requires supplementation of environmental documents in the STP COL proceeding to address recommendations related to seismic and flooding events. *Id.* at 13-14. Finally, the Intervenor argue that all twelve recommendations in the Task Force Report must be considered in the STP COL environmental review before licensing decisions are made. *Id.* at 14-17.

As further discussed below, the Proposed Contention is barred to the extent that it challenges existing NRC safety regulations, is not supported by the Task Force Report with respect to severe accident analyses under NEPA, and includes several additional claims that are not supported by the Task Force Report. In addition, because the STP COL Final EIS has been issued, a supplement to the EIS is not necessary unless the standards in 10 C.F.R. § 51.92(a) are satisfied. As the Commission has held, supplementation is not required unless the new information “present[s] a seriously different picture of the environmental impact of the proposed project from what was previously envisioned.” *Hydro Resources, Inc.* (P.O. Box 777, Crownpoint, NM 87313), CLI-06-29, 64 NRC 417, 419 (2006) (internal quotation marks omitted). The Intervenor come nowhere near to showing a genuine dispute over whether this high threshold has been met. For these reasons and others discussed below, the Proposed

Contention fails to satisfy the contention pleading rules in 10 C.F.R. §§ 2.309 and 2.335 and should be rejected.

I. To the Extent the Proposed Contention Challenges Existing Safety Regulations, It is Barred by NRC Regulations

The Proposed Contention is styled as a contention regarding both the safety and environmental implications of the Task Force Report. Proposed Contention at 1. According to the Intervenor, “[t]he NRC’s current regulatory scheme requires significant re-evaluation and revision in order to expand or upgrade the design basis for reactor safety as recommended by the Task Force Report.” *Id.* at 9. The Intervenor also challenge 10 C.F.R. §§ 52.47(a)(23) and 52.79(a)(38), apparently on the grounds that these regulations are subject to cost-benefit analysis. *Id.* at 8-9.

To the extent the Proposed Contention is intended to challenge existing NRC safety regulations, it is barred from consideration in adjudicatory proceedings by 10 C.F.R. § 2.335(a). Pursuant to this regulation, “no rule or regulation of the Commission, or any provision thereof . . . is subject to attack by way of discovery, proof, argument, or other means in any adjudicatory proceeding subject to this part.” 10 C.F.R. § 2.335(a). Intervenor seeking a waiver of this rule in a particular proceeding must meet the standards set forth in 10 C.F.R. § 2.335(b), something the Intervenor have not attempted here. For this reason, to the extent the Proposed Contention is meant as a challenge to the adequacy of current NRC safety regulations, it is not adjudicable in this proceeding and must be rejected.⁴

⁴ The Staff notes that a Petition for Rulemaking under 10 C.F.R. § 2.802 has also been submitted in response to the Task Force Report. To the extent any interested person desires a specific change to NRC regulations, this is the correct procedural approach. The Intervenor themselves recognize that some of the issues they raise may be more appropriate for generic resolution by rulemaking, Proposed Contention at 4, and the Petition for Rulemaking provides further indication that the Proposed Contention is intended in part to challenge Commission rules.

II. The Proposed Contention is Not Supported by the Task Force Report With Respect to Severe Accidents

The Intervenor's overarching argument, that the Task Force Report demonstrates the inadequacy of current NRC safety regulations and therefore of all related environmental reviews, is not supported by the Task Force Report itself. The Intervenor asserts that the Proposed Contention is based on a conclusion in the Task Force Report that the level of protection currently provided by NRC regulations is inadequate to ensure protection of public health, safety, and the environment, and that the environmental implications of the report's recommendations must be considered before any new reactor licensing decision. Proposed Contention at 2-3; see also Second Makhijani Declaration ¶¶ 11. The Task Force does not make this conclusion; rather, it states that "continued operation and continued licensing activities do not pose an imminent risk to the public health and safety and are not inimical to the common defense and security." Task Force Report at 18. The Task Force notes that the level of safety associated with adequate protection of public health and safety has improved over time and should continue to improve "supported by new scientific information, technologies, methods, and operating experience," but does not state that the current level of protection is inadequate. *Id.* Furthermore, the Task Force Report does not take any position on the NRC's environmental reviews. It is well established that a document cited by a petitioner as the supporting basis for a contention is subject to scrutiny, both for what it does and does not say. When a report is the central support for a contention, the contents of that report in its entirety is before the Board and subject to the Board's scrutiny. See, e.g., *Yankee Atomic Electric Co.* (Yankee Nuclear Power Station), LBP-96-2, 43 NRC 61, 90 (1996); *rev'd in part on other grounds*, CLI-96-7, 43 NRC 235 (1996). See also *Southern Nuclear Operating Co.* (Early Site Permit for the Vogtle ESP Site), LBP-07-3, 65 NRC 237, 254 (2007) ("the material provided in support of a contention will be carefully examined by the Board to confirm that on its face it does supply an adequate basis for the contention"). Because this central element of the Intervenor's argument is not

supported by the document that serves as the grounds for filing the Proposed Contention, the Intervenor has not provided a sufficient basis for the contention or sufficient information to show that a genuine dispute with the Applicant exists. One of the most important claims made in the Proposed Contention therefore fails to meet the requirements of 10 C.F.R. § 2.309(f)(1)(ii) and (vi).

The Intervenor appears to believe that the Task Force Report calls for a change to the way accidents are treated in environmental documents. See Proposed Contention at 10-12. The Task Force does discuss the distinction between design basis accidents and severe or beyond design basis accidents. Task Force Report at 17-22. It suggests creating a new category of events designated as “extended design-basis” and including a number of existing regulatory requirements under this heading. *Id.* at 20.

The Intervenor appears to have interpreted this section of the Task Force Report as support for a claim either that severe accidents are not currently addressed in NRC environmental reviews, or that the way they are addressed must be changed. See Proposed Contention at 11-13. To the extent that the Intervenor intends the former interpretation, they are simply incorrect. The Environmental Standard Review Plan (ESRP), which provides guidance for all NRC COL reviews, includes instructions for NRC staff reviewers to consider the environmental impacts of both design-basis accidents and severe accidents. See *generally* NUREG-1555, *Environmental Standard Review Plan*, Chapter 7 (Oct. 1999) (Staff Attachment 1). The STP COL Final EIS addresses the environmental impacts of design basis accidents and severe accidents in Section 5.11. See NUREG-1937, “Environmental Impact Statement for Combined Licenses (COLs) for South Texas Project Electric Generating Station Units 3 and 4; Final Report,” Vol. 1, Section 5.11 (Feb. 2011) (ML11049A000). A petitioner’s imprecise reading of a reference document does not create a contention suitable for litigation. *Georgia Institute of Technology* (Georgia Tech Research Reactor, Atlanta, Ga.), LBP-95-6, 41 NRC 281, 300 (1995). This portion of the contention, like the previous one, therefore fails to

demonstrate the existence of a genuine dispute with the Applicant, and is therefore inadmissible pursuant to 10 C.F.R. § 2.309(f)(1)(vi).

A. The Challenge to the Adequacy of the STP Severe Accident Review is Unsupported by the Task Force Report and Therefore Untimely

To the extent that the Intervenor intend instead to question the adequacy of the STP COL Final EIS with respect to its analysis of the environmental consequences of accidents, the Intervenor have not cited any part of the Task Force Report in support of their claims. See Proposed Contention at 11. Rather, this portion of their argument is based on assertions by the Intervenor's expert, Dr. Arjun Makhijani, that

a major overarching step that needs to be taken is to integrate into the design basis for NRC safety requirements an expanded list of severe accidents and events, based on current scientific understanding and evaluations. This would ensure that potential mitigation measures are evaluated on the basis of whether they are needed for safety and not whether they are merely desirable. Should the NRC fail to incorporate an expanded list of severe accident requirements in the design basis of reactors, then a conclusion that the design provides for adequate protection to the public against severe accident risks could not be justified.

Second Makhijani Declaration ¶ 7. The Intervenor rephrase Dr. Makhijani's assertions as a claim that the Task Force recommends "the incorporation of accidents formerly classified as 'severe' or 'beyond design basis' into the design basis." Proposed Contentions at 11.

According to the Intervenor, this recommendation invalidates the environmental conclusions in the STP COL Final EIS. *Id.*

Neither Dr. Makhijani's Declaration nor the Proposed Contention text cites to the Task Force Report in support of this proposition. Indeed, both ignore contrary statements within the Task Force Report itself, including the statement that "[t]he Task Force envisions a framework in which the current design-basis requirements (i.e., for anticipated operational occurrences and postulated accidents) would remain largely unchanged" and the proposal to establish a new "extended design-basis" category for both current beyond design-basis regulatory requirements and any future rules that may be added. Task Force Report at 21.

With respect to this portion of the Proposed Contention, the Intervenor's assertions are untimely in that they are not based on any new information contained in the Task Force Report and could have been filed on a number of occasions prior to that report's publication. Related claims were, in fact, made in Dr. Makhijani's April 2011 declaration accompanying the Emergency Petition currently pending before the Commission. See First Makhijani Declaration ¶¶ 16, 33-35. Any specific challenges to the Applicant's ER or the STP COL Draft EIS or Final EIS could have been raised at any time following publication of these documents. NRC regulations permit the filing of new or amended contentions

only with leave of the presiding officer upon a showing that (i) [t]he information upon which the amended or new contention is based was not previously available; (ii) [t]he information upon which the amended or new contention is based is materially different than information previously available; and (iii) [t]he amended or new contention has been submitted in a timely fashion based on the availability of the subsequent information.

10 C.F.R. § 2.309(f)(2). The Intervenor's have not cited to any allegedly new information in the Task Force Report that supports their argument regarding "the incorporation of accidents formerly classified as 'severe' or 'beyond design basis' into the design basis," and this portion is therefore untimely.

