ENCLOSURE 1
DETAILED DISCUSSION OF RECOMMENDED IMPROVEMENT ACTIVITIES FOR THE DISPOSITION OF NTTF RECOMMENDATION 1
ML13277A421

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BACKGROUND

Following the accident at the Fukushima Dai-ichi nuclear power plant in March 2011, the Commission established a senior level agency task force to conduct a systematic and methodical review of NRC processes and regulations to determine whether the agency should make additional improvements to its regulatory system and to make recommendations to the Commission for its policy direction, as set forth in Tasking Memorandum COMGBJ-11-0002 and SRM-COMGBJ-11-0002 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML110800456 and ML110820875, respectively). This task force is referred to as the Near-Term Task Force (NTTF). The NTTF issued its report on July 12, 2011 (ADAMS Accession No. ML111861807), as an enclosure to SECY-11-0093 (ADAMS Accession No. ML11186A959).

The NTTF developed 12 overarching recommendations, limited to radiological health and safety considerations for nuclear power reactors (common defense and security concerns were not directly addressed in the NTTF Report). Recommendation 1 consists of an overall recommendation and four sub-recommendations. The overall recommendation is for the establishment of a "logical, systematic, and coherent regulatory framework for adequate protection that appropriately balances defense-in-depth and risk considerations." (NTTF Report, p. 22). The four sub-recommendations are:

1.1 Draft a Commission policy statement that articulates a risk-informed defense-in-depth framework that includes extended design-basis requirements in the NRC's regulations as essential elements for ensuring adequate protection.

1.2 Initiate rulemaking to implement a risk-informed, defense-in-depth framework consistent with the above recommended Commission policy statement.

1.3 Modify the Regulatory Analysis Guidelines to more effectively implement the defense-in-depth philosophy in balance with the current emphasis on risk-based guidelines.

1.4 Evaluate the insights from the IPE and IPEEE efforts as summarized in NUREG-1560, "Individual Plant Examination Program: Perspectives on Reactor Safety and Plant Performance," issued December 1997, and NUREG-1742, "Perspectives Gained from the Individual Plant Examination of External Events (IPEEE) Program," issued April 2002, to identify potential generic regulations or plant-specific regulatory requirements.

In an August 19, 2011, staff requirements memorandum (SRM) for SECY-11-0093 (ADAMS Accession No. ML112310021), the Commission set forth its direction to the staff with respect to the recommendations in the NTTF Report. For Recommendation 1, the Commission stated:

> *Recommendation 1 should be pursued independent of any activities associated with the review of the other Task Force recommendations. Therefore, the staff should provide the Commission with a separate notation vote paper within 18 months of the issuance of this SRM. This notation vote paper should provide options and a staff recommendation to disposition this Task Force recommendation.*

Also, on June 14, 2012, Chairman Jaczko issued a tasking memorandum, "Evaluating Options Proposed for a More Holistic Risk-Informed, Performance-Based Regulatory Approach"

(ADAMS Accession No. ML121660102) directing the NRC staff to consider, when developing options for the disposition of Recommendation 1, the regulatory framework recommendations for power reactors in the Risk Management Task Force (RMTF) report, NUREG-2150, "A Proposed Risk Management Regulatory Framework" (April 2012).

To help the staff identify and assess options for the disposition of NTTF Recommendation 1, the staff developed the following problem statement describing the issues that Recommendation 1 is directed at resolving:

> The existing regulatory framework for power reactors effectively addresses design-basis events, including design-basis accidents. However, for non-design-basis accidents, the existing framework could be improved to facilitate more consistent, efficient, timely, and transparent Commission decisions to address new issues and information. These improvements would allow the NRC's regulatory framework to provide:
>
> - An improved structure and set of criteria for identifying and categorizing unanticipated hazards and events that may require regulatory action (e.g., extended station blackout). (addressed by Improvement Activity 1)
>
> - A structure and criteria for consistently and predictably evaluating how defense-in-depth should be addressed for an effective NRC regulatory response to new information or unforeseen events or accidents (e.g., evaluation of a possible requirement for filtered vents). (addressed by Improvement Activity 2)
>
> - A regulatory process that ensures licensee implementation and consistent long-term maintenance of voluntary industry initiatives (e.g., Severe Accident Management Guidelines (SAMGs)). (addressed by Improvement Activity 3)

In their report, the NTTF characterized the NRC's current approach to addressing safety concerns as a "patchwork of beyond-design-basis requirements and voluntary initiatives." The NTTF's concern about a "patchwork" of beyond design basis requirements and voluntary initiatives must be understood in context with the NTTF's recommendation for a "framework" in which current design basis requirements would remain largely unchanged and the current beyond-design-basis requirements would be complemented with new requirements to establish a more balanced and effective application of defense-in-depth. The NTTF stated that a new framework would "establish a more logical, systematic, and coherent set of requirements addressing defense-in-depth" (NTTF Report, p. 21). The staff believes that the problem statement presented above effectively captures the NTTF's concern about a "patchwork."

THREE IMPROVEMENT ACTIVITIES FOR THE DISPOSITION OF NTTF RECOMMENDATION 1

The staff recommends that the Commission approve three improvement activities for addressing NTTF Recommendation 1:

- *Improvement Activity 1: Establish a Design-Basis Extension Category of Events and Associated Regulatory Requirements*

- *Improvement Activity 2: Establish Commission Expectations for Defense-In-Depth*

- *Improvement Activity 3: Clarify the Role of Voluntary Industry Initiatives in the NRC Regulatory Process*

Although the Commission may adopt any one or more of the recommended improvement activities, the staff recommends that all three activities be adopted, inasmuch as they are all relatively low-resource intensive with limited impacts on current nuclear power plant licensees and applicants. More importantly, implementation of the three activities would be synergistic (e.g., Improvement Activity 2 on defense-in-depth-may increase the implementation effectiveness of Activities 1 and 3).

The staff intends for these improvement activities to address the underlying intent of the NTTF's recommendations, even if they do not fully implement every aspect of each of the NTTF's recommendations. Based on discussions with the Advisory Committee on Reactor Safeguards (ACRS) and public comments, the NTTF report appears to have given some stakeholders the impression that the current NRC process to develop new regulations is purely reactive in the sense that an accident must occur before actions are taken. Recommendation 1 is viewed by some stakeholders as being intended to change this reactive process into a proactive process. Most new regulations are reactive in the sense that new information is obtained which is evaluated and a determination made that changes to the regulations are needed. The staff may obtain new information from a variety of sources, including accidents and near accidents, after the occurrence of which the NRC's response is observed by the public. In addition, the NRC obtains new information from its oversight activities, which include inspections, audits, and review of reports from monitoring systems it has required licensees to implement, which are capable of identifying performance degradation before an accident occurs (e.g., unexpected performance deficiencies). Information from these sources may also lead to new regulatory requirements, but these requirements are not as visible to the public as actions taken following an accident. Even a probabilistic risk assessment (PRA) is reactive (after the initial IPE and IPEEE vulnerability issues from Generic Letter 88-20 were identified), in the sense that either an un-modeled event must occur or an indication that a previous model is incorrect must be obtained before any new risk insights could be developed. Therefore it is the staff's position that the extent to which the regulatory process/framework is reactive or proactive is independent of how aggressively a new regulatory framework is developed and implemented. The potential concern is in instances in which the regulator's reaction to unexpected events is narrow-scoped and does not involve determination of root causes and broad corrective action to address the full implications of the event. The staff believes that the NRC's response to the Fukushima Dai-ichi accident in general, as well as the staff's recommendations for the disposition of Recommendation 1 in this SECY Paper, belies such a regulatory philosophy at the NRC.

The staff recognizes that, as an abstract matter, more action could be taken to reduce uncertainties. However, the need for such action must be judged against the fact that the NRC has many ongoing regulatory activities to both identify and address new issues and reduce uncertainties. Some activities are long standing, as first comprehensively chronicled in NUREG-1412, "Foundation for the Adequacy of the Licensing Basis." Other activities have been instituted through the routine evolution of the regulatory process, including all the post-Fukushima actions that the NRC has undertaken (e.g., seismic and flooding hazard reviews). After surveying past and current NRC regulatory actions, the staff does not believe it to be prudent at this time to redirect limited resources and regulatory attention away from known safety and risk issues, in order to search to identify unknown (speculative) risk and safety vulnerabilities.

Each of the three improvement activities are discussed in the next section, "DISCUSSION OF EACH IMPROVEMENT ACTIVITY." First, a summary of the improvement activity is provided, followed by the relevant history or background of the underlying issue. Background information, including the relationship of the improvement activity to NTTF Recommendation 1 and related RMTF recommendations, is provided next. Following that is a detailed description of the improvement activity in sufficient depth to facilitate understanding of how the NRC staff would proceed if the improvement activity is approved by the Commission. This section includes a description of the proposed approach, key issues, expected products, estimated resources, length of time to implement, and pros and cons (both from the perspective of the industry and the NRC). Next, the staff discusses how the proposed improvement activity would resolve NTTF Recommendation 1, and concludes with an example scenario illustrating the possible outcome of implementing the proposed improvement activity.

Commission decision not to adopt any of the three recommended improvement activities

Consistent with the NRC's Regulatory Analysis Guidelines, NUREG/BR-0058, Revision 4, the staff evaluated the possible effects of a Commission decision not to adopt any of the three staff-recommended improvement activities. The staff believes that the public would continue to be adequately protected if the Commission took no action at this time on these recommendations. These activities, if implemented, have the capability to improve the clarity, efficiency, and effectiveness of the current regulatory framework. The improvement activities are not needed to maintain safety of nuclear power reactors. Nonetheless, the staff expects that the improvement activities would result in modest safety enhancements.

Moreover, the staff believes that a decision not to take specific action on any of the three improvement activities at this time neither precludes the Commission from deciding to adopt one or more of these activities in the future, when circumstances permit, nor the NRC from adopting some aspects of the improvement activities in the course of the ongoing evolution of the NRC's regulatory framework for nuclear power plants.

If the Commission decides not to pursue any of these improvement activities, there would be no changes to existing NRC policies or processes initiated by the Commission in response to NTTF Recommendation 1. Instead, the NRC would continue under its current process to make improvements as needed on a case-by-case basis, when identified in the course of existing regulatory processes, e.g., inspections, audits, new research, generic issues program, communications with international nuclear regulatory bodies. Emergent issues with potential safety impact would continue to be handled as they currently are, as is the case for the actions now underway as a result of the Fukushima Dai-ichi accident. In addition, the staff notes that existing new reactor certification and licensing processes specified in 10 CFR Part 52 require licensees to perform PRAs and use them to address beyond design basis events, including severe accidents.

Thus, a Commission decision not to implement any of these improvement activities is *not* a "do nothing" approach. Under the existing regulatory processes and framework, the NRC would continue to improve portions of its processes and framework in response to operating experience, new information, or emergent issues, just as it has done in the past. For example, the NRC began to update its Regulatory Analysis Guidelines prior to the Fukushima Dai-ichi event. As another example, post-Fukushima Orders and other related regulatory actions will ensure NRC oversight of SAMGs, enhance the ability of licensees to mitigate severe accidents, improve emergency planning, and realize other safety improvements. These activities are being accomplished under the current NRC regulatory framework.

Maintaining the existing regulatory processes, policy, and framework would cause no additional incremental costs to be incurred by either the NRC or the nuclear power industry. However, the NRC and industry would incur costs when the agency decides to undertake future framework improvement activities on an *ad hoc* basis, and may forego possible reductions in costs resulting from efficiencies that might be realized if regulatory process and framework improvement activities were accomplished in an integrated fashion under the three framework improvement activities recommended in the SECY paper and described in detail below.

The major benefit of maintaining the existing regulatory processes and framework is that it would maintain nuclear safety while preserving an approach to regulation that has been successfully implemented by the NRC and industry for many years and is well understood by both. The existing framework allows for incremental improvements of the regulatory approach with full stakeholder engagement. However, it does not clearly address the apparent "patchwork" remarked upon by the NTTF and therefore does not aid in improving the understanding of NRC's regulatory structure. It does not provide a systematic method for assuring appropriate treatment criteria, change processes, reporting requirements, etc. are put into place for all new requirements developed in the future. It may also not be as efficient at effecting identified improvements as a framework that has been augmented by the three framework improvement activities described below.