The Intervenor's have also failed to show good cause for untimely filing, as required by 10 C.F.R. § 2.309(c)(1)(i). Good cause for late filing is the most important factor to consider when evaluating whether an untimely filing will be accepted, and failure to meet this factor requires a compelling showing regarding the other factors. See *Commonwealth Edison Co.* (Braidwood Nuclear Plant, Units 1 and 2), CLI-86-8, 23 NRC 241, 244 (1986); *Long Island Lighting Co.* (Shoreham Nuclear Power Station, Unit 1), ALAB-743, 18 NRC 387, 397 (1983). Of the remaining factors in 10 C.F.R. § 2.309(c)(1)(vii) and (viii) also disfavor the Intervenor's, as the issues they raise would broaden the proceeding, result in delays, and not contribute to a sound record. The other factors favor the Intervenor's or are neutral. However, given the

importance of 10 C.F.R. § 2.309(c)(1)(i), (vii), and (viii), this untimely portion of the Proposed Contention should not be entertained.

Like those before it, this portion of the Proposed Contention also fails to supply an adequate basis or demonstrate the existence of a genuine dispute with the Applicant on a material issue of law or fact. In part, this failure may be related to the Intervenors' assumption, evident throughout their pleading, that only design-basis accidents and not severe accidents are associated with mandatory safety regulations. See Proposed Contention at 2, 6, 7, 8, 9, 11; see *also infra* n.6. The Task Force Report itself notes the potential for confusion associated with this issue, and observes that:

the phrase "beyond design basis" is vague, sometimes misused, and often misunderstood. Several elements of the phrase contribute to these misunderstandings. *First, some beyond-design-basis considerations have been incorporated into the requirements and therefore directly affect reactor designs.* The phrase is therefore inconsistent with the normal meaning of the words. In addition, there are many other beyond-design-basis considerations that are not requirements. The phrase therefore fails to convey the importance of the requirements to which it refers.

Task Force Report at 19 (emphasis added). The Task Force Report makes recommendations regarding a new regulatory framework for mandatory requirements related to beyond design-basis considerations, including a terminology change intended to clarify the nature of these requirements, but does not propose changes to current design-basis requirements. *Id.* at 20-21. As noted above, a petitioner's imprecise reading of a reference document does not create a contention suitable for litigation. *Georgia Tech*, LBP-95-6, 41 NRC at 300. The Intervenors' arguments related to this issue, therefore, fail to provide an adequate basis for an admissible contention, in violation of 10 C.F.R. § 2.309(f)(1)(ii), or to demonstrate the existence of a material dispute as required by 10 C.F.R. § 2.309(f)(1)(vi).

B. The Discussion of SAMAs is Not Supported by the Task Force Report

The Proposed Contention also includes an argument related to SAMAs, which are considered in NRC environmental reviews. See, e.g., STP COL Final EIS at Section 5.11.3.

According to the Intervenor, the Task Force Report includes a recommendation that all SAMAs be incorporated into the set of features required in all nuclear power plants “*without regard to their cost* as fundamentally required for all NRC standards that set requirements for adequate protection of health and safety.” Proposed Contention at 12 (emphasis in original). Neither the Task Force Report nor the declaration submitted in support of the Proposed Contention contains any statement to that effect; further, as noted in Section II above, the Task Force Report makes no reference to SAMAs or any other portion of the NRC’s environmental reviews. Because neither the Task Force Report nor the declaration submitted with the contention contains such a statement, this portion of the Proposed Contention fails to satisfy the requirements of 10 C.F.R. § 2.309(f)(1)(v), which requires factual or expert support for a contention.⁵

The recommendations in the Task Force Report, were they to be adopted, would have no impact on the nature of SAMA analysis. SAMA analyses, which are related to the probabilistic risk assessment (PRA) requirement of 10 C.F.R. § 50.34(f)(1)(i) and include cost-benefit analysis by definition, are intended “to review and evaluate plant-design alternatives that could significantly reduce the radiological risk from a severe accident.” See ESRP at 7.3-1 to 7.3-5 (Staff Attachment 1). As the Commission has stated, SAMAs are safety enhancements intended to reduce the risk of severe accidents. *Entergy Nuclear Generation Co. and Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), CLI-10-11, 71 NRC 287, 290-91 (2010). A SAMA analysis examines the extent to which implementation of the SAMA would decrease the probability-weighted consequences of the analyzed severe accident sequences. *Id.* at 291. “Significantly, NRC SAMA analyses are not a substitute for, and do not represent,

⁵ The Staff notes that severe accident mitigation design alternatives (SAMDA) are a subset of SAMAs. The STP COL Final EIS concludes that all SAMDA issues in this proceeding have been resolved by rule pursuant to 10 C.F.R. Part 52, App. A, Section VI.B.7. See STP COL Final EIS, Vol. 1, at 5-113. The Board rejected the Staff’s view in LBP-11-07, but the Staff has appealed this decision and is awaiting a ruling from the Commission. See NRC Staff Petition for Review of the Licensing Board’s Decision in LBP-11-07 Denying the NRC Staff Motion for Summary Disposition (Mar. 15, 2011). The Staff continues to maintain that all SAMDA issues in this proceeding are resolved by rule, and, therefore also maintains that portions of the Proposed Contention that relate to SAMDAs are inadmissible.

the NRC NEPA analysis of potential impacts of severe accidents.” *Id.* at 316. Rather, SAMA analyses are rooted in a cost-beneficial assessment:

SAMA analysis is used for determining whether particular SAMAs would sufficiently reduce risk – e.g., by reducing frequency of core damage or frequency of containment failure – for the SAMA to be cost-effective to implement. The SAMA analysis therefore is a [PRA] analysis. If the cost of implementing a particular SAMA is greater than its estimated benefit, the SAMA is not considered cost-beneficial to implement.

Id. at 291. For a SAMA analysis, the “goal is *only* to determine what safety enhancements are cost-effective to implement.” *Id.* at 317 (emphasis added). A SAMA analysis, including cost-benefit considerations, is specifically required by NRC regulations governing the environmental review of standard design certification applications. See 10 C.F.R. § 51.55(a). Design features required by safety regulations are not subject to SAMA analysis in the environmental review, even if they are related to severe accidents, because the SAMA analysis only considers mitigation *alternatives*, that is, features that are not already incorporated into the design.

In making their argument, the Intervenors appear to merge concepts related to mandatory safety regulations under 10 C.F.R. Parts 50 and 52 with the SAMA analysis process. As noted above, the Intervenors incorrectly allege that 10 C.F.R. §§ 52.47(a)(23) and 52.79(a)(38) are subject to cost-benefit analysis, a proposition they support with citations to discussions related to the SAMA analysis for the AP1000 design certification rule and not with any references to NRC safety regulations or the Task Force Report. Proposed Contention at 8. Furthermore, the Intervenors assert that “the Task Force effectively recommends a complete overhaul of the NRC’s system for mitigating severe accidents through consideration of SAMAs.” *Id.* at 11. According to the Intervenors, the NRC’s current strategy related to severe accidents is limited to the SAMA analysis prepared as part of the environmental review and any voluntary measures adopted at a specific facility. *Id.*

In so arguing, the Intervenors ignore those regulations mentioned in the Task Force Report that do impose mandatory safety requirements related to severe accidents, and which

the Task Force identifies as elements to be incorporated into their proposed “extended design-basis” regulatory framework. Task Force Report at 20-21. These include the station blackout rule in 10 C.F.R. § 50.63, the rules governing anticipated transient without scram in 10 C.F.R. § 50.62, the maintenance rule in 10 C.F.R. § 50.65, the aircraft impact rule in 10 C.F.R. § 50.150, the rule for protection against beyond design-basis fires and explosions in 10 C.F.R. § 50.54(hh), and others. *Id.* at 20. Furthermore, the Intervenor ignores the Task Force’s observation that 10 C.F.R. §§ 52.47(a)(23), which applies to design certifications, and 52.79(a)(38), which applies to COLs, have “clearly established . . . defense-in-depth severe accident requirements for new reactors, . . . thus bringing unity and completeness to the defense-in-depth concept.” *Id.* By disregarding these regulatory requirements and focusing on the cost-benefit analysis conducted as part of the SAMA review in the EIS, the Intervenor misunderstands the NRC’s current approach to severe accidents, as well as the Task Force’s recommendations.

To the extent Intervenor is using the term “SAMA” as shorthand for new design features they wish to see implemented at nuclear facilities, the correct procedural option is to file a Petition for Rulemaking under 10 C.F.R. § 2.802 rather than contentions in individual proceedings. The Intervenor themselves concede that some of the issues they raise may be resolved more appropriately by rulemaking than in site-specific proceedings. Proposed Contention at 4. The Intervenor has not identified any such feature or features here.

The possibility that the Intervenor is using the term “SAMA” outside its usual NEPA context may be responsible for the assertion that certain mandatory safety regulations are “subject to cost-benefit analysis.” See Proposed Contention at 8. As stated above, SAMA analyses conducted pursuant to NEPA use cost-benefit analyses to evaluate potential design alternatives for use at specific facilities. As discussed in Section II.A, safety regulations in 10 C.F.R. Parts 50 and 52 do not, regardless of whether they apply to design-basis or severe

accident phenomena.⁶ Whatever the Intervenor's intent in using the "SAMA" terminology, however, nothing in this portion of their argument amounts to a contention meeting the requirements of 10 C.F.R. § 2.309(f)(1).

C. Assertions Related to the Alternatives Analysis in the EIS are Also Unsupported by the Task Force Report and Do Not Support an Admissible Contention

The Intervenor's final NEPA-related claim is that making SAMAs mandatory would affect the outcome of the NRC's environmental reviews in two ways. First, the Intervenor argues that making SAMAs mandatory would improve plant safety. Proposed Contention at 12. Second, the Intervenor asserts that imposing new mandatory safety features would raise the cost of new reactors and could affect the alternatives analysis in the Final EIS. *Id.*; see also Second Makhijani Declaration ¶¶ 13-24. According to the Intervenor, "these costs may be significant, showing that other alternatives such as the no-action alternative and other alternative electricity production sources may be more attractive." Proposed Contention at 12.

The first of these claims does nothing to invalidate the analysis in the STP COL Final EIS. If additional safety measures were to be imposed on reactors for any reason, the result would likely be to lower accident risks and therefore reduce accident impacts below those stated in the Final EIS. Any environmental analysis carried out under the current regulations would therefore be conservative.

⁶ It appears that the Intervenor has drawn incorrect inferences from *Union of Concerned Scientists v. NRC*, which they cite in their pleading. Proposed Contention at 8-9, citing 824 F.2d 108, 120 (D.C. Cir., 1987). As stated in this case, the AEA

prohibits the Commission from considering costs in setting the level of adequate protection and requires the Commission to impose backfits, regardless of cost, on any plant that fails to meet this level. The Act allows the Commission to consider costs only in deciding whether to establish or whether to enforce through backfitting safety requirements that are not necessary to provide adequate protection.

824 F.2d at 119-20. This distinction, which relates to NRC decisions about making new regulations and applying them to existing licensees by imposing a backfit, does not open the door to the use of cost-benefit analysis by license applicants with respect to safety features required by current mandatory safety rules. The distinction between design-basis and beyond design-basis phenomena, which the Intervenor considers central to their argument, therefore has no connection to the question of whether a given safety feature is mandatory or not.

The second claim states what appears to be the essence of the Intervenor's NEPA contention, namely that the alternatives analysis in the STP COL Final EIS is inadequate. If this is intended as the core of the Proposed Contention, then the Proposed Contention as a whole is untimely for the reasons discussed in Section II.A above. As in that section, the argument that increased costs for nuclear facilities will alter the alternatives analysis in environmental reviews for new reactors has been submitted previously in connection with the Emergency Petition currently pending before the Commission. See First Makhijani Declaration ¶ 35. Additionally, contentions challenging the alternatives analysis in the STP COL proceeding could have been filed at any time since the ER, Draft EIS, or Final EIS became available. This portion of the Proposed Contention should, therefore, be rejected for timeliness reasons alone.

In addition to the timeliness issue, the Proposed Contention also fails to meet the pleading requirements of 10 C.F.R. § 2.309(f)(1). The text of the Proposed Contention does not mention the specific recommendations in the Task Force Report or raise a challenge to any portion of the STP COL application. The accompanying declaration does list a number of specific items that, according to Dr. Makhijani, are likely to substantially increase the cost of nuclear reactors in general. Second Makhijani Declaration ¶¶ 13-24. Many of these are clearly inapplicable to the STP COL proceeding in that they recommend specific upgrades to the existing reactor fleet rather than any changes related to new reactors. See *id.* ¶¶ 15, 19, 21, 22, & 23. Even with respect to the other recommendations, however, Dr. Makhijani makes no attempt to relate his assertions to the STP COL alternatives analysis, and merely asserts that significantly increased costs are likely. The Intervenor in this proceeding makes no attempt to focus the claims made in Dr. Makhijani's declaration, which is extremely broad and has been filed in multiple proceedings, to anything specific to the STP COL proceeding. For these reasons, this portion of the Proposed Contention fails to meet the basis requirement of 10 C.F.R. § 2.309(f)(1)(ii), or the requirements in 10 C.F.R. § 2.309(f)(1)(v)-(vi) that Intervenor provided supporting information to show a genuine, material dispute with the applicant.

Moreover, the Intervenor's assertions regarding the proposed reactors' costs fail to meet the materiality requirements of 10 C.F.R. § 2.309(f)(1)(iv) and (vi) because reactor costs are not material to the STP COL environmental review. In the *Summer* COL proceeding, the Commission held that contentions related to reactor costs "were potentially relevant only if an environmentally preferable alternative had been identified." See *South Carolina Electric & Gas Co. & South Carolina Public Service Authority (Also Referred to as Santee Cooper)* (Virgil C. Summer Nuclear Station, Units 2 and 3), CLI-10-21, 72 NRC __, __ (Aug. 27, 2010) (slip op. at 4). The Commission provided the basis for this holding in a previous decision in the same proceeding:

"[N]either NEPA nor any other statute gives us the authority to reject an applicant's proposal solely because an alternative might prove less costly financially. Monetary considerations come into play in only the opposite fashion — i.e., if an alternative to the applicant's proposal is environmentally preferable, then we must determine whether the environmental benefits conferred by that alternative are worthwhile enough to outweigh any additional cost needed to achieve them."

South Carolina Electric & Gas Co. & South Carolina Public Service Authority (Also Referred to as Santee Cooper) (Virgil C. Summer Nuclear Station, Units 2 and 3), CLI-10-1, 71 NRC 1, 23-24 (2010) (quoting *Consumers Power Co. (Midland Plant, Units 1 and 2)*, ALAB-458, 7 NRC 155, 162 (1978)). In *Summer*, the possibility of an environmentally preferable alternative remained only if the Intervenor's alternatives contention was admissible, and the Commission therefore stated that should the licensing board reject this alternatives contention, then it must also reject the Intervenor's cost-related contentions. *Summer*, CLI-10-21, 72 NRC at __ (slip op. at 4). In the instant proceeding, the STP COL Final EIS analyzes alternatives and concludes that none of the viable alternatives are environmentally preferable. See STP Final EIS, Vol. 1, at 9-31. In addition, there are no pending or admitted alternatives contentions in this proceeding. Therefore, the Intervenor's assertions regarding reactor costs are not material to this proceeding and do not form an admissible basis for the Intervenor's contention. See 10 C.F.R. § 2.309(f)(1)(iv), (vi).

III. The Intervenors' Further Assertions Related to the Environmental Implications of the Task Force Report are Unsupported and Inadmissible

The Intervenors' further assertion that the Task Force Report requires supplementation of environmental documents in the STP COL proceeding to address recommendations related to seismic and flooding events also does not accurately reflect the report's contents. The Intervenors cite portions of the Task Force Report that recommend existing licensees reevaluate seismic and flooding hazards at their sites and make any necessary changes to structures, systems, and components that are important to safety. Proposed Contention at 14 (citing Task Force Report at 30). The Intervenors conclude that, as a consequence of this recommendation, the environmental documents in the STP COL proceeding are incomplete and require supplementation. *Id.* However, the Task Force Report states clearly that all current design certification and COL applicants address seismic and flooding issues adequately under existing regulations and guidance. Task Force Report at 71. As noted in Section II above, a referenced document may be scrutinized both for what it does and what it does not say. *Yankee Atomic, LBP-96-2, 43 NRC at 90.* Thus, this portion of the contention is not supported by fact or expert opinion and fails to demonstrate the existence of a genuine dispute, in contravention of the requirements of 10 C.F.R. § 2.309(f)(1)(v) and (vi).

Finally, the assertion that all twelve of the task force's recommendations must be addressed in environmental documents prior to COL issuance is not supported by the report itself. As stated previously, the Task Force Report makes no mention of environmental reviews. It also recommends specific strategies for addressing its recommendations in the safety reviews of design certification and COL applications. Task Force Report at 71-72. The Intervenors do not address this portion of the report, which specifically states that not all recommendations related to the existing reactor fleet apply to new reactors. This portion of the Proposed Contention, like the previous one, therefore fails to satisfy the requirements of 10 C.F.R. § 2.309(f)(1)(v) and (vi).

CONCLUSION

As explained above, the Intervenor has not provided sufficient support demonstrating a genuine dispute over whether the high threshold for requiring a supplement to the STP COL Final EIS has been met. See *Hydro Resources*, CLI-06-29, 64 NRC at 419. The Proposed Contention is inadmissible because it fails to satisfy the contention admissibility requirements in 10 C.F.R. § 2.309(f)(1) and the requirements for new and amended contentions in 10 C.F.R. § 2.309(f)(2) and (c).

Respectfully submitted,

/Signed (electronically) by/

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REQUIRED CERTIFICATIONS

I certify that I have made a sincere effort to make myself available to listen and respond to the moving party, and to resolve the factual and legal issues raised in the motion, and that my efforts to resolve the issues have been unsuccessful.

/Signed (electronically) by/

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Staff Attachment 1



U.S. NUCLEAR REGULATORY COMMISSION
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**7.0 ENVIRONMENTAL IMPACTS OF POSTULATED ACCIDENTS INVOLVING
 RADIOACTIVE MATERIALS**

REVIEW RESPONSIBILITIES

Primary—Appendix B

Secondary—Appendix B

I. AREAS OF REVIEW

This environmental standard review plan (ESRP) directs the staff's preparation of an introductory paragraph for the portion of the environmental impact statement (EIS) that describes the environmental impacts of postulated accidents involving radioactive materials. The scope of the paragraph covered by this plan is to introduce the material from the reviews conducted under ESRPs 7.1 through 7.3.

Review Interfaces

None.

Data and Information Needs

The reviewer for this ESRP should obtain the proposed organizational structure of the EIS from the Environmental Project Manager.

II. ACCEPTANCE CRITERIA

The reviewer should ensure that the introductory paragraph prepared under this ESRP is consistent with the intent of the following regulation:

- 10 CFR 51.70(b) with respect to preparation of an EIS that is concise, clear, analytic, and written in plain language.

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Published environmental standard review plans will be revised periodically, as appropriate, to accommodate comments and to reflect new information and experience.

Comments and suggestions for improvement will be considered and should be sent to the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Washington, D.C. 20555-0001.

Regulatory positions and specific criteria necessary to meet the regulations identified above are as follows:

- There are no regulatory positions specific to this ESRP.

Technical Rationale

The technical rationale for evaluation of the applicant's data regarding environmental impacts of postulated accidents involving radioactive materials is discussed in the following paragraph:

Introductory paragraphs that orient the reader with respect to the relevance of material to the overall organization and goals of the EIS add clarity to the presentation.