DISCUSSION OF EACH IMPROVEMENT ACTIVITY

Improvement Activity 1: Establish a Design-Basis Extension Category of Events and Associated Regulatory Requirements

I. Summary of Improvement Activity

This improvement activity would adopt a new term – “design-basis extension” -- to define and describe the conditions (events) and requirements which have typically been characterized as “beyond design-basis:”

> “Design-basis extension” conditions are those conditions (including hazards and events) posing a significant safety concern at nuclear power plants for which accident prevention and/or mitigation capability must be provided, but are neither postulated accidents (anticipated operational occurrences or design basis accidents) evaluated in a nuclear power plant’s final safety analysis report, nor the external hazards for which a nuclear power plant was designed and licensed.

This terminology is deliberate and is intended to convey that these plant conditions are not treated as “design basis accidents” as that term has historically been used by the agency, but that these conditions are included within the “design bases” as defined in 10 CFR 50.2. This improvement activity would result in revision of NRC's internal policies, guidance and procedures to define this new term and to ensure that future design-basis extension requirements (both rules and orders) are written in a consistent, logical, and complete manner.

II. Background

A. The Concept of Design Basis and Design Basis Events

The Commission has historically relied upon a set of design-basis events and accidents to demonstrate that a nuclear plant design is robust. Regulatory Guide 1.70, "Standard Format

and Content of Safety Analysis Reports for Nuclear Power Plants.", provides a list of potential accident initiating events (initiators) that applicants are requested to address in Chapter 15 of the Safety Analysis Report. The loss of coolant accident (LOCA) is specified in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50 as the design-basis for the light water reactor (LWR) emergency core cooling system and containment, and the performance of these systems, structures, and components (SSCs) is evaluated and reported in Chapter 6 of the FSAR. The term “design-basis accident” (DBA) is defined as a postulated set of failure events that a facility is designed and built to withstand without exceeding the offsite exposure guidelines in 10 CFR 50.34(a)(1) or 10 CFR 100.11 of the Commission’s regulations.

NUREG/CR-6042, "Perspectives on Reactor Safety," provides the long history of the concept of design-basis for nuclear power plants. Yet, despite the long history of this regulatory concept, important “design-basis” terms have not been consistently defined or clearly distinguished from other regulatory requirements in 10 CFR Part 50. Although “design bases” is defined in 10 CFR 50.2, “design-basis event”[1] (DBE) and “design-basis accident” are not, even though both terms are used in many places in Part 50.

B. Events outside the Set of Design Basis Accidents/Events

Chapter 3, “Regulatory Framework for the 21st Century,” of the NTTF report provides a discussion of the historical development of requirements to address issues beyond the design-basis which will not be repeated here. In summary, the NRC has adopted requirements addressing new events based on new information (e.g., risk insights from IPE/IPEEE and other probabilistic risk analyses, plant events, operating experience) without a common set of criteria for characterizing these events using the DBA/DBE nomenclature. Some examples include the Station Blackout (SBO) Rule, 10 CFR 50.63, and the Aircraft Impact Assessment Rule, 10 CFR 50.150. In addition, the NRC has relied upon industry or individual licensee voluntary actions to address some issues identified as the result of new information, but without characterizing these issues using the DBA/DBE nomenclature. For example, programs for management of severe accident conditions have been instituted at licensed facilities on a voluntary basis. They are not required by the NRC.

As noted below, both the NTTF and the RMTF have recommended that the Commission consider establishing a category of extended or enhanced design-basis accidents or events to augment the existing NRC regulatory framework for power reactors. Additionally, several international industry and regulatory organizations have already published requirements to consider beyond-design-basis events explicitly. The Western European Nuclear Regulators Association (WENRA) now recommends[2] a “design-extension” analysis and the International Atomic Energy Agency (IAEA) has included a requirement in a draft safety requirements document[3] for identification of “design-extension conditions”. In both cases events are selected based on deterministic insights, probabilistic assessments, and engineering judgment. Power plants are expected to have measures for prevention or mitigation of the events.

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[1] Although "design basis event" is defined in 10 CFR 50.49, "Environmental qualification of electric equipment important to safety for nuclear power plants."

[2] See Appendix F of WENRA Reactor Harmonization Working Group, “WENRA Reactor Safety Reference Levels,” (January 2008)

[3] DS414, “Safety of Nuclear Power Plants”

C. Relationship to NTTF Recommendation 1

The NTTF considered the current NRC regulatory framework as one that "… has come to rely on design-basis requirements and a patchwork of beyond-design-basis requirements and voluntary initiatives for maintaining safety." The NTTF observed that "… for new reactor designs, the Commission's expectations that beyond-design-basis and severe accident concerns be addressed and resolved at the design stage are largely expressed in policy statements and staff requirements memoranda, only reaching the level of rulemaking when each design is codified through design certification rulemaking." The NTTF supported a more formal approach that would include "extended design-basis events" in a new regulatory framework:

> The 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 current beyond-design-basis requirements (e.g., for Anticipated Transients Without SCRAM (ATWS) and SBO) would be complemented with new requirements to establish a more balanced and effective application of defense-in-depth.

The NTTF report goes on to say:

> This framework, by itself, would not create new requirements nor eliminate any current requirements. It would provide a more coherent structure within the regulations to facilitate Commission decisions relating to what issues should be subject to NRC requirements and what those requirements ought to be. … Such changes would establish a more logical, systematic, and coherent set of requirements addressing defense-in-depth.

D. Relationship to RMTF Report

The RMTF explicitly recommends the creation of a special category of events that are beyond the current design-basis events, called "design-enhancement events:"

> The purpose of the design-enhancement category is to address gaps that exist between the regulatory controls that are appropriate to address the risk management goal (e.g., risk-informed, performance-based defense-in-depth) and current controls involving a combination of design-basis events and ad hoc requirements added in reaction to specific events or other concerns. The goal would be to define a consistent approach for such events in terms of analysis techniques, safety classification, change control, reporting, and other regulatory requirements that have been defined previously on a case-specific basis. … [The RMTF] envisions that the combination of design-basis events, design-enhancement events, and various programs such as emergency preparedness collectively define the risk-informed and performance-based defense-in-depth protections that are the centerpiece of the proposed Risk Management Regulatory Framework.

III. Detailed Description of Improvement Activity 1

Improvement Activity 1 is intended to address the recommendations of the NTTF and RMTF with respect to establishing a category of beyond design-basis events/accidents. In the staff's view, the common concern underlying the NTTF and RMTF recommendations is with the NRC's inconsistent approach for dealing with hazards and events which are typically characterized as "beyond design-basis accidents." The staff believes that neither the NTTF Recommendation 1 approach nor the RMTF approach is a cost-effective approach for addressing the common concerns of the NTTF and RMTF. Therefore, the staff is proposing a simpler way to address the common concern which appears to underlie the categorization recommendations of the NTTF and RMTF.

A. Proposed Approach

The staff proposes that the NRC adopt a new term – "design-basis extension" – to define and describe the events and requirements which have typically been characterized as "beyond design-basis accidents," even though they are within the "design bases" as defined in 10 CFR 50.2.

The proposed terminology should avoid confusion between a plant's design basis, as defined in 10 CFR 50.2; and the various events, accidents, occurrences, hazards, and conditions that comprise the plant's design and licensing basis[4]. It makes it clear that there are regulations regarding hazards and events that are not included in the set of design-basis accidents (but may still be part of the plant's design bases) and for which, therefore, the regulatory treatment of associated systems, structures, and components (SSCs) may be different than that prescribed for safety-related SSCs.

After reviewing the current NRC regulations that address so-called[5] beyond design-basis events (SBO, ATWS, 10 CFR 50.44, 10 CFR 50.54(hh), etc.), the NRC staff determined that a de-facto "category" of requirements to address what would be termed "design-basis extension events" already exists. This de-facto category includes NRC requirements that address events or conditions that do not meet NRC criteria in either regulations or guidance for inclusion in the plant safety analysis. Thus, it is unnecessary for the NRC to undertake rulemaking to establish such a category in the NRC's regulations in 10 CFR Chapter I[6]. The NRC may adopt the new term and implement the new category through internal policies, guidance, and procedures. The proposed approach increases the coherency and clarity of the NRC's regulatory framework while providing regulatory stability and efficiency and requires fewer resources than any of the other three approaches the NRC staff considered.

As part of Improvement Activity 1, the NRC would revise its internal policies, guidance and procedures (e.g., guidance on development of the regulatory basis for rulemakings) to ensure that future design-basis extension requirements (both rules and orders) are written in a consistent, logical, and complete manner. To ensure consistency, rationality, and

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[4] An individual plant's licensing basis includes a plant's design, operation, or other activities that require NRC approval.

[5] These events are part of the design basis of currently operating plants, but they are not part of the design-basis accidents analyzed for a given plant. They are, therefore, not "beyond" the design basis; rather, they are additions as a result of regulations after initial plant licensing that *extend* its design basis.

[6] However, there may be value to including a "definition" of this new category in Part 50 for clarity.

completeness, the guidance would specify a core set of "attributes" that the NRC staff must address when developing each new requirement in this category.[7] The staff would address the attributes in accordance with the policies, guidance, and procedures to be developed under this Improvement Activity. These attributes to be addressed would include (but are not limited to):

- Performance goals, including analysis methods and acceptance criteria
- Treatment requirements, such as design criteria, level of quality assurance needed, and environmental qualification
- Documentation requirements for information which the NRC needs to be developed and maintained with respect to demonstrating compliance with the design-basis extension requirements
- Change processes for licensee-initiated facility changes related to compliance with design-basis extension rules
- Reporting requirements
- Characterization of each future design-basis extension requirement as a matter of adequate protection or safety enhancement, even if the requirement is not a backfit or inconsistent with Part 52 issue finality provisions

The staff notes that a standard set of "treatment" guidelines for each of these attributes which can be applied to all design-basis extension requirements would be ideal from many perspectives, but that it may be necessary to have a process that allows for a graded approach for treatment based on whether or not the requirement at hand is being promulgated to maintain adequate protection of the public or is a cost-justified safety enhancement.

The staff's simplified approach for implementing Improvement Activity 1 would use existing NRC programs (e.g., reactor operating experience program, generic issues program, industry trends program, etc.) for the identification of new regulatory issues and would use existing guidelines (e.g., regulatory analysis guidelines, safety goals, etc.) for determining which regulatory requirements would be imposed to address matters of design-basis extension. The staff plans, however, to update the criteria for both identification and promulgation of new regulations in conjunction with routine updates of internal guidance documents and other Commission-directed activities now underway[8]. Also, in Improvement Activity 2 on defense-in-depth, the staff proposes to make other changes to the regulatory analysis guidelines to include consideration of defense-in-depth. These proposed improvements to the regulatory analysis guidelines could, in certain cases, simplify the staff's decisionmaking process for when new design-basis extension regulations should be issued. But the staff's proposal to continue to determine the need for rulemaking by using existing programs and processes will not result in explicit new criteria for identifying when additional design-basis extension rules should be promulgated

[7] These core attributes should also be addressed for future requirements addressing design basis events. The staff will consider the most appropriate way for implementing such improvements in guidance, policies, and procedures as part of the implementation of Improvement Activity 1.

[8] In response to the SRM on SECY-12-0110 on Economic Consequences, the staff is updating guidance documents integral to performing cost-benefit analyses in support of regulatory, backfit, and environmental analyses. These revisions include an update to NRC's dollar per person-rem conversion factor policy, an update to replacement energy costs, and non-policy changes to the Regulatory Analysis Guidelines and the Regulatory Analysis Technical Evaluation Handbook to ensure consistent use of terminology. Any additional potential policy issues regarding these guidance documents would be provided for Commission review and approval. Information on the staff's plans to update cost-benefit guidance will be provided in an upcoming SECY paper.

(development of such criteria was recommended explicitly in the RMTF report and implicitly by the description of the new regulatory framework envisioned by the NTTF).