III. REVIEW PROCEDURES

The material to be prepared is informational in nature, and no specific analysis of data is required.

IV. EVALUATION FINDINGS

The reviewer of information covered by this ESRP should prepare at least one introductory paragraph for the EIS. The paragraph(s) should introduce the nature of the material to be presented by the reviewers of information covered by ESRPs 7.1 through 7.3. The paragraph(s) should list the types of information to be presented and describe their relationships to information presented earlier and to be presented later in the EIS.

V. IMPLEMENTATION

The method described herein will be used by the staff in evaluating conformance with the Commission's regulations, except in those cases in which the applicant proposes an acceptable alternative for complying with specified portions of the regulations.

VI. REFERENCE

10 CFR 51.70, "Draft environmental impact statement—general."



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7.1 DESIGN BASIS ACCIDENTS

REVIEW RESPONSIBILITIES

Primary—Appendix B

Secondary—Appendix B

I. AREAS OF REVIEW

This environmental standard review plan (ESRP) directs the staff's evaluation and input to the environmental impact statement (EIS) of the environmental risks of accidents involving radioactive material that can be postulated for the plant under review.

The scope of this review is a comparison of the offsite dose consequences and resulting health effects for design basis accidents (DBAs) as calculated by the applicant and those contained in Section 15 of the safety evaluation report (SER).

Review Interfaces

The reviewer for this ESRP should obtain input from or provide input to the reviewers for the following ESRPs, as indicated:

- ESRP 2.7. Obtain the dispersion data for the site.
- SER Chapter 15. Obtain input from the responsible reviewer(s) of SAR Chapter 15 to ensure consistency of the review of DBAs and offsite releases.

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Published environmental standard review plans will be revised periodically, as appropriate, to accommodate comments and to reflect new information and experience.

Comments and suggestions for improvement will be considered and should be sent to the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Washington, D.C. 20555-0001.

Data and Information Needs

The type of data and information needed will be affected by site- and station-specific factors, and the degree of detail should be modified according to the anticipated magnitude of the potential impacts. The following data or information should be obtained.

- the list of DBAs identified by the applicant as having a potential for releases to the environment and the applicant's analysis of the dose consequences from these accidents (from the ER or from the reviewer of SAR Chapter 15 as appropriate)
- the list of DBAs considered in the staff's safety evaluation and the analysis of the magnitude of the source-term for offsite releases (from Chapter 15 of the safety evaluation or from the reviewer for SAR Chapter 15)
- the 50th percentile normalized concentrations (χ/Q) at appropriate distances from the effluent release points (from ESRP 2.7).

II. ACCEPTANCE CRITERIA

Acceptance criteria for the review of environmental impacts of postulated accidents involving radioactive material and related to the plant are based on the relevant requirements of the following:

- 10 CFR 50.34 with respect to the applications for construction permits and operating licenses. This includes an analysis and evaluation of the design and performance of structures, systems, and components of the facility with the objective of assessing the risk to public health and safety resulting from operation of the facility.
- 10 CFR 52.17 with respect to applications for early site permits
- 10 CFR 52.79 for combined licenses with regard to requirements in 10 CFR 50.34 for the analysis and evaluation of the design and performance of structures, systems, and components of the facility with the objective of assessing the risk to public health and safety resulting from operation of the facility

Regulatory positions and specific criteria necessary to meet the regulations identified above are as follows:

- Regulatory Guide 1.3, Rev. 2, *Assumptions Used for Evaluating the Potential Radiological Consequences of a Loss of Coolant Accident for Boiling Water Reactors* (NRC 1974), with respect to evaluating the potential radiological consequences of a loss-of-coolant accident for boiling-water reactors (BWRs)

- Regulatory Guide 1.4, Rev. 1, *Assumptions used for Evaluating the Potential Radiological Consequences of a Loss of Coolant Accident for Pressurized Water Reactors* (NRC 1973), with respect to evaluating the potential radiological consequences of a loss-of-coolant accident for pressurized-water-reactors (PWRs)
- Regulatory Guide 1.70, Rev. 3, *Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants - LWR Edition* (NRC 1978) with respect to analyses of DBAs other than loss-of-coolant accidents
- Regulatory Guide 1.145, *Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants* (NRC 1982) with respect to information on dispersion models
- Regulatory Guide 4.2, Rev. 2, *Preparation of Environmental Reports for Nuclear Power Stations* (NRC 1976) with respect to the calculation of χ/Q values for determining offsite dose consequences from postulated accidents.

Technical Rationale

The technical rationale for evaluation of the applicant's plant accident data is discussed in the following paragraphs:

Applicants for construction permits, operating licenses, combined licenses and early site permits are required to evaluate the design and performance of structures, systems, and components of the facility with the objective of assessing the risk to public health and safety resulting from the operation of the facility. For construction-permit applications, this information is to be contained in a preliminary safety analysis report (PSAR). Applicants for operating licenses and combined licenses are required to prepare a final safety analysis report (FSAR).

Events up through Class 8 accidents were previously the only accidents considered in SARs and staff SERs. They were and are currently used, together with conservative assumptions, as the design basis events to establish the performance requirements of engineered safety features.

Guidance on reviewing safety analysis report submittals related to postulated accidents is in Chapter 15 of NUREG-0800, *Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants* (NRC 1985). The SRP Chapter 15 contains the methodology for reviewing the models, assumptions, and parameter values used to determine the offsite releases from DBAs. However, the conservative assumptions and calculations used in NRC safety evaluations substantially overestimate the environmental risk. Among the conservative assumptions used pursuant to the Chapter 15 analyses is the use of adverse meteorological dispersion conditions (i.e., 95th percentile χ/Q). Actual consequences will likely be far less severe than those given for the same events in SARs where more conservative evaluations are used. For this reason, DBAs (up through Class 8) are evaluated using more realistic meteorological conditions. Consequences predicted in

this way will be far less severe than those given for the same events in SARs where more conservative estimates of meteorology are used.

III. REVIEW PROCEDURES

Accidents are categorized as “design basis” or “severe.” The DBAs are accidents that the plant is designed specifically to accommodate. The evaluation of DBAs is performed for the NRC’s SER using conservative assumptions.

This ESRP section is designed to evaluate the applicant’s assessment of the environmental consequences of DBAs.

The analysis procedures are given for DBAs only.

Design-Basis Accidents

When analyzing doses calculated to result from DBAs, the reviewer should do the following:

- (1) Examine the applicant’s descriptions of accidents considered (as given in the ER) and compare them with the descriptions of accidents given in Appendix A of this ESRP (as taken from Chapter 15 of the SRP) to ensure that all accidents with anticipated offsite-dose consequences have been considered.
 - (a) Coordinate with the reviewer of SRP Chapter 15 to ensure that all appropriate accidents have been identified.
 - (b) Verify that the applicant provides a justification (included in the EIS) for not estimating the consequences of any accident given in Appendix A to this ESRP.
- (2) Examine the applicant’s estimated doses for the appropriate accidents given in Chapter 15 of the SRP. Ensure that the applicant used a 50th percentile χ/Q value that was based on onsite meteorological data, or 10% of the levels given in Regulatory Guide 1.3 or Regulatory Guide 1.4, to represent more realistic dispersion conditions than assumed in the safety evaluation.
- (3) Determine that the calculation of dose consequences resulting from a DBA to verify that the applicant’s proposed exclusion area and low-population-zone distances are adequate to provide a high degree of protection of the public from a variety of potential plant accidents.

For construction permit holders before January 10, 1997, a low population zone should be of such a size that an individual located at any point on its outer boundary who is exposed to the radioactive cloud resulting from the release during the entire period of the passage would not receive a total radiation dose to the whole-body in excess of 0.25 sievert (25 rem) or a total radiation dose in excess of 3 sieverts (300 rem) to the thyroid from exposure to iodine (10 CFR 100.11). For all other

applicants, the current siting regulations require an exclusion area of such a size that an individual located for any 2-hour period at the exclusion area boundary would receive a dose that would not be in excess of 0.25 sievert (25 rem) total effective dose equivalent (TEDE). A license to operate the facility would not be granted if the calculated exposures exceed the dose-guideline values.

IV. EVALUATION FINDINGS

The depth and extent of input to the EIS will be governed by the nature of the plant accidents and their impacts on the proposed project. The following information should be included:

- a general discussion of DBAs and the methodology used to calculate realistic dose consequences
- the staff's findings, relative to this plant, including
 - the radionuclide inventory of the reactor core at full power
 - the estimates of the 2-hour dose consequences at the proposed exclusion area boundary and the 30-day consequences in the low-population zone
 - a comparison of the offsite-dose consequences and health effects estimated by the applicant with those determined for normal and anticipated releases (as obtained from ESRP 5.4.3)
- a conclusion about the degree of environmental impact due to postulated DBAs at this plant. The reviewer should use language similar to that from the preamble to the current 10 CFR 100 that states, if appropriate,

The Commission's use of the value (of 0.25 sievert [25 rem] TEDE) does not imply that it considers it to be an acceptable limit for an emergency dose to the public under accident conditions, but only that it represents a reference value to be used for evaluating plant features and site characteristics intended to mitigate the radiological consequences of accidents in order to provide assurance of low risk to the public under postulated accidents. The Commission, based upon extensive experience in applying this criterion, and in recognition of the conservatism of the assumptions in its application (a large fission product release within containment associated with major core damage, maximum allowable containment leak rate, a postulated single failure of any of the fission product cleanup systems, such as the containment sprays, adverse site meteorological dispersion characteristics, an individual presumed to be located at the boundary of the exclusion area at the centerline of the plume for two hours without protective actions), believes that this criterion has clearly resulted in an adequate level of protection.

V. IMPLEMENTATION

The method described herein will be used by the staff in evaluating conformance with the Commission's regulations, except in those cases in which the applicant proposes an acceptable alternative for complying with specified portions of the regulations.

VI. REFERENCES

10 CFR 50.34, "Contents of application; technical information."

10 CFR 50.17, "Contents of application."

10 CFR 52.79, "Contents of applications; technical information."

10 CFR 100, "Reactor Site Criteria."

10 CFR 100.11, "Determination of exclusion area, low population zone, and population center distance."

U.S. Nuclear Regulatory Commission (NRC). 1973. *Assumptions used for Evaluating the Potential Radiological Consequences of a Loss of Coolant Accident for Pressurized Water Reactors*. Regulatory Guide 1.4, Rev. 1, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1974. *Assumptions Used for Evaluating the Potential Radiological Consequences of a Loss of Coolant Accident for Boiling Water Reactors*. Regulatory Guide 1.3, Rev. 2, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1976. *Preparation of Environmental Reports for Nuclear Power Stations*. Regulatory Guide 4.2, Rev. 2, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1978. *Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants - LWR Edition*. Regulatory Guide 1.70, Rev. 3, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1982. *Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants*. Regulatory Guide 1.145, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1985. *Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants, Section 2.3.3. Appendix A, Recommended Format for Hourly Meteorological Data to be Placed on Magnetic Tape*. NUREG-0800, Washington, D.C.

APPENDIX A

DESIGN BASIS ACCIDENTS INCLUDED IN SECTION 15 OF THE STANDARD REVIEW PLAN

SRP Section	Design-Basis Accident Description
15.1.5A	Radiological Consequences of Main Steam Line Failures Outside Containment of a PWR
15.2.8	Feedwater System Pipe Breaks Inside and Outside Containment (PWR)
15.3.3	Reactor Coolant Pump Rotor Seizure
15.3.4	Reactor Coolant Pump Shaft Break
15.4.9A	Radiological Consequences of Control Rod Drop Accident (BWR)
15.6.2	Radiological Consequences of the Failure of Small Lines Carrying Primary Coolant Outside Containment
15.6.3	Radiological Consequences of Steam Generator Tube Failure (PWR)
15.6.5A	Radiological Consequences of a Design Basis Loss of Coolant Accident Including Containment Leakage Contribution
15.6.5B	Radiological Consequences of a Design Basis Loss of Coolant Accident: Leakage From Engineered Safety Feature Components Outside Containment
15.6.5D	Radiological Consequences of a Design Basis Loss of Coolant Accident: Leakage From Main Steam Isolation Valve Leakage Control System (BWR)
15.7.4	Radiological Consequences of Fuel Handling Accidents



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7.2 SEVERE ACCIDENTS

REVIEW RESPONSIBILITIES

Primary—Appendix B

Secondary—Appendix B

I. AREAS OF REVIEW

This environmental standard review plan (ESRP) directs the staff's evaluation and input to the environmental impact statement (EIS) of the environmental risks of accidents involving radioactive material that can be postulated for the plant under review.

The scope of this review should include dose consequence analysis for severe accidents, including the socioeconomic impacts and, where applicable, the impact to biota. This includes coordination with the reviewers of safety analysis report (SAR) Chapter 19, 10 CFR 50.34(f), the reviewers of the individual plant examination (IPE), and the individual plant examination of external events (IPEEE). The review directed by this plan includes consideration of a limited amount of plant specific data in sufficient detail to appropriately evaluate the dose consequences for severe accidents.

Review Interfaces

The reviewer for this ESRP should obtain input from or provide input to the reviewers for the following ESRPs, as indicated:

- ESRP 2.4.1 and 2.4.2. Obtain a list of threatened and endangered species and critical habitats.
- ESRP 2.5.1. Obtain the estimated population data and distribution within an 80-km (50-mile) radius for a date 5 years from the time of the licensing action under consideration.

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Published environmental standard review plans will be revised periodically, as appropriate, to accommodate comments and to reflect new information and experience.

Comments and suggestions for improvement will be considered and should be sent to the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Washington, D.C. 20555-0001.

- ESRP 5.4.1. Obtain information regarding the anticipated exposure pathways.
- ESRP 5.4.3. Obtain the dose consequences and health effects associated with normal operational releases.
- ESRP 5.8.3. Provide regions of impacts from the postulated accidents.
- ESRP 7.3. Provide a list of the dominant severe-accident sequences and dose consequences, including the initiating-event contribution to population dose and accident progression bin contribution to population dose.

In addition, the reviewer of severe accidents should obtain input from reviewers of information covered in the following documents:

- SER Chapter 19. Coordinate with the responsible reviewer(s) (or review branch) of SAR Chapter 19 to ensure consistency with the severe-accident analyses given by the applicant in the environmental report (ER).
- Individual Plant Examination. Coordinate with the responsible reviewer(s) or review branch for the IPE to ensure consistency with the severe-accident analysis given by the applicant in the ER (NRC 1988).
- Individual Plant Examination for External Events. Coordinate with the responsible reviewer of the IPEEE to ensure consistency with the severe-accident analyses given by the applicant in the ER (NRC 1991).
- 10 CFR 50.34(f). Coordinate with the responsible reviewer of 10 CFR 50.34(f) to ensure consistency with the severe-accident analyses given by the applicant in the ER.

Data and Information Needs

The type of data and information needed will be affected by site- and station-specific factors, and the degree of detail should be modified according to the anticipated magnitude of the potential impacts. The following data or information should be obtained.

- a list of leading contributors to (1) core-damage frequency (e.g., from dominant severe-accident sequences or initiating events), (2) large-release frequency (e.g., from each containment failure mode or accident-progression bin), and (3) dose consequences with and without interdiction (e.g., from each release class and associated source term) (from the ER)
- the projected demographic data within an 80-km (50-mile) radius from the plant for the 5 years from the time of the licensing action under consideration (from ESRP 2.5.1)

- meteorological data for a 1-year period represents current conditions (from ESRP 2.7)
- socioeconomic impacts that might be associated with emergency measures during or following an accident (from the ER)
- radiological dose consequences and health effects associated with normal and anticipated operational releases (from ESRP 5.4.3).

II. ACCEPTANCE CRITERIA

Acceptance criteria for the review of environmental impacts of postulated accidents involving radioactive material and related to the plant are based on the relevant requirements of the following:

- 10 CFR 52.17 with respect to applications for early site permits
- 10 CFR 52.79 for combined licenses with regard to requirements in 10 CFR 50.34 for the analysis and evaluation of the design and performance of structures, systems, and components of the facility with the objective of assessing the risk to public health and safety resulting from operation of the facility.

Technical Rationale

The technical rationale for evaluation of the applicant's plant accident data is discussed in the following paragraph:

The Commission decided that the events or accident sequences that lead to releases shall include, but not be limited to, those that can reasonably be expected to occur. The environmental consequences of releases whose probability of occurrence has been estimated shall also be discussed in probability terms. Although the consequences of the accidents that can reasonably be expected to occur are expressed in terms of potential exposure to individuals, the consequences of severe accidents (referred to as probabilistic accidents in the policy statement) are characterized in terms of exposure to population groups and, where applicable, to the biota. Releases refer to radiation and/or radioactive materials or both entering environmental exposure pathways, including air, water, and groundwater. In-plant accident sequences that can lead to a spectrum of releases shall be discussed and shall include sequences that can result in inadequate cooling of reactor fuel and melting of the reactor core. The events arising from causes external to the plant that are considered possible contributors to the risk associated with the plant should be discussed. Socioeconomic impacts associated with emergency measures during or following an accident should also be discussed, and the environmental risks compared to and contrasted with radiological risks should be associated with normal and anticipated operational releases. The Commission also took the position that detailed quantitative considerations that form the basis of probabilistic estimates of releases do not need to be incorporated into the EIS, but shall be referenced, including references to safety evaluation reports.

III. REVIEW PROCEDURES

Severe accidents are those involving multiple failures of equipment or function and, therefore, the likelihood of occurrence is lower for severe accidents than for DBAs, but the consequences of such accidents may be higher. The environmental consequences of severe accidents are estimated using acceptable methodology (such as the MACCS code package; Chanin et al. [1990]). The risks for specific accident types are defined as the product of the probability of that type of accident occurring multiplied by the estimated consequences for that type of accident.

This ESRP section is designed to provide a methodology for reviewing the applicant's probabilistic assessment of the dose consequences of severe accidents.

When analyzing doses calculated to result from severe accidents, the reviewer should do the following:

- (1) Consult the reviewer (or review branch) for the IPE, the reviewer of Chapter 19 of the SAR, or the reviewer of 50.34(f) to determine if the information given in the ER on which the applicant's analysis is based is appropriate; that is, whether the applicant properly assessed and depicted severe-accident sequences, core damage, severe-accident progression, containment response, release categories, and source terms.
 - (a) In consultation with the reviewer of the IPE, Chapter 19 of the SAR or the reviewer of 10 CFR 50.34(f), determine whether an acceptable platform has been provided for assessing the environmental consequences of severe accidents.
 - (b) Consider the IPEEE for the analysis of severe accidents resulting from external initiators and the corresponding source-term releases.
- (2) Consult with the reviewer for ESRP 2.5.1 and review other appropriate sources of demographic data to ascertain that sufficient population data were used for the applicant's calculation of the population dose and that an appropriate population distribution was used.
- (3) Ensure that the dispersion data were determined from representative onsite meteorological data by coordinating your review with the reviewer of ESRP 2.7.
- (4) Ensure that estimates of the collective dose were made for the projected population within an 80-km (50-mile) radius.
- (5) Determine if the applicant appropriately extended the information on anticipated release classes and containment response to the calculation of dose consequences.
 - (a) Evaluate the dose-consequence code to determine if the consequence code used by the applicant is currently supported by NRC for estimating the dose consequences associated with severe reactor accidents.