The staff recommends that the initial set of regulations in this category be those existing regulations addressing what are currently referred to as "beyond design-basis events" (even though these regulations are in the design basis for most plants). These existing regulations include station blackout (10 CFR 50.63), anticipated transients without scram (10 CFR 50.62), combustible gas control (10 CFR 50.44), loss of large plant areas (10 CFR 50.54(hh)), and aircraft impact assessment (10 CFR 50.150). In-process rulemakings which could be characterized as design-basis extension rules under this proposal include the risk-informed emergency core cooling system rule (proposed 10 CFR 50.46a) and the station blackout mitigation strategies rulemaking that address NTTF Recommendations 4.1 and 4.2 respectively. Initial designation of these regulations as design-basis extension may increase stakeholder understanding of the new category and provide a better basis for future regulatory actions with respect to these design-basis extension regulations.

The internal staff guidance to establish the design-basis extension category could be provided in a number of different ways. This guidance would address the best regulatory practices identified by the staff (i.e., inclusion of requirements for performance goals, documentation, reporting, change control, and special treatment) for regulatory requirements (both rules and orders) in the design-basis extension category.

The NRC staff's recommended approach to this improvement activity is expected to achieve a small level of future safety improvement for currently operating plants at the lowest cost of any alternative that was considered. This approach should improve consistency, transparency, coherency and efficiency when requirements are developed as new issues are identified.

Limited Scope of Proposed Approach

The staff notes that this improvement activity is limited to establishing the new category of design-basis extension conditions, and would revise its internal policies, guidance, and procedures to ensure that future design-basis extension regulations and orders are written in a consistent, logical, and complete manner with respect to a set of attributes. It does *not* involve re-evaluating the existing regulatory construct for "defining" design-basis accidents and events, including formally defining or listing the characteristics, elements, and/or risk thresholds for both design-basis accidents and events and for the new design-basis extension category. The staff acknowledges that the portion of the NRC's existing regulatory framework addressing design-basis events and accidents for nuclear power plants, as well as its de facto practice of addressing matters which would fall into the proposed new design-basis extension category is complex. This regulatory framework has evolved over time and may not be as logical, consistent, or coherent[9] as might be a framework developed all at once. Nonetheless, the existing framework for design-basis events and accidents is reasonably well understood by NRC and licensees. Developing characteristics, elements, and risk thresholds would be complex, and the benefits of this developmental effort would be directed, for the most part, at NRC decisionmakers in determining the categorization of future regulatory requirements. Applicants and licensees, for the most part, would not directly benefit from the developmental effort, except as potential commenters on NRC-proposed categorization criteria for new or amended regulatory requirements. The staff believes that it would not be cost-justified to use

[9] For example, the initiating event frequencies of the external hazards that nuclear power plants are designed to withstand are not consistent and, in certain cases, vary by several orders of magnitude.

additional NRC resources to re-visit the existing framework for design-basis events and accidents, and define the characteristics, elements, and/or risk thresholds for either design-basis accidents or the new design-basis extension category. Given these considerations, the staff did not include a proposed action for defining or establishing the characteristics, elements, or risk thresholds for design basis accidents and events or for the new design-basis extension category as part of Improvement Activity 1.

Improvement Activity 1 also does not involve developing a formal definition of "adequate protection," nor would the improvement activity include developing a discussion which relates the adequate protection concept to either the design basis accident and event category, or to the design-basis extension category. Developing a definition of adequate protection is not needed because the adequate protection concept does not directly control the characteristics, elements, or risk thresholds for either the design-basis accidents and events, or the new design-basis extension category. The concepts of design-basis and design-basis extension are largely technically-driven, whereas the adequate protection concept is more philosophical or normative in character. Defining adequate protection, by itself, does not determine the elements, characteristics, or thresholds of the design-basis extension category. Thus, the NRC may establish the design-basis extension category, populate that category in a forward-looking[10] manner (and in a retrospective manner as well, should the Commission so elect), and establish consistent treatment for regulations in this category, all without defining adequate protection. Finally, it is not clear that developing a definition of adequate protection, in a manner that results in consistent NRC decisionmaking, would be achievable. Given these considerations, the staff did not include a proposed action for developing a definition of adequate protection as part of Improvement Activity 1.

B. Key Issues

There are several issues which the NRC staff considered in developing this improvement activity:

1. Would the approach be generic, plant-specific, or a hybrid?
2. Would the category be for adequate protection, safety enhancement, or both?
3. Would a plant-specific PRA regulation be required?
4. Would the new category be applicable to new reactors only, or also to operating plants?
5. Would the category be populated on a forward-looking or retrospective basis?

Each of these issues is discussed in turn.

[10] By "forward-looking," the staff means that the activity would apply to future NRC regulatory actions. For rulemakings, this would include both new regulations addressing events and accidents, as well as future amendments of existing regulations to address new information. For licensing actions, this would include only new license applications and new licenses issued after the improvement activity is completed and first implemented. By "retrospective" or "backwards-looking," the staff means that the improvement activity, once completed and implemented, would be applied to existing NRC regulations and existing licenses. For existing regulations, retrospective implementation would require amendment of those regulations that did not conform to the improvement activity and possible imposition of backfits on existing license holders.

1. Would the approach be generic, plant-specific, or a hybrid? The NRC staff believes that the regulatory requirements for design-basis extension conditions should be applied on a generic basis, meaning that NRC would determine when orders or regulations would be promulgated and licensees would be required to comply with the generic requirements applicable to classes or groups of licensees.

2. Would the category be for adequate protection, safety enhancement, or both? The staff believes that regulatory requirements for beyond design-basis events could be for either adequate protection (e.g., recent Order EA-12-049 on mitigation strategies) or for safety enhancement[11], or both. Regulations developed under either rationale would require the NRC to define appropriate performance goals, treatment requirements, documentation and reporting requirements, and change processes; although the specific requirements might be more stringent for regulations deemed necessary to provide reasonable assurance of adequate protection of public health and safety. The NRC will develop a standard set of treatment requirements for design-basis extension category requirements. The staff recommends that the development of this standard set of requirements be accomplished via a public process. Because the proposed design basis extension category would contain both adequate protection and safety enhancement requirements, it may not be possible to establish a standard set of treatment requirements that would be appropriate for all requirements in the proposed category. In the event that a standard set of treatment requirements cannot be defined, the staff would issue guidance to assist rulemaking staff to determine an appropriate set of requirements to be applied to each individual design-basis extension rule.

3. Would a plant-specific PRA regulation be required for facilities licensed under 10 CFR Part 50? PRAs are useful tools for maintaining and operating plants safely and may also be used to assess the site-specific risk-significance of emergent issues. All operating reactors have PRA's of varying quality and have used these PRAs to search for site-specific vulnerabilities (i.e., Generic Letter 88-20), to support risk-informed regulatory activities (e.g., 10 CFR 50.65 risk assessments and the Significance Determination Process of the Reactor Oversight Program), and to support risk-informed alternatives to regulatory requirements (e.g., changes to Technical Specifications and Inspection programs). However, the NRC staff believes that a regulation for a site-specific PRA for currently operating reactors, for the sole purpose of searching for as yet unrealized cost-beneficial risk-reduction activities, would not provide benefits commensurate with the substantial costs[12] of developing such regulatory compliant PRA models. Nuclear power plants licensed under Part 52 are already required to have plant-specific PRA models and include features in their design for mitigation of severe accidents. These new reactor designs have already benefited from risk insights. Nonetheless, it is still expected that plant-specific PRAs would continue to be used for risk-informed regulatory activities including the implementation of the improvement activities discussed in this

[11] Safety enhancements include backfits meeting the criteria for cost-justified significant safety enhancement (e.g., 10 CFR 50.63 SBO rule) and forward-fit safety enhancements determined to be cost-effective (e.g., 10 CFR 50.150 Aircraft Impact Assessment rule).

[12] The NRC staff estimated industry costs to upgrade and maintain PRAs at current operating plants to be $702 to $865 million. The staff qualitatively estimated only the safety benefits that could result from requiring PRAs. The staff did not attempt to estimate the potential non-safety benefits (e.g., potential increases in operational flexibility, etc.) that could result from having PRAs. For more information about PRA cost estimates, please see Attachment 1 to this Enclosure.

paper even though the staff is not proposing that plant-specific PRAs be required by regulation.

4. Would the new category be applicable to new reactors only, or also to operating plants? The staff believes that the regulations developed for design-basis extension events should be applicable to all nuclear power reactors affected by the hazard or event that a new requirement is intended to address unless found unnecessary due to plant-specific design features as demonstrated by a request for exemption.

5. Would the category be populated on a forward-looking or retrospective basis? A retrospective approach would generally reassess currently operating plants to determine whether there are additional risk-reduction measures that should be imposed to address design-basis extension conditions. A forward-looking approach would not involve a new assessment of currently operating plants unless new information arose that indicated a reassessment would potentially lead to new requirements. The NRC staff believes that the forward-looking is the more effective approach especially given that, under the staff's proposed approach, the processes for identifying and making decisions on regulatory requirements are unchanged.

C. Expected Products

Expected products resulting from this activity would include a publicly available document (e.g., a NUREG) which would: (i) define the new category, and (ii) specify how the NRC should write future design-basis extension regulations and orders in a consistent, logical, and complete manner (including the need to address the specified set of attributes). The process defined in that publicly available document would be implemented by conforming changes to internal NRC policies, guidance, and procedures. The Commission could also direct rulemaking to establish a "definition" of the new category in Part 50, although—as mentioned earlier—rulemaking is not needed to establish this new category as a regulatory concept.

D. Estimated Resources and Schedule

Industry Resources

Because the design-basis extension category can be implemented by NRC action alone, no incremental licensee resource expenditures are needed. Even though individuals from industry, licensees, non-governmental organizations, and the general public will be invited to participate in developing the new design-basis extension approach, such voluntary expenditures are not considered when estimating costs and preparing regulatory analyses for an NRC activity.

NRC Resources

NRC resource estimates for developing the publicly-available document describing and defining the design-basis extension category were based on historical resource usage data for rulemaking activities. Average total resource usage (both project management and technical staff) for each phase of a typical rulemaking is shown below:

Rulemaking phase	Regulatory Basis	Proposed Rule	Final Rule
FTE required	1.2	1.5	1.2
Time required	13 months	1 year	1 year

The staff believes that detailed development activities for the design-basis extension category will involve a process similar to developing the regulatory basis for a rulemaking but will take significantly more resources than for an average rule. Thus the staff doubled the time and resources needed for developing a regulatory basis (2.4 FTE and 26 months). This effort will also involve more extensive public outreach than is typically done when developing a regulatory basis. This outreach involves activities similar to those conducted during both the proposed and final rule stages but was estimated to involve only about 25% of typical rulemaking resources for those stages (1.5 + 1.2 = 2.7 FTE X 25% = 0.625 FTE). Thus the total estimated resources and the duration of the activity are 2.4 + 0.625 = 3.025 FTE and 26 + (12 + 12) X 25% = 26 + 6 = 32 months, respectively; which were rounded off to an estimate of 3.0 FTE over approximately 3 years.

Then internal staff guidance must be developed to implement the design-extension category as described in the public document. Because the staff routinely updates all key internal guidance documents, resource needs for the incremental changes associated with updating internal staff guidance are typically assumed to be negligible when performing regulatory and cost analyses. However, because numerous different guidance documents are expected to need substantial revision, the staff has estimated an additional 0.5 FTE to update internal guidance which could take an additional year.

Thus the staff's estimate for total NRC resources needed for Improvement Activity 1 is 3.5 FTE over a time period of 3 to 4 years.

Resource Estimate for Optional NRC Rulemaking

If desired by the Commission, after the public document and the internal guidance have been issued establishing the definition and implementation process for the design basis extension category, the definition of "design-basis extension" could be added to 10 CFR 50.2, "Definitions." The staff believes that this effort could be combined with another Part 50 rulemaking activity and that the additional resource expenditures would be approximately 10 percent of a typical rulemaking (10 percent of 1.2 + 1.5 + 1.2 = 0.1 X 3.9 = 0.39 FTE) which was rounded off to an estimate of 0.4 FTE.

E. Pros and Cons

Pros:

The NRC staff believes that Improvement Activity 1 supports the NRC strategic plan and the principles of good regulation in the following ways:

- Promotes openness and clarity

- Provides clarity and a common terminology for describing these events (now characterized inconsistently in various ways including “beyond design-basis”).
- Provides a consistent, clear, and efficient approach to developing future requirements for addressing design-basis extension conditions
- Aids the public’s understanding of NRC regulations that address events that are not design-basis accidents, including the regulatory controls over the SSCs that mitigate these events
- Provides for consistently addressing performance goals, treatment requirements, documentation and reporting requirements, and change processes for all design-basis extension requirements

- Improves efficiency

    - This approach represents a cost-effective way to improve NRC’s regulatory system related to evaluating and establishing regulatory requirements for these events.

- Increases alignment between the NRC and its counterpart foreign regulatory bodies and international organizations, such as the IAEA, which have adopted the concept of a design-extension event category for addressing certain beyond-design-basis events.

Cons:

- While it maintains safety, this generic approach is not expected to be able to provide safety benefits by identifying potential site-specific risk outliers

- Because this approach does not provide explicit criteria for identifying design-basis extension requirements, the current uncertainties over which events and accidents should be included in the category will remain.

F. How the NRC Staff's Proposal Resolves NTTF Recommendation 1

Proposed Improvement Activity 1 would not establish by rule a design extension category of events exactly as recommended by the NTTF. However, the proposed activity would meet the intent of NTTF Recommendation 1 in part. Table 1-1 shows the extent to which Improvement Activity 1 relates to each part of NTTF Recommendation 1:

Table 1-1: Comparison of Improvement Activity 1 to NTTF Recommendation 1	
NTTF Recommendation	Activity 1
1. [Establish] a logical, systematic, and coherent regulatory framework for adequate protection that appropriately balances defense-in-depth and risk considerations.	Increased coherence and stakeholder understanding by defining and using a common term. Increased clarity going forward as new requirements consistently include treatment, reporting, and QA requirements as well as explicit change control provisions.
1.1 Draft a Commission policy statement that articulates a risk-informed defense-in-depth framework that includes extended design-basis requirements in the NRC's regulations as essential elements for ensuring adequate protection.	Both adequate protection and safety enhancement requirements would be covered (refer to Improvement Activity 2 for discussion of defense-in-depth).
1.2 Initiate rulemaking to implement a risk-informed, defense-in-depth framework consistent with the above recommended Commission policy statement.	The intent of this sub-recommendation would be accomplished without promulgating a rule.
1.3 Modify the Regulatory Analysis Guidelines to more effectively implement the defense-in-depth philosophy in balance with the current emphasis on risk-based guidelines.	Not covered by this activity.
1.4 Evaluate the insights from the IPE and IPEEE efforts … to identify potential generic regulations or plant-specific regulatory requirements.	Not covered by this activity. The basis for the staff's decision not to pursue this recommendation is provided in the section below.
Voluntary safety initiatives by licensees should not take the place of needed regulatory requirements. (NTTF Report, pp 19, 21)	Not covered by this activity (refer to Improvement Activity 3).
The current NRC regulatory approach (requirements for design-basis events, beyond design-basis events, and voluntary initiatives) has resulted in a "patchwork" of regulatory requirements and other safety initiatives.	This activity partially addresses the NTTF's "patchwork" observation by adding structure to the existing and future regulations intended to extend the plant's design basis.

Table 1 in Attachment 4 to Enclosure 1 presents summary information on each improvement activity for easy comparison showing the extent to which each improvement activity addresses NTTF Recommendation 1.

The NRC staff working group was questioned by internal stakeholders (the ACRS and the Japan Lessons Learned Directorate (JLD) Steering Committee) regarding why it is not proposing to evaluate IPE and IPEEE insights as set forth in NTTF recommendation 1.4. The staff considered NTTF recommendation 1.4 in detail and concluded that there is a low likelihood

of identifying plant-specific design or operational safety concerns, and therefore expending the resources (staff and industry) to pursue this activity would not be justified.

Specifically, the NRC staff notes the following regarding the IPE and IPEEE studies and present risk assessments:

- The IPE/IPEEE are dated and were performed before applicable industry consensus standards existed.
- All plants have updated their IPE studies and have subjected them to industry peer reviews. These internal events, at-power PRA models are routinely used for:
    - Requesting risk-informed license amendments
    - Assessing the risk of performance deficiencies under the significance determination part of the ROP
- The NRC built simplified plant analysis risk (SPAR) models for every site. These models were benchmarked against plant-specific internal events PRA models by NRR with contract support from Idaho National Laboratory (INL). While the SPAR models themselves may not be developed to a level of detail that might identify all potentially risk-significant issues, the process of comparing them to licensee models made NRC aware of plant-specific features modeled in the licensee's updated IPE models.
- NTTF Recommendation 2.1 is re-evaluating seismic and flooding hazards at all operating reactors to the latest methods applied to new reactors.
- Section 402 of Public Law 112-074, "Consolidated Appropriations Act," requires NRC to require reactor licensees to reevaluate the seismic, tsunami, flooding, and other external hazards at their sites against current applicable Commission requirements and guidance for such licenses as expeditiously as possible, and thereafter when appropriate.
- The SBO/mitigation strategies orders and associated rulemaking will provide a flexible means of mitigating a range of events and conditions that one might identify from a review of IPE/IPEEE. Thus, the motivation for searching for such events through IPE/IPEEE review is lessened because many would be addressed by the flexible mitigation strategies.

The staff concluded that there is a low likelihood of finding a safety-significant issue as a result of reviewing the outdated IPE/IPEEE results that would not either have already been identified from existing risk-informed activities or that would be identified as a result of the activities already planned or underway post-Fukushima. The resources required to review the IPE/IPEEE summary documents would be better employed in the review of the external hazard re-assessments referred to above.

The staff did consider several alternatives to address the concern raised by NTTF Recommendation 1.4 before reaching its conclusion that no action was necessary.

First, under Improvement Activity 1, the NRC staff realized that a review of IPE/IPEEE insights could result in new design-basis extension events. However, as documented elsewhere in this enclosure, the staff concluded that the new category of events should be implemented in a forward-looking, and not retrospective, fashion. The staff also noted that any regulatory action taken as a result of the NTTF 2.1 or Public Law 112-074 hazard reassessments would benefit

from implementation of Improvement Activity 1, in that a standard set of treatment requirements, reporting requirements, quality assurance requirements, and change control processes would be specified.

Second, under Improvement Activity 3, the NRC staff considered whether to recommend an effort to confirm that safety-significant licensee commitments made under the IPE/IPEEE program had been implemented and were still in effect. However, after considering the length of time that has elapsed since the IPEs were performed (over 20 years) and the scope of safety improvements that have been made in the past and are being implemented now in response to Fukushima, the staff did not believe that the safety benefits of such an effort would be substantial. Therefore, the staff concluded that it would not be prudent to expend resources to confirm these commitments had been implemented and maintained.

Finally, the staff also considered whether updated risk information should be requested from licensees. (The question of whether an improved regulatory framework should include a plant-specific PRA regulation for operating reactors is discussed in Attachment 2 to this Enclosure.) The staff concluded that, as a result of risk-informed submittals and licensee analyses as part of significance determination process discussions, there would be few additional insights from having licensees submit at-power, internal events PRA results. As stated above, external hazards re-assessments are underway or planned that will provide such insights for those hazards. Therefore, the staff did not recommend that updated risk information be sought from licensees under NTTF Recommendation 1.

G. Example of a Possible Outcome of Implementing Improvement Activity 1

To provide an example of the possible outcome of implementing Improvement Activity 1, the staff believes that portions of 10 CFR 50.54(hh)(2) on loss of large areas of the plant would have been designated as a design-basis extension rule. Having staff guidance for promulgating such rules would have provided a more complete basis for specifying appropriate treatment requirements for SSCs required to meet 10 CFR 50.54(hh)(2) and could have led to more timely, clear, and consistent implementation of the rule.

H. Staff Evaluation of Alternative Approaches to Establish a New Event Category

Both the NTTF and the RMTF reports discuss options for creating a single new event category but offer differing insights as to what this new category may look like and how it would be populated with events and associated requirements. The extent to which the implementation of Improvement Activity 1 conforms with either NTTF or RMTF recommendations depends upon how the five key issues discussed above are resolved. The various combinations of possible answers to the five key issues could result in significantly different approaches to establishing the new category of accidents or events. The NRC staff considered three specific approaches in detail before finalizing its recommended approach for this proposed improvement activity:

- A plant-specific approach using NRC-required plant-specific PRA models
- A plant-specific approach using generic risk information and plant-specific risk insights developed by an expert panel established by the licensee
- A generic approach without a PRA requirement, which would use available risk insights from licensee PRAs, NRC risk studies (e.g., SOARCA; Level 3 PRA Project), and SPAR models

The staff ultimately adopted a simplified version of the third approach as presented above. Attachment 2 to this Enclosure provides a detailed discussion of the NRC staff's evaluation of the three approaches and its rationale for not recommending them.

Improvement Activity 2: Establish Commission Expectations for Defense-In-Depth

I. Summary of Improvement Activity

This improvement activity would establish the Commission's expectations for defense-in-depth as applied to nuclear power reactor safety. A Commission policy statement would be developed that would include the definition, objectives, and principles of defense-in-depth. This improvement activity would also develop implementation guidance that would specify the needed levels of defense for reactor safety along with associated decision criteria to support regulatory decisions regarding whether the Commission's expectations for defense-in-depth have been addressed in the design and operation of a nuclear power plant.

II. Background

A. History

Defense-in-depth is a major aspect of the NRC's regulatory framework. It is embodied in the requirements, and an important element of NRC's regulatory decision-making process. It is addressed in numerous regulatory guides, NUREGs, Commission papers, etc. However, it is described differently in the various sources. Because of this, it would be useful to formalize the defense-in-depth philosophy as it applies to nuclear power reactors and provide a common terminology to foster understanding and consistent application of this concept.

The NRC has made progress towards implementing risk-informed regulation. Although initial successes have indicated the usefulness and importance of using risk insights to inform regulatory decisions, principles of risk-informed regulation have not been incorporated into the overall regulatory framework for power reactors in a comprehensive manner. Two examples serve to illustrate this point.

Five key principles of risk-informed regulation have been specified in Regulatory Guide 1.174, which provides guidance for licensees to voluntarily request risk-informed license amendments. One of these principles, that any proposed change be consistent with the defense-in-depth philosophy, is difficult to implement, both in a relative sense (e.g., whether a proposed change maintains adequate defenses) and in an absolute sense (that is, not only for changes), absent a well-defined policy that includes an objective definition and associated decision criteria. Such a policy would facilitate regulatory decision-making. As a second example, NRR Office Instruction LIC-504, "Integrated Risk-Informed Decision-Making Process for Emergent Issues," uses these same five key principles in a decision process for emergent issues where no other NRC process exists to resolve the issue. Again, assessing whether the proposed resolution of an emergent issue is consistent with the defense-in-depth philosophy is problematic without a common definition and associated decision criteria.

A brief history of the defense-in-depth philosophy is presented below to provide a starting point for characterizing this improvement activity.