- (b) If the applicant used a code not currently endorsed by the NRC, either evaluate the code that was used or determine the dose consequences resulting from selected severe accidents using an NRC-endorsed code to compare with the dose consequences calculated by the applicant.
- (6) Evaluate the protective actions that the applicant considered in its evaluation of the dose consequences from severe accidents to determine if the protective actions were appropriately considered.
- (7) Evaluate the applicant's analysis of the groundwater pathway for radiation exposure to the public.
- (a) Refer to the analysis of the potential consequences of a liquid-pathway release for generic sites as presented in NUREG-0440 (NRC 1978).
- (b) Ensure that the generic analysis is bounding for this particular plant.
- (8) Review the socioeconomic impacts that might be associated with emergency measures during or following an accident. This would include a review of the probability distribution for cost of offsite mitigating actions including the following:
- evacuation costs
 - value of crops contaminated and condemned
 - value of milk contaminated and condemned
 - costs of decontamination of property (where practical)
 - indirect costs resulting from the loss of use of property and incomes derived as a result of the accident (this would include any interdiction to prevent the use of property until it is either free of contamination or can be economically decontaminated).
- (9) Review the applicant's characterization of environmental consequences to biota.
- (a) Determine the presence of threatened and endangered species and federally designated critical habitat by coordinating with the reviewers of ESRPs 2.4.1 and 2.4.2.
- (b) Determine if the previously calculated radiation-exposure levels would significantly impact the threatened and endangered species located in the area or in any nearby critical habitats.
- (c) Obtain assistance in making this evaluation from the reviewer for ESRP 5.4.4, as needed.

- (10) Compare the offsite-dose consequences and health effects estimated by the applicant with those determined for normal and anticipated releases. In doing this, do not forget that the offsite-dose consequences from severe accidents are expressed probabilistically.

IV. EVALUATION FINDINGS

The depth and extent of input to the EIS will be governed by the nature of the plant accidents and their impacts on the proposed project. The following information should be included:

- a summary of atmospheric releases in severe-accident sequences (this includes the accident sequence or sequence group, the probability of the accident sequence per reactor year, and the fraction of the core inventory released)
- a summary of the environmental impacts and probabilities of severe accidents (including the probability of impact per reactor-year, the number of persons exposed to doses greater than 2 sieverts (200 rem) and greater than 0.25 sievert (25 rem), the population exposure, the number of latent cancers, and the cost of offsite mitigating actions)
- a summary of early fatalities and probabilities (including the probability of impact per reactor-year)
- the average values of environmental risks resulting from accidents per reactor-year (see NUREG-0921 [NRC 1983], Tables 5.8 through 5.13 for examples).
- a comparison of the environmental risk of severe accidents with (and contrasted to) the radiological risks associated with normal and anticipated operational releases. If appropriate, the following concluding statement may be used

The environmental impacts that have been considered include potential radiation exposures to individuals and to the population as a whole, the risk of near- and long-term adverse health effects that such exposures could entail, and the potential economic and societal consequences of accidental contamination of the environment. These impacts could be severe, but the likelihood of their occurrence is judged to be small. This conclusion is based on (1) considerable experience gained with the operation of similar facilities without significant degradation of the environment, (2) to obtain a license, the applicant must comply with the applicable Commission regulations and requirements, and (3) a previously analyzed assessment of the risk of design-basis and severe accidents. The overall assessment of environmental risk of accidents, assuming protective action, shows that it is roughly comparable with the risk from normal operation, although accidents have a potential for early fatalities and economic costs that cannot arise from normal operations. The risks of an early fatality from potential accidents at the site are small in comparison with the risks of an early fatality from other human activities in a comparably sized population.

V. IMPLEMENTATION

The method described herein will be used by the staff in evaluating conformance with the Commission's regulations, except in those cases in which the applicant proposes an acceptable alternative for complying with specified portions of the regulations.

VI. REFERENCES

10 CFR 50.34, "Contents of application; technical information."

10 CFR 52.17, "Contents of application."

10 CFR 52.79, "Contents of applications; technical information."

Chanin, D. I., J. L. Sprung, and L. T. Ritchie. 1990. *MELCOR Accident Consequence Code System (MACCS). Volume 1: User's Guide*. NUREG/CR-4691 Volume 1. Sandia National Laboratories, Albuquerque, New Mexico.

U.S. Nuclear Regulatory Commission (NRC). 1978. *Liquid Pathway Generic Study: Impacts of Accidental Radioactive Releases to the Hydrosphere from Floating and Land-Based Nuclear Power Plants*. NUREG-0440, Washington D.C.

U.S. Nuclear Regulatory Commission (NRC). 1983. *Final Environmental Statement Related to the Operation of Catawba Nuclear Station, Units 1 and 2*. NUREG-0921, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1988. Generic Letter 88-02 - Individual Plant Examination for Severe Accident Vulnerabilities. November 23, 1988, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1991. Generic Letter 88-20, Supplement 4, "Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities - 10 CFR 50.54(f)," Washington, D.C.



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7.3 SEVERE ACCIDENT MITIGATION ALTERNATIVES

REVIEW RESPONSIBILITIES

Primary—Appendix B

Secondary—Appendix B

I. AREAS OF REVIEW

This environmental standard review plan (ESRP) directs the staff's evaluation of the severe accident mitigation alternatives (SAMAs), referred to as severe accident mitigation design alternatives (SAMDAs) in some references. The scope includes the identification and evaluation of design alternatives and procedural modifications that reduce the radiological risk from a severe accident by preventing substantial core damage (i.e., preventing a severe accident) or by limiting releases from containment in the event that substantial core damage occurs (i.e., mitigating the impacts of a severe accident). The intent is to identify additional cases that might warrant either additional features or other actions that would prevent or mitigate the consequences of serious accidents.

Review Interfaces

The reviewer for this ESRP should provide input to or obtain input from the reviewers for the following ESRP sources, as indicated:

- ESRP 7.2. Obtain information that characterizes the risk profile of the plant. This includes a list showing leading contributors to (1) core damage frequency (e.g., from dominant severe accident sequences or initiating events), (2) large release frequency (e.g., from containment failure mode or accident-progression bin), and (3) dose consequences with and without interdiction (e.g., from each release class and associated source term).

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Environmental standard review plans are prepared for the guidance of the Office of Nuclear Reactor Regulation staff responsible for environmental reviews for nuclear power plants. These documents are made available to the public as part of the Commission's policy to inform the nuclear industry and the general public of regulatory procedures and policies. Environmental standard review plans are not substitutes for regulatory guides or the Commission's regulations and compliance with them is not required. The environmental standard review plans are keyed to Preparation of Environmental Reports for Nuclear Power Stations.

Published environmental standard review plans will be revised periodically, as appropriate, to accommodate comments and to reflect new information and experience.

Comments and suggestions for improvement will be considered and should be sent to the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Washington, D.C. 20555-0001.

- 10 CFR 50.34(f)(1)(I). Obtain input from the responsible 10 CFR 50.34(f)(1)(I) reviewer to ensure consistency of the SAMA and the 10 CFR 50.34(f)(1)(I) reviews.
- Internal Plant Examination (IPE). Obtain input from the responsible reviewer for the IPE to ensure consistency of the SAMA analysis with the findings of the IPE.
- Internal Plant Examination of External Events (IPEEE). Obtain input from the responsible reviewer of the IPEEE to ensure consistency of the SAMA analysis with the results of the IPEEE.
- Safety Analysis Report (SAR), Chapter 19 Review. Obtain input from the responsible reviewer of Chapter 19 of the SAR to assure consistency of the SAMA analysis with the results of the SAR Chapter 19 review.

Data and Information Needs

The type of data and information needed will be affected by site- and station-specific factors, and the degree of detail should be modified according to the anticipated magnitude of the potential impacts. The following data or information should be obtained:

- a list of leading contributors to (1) core damage frequency (e.g., from dominant severe accident sequences or initiating events), (2) large release frequency (e.g., from containment failure mode or accident progression bin), and (3) dose consequences with and without interdiction (e.g., from each release class and associated source term) (from ESRP 7.1)
- the methodology, process, and rationale used by the applicant to identify, screen, and select design alternatives and procedural modifications (from the environmental report [ER])
- the estimated cost, risk reduction, and value impact ratios for the selected SAMAs and the assumptions used to make these estimates (from the ER)
- a description and list of any alternatives that have been or will be implemented to prevent or mitigate severe accidents or reduce the risk of a severe accident (from the ER).

II. ACCEPTANCE CRITERIA

Acceptance criteria for the analysis and evaluation of severe accident mitigation alternatives are based on the relevant requirements of the following:

- the U.S. Court of Appeals decision in *Limerick Ecology Action v. NRC* 869 F.2d 719 (3rd Cir. 1989) with respect to the requirement that the NRC include consideration of certain SAMAs in environmental impact reviews performed under Section 102(2)(c) of NEPA as part of operating-license applications

- 10 CFR 50.34(f)(1)(I) with respect to requirements for the applicant to perform a plant/site-specific probabilistic risk assessment, the aim of which is to seek such improvements in the reliability of core and containment heat removal systems that are significant and practical and do not impact excessively on the plant
- 10 CFR 52.17 with respect to requirements in 10 CFR 50.34(f) for the applicant to perform a plant/site-specific probabilistic risk assessment, the aim of which is to seek such improvements in the reliability of core and containment heat removal systems that are significant and practical and do not impact excessively on the plant
- 10 CFR 52.79 with respect to requirements to contain the technically relevant information required of applicants for an operating license in 10 CFR 50.34

Regulatory positions and specific criteria necessary to meet the regulations identified above are provided in the following:

- Interim Policy Statement, “Power Plants—Nuclear Power Plant Accident Considerations under NEPA” (1980) with respect to the early consideration of either additional features or other actions that would prevent or mitigate the consequences of serious accidents
- SECY-91-229 (NRC 1991a), which presents alternative courses of action and the staff’s recommendations concerning the treatment of the SAMA issues to be considered under NEPA as they relate to the certification of standard plant designs, including evolutionary, passive, and advanced reactors
- NUREG/BR-0058, Rev. 2 (NRC 1997a), which states the policy for the preparation and the contents of regulatory analyses, including estimation of values and impacts for design alternatives and the “dollars per person-rem” conversion factors
- NUREG/BR-0184 (NRC 1997b) with respect to the value impact methodology
- NUREG/CR-6349 (Mubayi et al. 1995) with respect to dollars per person-rem conversion factor for offsite damage costs
- Generic Letter 88-20 (NRC 1988) with respect to the performance of an IPE at operating plants for severe-accident vulnerabilities
- Generic Letter 88-20, Supplement 3 (NRC 1990), with respect to accident prevention and mitigation features identified in the Containment Performance Improvement Program that may be valid for consideration in the review of SAMA
- Generic Letter 88-20, Supplement 4 (NRC 1991b), with respect to conducting an individual plant examination for externally initiated events.