Since the beginning of licensing nuclear facilities, the concept of defense-in-depth has been an integral part of the regulatory framework regardless whether the term defense-in-depth was

used. Starting with WASH-740 in March 1957, "Theoretical Possibilities and Consequences of Major Accidents in Large Nuclear Power Plants," the concept of multiple lines of defense was introduced, as shown in this sample excerpt from that document: "Looking to the future, the principle on which we have based our criteria for licensing nuclear power reactors is that we will require multiple lines of defense against accidents which might release fission products from the facility." This concept of multiple lines of defense over time has evolved into what is consistently referred to as "defense-in-depth" today. It has been generally characterized in terms of multiple barriers, levels of defense, levels of protection, successive compensatory measures, lines of protection, multiple measures, protective barriers, echelons of defense, etc. Moreover, levels of defense have been viewed as an approach to address accident prevention and mitigation. This consistency can be seen in two examples regarding the different, but similar, explanations for levels of defense:

- preventing accidents from occurring, having safety systems in place should an accident occur, having mitigation capabilities in place should the safety systems not function, having emergency plans in place if mitigation does not work

- employing successive barriers between the radiological source term and the public, such as fuel cladding, RCS boundary, containment, and siting in remote areas

In further reviewing the history, the NRC staff found that there has been a consensus in that defense-in-depth is needed to provide a robust plant design that will be tolerant of anticipated challenges and to compensate for the recognized lack of knowledge (i.e., uncertainties) regarding nuclear reactor operations and the consequences of potential accidents. That is, defense-in-depth is needed to deliver a design that is tolerant of uncertainties in our knowledge regarding plant behavior, component reliability, or operator performance that might compromise safety. Moreover, given the uncertainties, when failures occur they would be compensated for or corrected without causing harm to individuals or the public at large. In summary, there has been a common theme with regard to defense-in-depth which is to prevent and mitigate accidents via multiple levels of defense in light of uncertainties to keep the risk to an acceptable level. Although the levels of defense address accident prevention and mitigation, how to implement a level of defense has not been viewed consistently. Implementation of the various levels of defense has included for example:

- reactor core, reactor vessel, reactor container

- quality in design, safety systems, consequence-limiting systems

- quality assurance, protective systems, engineered safety features

- safety margins, high quality, redundancy, containment structure and safety features, emergency plans

The above discussion presents a deterministic approach to defense-in-depth. The deterministic model to defense-in-depth is embodied in the structure of the regulations and in the design of the facilities that are built in accordance with those regulations. The potential requirements for defense-in-depth result from repeatedly asking the question, "What if this barrier or safety feature fails?" without assigning a likelihood of such a failure. Therefore, a characteristic of this approach is that there is reliance on each line of defense to protect against the unknown and unpredictable; e.g., assuming the other defenses have not succeeded.

Use of probabilistic insights to complement traditional engineering analyses, including application of the defense-in-depth philosophy, came into the history in the mid-1990s. At that time, it was generally acknowledged that PRA can be a powerful tool in pointing out areas where "deterministic defense-in-depth" needs enhancement.

The NRC has moved towards a risk-informed regulatory framework. In the risk-informed approach to regulation, PRA could be used to inform regulatory decisions regarding whether there is sufficient defense-in-depth for a given situation. The discussion in the *Federal Register* Notice (FRN) that promulgated the Commission PRA Policy Statement (1995) notes that "PRA technology will continue to support the NRC's defense-in-depth philosophy by allowing quantification of the levels of protection and by helping to identify and address weaknesses or overly conservative regulatory requirements." The FRN discussion also notes that defense-in-depth is used by the NRC to provide redundancy as well as a multiple-barrier approach. Risk insights could be used to move to a more structured, formal process in implementing and evaluating the adequacy of defense-in-depth.

Several proposals to use risk insights to help assess whether adequate defense-in-depth has been achieved were proposed in the 2000–2012 time frame. IAEA and INL, in particular, have proposed risk as one of the measures to assist in determining adequacy of defense-in-depth. For example:

- quantitative safety goal targets are established for each level of defense using a frequency consequence curve; plant design and operation is evaluated against each level to determine if the quantitative target goal has been met

- decision process with criteria is established that evaluates whether quantitative criteria (using a frequency consequence curve) have been met while also determining whether there are adequate safety margins and if the known uncertainties have been adequately addressed

B. Relationship to NTTF Recommendation 1

This improvement activity directly supports NTTF Recommendation 1, which states: "The Task Force recommends establishing a logical, systematic, and coherent regulatory framework for adequate protection that appropriately balances defense-in-depth and risk considerations." Implementing this improvement activity accomplishes this by defining defense-in-depth for nuclear power reactors and developing decision criteria for assessing when defense-in-depth has been adequately addressed in the design or operation of a nuclear power plant.

In Recommendation 1 of the NTTF report, that task force provided its definition of defense-in-depth:

> The key to a defense-in-depth approach is creating multiple independent and redundant layers of defense to compensate for potential failures and external hazards so that no single layer is exclusively relied on to protect the public and the environment. In its application of the defense-in-depth philosophy, the Task Force has addressed protection from design-basis natural phenomena, mitigation of the consequences of accidents, and EP.

The NTTF concluded that a more balanced application of the Commission's defense-in-depth philosophy using risk insights would provide an enhanced regulatory framework that is more

logical, systematic, coherent, and better understood. Such a framework would support appropriate requirements for increased capability to address events of low likelihood and high consequence, thus enhancing safety. The NTTF described a new regulatory framework where risk assessment and defense-in-depth would be combined more formally. It should be noted that the NTTF concluded that the new framework could be implemented on the basis of full-scope Level 1 core damage assessment PRAs and Level 2 containment performance assessment PRAs; the NRC staff's recommendation for Improvement Activity 2 does not include a PRA regulation, as discussed in further detail below.

Table 1 in Attachment 4 to Enclosure 1 presents summary information on each improvement activity for easy comparison of the activities by showing the extent to which each improvement activity addresses NTTF Recommendation 1.

C. Relationship to RMTF Report

The RMTF notes in NUREG-2150 that "After decades of use, there is no clear definition or criteria on how to define adequate defense-in-depth protections." The RMTF further notes that "the concept of defense-in-depth has served the NRC and the regulated industries well and continues to be valuable today. However, it is not used consistently, and there is no guidance on how much defense-in-depth is sufficient." The RMTF concluded that "clarifying what the U.S. Nuclear Regulatory Commission (NRC) means by defense-in-depth is a necessary part of the development of a holistic strategic vision."

This improvement activity supports the RMTF overall recommendations (R2.1-2.4) and those for power reactors (PR-R-5, OR-R-5, and NR-R-5). Table 3 at the end of Enclosure 1 presents summary information on each improvement activity for easy comparison of the activities by showing the extent to which each improvement activity addresses the power reactor recommendations of the RMTF report.

III. Detailed Description of Improvement Activity 2

If this improvement activity were implemented, the Commission would issue a policy statement that would articulate the Commission's expectations for defense-in-depth as applied to nuclear power reactor safety.

The policy for defense-in-depth as applied to nuclear power reactor safety would define what is meant by defense-in-depth and set forth the objectives of this strategy. It would define the fundamental levels of defense that comprise the top level in a hierarchical approach to applying defense-in-depth to nuclear power reactors.

The NRC staff would also prepare guidance documents to implement the policy statement. The implementation guidance would articulate the decision criteria to support regulatory decisions regarding whether the Commission's expectations for defense-in-depth have been addressed in the design and operation of a nuclear power plant. If necessary, and in accordance with the forward-looking implementation of Improvement Activity 1, the rulemaking process would be used to impose any new requirements necessary to implement the Commission's expectations regarding nuclear power reactor defense-in-depth.

A. Proposed Approach

If the Commission directs the NRC staff to proceed with Improvement Activity 2, the staff would develop the policy statement and implementation guidance as described above. However, as noted in the *Background* above, there has been a great deal of thought already given to this topic over many years. Therefore, in order to help inform the Commission's decision, the major elements of the proposed policy statement and implementation guidance are provided below, along with examples for each element of the policy. These are examples because the specific elements may change as the staff works to develop the specific details and evaluates inputs from various stakeholders.

Policy Statement

The staff envisions four major parts to the Commission Policy Statement on Defense-in-Depth for Nuclear Power Reactor Safety:

- Statement of Commission Expectations
- Definition of Defense-in-Depth
- Objective of Defense-in-Depth
- Defense-in-Depth Principles

Example Commission Expectations: A defense-in-depth approach is used to provide reasonable assurance of public health and safety from the operation of the reactor of a nuclear power plant.

Example Definition: Defense-in-depth is a strategy that employs successive levels of defense and safety measures in the design, construction and operation of the nuclear power plant to ensure appropriate barriers, controls, and personnel are in place to prevent, contain, and mitigate exposure to radioactive material.

Example Objectives: The purpose of employing a defense-in-depth strategy is to keep the risk to the public and environment from the operation of the reactor of a nuclear power plant acceptably low by:

- Compensating for uncertainties, including events and event sequences which are unexpected
- Making the nuclear power plant more tolerant of failures and external challenges; for example, by:
  - compensating for potential adverse equipment performance, as well as human actions of commission (including intentional adverse acts) as well as omission
  - maintaining the effectiveness of barriers and protective systems by ensuring multiple, generally independent and separate, means of accomplishing their functions
- Protecting the health and safety of the public even assuming a severe accident and radiological release

Example Principles: The objectives of defense-in-depth are achieved by implementing the following **example** principles:

- Key safety functions are not dependent upon a single element of design, construction, maintenance or operation
- Uncertainties in SSCs and human performance are accounted for in the safety analysis and appropriate safety margins are provided
- Application of conservative codes and standards
- High quality in the design, construction, and operation of the nuclear power plant
- System redundancy, independence, and diversity are part of the design and operation
- Defenses against potential common-cause failures are part of the design and operation

The policy statement would reinforce the Commission's expectation that all regulatory decisions be made with appropriate consideration of uncertainties. The strategy and approach in the policy statement for defense-in-depth would likely include both deterministic and probabilistic decision criteria. The policy statement would clearly state that the deterministic criteria for defense-in-depth must, at the most fundamental level, compensate for uncertainties, including those in the PRA models or other risk assessments.

Implementation Guidance

The staff envisions two major parts to the associated implementation guidance:

- Levels of Defense for Nuclear Power Reactor Safety
- Decision Criteria

Example Levels of Defense: For ensuring nuclear power reactor safety, defense-in-depth is comprised of four successive levels of defense where each level's defense measures are applied if the previous level fails:

- Event preclusion – safety measures that can preclude events that could challenge safety
- Accident prevention – safety measures that can prevent events from progressing to core damage
- Source term containment– safety measures that can prevent radioactive release from the containment
- Release mitigation – safety measures that can protect the public from the effects of radioactive releases

Example Decision Criteria: Decision criteria would be developed to determine whether a given plant design had sufficient depth, that is, an appropriate number of each of the four levels of defense, as well as to judge whether the defenses within a level had an appropriate reliability and availability in view of uncertainties. Such decision criteria could involve:

- Extent to which the objectives of defense-in-depth are met
- Extent to which the principles of defense-in-depth are employed
- How well each level of defense provides protections from a given hazard or scenario

- Extent to which each level of defense is independent from the other levels
- Amount of safety margin available
- Effectiveness of performance measurement or monitoring strategies
- Significance of uncertainties
- Comparison to quantitative acceptance guidelines (e.g., CDF, LERF)

The information contained in the policy statement and implementation guidance would use the information provided in Enclosure 3, which documents a comprehensive review of the history of defense-in-depth.

B. Key Issues

There are several issues which the NRC staff considered in developing this improvement activity:

1. Would a plant-specific PRA regulation be required?
2. Would the policy be applicable to new reactors only, or also to operating plants?
3. Would the policy be implemented on a forward-looking or retrospective basis?

Each of these issues is discussed in turn.

1. Would a plant-specific PRA regulation be required? The staff considered whether a regulation for a plant-specific PRA would be necessary in order to make decisions regarding adequacy of defense-in-depth. The NRC staff believes that a regulation for a site-specific PRA for currently operating reactors, for the sole purpose of informing the defense-in-depth policy, would not provide benefits commensurate with the cost of developing such PRA models. Nuclear power plants licensed under Part 52 are required to have a plant-specific PRA.

   In development of the policy statement (e.g., defining defense-in-depth), it is likely that the criteria for determining whether a given nuclear power plant has sufficient defense-in-depth will include quantitative risk criteria. Although a PRA is not needed to develop these criteria, a PRA may be beneficial to the licensee in demonstrating that the risk criteria have been met.

2. Would the policy be applicable to new reactors only, or also to operating plants? The staff considered whether the new policy and any related requirements would be applicable to currently operating reactors, reactors licensed in the future, or both. The staff believes that the new policy should be applicable to all light water nuclear power reactors.

3. Would the policy be implemented on a forward-looking or retrospective basis? The staff considered whether the new policy and promulgation of any associated regulatory requirements upon implementing the new policy, would be forward-looking or retrospective. A retrospective approach would assess currently licensed plants to determine whether the Commission's expectations regarding defense-in-depth were met. In cases where the expectations were not met, the NRC staff would pursue imposition of

backfits to the extent allowed by 10 CFR 50.109. A forward-looking approach would not assess currently licensed plants, but would apply the Commission's expectations for defense-in-depth to new issues as they arise. This could still lead to the imposition of backfits on plants, but these would be the result of the new information. The NRC staff believes that the forward-looking approach would be more consistent with the NRC's principles of good regulation, given that there is reasonable assurance of adequate protection for currently licensed plants.

C. Expected Products

If this improvement activity is approved by the Commission, the staff would develop the following:

- Commission policy statement that includes:
  - The Commission's expectations on defense-in-depth for nuclear power reactor safety
  - Definition, objective and principles of defense-in-depth
  - Identification of the levels of defense-in-depth for nuclear power reactors.
  - Identification of the types of decision criteria for assessing adequacy of defense-in-depth

  The development of this policy statement would be accomplished by the NRC staff with input from interested stakeholders.

- Implementing guidance that includes:
  - Detailed discussion describing the levels of defense-in-depth and their associated safety measures
  - Decision criteria for implementing the strategy for achieving defense-in-depth and associated decision criteria for determining whether sufficient defense-in-depth has been achieved
  - Revision to the Regulatory Analysis Guidelines to include defense-in-depth as a fundamental decision criterion and to reference the policy statement and the staff's guidance on determining adequacy of defense-in-depth
  - Conforming changes to existing regulatory guides including Regulatory Guide 1.174
  - Conforming changes to Management Directives and Office procedures, as appropriate

  The development of the implementation guidance may be internal NRC documents (e.g., Management Directive, Office Instruction, Standard Review Plan, Regulatory Analysis Guidelines) or external documents (e.g., Regulatory Guide, generic communication).

D. Estimated Resources and Schedule

Industry Resources

Because the defense-in-depth improvement activity can be implemented by NRC action alone, no incremental licensee resource expenditures are needed. Even though individuals from industry, licensees, non-governmental organizations, and the general public will be invited to participate in developing the new design-basis extension approach, such voluntary expenditures are not considered when estimating costs and preparing regulatory analyses for an NRC activity.

NRC Resources

NRC resource estimates for developing the defense-in-depth conceptual approach and criteria for determining adequacy and for and issuing the policy statement were estimated by assuming that 5 persons would be necessary working for 15% of their time for a period of 2 years (5 persons X 2 years X 15% = 1.5 FTE).

Internal staff guidance must then be developed to implement the process and criteria in the policy statement. The estimated resources for this are 4.8 FTE assuming that 6 persons would be necessary working for 40% of their time for a period of 2 years (6 persons X 2 years X 40% = 4.8 FTE).

Implementation of the new criteria will also require that they be incorporated into the existing Regulatory Analysis Guidelines (NUREG/BR-0058, Rev. 4). In response to the SRM on SECY-12-0110 on Economic Consequences, the staff is now working to update guidance documents integral to performing cost-benefit analyses in support of regulatory, backfit, and environmental analyses, including NUREG/BR-0058, Rev. 4. Necessary resources are being budgeted separately in conjunction with this effort. Incremental resources needed to incorporate defense-in-depth criteria into this update are negligible. This update activity is expected to take an additional 1 to 2 years.

Thus the staff's estimate for total NRC resources needed for Improvement Activity 2 is 6.3 FTE over a time period of 3 to 4 years.

E. Pros and Cons

Pros:

Improvement Activity 2 supports the NRC strategic plan and the principles of good regulation in the following ways:

- Promotes efforts that help ensure that licensees perform at acceptable safety levels.
    - Provides a uniform and technically-justified concept of defense-in-depth for nuclear power reactors
    - Enhances risk-informed decisionmaking by more clearly defining one of the five key principles: defense-in-depth
- Supports the NRC strategic plan effectiveness objective that NRC actions are high quality, efficient, timely, and realistic.

- Formalizes the defense-in-depth philosophy into a defined strategy for addressing uncertainty
- With a common understanding of defense-in-depth, enables more efficient, effective, consistent and timely decisions on safety issues
- Provides clear and timely guidance to applicants and licensees for submittal of high-quality and timely license applications and risk-informed license amendment requests
- Facilitates high quality implementation of Improvement Activity 1, if it is selected

- Promotes openness, clarity, and reliability: criteria for adequacy of defense-in-depth for regulatory actions are specified, resulting in a more predictable and stable regulatory process
- Supports the PRA policy statement for increased use of PRA technology to the extent supported by the state-of-the-art that complements the NRC's deterministic approach and supports defense-in-depth.
- Improves consistency with the international community on the concept of defense-in-depth and provides international leadership on defining defense-in-depth and associated decision criteria

Cons:

- It will be challenging to develop decision criteria with sufficient detail to achieve consistency in applying those criteria to regulatory decisions regarding defense-in-depth.
- The magnitude of any improvements in the overall level of safety for power reactors under this improvement activity is uncertain.

F. How the NRC Staff's Proposal Resolves NTTF Recommendation 1

As stated in the introduction to this Enclosure, the NRC staff developed a problem statement describing the issue that Recommendation 1 is directed at resolving. Implementation of Improvement Activity 2 addresses the aspect of the problem statement involving how risk and defense-in-depth should be addressed for an effective NRC regulatory response to new information or unforeseen events or accidents. Improvement Activity 2 would define defense-in-depth and develop decision criteria to support risk-informed regulatory decisions.

Table 1-2: Comparison of Improvement Activity 2 to NTTF Recommendation 1

NTTF Recommendation	Activity 2
1. [Establish] a logical, systematic, and coherent regulatory framework for adequate protection that appropriately balances defense-in-depth and risk considerations.	Activity 2 would develop a policy statement defining defense-in-depth and develop decision criteria to support risk-informed decisions

Table 1-2: Comparison of Improvement Activity 2 to NTTF Recommendation 1	
NTTF Recommendation	Activity 2
1.1 Draft a Commission policy statement that articulates a risk-informed defense-in-depth framework that includes extended design-basis requirements in the NRC's regulations as essential elements for ensuring adequate protection.	Activity 2 would support development of extended design-basis requirements (which are addressed as Improvement Activity 1) to the extent that these requirements were needed to provide adequate defense-in-depth.
1.2 Initiate rulemaking to implement a risk-informed, defense-in-depth framework consistent with the above recommended Commission policy statement.	Activity 2 in itself would not include any new rules. However, the need for additional rules to implement the Commission's policy would be evaluated as part of Improvement Activity 1 and Activity 2.
1.3 Modify the Regulatory Analysis Guidelines to more effectively implement the defense-in-depth philosophy in balance with the current emphasis on risk-based guidelines.	Conforming changes would be made to the Regulatory Analysis Guidelines as appropriate.
1.4 Evaluate the insights from the IPE and IPEEE efforts … to identify potential generic regulations or plant-specific regulatory requirements.	Activity 2 does not address this sub-recommendation.
Voluntary safety initiatives by licensees should not take the place of needed regulatory requirements. (NTTF Report, pp. 19, 21)	Activity 2 does not address this sub-recommendation.
The current NRC regulatory approach (requirements for design-basis events, beyond design-basis events, and voluntary initiatives) has resulted in a "patchwork" of regulatory requirements and other safety initiatives.	Activity 2 does not address this sub-recommendation.

Table 1 in Attachment 4 to Enclosure 1 presents summary information on each improvement activity for easy comparison showing the extent to which each improvement activity addresses NTTF Recommendation 1.

G. Example of a Possible Outcome of Implementing Improvement Activity 2

To provide an example of the possible outcome of implementing Improvement Activity 2, the staff describes how the NRC's recent deliberations on filtered vents in Mark I and II containments might have proceeded if this activity had been implemented and in effect during those deliberations. The containment designs would have been evaluated for defense-in-depth considerations. If the NRC had well-defined criteria for evaluating the adequacy of defense-in-depth, the NRC may have been able to more efficiently come to a decision on this issue. Such decision criteria would improve the transparency and predictability of the NRC's regulatory process.

Improvement Activity 3: Clarify the Role of Voluntary Industry Initiatives in the NRC Regulatory Process

I. Summary of Improvement Activity

This improvement activity would clarify the role of industry initiatives in the NRC's regulatory processes by (1) re-affirming the Commission's expectation that industry initiatives may not be used in lieu of NRC regulatory action where a question of adequate protection of public health and safety exists; (2) specifying when industry initiatives may be credited in the baseline case for regulatory analyses; and (3) providing guidance regarding what type and level of licensee documentation and NRC oversight is appropriate for future voluntary initiatives. Specifically, this improvement activity would yield:

- Revisions to existing guidance to clarify the role of Type 2 industry initiatives
- Guidance for licensee documentation and NRC oversight of certain types of industry initiatives (defined later in this enclosure) determined to be risk or safety significant
- A staff evaluation of whether the most risk/safety significant existing industry initiatives of this type are being adequately maintained

II. Background

A. History

The NRC has a long history of encouraging licensees and the nuclear industry as a whole to take the initiative to address safety or other issues related to nuclear plant design and operation.

The NRC has on several previous occasions considered policy issues related to voluntary commitments or initiatives. The decision to develop guidelines for using industry initiatives in the regulatory process was an outgrowth of the Commission's Direction Setting Initiative (DSI) 13, which was published as part of SECY-97-303, "The Role of Industry (DSI-13) and Use of Industry Initiatives," dated December 31, 1997 (ADAMS Accession No. ML992950105), and the associated April 16, 1998, staff requirements memorandum (SRM) (ADAMS Accession No. ML003753845). The staff proposed in SECY-99-063, "The Use by Industry of Voluntary Initiatives in the Regulatory Process," on March 2, 1999 (ADAMS Accession No. ML992810068), to develop NRC guidelines for crediting industry initiatives in lieu of taking regulatory action.

On May 27, 1999, the Commission issued an SRM (ADAMS Accession No. ML003752062) approving the staff's recommendations in SECY-99-063. In this SRM, the Commission agreed that the current regulatory framework does not preclude voluntary industry initiatives and that existing regulatory processes can be used to support implementation of voluntary initiatives as long as such initiatives will not be used in lieu of regulatory action where a question of adequate protection of public health and safety exists. The SRM directed the staff to work with the industry and other stakeholders in developing the guidelines for using industry initiatives. These guidelines were developed and provided to the Commission in SECY-00-0116, "Industry Initiatives in the Regulatory Process," on May 30, 2000 (ADAMS Accession No. ML003718488). In response to the June 28, 2000, SRM on SECY-00-0116 (ADAMS Accession No. ML003727346), the staff revised the proposed guidelines as directed by the Commission and published them for public comment on August 31, 2000 (65 FR 53050).

After reviewing the public comments, the staff found that some industry stakeholders perceived the proposed guidelines on industry initiatives as imposing a burdensome obstacle to open and candid interactions between the regulator and the industry. A public interest group stated that it is "…categorically opposed to the regulatory retreat under way at the U.S. Nuclear Regulatory Commission (NRC) under the guise of voluntary industry initiatives (in lieu of regulation)...The NRC plans to supplant regulation with voluntary initiatives that are non-enforceable, remove the public from the process, and fail to address significant safety issues....Proposed guidelines will limit the ability of the public to meaningfully participate in the decisions that affect the health and safety of our families, homes, and communities...." In view of the stakeholders' reluctance to embrace the proposed guidelines, the staff concluded that implementing this largely voluntary process would be ineffective. Thus, in SECY-01-0121, "Industry Initiatives in the Regulatory Process," on July 5, 2001 (ADAMS Accession No. ML011630126), the staff requested Commission approval to notify all stakeholders that the proposal to implement a new industry initiative program and related guidelines would be withdrawn. The Commission approved, in an SRM on August 2, 2001, (ADAMS Accession No. ML012140398). The program was withdrawn by an August 20, 2001 notice in the *Federal Register* (66 FR 43597).

SECY-01-0121 defines three types of industry initiatives:

> Type 1: A Type 1 initiative is developed in response to an issue of potential safety concern that would complement regulatory actions within existing regulatory requirements. However, when it is determined that the safety concern involves the assurance of adequate protection, or other criteria described in Title 10, Section 50.109, of the *Code of Federal Regulations* (10 CFR 50.109), the NRC shall pursue rulemaking. In such a case, the Type 1 industry initiative may form the basis for an acceptable method of meeting the new regulation through endorsement in a regulatory guide.
>
> Type 2: A Type 2 initiative is developed in response to a potential safety concern that is a potential cost-beneficial safety enhancement outside existing regulatory requirements. Such industry initiatives may be used to provide safety enhancements without the need for regulatory action. However, where it is determined that the proposed industry initiative is not effective in addressing the safety concern, the NRC may pursue rulemaking in accordance with the criteria described in 10 CFR 50.109.
>
> Type 3: A Type 3 initiative is developed as an information-gathering mechanism, or a means to address issues of concern to the applicable industry group that are not potential safety concerns, do not involve adequate protection issues, are outside existing regulatory requirements, and are not likely to yield cost-beneficial safety enhancements. These voluntary industry initiatives may be used by the applicable industry group to address economic or efficiency issues.