In addition, the following acceptance criterion is used:

- Completeness and reasonableness, also with respect to the following: (1) the identification of SAMAs applicable to the plant or design under consideration, (2) the estimation of core damage frequency reduction and averted person-rem for each SAMA, (3) the estimation of cost for each SAMA, (4) the ranking of value-impact screening criteria to identify SAMAs for further consideration, and (5) the final disposition of promising SAMAs.

Technical Rationale

The technical rationale for evaluation of the applicant's severe accident mitigation alternatives is discussed in the following paragraphs:

An evaluation of SAMAs is required to be performed as part of the certification of new designs for nuclear power plants (as well as licensing custom plants) and for site approval applications. The purpose of SAMAs is to review and evaluate plant-design alternatives that could significantly reduce the radiological risk from a severe accident by preventing substantial core damage (i.e., preventing a severe accident) or by limiting releases from containment in the event that substantial core damage occurs (i.e., mitigating the impacts of a severe accident).

In 1980, the NRC published an interim policy statement (Interim Policy Statement, "Nuclear Power Plant Accident Considerations Under the National Environmental Policy Act of 1969" [NRC 1980]) that stated that it was the intent of the Commission for the staff to take steps to identify additional cases that might warrant early consideration of either additional features or other actions that would prevent or mitigate the consequences of serious accidents.

In 1985, the NRC published a policy statement ("Policy Statement on Severe Reactor Accidents Regarding Future Designs and Existing Plants," August 9, 1985 [NRC 1985a]). It concluded that existing plants posed no undue risk to public health and safety and no present basis for immediate action on a generic rulemaking or other regulatory changes for these plants because of severe accident risk. However, the policy statement indicated that "the Commission plans to formulate an approach for a systematic safety examination of existing plants to determine whether particular accident vulnerabilities are present and what cost-effective changes are desirable to ensure that there is no undue risk to public health and safety."

A 1989 court decision (*Limerick Ecology Action vs. NRC*, 869 F.2d 719 [3rd Cir. 1989]) stated that the "Action of NRC in addressing severe accident mitigation design alternatives through policy statement, not rule making, did not satisfy NEPA, where policy statement did not represent requisite careful consideration of environmental consequences, excluded consideration of design alternatives without making any conclusions about effectiveness of any particular alternative, and issues were not generic in that impact of severe accident mitigation design alternatives on environment would differ with particular plant's design, construction and locations."

Currently, NRC considers the evaluation of SAMAs in the environmental impact review that is now performed as part of every application for a construction permit, an early site permit, an operating license, and a combined license. In addition, the Commission has endorsed staff consideration of SAMAs in conjunction with the design certification application. The purpose of this consideration is to ensure that plant design changes with the potential for improving severe accident performance are identified and evaluated.

III. REVIEW PROCEDURES

This procedure applies to the review of applications for construction permits, operating licenses, combined licenses, standard design certifications, and early site permits.

When evaluating SAMAs, the reviewer should do the following:

- (1) Be familiar with analyses previously performed and with the potential process and design alternatives, if any, in previous studies, including the following:
 - Limerick (NRC 1989)
 - Watts Bar (NRC 1995)
 - 10 CFR 50.34(f)(1)(I) reviews of the System 80+ (NRC 1997c)
 - the Advanced Boiling Water Reactor (ABWR) (NRC 1997d)
 - the GESSAR II (NRC 1985b)
 - the Containment Improvement Program
 - Generic Environmental Impact Statement for License Renewal (NRC 1996).
- (2) Evaluate the applicant's methods for identifying the potential mitigation alternatives. If the applicant used an alternative methodology to a probabilistic risk assessment approach to assess potential SAMAs (e.g., a margins-based approach to evaluate external events initiated by fires or seismic activity), the staff evaluation should be appropriately modified. For example, the synergistic effects of mitigation alternatives that reduce risks for internally initiated events that also provide a benefit for mitigation of externally initiated events should be considered. Alternative benefit-cost approaches are appropriate when a margins method has been used to screen external events.
 - (a) Determine if this set of potential design alternatives and procedural modifications represents a reasonable range of preventive and mitigative alternatives.

- (b) Verify that the applicant's list of potential SAMAs includes a reasonable range of applicable SAMAs derived from consideration of previous analyses and based on insights from the Level 1 and Level 2 portions of the applicant's probabilistic risk assessment (PRA) or IPE/IPEEE.
- (3) Evaluate the applicant's basis for estimating the degree to which various alternatives would reduce risk (expressed as a reduction in core damage frequency or in terms of person-rem averted). In performing its independent assessment, the staff may make bounding assumptions to determine the magnitude of the potential risk reduction for each SAMA.
- (4) Evaluate whether the applicant's cost estimates for each SAMA are reasonable and compare the cost estimates with estimates developed elsewhere (e.g., using previous SAMA evaluations or using accepted cost-estimation tools).
- (5) Evaluate the benefit-cost comparison to determine if it is consistent with the benefit-cost balance criteria and methodology given in NUREG/BR-0058, Rev. 2 (NRC 1997a), and further analyze any SAMAs that are within a decade of the NUREG/BR-0058, Rev. 2, or NUREG/CR-6349 (Mubayi et al. 1995) benefit-cost criteria to ensure that a sufficient margin is present to account for uncertainties in assumptions used to determine the cost and benefit estimates. The benefit-cost criterion in NUREG/BR-0058 is \$200,000 per person-sievert averted (\$2000 per person-rem averted) for health effects. In addition, a criterion of \$300,000 per person-sievert averted (\$3000 per person-rem averted) is given in NUREG/CR-6349 (Mubayi et al. 1995) for offsite damage and other related costs for severe accidents.
- (6) Subject any SAMAs that remain following the screening given above to further probabilistic and deterministic considerations, including a qualitative assessment of the following:
- the impact of additional benefits that could accrue for the SAMA if it would be effective in reducing risk from certain external events, as well as internal events
 - the effects of improvements already made at the plant
 - any operational disadvantage associated with the potential SAMA.

IV. EVALUATION FINDINGS

The input to the environmental impact statement (EIS) should describe the applicant's analysis and detail the staff's review process. Any design mitigation or procedural modification should be described along with the estimated benefit-cost ratio. The risk reduction for the facility should be provided.

A concluding statement similar to the following should be made in the EIS:

The staff concludes that the applicant completed a comprehensive, systematic effort to identify and evaluate the potential plant enhancements to mitigate the consequences of severe accidents. The

staff considered the robustness of this conclusion relative to critical assumptions in the analysis—specifically the impact of uncertainties in the risk and cost estimates and the use of alternative benefit-cost screening criteria. The staff concludes that the findings of the analysis would be unchanged even considering these factors. Therefore the staff concludes that the mitigation alternatives committed to by the applicant are appropriate and no further mitigation measures are warranted.

V. IMPLEMENTATION

The method described herein will be used by the staff in evaluating conformance with the Commission's regulations, except in those cases in which the applicant proposes an acceptable alternative for complying with specified portions of the regulations.

VI. REFERENCES

10 CFR 50.34, "Contents of application; technical information."

10 CFR 51.53, "Postconstruction environmental reports."

10 CFR 52.17, "Contents of application."

10 CFR 52.79, "Contents of applications; technical information."

Limerick Ecology Action vs. NRC. 869 F.2d 719 [3rd Cir. 1989].

Mubayi, V., V. Sailor, and G. Anandalingam. 1995. *Cost-Benefit Considerations in Regulatory Analysis*. NUREG/CR-6349, U.S. Nuclear Regulatory Commission, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1980. "Nuclear Power Plant Accident Considerations Under the National Environmental Policy Act of 1969." 45 FR 40101, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1985a. "Policy Statement on Severe Reactor Accidents Regarding Future Designs and Existing Plants." 50 FR 32138, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1985b. *Safety Evaluation Report Related to the Final Design Approval of the GESSAR II BWR/6 Nuclear Island Design*. NUREG-0979, Supplement 4, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1988. Generic Letter 88-20, "Individual Plant Examination for Severe Accident Vulnerabilities." November 23, 1988, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1989. Letter from U.S. NRC to G. A. Hunger, Jr. Philadelphia Electric Company. Subject: Supplement to the Final Environmental Statement—Limerick Generating Station, Units 1 and 2. Supplement to NUREG-0974.

U.S. Nuclear Regulatory Commission (NRC). 1990. Generic Letter 88-20, Supplement 3, “Completion of Containment Performance Improvement Program and Forwarding Insights for Use in the Individual Plant Examination for Severe Accident Vulnerabilities.” July 6, 1990, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1991a. “Severe Accident Mitigation Design Alternatives for Certified Standard Designs.” SECY-91-229, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1991b. Generic Letter 88-20, Supplement 4, “Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities - 10 CFR 50.54(f).” June 28, 1991, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). April 1995. *Final Environmental Statement Related to the Operation of Watts Bar Nuclear Plant, Units 1 and 2*. NUREG-0498, Suppl. 1, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1996. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants*. NUREG-1437, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1997a. *Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission. Final Report*. NUREG/BR-0058, Rev. 2, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1997b. *Regulatory Analysis Technical Evaluation Handbook*. NUREG/BR-0184, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1997c. *Final Environmental Assessment by the Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, Relating to the Certification of the System 80+ Standard Nuclear Plant Design*. NUREG-1462, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1997d. *Final Environmental Assessment by the Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, Relating to the Certification of the U.S. Advanced Boiling Water Reactor Design*. NUREG-1503, Washington, D.C.



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7.4 TRANSPORTATION ACCIDENTS

RESPONSIBILITIES

Primary—Appendix B

Secondary—Appendix B

I. AREAS OF REVIEW

This environmental standard review plan (ESRP) directs the staff's consideration and treatment of the assessment of transportation accidents involving radioactive materials. The scope of the review directed by this plan will be governed by the level of compliance of the proposed project with the criteria provided in 10 CFR 51.52(a).

Review Interfaces

The reviewer for this ESRP should obtain input from and provide input to the reviewer for the following ESRP, as indicated:

- ESRP 3.8. Obtain a statement regarding the compliance of proposed transportation modes with the criteria of 10 CFR 51.52(a).

Data and Information Needs

This review applies to applications for construction permits, operating licenses, and combined licenses. The data and information needed will be determined by the extent of compliance with the criteria of 10 CFR 51.52(a), generic determinations of effects of transportation accidents involving irradiated fuel falling outside those criteria, and by the nature of those proposed project details that may not comply with it. The following data or information should be obtained:

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Published environmental standard review plans will be revised periodically, as appropriate, to accommodate comments and to reflect new information and experience.

Comments and suggestions for improvement will be considered and should be sent to the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Washington, D.C. 20555-0001.

- a statement from the reviewer for ESRP 3.8 to the effect that proposed irradiated fuel characteristics and transportation modes are in compliance with the provisions of 10 CFR 51.52(a) or, when not in compliance, a statement about the nature and extent of the characteristics and modes that are not in compliance with this provision (from ESRP 3.8)
- the estimated transportation distance from the plant to the facility to which spent fuel will most likely be sent (from ESRP 3.8)

When the proposed transportation modes are not in compliance with the provisions of 10 CFR 51.52(a), the following data should be obtained:

- a description of each transportation mode that does not comply (from the environmental report [ER])
- a description of transportation accident statistics for each of the above transportation modes (from the ER)
- accident statistics for the transportation modes described in 10 CFR 51.52(a) (AEC 1972)
- the environmental effects of the transportation accidents that could occur based on the proposed transportation modes and changes or additions to Table S-4 (in 10 CFR 51.52) resulting from these potential accidents (from the ER).

II. ACCEPTANCE CRITERIA

Acceptance criteria for the assessment of transportation accidents involving radioactive materials are based on the relevant requirements of the following:

- 10 CFR 51.52(a) with respect to the design and operational parameters related to the transportation of fuel and waste to and from the reactor.

Regulatory guidelines and specific criteria necessary to meet the regulations identified above are as follows:

- There are no regulatory positions specific to this ESRP. However, there are generic determinations of environmental effects of transportation of fuel with enrichment to 5% uranium-235 by weight irradiated to a maximum of 62,000 megawatt days per ton, provided that the fuel is shipped more than 5 years after discharge from the reactor (NRC 1996, NRC 1999a, 64 FR 48496).

Technical Rationale

The technical rationale for evaluation of the applicant's transportation accident data is discussed in the following paragraph:

The transportation of fuel and waste to and from the reactor facility could result in possible accidents that could have either a radiological or nonradiological impact. The risk associated with such an occurrence is related to the type of shipment, the number of shipments, and the distance that the shipment is made.

III. REVIEW PROCEDURES

If the reviewer of ESRP 3.8 determines that the proposed transportation of radioactive materials complies with the provisions of paragraph (a) of 10 CFR 51.52, no further analysis is needed. An additional analysis of transportation accidents should be made when the reviewer of ESRP 3.8 determines that the proposed project does not comply with the following provisions of 10 CFR 51.52(a)(5):

Unirradiated fuel is shipped to the reactor by truck; irradiated fuel is shipped from the reactor by truck, rail, or barge; and radioactive waste other than irradiated fuel is shipped from the reactor by truck or rail.

When transportation modes differing from these are proposed, the reviewer should do the following:

- (1) Prepare an analysis of the modes as they apply to the proposed transportation of new fuel, irradiated fuel, and radioactive wastes.
 - (a) Conduct the analysis to determine whether the proposed transportation modes can result in environmental risks greater than those summarized in the "Accidents in Transport" section of Table S-4 (in 10 CFR 51.52).
 - (b) When it is obvious that the proposed modes do not represent an increased environmental risk, do the following:
 - Terminate the analysis.
 - Prepare a statement to the effect that the proposed transportation modes are within the scope of Table S-4.
 - (c) When this is not the case, do the following:
 - Consider the accident probabilities and accident statistics for each proposed transportation mode.
 - Compare these data with the probabilities and statistics considered in WASH-1238 and Supplement.
 - Determine to what extent the differences will affect the accident data of Table S-4.

- (2) When the proposed transportation of radioactive materials does not comply with the provisions of 10 CFR 51.52(a)(1-4), determine the extent to which transportation accidents involving radioactive materials represent an increased probability of risk to the general public over those risks shown in Table S-4, and determine whether this increase is significant. Generic determinations of environmental effects of transportation of fuel with enrichment to 5% uranium-235 by weight irradiated to a maximum of 62,000 megawatt days per ton, provided that the fuel is shipped more than 5 years after discharge from the reactor (NRC 1996, NRC 1999a, 64 FR 48496). These determinations were that the environmental impacts of the transport of irradiated fuel having these characteristics are bounded by the impacts listed in Table S-4.
- (a) If the increased risk can be shown to be significant, evaluate the possibility of the use of those transportation modes described in 10 CFR 51.52(a)(5).
- (b) If it is not possible to use these modes, seek other modes that project a lower risk.
- (c) Ensure that estimated transportation distances for spent fuel have been considered in determining any increased probability of risks.

IV. EVALUATION FINDINGS

When the reviewer for ESRP 3.8 determines that the proposed transportation of radioactive materials complies with the provisions of 10 CFR 51.52(a), a statement similar to the following should be made:

The transportation of new fuel to the plant, of irradiated fuel from the reactor to a storage or disposal facility,^(a) and of solid radioactive waste from the reactor to burial grounds is within the scope of the Atomic Energy Commission (AEC) report entitled, *Environmental Survey of Transportation of Radioactive Materials to and from Nuclear Power Plants* (AEC 1972). The environmental risks of accidents in transportation are summarized in Table 7.4-1.

If fuel enrichment, irradiation, and cooling time exceed the criteria in 10 CFR 51.52(a) but are within the bounds covered in the generic determinations, prepare a statement that references the generic determinations and states that the environmental impacts of fuel transportation accidents are bounded by the impacts listed in Table S-4.

If an independent analysis of transportation accidents has been made, the reviewer should prepare an input that (1) describes the proposed transportation means and why they were proposed, (2) compares accident statistics for the proposed transportation modes with the statistics provided in AEC (1972), (3) discusses the increase in risk due to the proposed transportation modes, and (4) concludes that the risks are acceptable or that some alternative form of transportation is recommended for consideration. The reviewer is directed to the Transportation Accidents section of the "Draft Environmental Statement

(a) Fuel reprocessing plant.

Table 7.4-1. Environmental Impact of Transportation of Fuel and Waste to and from One Light-Water Cooled Nuclear Power Reactor^(a)

Accidents in Transport	
Item	Environmental Risk
Radiological Effects	Small ^(b)
Common (Nonradiological) Causes	1 fatal injury in 100 reactor years; 1 nonfatal injury in 10 reactor years; \$475 property damage per reactor-year.
(a) Data supporting this table are given in the Commission's <i>Environmental Survey of Transportation of Radioactive Materials To and From Nuclear Power Plants</i> , WASH-1238, December 1972; Supplement I, NUREG-75/038, April 1975.	
(b) Although the environmental risk of radiological effects stemming from transportation accidents is currently incapable of being numerically quantified, the risk remains small regardless of whether it is being applied to a single-reactor or a multireactor site.	

for Atlantic Generating Station Units 1 and 2" (NUREG-0058, *Revised Draft Environmental Statement Related to Construction of Atlantic Generating Station Units 1 and 2*) (NRC 1976) for guidance in developing this input to the environmental statement.

V. IMPLEMENTATION

The method described herein will be used by the staff in evaluating conformance with the Commission's regulations, except in those cases in which the applicant proposes an acceptable alternative for complying with specified portions of the regulations.

VI. REFERENCES

10 CFR 57.52, "Environmental effects of transportation of fuel and waste."

Atomic Energy Commission (AEC). 1972. *Environmental Survey of Transportation of Radioactive Materials to and from Nuclear Power Plants*. WASH-1238 (NUREG-75/038).

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U.S. Nuclear Regulatory Commission (NRC). 1999a. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Main Report, Section 6.3—Transportation, Table 9.1 Summary of findings on NEPA issues for license renewal of nuclear power plants*. NUREG-1437 Vol. 1, Addendum 1, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1999b. Changes to Requirements for Environmental Review for Renewal of Nuclear Power Plant Operating Licenses. *64 Federal Register* (September 3, 1999).

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)
)
NUCLEAR INNOVATION NORTH)
AMERICA LLC) Docket Nos. 52-012 & 52-013
)
(South Texas Project, Units 3 & 4))

CERTIFICATE OF SERVICE

I hereby certify that copies of the "NRC Staff Answer to Intervenors' Motion to Admit New Contention Regarding the Safety and Environmental Implications Of The NRC Task Force Report on the Fukushima Dai-Ichi Accident" have been served upon the following persons by Electronic Information Exchange this 6th day of September 2011:

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