NUREG/BR-0058, "Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission," Revision 4, provides the most current descriptions of these three types of industry initiatives:

Industry initiatives can generally be put into one of the following categories:

(1) those put in place in lieu of, or to complement, a regulatory action to ensure that existing requirements are met,

(2) those used in lieu of, or to complement, a regulatory action in which a substantial increase in overall protection could be achieved with costs of implementation justifying the increased protection, and

(3) those that were initiated to address an issue of concern to the industry but that may or may not be of regulatory concern.

Issues related to adequate protection of public health and safety are deemed the responsibility of the NRC and should not be addressed through industry initiatives.

The Fukushima Dai-ichi event highlighted that some measures previously put in place as voluntary initiatives in the U.S. to deal with severe accidents (e.g., severe accident management guidelines (SAMGs) and hardened vents), could have played a significant role in preventing or mitigating the accident. However, NRC assessments performed after the Fukushima event revealed that these specific examples were not subject to NRC inspection or enforcement activities, ostensibly because they were not implemented by a legally-binding requirement. These assessments found that the implementation and maintenance of these industry initiatives did not, in some cases, provide the desired degree of confidence that the equipment or procedures would have worked as the NRC had intended when an industry initiative was accepted in lieu of taking a regulatory action. As discussed below, both the NTTF and the RMTF expressed concerns that in some cases use of licensee voluntary initiatives has led to inefficiencies and potentially less robust resolution of issues. The lack of oversight of such initiatives, which has been NRC's practice, has resulted in the NRC not knowing the extent to which voluntary industry initiatives have been implemented or maintained over time.

The NRC's ability to enforce industry initiatives is limited. An industry initiative is not directly enforceable, but a licensee's failure to meet a formal commitment could be the basis for a notice of deviation and any associated finding would be captured by the Reactor Oversight Process. Actions taken to address Type 2 industry initiatives are developed and implemented by licensees outside the scope of existing regulatory requirements, and they can be documented in written commitments. Traditional enforcement would not be possible, although an inspector could write a notice of deviation from the licensee's commitments. While a deviation is within the enforcement guidance, it is not captured by the Reactor Oversight Process unless there is an associated finding. A finding can be associated with a regulatory requirement or a licensee's self-imposed standard. In the case of deviations, a finding exists if the licensee failed to implement a self-imposed standard, the issue was within the licensee's ability to foresee and correct and therefore should have been prevented, and the issue is more than minor in accordance with Reactor Oversight Process program guidance. If the Reactor Oversight Process inspection program issues a finding, the significance of the finding would be determined in the significance determination process and it would be assigned a color. This finding will be an input into the overall inspection level for the plant. Licensees could respond by putting the finding into their corrective action program and by making changes to conform to the regulatory commitment or by revising the regulatory commitment. One of the goals of Improvement Activity 3 is to providing guidance regarding what type and level of licensee documentation and NRC oversight is appropriate for future Type 2 industry initiatives. If NRC oversight activities determine that multiple licensees are failing to implement or maintain a

particular voluntary initiative, the NRC may conclude that the industry initiative was ineffective, and that there may be a need for regulatory action (e.g., order, rulemaking) to address the safety concern or substantial safety enhancement issue. Also, if a licensee failed to take timely action to correct a deviation found to be of substantial safety significance for the facility (e.g., a significance determination process rating of RED or YELLOW), the NRC could conclude that the industry initiative was ineffective at the particular facility and that there may be a need for regulatory action (e.g., plant-specific backfit).

B. Relationship to NTTF Recommendation 1

The NTTF stated that the current NRC regulatory approach includes the following:

- requirements for design-basis events with protection and mitigation features controlled through specific regulations or the general design criteria 10 CFR Part 50, “Domestic Licensing of Production and Utilization Facilities,” Appendix A, “General Design Criteria for Nuclear Power Plants”)

- requirements for some “beyond-design-basis” events through specific regulations (e.g., station blackout, large fires, and explosions)

- voluntary industry initiatives to address severe accident features, strategies, and guidelines for operating reactors"

The NTTF provided examples of voluntary industry initiatives:

- containment hardened vents for BWR Mark I designs

- some severe accident considerations (through the IPE and IPEEE programs)

- shutdown risk issues

- SAMGs

- Groundwater Protection Initiative

In several places in the NTTF report, the Task Force notes that voluntary initiatives have a place in NRC's regulatory framework, but states that voluntary industry initiatives should not serve as a substitute for regulatory requirements but as a mechanism for facilitating and standardizing implementation of such requirements. The NTTF further notes that NRC inspection and licensing programs give little attention to industry voluntary initiatives since there are no requirements to inspect against.

The NTTF noted that voluntary industry initiatives had been valuable and useful in the past as a mechanism for facilitating and standardizing implementation of ... [NRC] requirements. The NTTF report cited the development of symptom-based emergency operating procedures (EOPs) in the 1980s and development of the EDMGs following the events of September 11, 2001 as just two examples of notable industry contributions to effective implementation of regulatory initiatives.

However, the NTTF noted potential problems with some voluntary industry initiatives – specifically, those initiatives that were used to address safety concerns in lieu of the NRC developing and issuing regulatory requirements. To demonstrate this point, the NTTF requested that NRC inspectors collect information (TI 2515/184) on how each licensee had implemented SAMGs, a voluntary initiative. It also considered the results of an inspection (TI 2515/183) of required activities related to mitigation strategies codified in 10 CFR 50.54(hh). The NTTF wrote:

> Through these two inspection activities, the Task Force also had the opportunity to compare industry activities under a required program and a similar voluntary initiative (i.e., EDMGs and SAMGs). Both programs had been effectively implemented, including initial program formulation and licensee staff training. Those programs are now 10 to 20 years old, and some licensees have maintained both programs in a manner expected for an important safety activity, including in terms of maintenance, configuration control, training, and retraining. However, some licensees have treated the industry voluntary initiative (the SAMG program) in a significantly less rigorous and formal manner, so much so that the SAMG inspection would have resulted in multiple violations had it been associated with a required program. The results of the SAMG inspection do not indicate, nor does the Task Force conclude that, the SAMGs would not have been effective if needed. However, indications of programmatic weaknesses in the maintenance of the SAMGs are sufficient to recommend strengthening this important activity.

In summary, the NTTF expressed its belief that voluntary industry initiatives could play a useful and valuable role in the suggested framework. These voluntary industry initiatives should not serve as a substitute for regulatory requirements but as a mechanism for facilitating and standardizing implementation of such requirements. Although the topic of voluntary industry initiatives is not specifically included in the NTTF Recommendation 1 or the related sub-recommendations, the staff included the topic in this paper because it does generally relate to improving the regulatory framework and it was not being addressed by other post-Fukushima activities.

Table 1 in Attachment 4 to Enclosure 1 presents summary information on each improvement activity for easy comparison of the activities by showing the extent to which each improvement activity addresses NTTF Recommendation 1.

C. Relationship to RMTF Report

The RMTF report also expressed a concern regarding NRC's handling of industry voluntary initiatives in Finding PR-F-3: "The extent to which licensee activities undertaken as part of voluntary industry initiatives can be credited has been a source of contention in the Reactor Oversight Process and has reduced the efficiency of that process."

Table 3 at the end of Enclosure 1 presents summary information on each improvement activity for easy comparison of the activities by showing the extent to which each improvement activity addresses the power reactor recommendations of the RMTF report.

III. Detailed Description of Improvement Activity 3

A. Proposed Approach

Improvement Activity 3 would clarify the role of Type 2 industry initiatives in NRC's regulatory processes by (1) re-affirming the Commission's expectation that industry initiatives may not be used in lieu of NRC regulatory action where a question of adequate protection of public health and safety exists; (2) specifying when industry initiatives may be credited in the baseline case for regulatory analyses; and (3) providing guidance regarding what type and level of licensee documentation and NRC oversight is appropriate for future voluntary initiatives. By "industry initiative," the staff is referring to proposals made by the nuclear power industry, e.g., commitments made by the Nuclear Energy Institute (NEI) on behalf of all licensees, or proposals made by discrete groups of licensees and applicants, e.g., the BWR Owners Group.

As stated in the *Background* section above, industry initiatives can generally be classified as one of three types. Improvement Activity 3 focuses on how Type 2 industry initiatives should be considered in the NRC regulatory process. It does not address Type 1[13] or Type 3[14] initiatives. Some examples of existing Type 2 industry initiatives include:

- Low power/shutdown risk
- Severe accident management guidelines
- Heavy load lifts
- Hydrogen igniter backup power for BWR Mark III and ice condenser containments

The scope of this proposed improvement activity is limited to voluntary initiatives proposed at a high level during rulemaking activities and for application to all or a class of licensed facilities in lieu of a generic regulatory requirement under consideration by the NRC. It does not address implementation of plant-specific voluntary commitments made by licensees of individual facilities.

In general, this activity would involve revisions to existing guidance. The revised guidance would reiterate the current Commission policy that industry initiatives may not be used in lieu of NRC regulatory action where a question of adequate protection of public health and safety exists (May 27, 1999, Commission SRM (ADAMS Accession No. ML003752062), approving the staff's recommendations in SECY-99-063, "The Use by Industry of Voluntary Initiatives in the Regulatory Process," March 2, 1999 (ADAMS Accession No. ML992810068)). The revisions to existing guidance would also direct that an industry initiative is credited in the baseline case as defined in the Regulatory Analysis Guidelines (NUREG/BR 0058, Rev. 4) only when it is well documented and there is a high likelihood that each licensee will effectively implement and maintain the initiative over time.

[13] Activity 3 does not address Type 1 industry initiatives even though some of those initiatives address NRC requirements involving adequate protection. Additional NRC action on Type 1 industry initiatives is unnecessary, because the NRC already has the regulatory tools to address a licensee's failure to comply with the underlying NRC regulatory requirement (regulation, license condition, order, technical specification) to which the Type 1 industry initiative is directed. The NRC may inspect/audit a licensee to determine if the licensee is complying with the underlying NRC requirement and may take enforcement action if the NRC determines that the licensee is not complying with the underlying NRC requirement.

[14] Activity 3 does not address Type 3 industry initiatives because those initiatives address issues that are not potential safety concerns.

As a part of this proposed improvement activity, the staff will develop and implement an integrated program for Type 2 voluntary industry initiatives. The program consists of the following two elements. First, the staff intends to evaluate the current status of implementation on those existing Type 2 initiatives which the staff believes are most risk significant or safety significant. The staff will use risk insights to identify the existing Type 2 initiatives which are the most risk and safety significant and then determine if the effectiveness of licensee implementation of the initiative(s) is already monitored (directly or indirectly) under an existing NRC oversight activity (e.g., inspections, performance indicators, reports). The staff would verify those initiatives where an acceptable measure of effectiveness cannot be identified (e.g., one-time audit, inspection, or request for information). Based on the results of the verification activity, the staff would take appropriate action, including pursuing a regulatory requirement. The verification activities to ensure that certain existing industry initiatives are being consistently maintained are within the staff's authority and do not require Commission approval. Second, the staff would revise its policies and procedures to ensure that the staff monitors future Type 2 initiatives for continued effective implementation. The staff's process will ensure that licensee voluntary initiatives are well-documented and transparent to the public. Under the process, licensees would report certain information regarding voluntary initiatives and notify the NRC if it intends to change its decision to implement or maintain Type 2 industry initiatives which the NRC has publicly identified and relied on as the basis for not pursuing rulemaking. If the process includes rulemaking, staff would follow the routine process to request Commission approval to institute such a rulemaking.

Table 4 at the end of this enclosure provides a partial listing of voluntary industry initiatives identified by the staff.

B. Key Issues

There are several issues which the NRC staff considered in developing this improvement activity:

1. Should a Commission policy statement be developed?
2. Should the existing approach be modified to allow less reliance on Type 2 voluntary industry initiatives; for example by requiring a legally binding requirement once such initiatives have been implemented?
3. Should the NRC staff perform a detailed assessment of Type 1 and/or Type 2 initiatives to ensure they have been implemented and are being maintained?

Each of these issues is discussed in turn.

1. Should a Commission policy statement be developed? The NRC staff believes that the Commission policy, as set forth in SRM/SECY-99-063, is clear and will be made more readily accessible by including the policy in NRC internal guidance documents. Therefore, the staff does not believe that a Commission policy statement is necessary.

2. Should the existing approach be modified to allow less reliance on Type 2 voluntary industry initiatives; for example by requiring a legally binding requirement (e.g., rule or order) once such initiatives have been implemented? The staff believes that the proposed approach, which provides oversight for significant Type 2 initiatives and

guidance on crediting such initiative in regulatory analyses, is sufficient to ensure that these initiatives are implemented and maintained. Therefore, the staff does not recommend a change in policy that would require legally binding requirements for all Type 2 industry initiatives.

3. Should the NRC staff perform a detailed assessment of Type 1 and/or Type 2 initiatives to ensure they have been implemented and are being maintained? The NRC staff believes that its proposed activity to use a risk-informed approach to evaluate significant Type 2 industry initiatives is a cost-effective way of providing reasonable assurance that the most important industry initiatives are in place and being maintained. The two inspection activities initiated after the Fukushima accident (SAMGs and hardened vents) have already evaluated two very key industry initiatives and the staff is currently developing proposed requirements to assure that these activities are implemented properly. The staff reviewed existing Type 1 initiatives and concluded that sufficient oversight and performance monitoring activities are in place. Therefore, the NRC staff does not recommend a detailed assessment of Type 1 and non-significant Type 2 industry initiatives.

C. Expected Products

This improvement activity would result in the following:

- Revisions to existing guidance documents (e.g., Management Directives, Office Instructions, and other guidance documents) to implement the current Commission direction regarding voluntary industry initiatives

- Revision to the Regulatory Analysis Guidelines and procedures for preparing both plant-specific and generic backfit analyses, specifying when Type 2 industry initiatives may be credited in the baseline case.

- Revisions to inspection manual to better address industry initiatives

D. Estimated Resources and Schedule

Industry Resources

Industry resources are estimated to support the planned NRC audits of certain facilities to evaluate the implementation effectiveness of certain existing safety-significant initiatives. For the purposes of a resource estimate, it is assumed that the NRC would send 3 inspectors to perform audits at six sites. Licensee support for an entrance meeting (6 person-hours), daily support (48 person-hours), an exit meeting (6 person-hours), and responding to a follow-up request for additional information (200 person-hours) plus administrative and management support would cost approximately $180,000. This figure was rounded up to $200,000 for conservatism.

NRC Resources

NRC resource estimates for developing the conceptual approach, criteria, and revising a significant amount of internal staff guidance (Office Instructions, changes and additions to Inspection Manual chapters, etc.) addressing how the NRC will address future voluntary

industry initiatives were made by assuming that 4 persons would be necessary working for 25% of their time for a period of 1 year (4 persons X 40% X 1 year = 1.0 FTE).

Implementation of the new criteria for crediting of voluntary initiatives will also require that they be incorporated into the existing Regulatory Analysis Guidelines (NUREG/BR-0058, Rev. 4). In response to the SRM on SECY-12-0110 on Economic Consequences, the staff is now working to update guidance documents integral to performing cost-benefit analyses in support of regulatory, backfit, and environmental analyses, including NUREG/BR-0058, Rev. 4. Necessary resources are being budgeted separately in conjunction with this effort. Incremental resources needed to incorporate new criteria for voluntary initiatives into this update activity are negligible.

Also, a screening review of existing voluntary initiatives to determine which initiatives would be audited by the NRC would be done in parallel with the above activity and is estimated to require 4 persons working for 25% of their time for a period of 1 year (4 persons X 40% X 1 year = 1.0 FTE).

Additional audit/inspection resources to conduct the audits are not included as these resources would be diverted from existing budgeted inspection activities. Completion of the audit activity is expected to take an additional year.

Thus the staff's estimate for total NRC resources needed for Improvement Activity 3 is 2.0 FTE over a time period of 2 years.

Resource Estimate for Possible NRC Rulemaking

The staff's process will ensure that licensee voluntary initiatives are well-documented and transparent to the public. Under the process, licensees would report certain information regarding safety-significant Type 2 voluntary initiatives and notify the NRC if it intends to change its decision to implement or maintain Type 2 industry initiatives which the NRC has publicly identified and relied on as the basis for not pursuing rulemaking. If the process includes rulemaking, the staff estimates that such a rulemaking would be of average scope and complexity and would require approximately 3.9 FTE over a time period of 3 years. Should this occur, the staff would follow the routine process to request Commission approval to institute the rulemaking.

E. Pros and Cons

Pros:

Improvement Activity 3 supports the NRC strategic plan and the principles of good regulation in the following ways:

- Ensures that that the safety benefits from voluntary industry initiatives would be consistently maintained over time by providing risk-informed regulatory oversight

- Facilitates monitoring and feedback to ensure that voluntary initiatives (whether used in lieu of or to support implementation of regulatory requirements) are improved as needed

- Improves the clarity of NRC regulatory processes by providing guidance on the handling of industry initiatives

- Sets clear criteria for determining when and how voluntary industry initiatives would be integrated into regulatory processes
- Clarifies and makes visible to all stakeholders how voluntary initiatives fit into the NRC's regulatory framework
- Defines how industry initiatives should be addressed within NRC inspection and oversight processes.

Cons:

- Improvement Activity 3 may not support efficiency
  - Licensees may be less likely to interact with the NRC on safety issues
  - Licensees may be less likely to develop industry initiatives for Type 2 issues.
- Could result in industry backing away from initiatives if they are not given credit for their implementation
- This approach may not be seen as going far enough to address voluntary initiatives

F. How the NRC Staff's Proposal Resolves NTTF Recommendation 1

Table 1-3 below presents summary information on Improvement Activity 3 showing the extent to which it addresses NTTF Recommendation 1.

Table 1-3: Comparison of Improvement Activity 3 to NTTF Recommendation 1

NTTF Recommendation	Activity 3
1. [Establish] a logical, systematic, and coherent regulatory framework for adequate protection that appropriately balances defense-in-depth and risk considerations.	Adds clarity by reaffirming existing Commission policy regarding Type 1 initiatives and provides guidance and oversight for Type 2 initiatives, contributing to a systematic and coherent approach to regulation.
1.1 Draft a Commission policy statement that articulates a risk-informed defense-in-depth framework that includes extended design-basis requirements in the NRC's regulations as essential elements for ensuring adequate protection.	Does not address.
1.2 Initiate rulemaking to implement a risk-informed, defense-in-depth framework consistent with the above recommended Commission policy statement.	Does not address.

Table 1-3: Comparison of Improvement Activity 3 to NTTF Recommendation 1	
NTTF Recommendation	Activity 3
1.3 Modify the Regulatory Analysis Guidelines to more effectively implement the defense-in-depth philosophy in balance with the current emphasis on risk-based guidelines.	Does not address, although Regulatory Analysis Guidelines would be revised regarding when to credit voluntary industry initiatives in the baseline case.
1.4 Evaluate the insights from the IPE and IPEEE efforts … to identify potential generic regulations or plant-specific regulatory requirements.	Does not address.
Voluntary safety initiatives by licensees should not take the place of needed regulatory requirements. (NTTF Report, pp 19, 21)	Addresses by re-affirming Commission's expectation that industry initiatives may not be used in lieu of NRC regulatory action where a question of adequate protection of public health and safety exists. Strengthens expectations beyond the status quo for use of voluntary initiatives in cost-justified substantial safety enhancements.
The current NRC regulatory approach (requirements for design-basis events, beyond design-basis events, and voluntary initiatives) has resulted in a "patchwork" of regulatory requirements and other safety initiatives.	Improvement Activity 3 adds formal structure and NRC oversight to address the concerns identified by the NTTF with voluntary industry initiatives.

Table 1 in Attachment 4 to Enclosure 1 presents summary information on each improvement activity for easy comparison showing the extent to which each improvement activity addresses NTTF Recommendation 1.

G. Example of a Possible Outcome of Implementing Improvement Activity 3

To provide an example of the possible outcome of implementing this option, the staff has reviewed the history of its efforts in 2004–2005 to promulgate a rule requiring Mark III and ice condenser containments to provide backup power to hydrogen igniters. As the staff was performing the backfit analysis and regulatory analysis, industry representatives voluntarily proposed to install a rudimentary backup power system that relied substantially on operator manual actions. As a result of crediting this proposed initiative in the baseline case of the value-impact analysis, the benefits of the staff's proposed rule for ice condensers were reduced and the staff could not find that there was a "substantial increase" in protection to public health and safety, or that the proposed rule was cost-effective under the regulatory analysis. The staff believes that, had Improvement Activity 3 been implemented at the time of the proposed rulemaking, the industry initiative would have been credited only if verification activities (e.g., NRC inspections, reporting requirements, etc.) had been put in place.

H. Staff Evaluation of Alternative Approaches to Address Voluntary Industry Initiatives

The Recommendation 1 Working Group and the Steering Committee conducted a detailed evaluation of three different approaches for addressing the concerns on voluntary industry initiatives identified by the both the NTTF and the RMTF. They include:

Approach #1 - Credit initiatives in regulatory analyses only if highly likely to be implemented and maintained in the future; increase NRC oversight of significant voluntary industry initiatives

Approach #2 - Explore change in current Commission policy

Approach #3 – Maintain Status Quo on Voluntary Industry Initiatives

Additional details on the development of the NRC's current policy on voluntary initiatives and the specific considerations addressed by the staff in its evaluation of these different approaches are provided in Attachment 3 to this Enclosure.

HOW THE STAFF'S REGULATORY FRAMEWORK RECOMMENDATIONS WOULD ADDRESS THE RMTF RECOMMENDATIONS FOR POWER REACTORS

The Chairman's Tasking Memorandum on June 14, 2012, (ADAMS Accession No. ML121660102) directed the staff to "consider the regulatory framework recommendations for power reactors provided in the RMTF report [NUREG-2150] in its development of options for implementing NTTF Recommendation 1." The Chairman's memorandum also directed the staff to "review NUREG-2150 and provide a paper to the Commission that would identify options and make recommendations [responding to the RMTF recommendations]." This separate effort is now being performed by the Risk Management Regulatory Framework (RMRF) working group, which has been coordinating closely with the NTTF Recommendation 1 working group. Commission direction on Recommendation 1 will inform future actions taken regarding the RMRF. Accordingly, Table 2 of Attachment 4 shows how the proposed Recommendation 1 improvement activities would address the RMTF recommendations for power reactors in NUREG-2150. The staff believes that the new design-basis extension category proposed under Improvement Activity 1 could serve as a logical foundation which the staff can build upon when developing its plan to address the RMTF report recommendations for establishing a Risk Management Regulatory Framework. Similarly, the proposed establishment of a definition and criteria for adequacy of defense-in-depth under Improvement Activity 2 will be a key component of the risk-informed and performance-based defense-in-depth approach proposed by the RMTF under the Risk Management Regulatory Framework.

Staff Estimate of the Safety Benefits and Costs of Upgrading Existing PRAs to Meet Phase 4 of the Commission's Phased Approach to PRA Quality for Use in Support of Improvement Activities 1 and 2

Purpose

In this SECY paper, the staff noted that the issuance of a rule requiring Part 50 licensees to upgrade plant-specific PRAs to support a plant-specific design basis extension category approach under Improvement Activity 1 and to support the implementation of criteria for determining the adequacy of defense-in-depth under Improvement Activity 2 was not justified due to (1) the high cost of such a requirement and (2) the low anticipated level of safety benefits.[15] The purpose of this attachment is to provide the staff's analysis of the safety benefits and costs of promulgating a regulation requiring licensees to perform and update PRAs to a level of quality and completeness sufficient to make fundamental changes to a plant's licensing basis. Such PRAs could then be used in conjunction with regulatory framework changes that would (i) require the addition of some currently unregulated events or accidents to the new design-basis extension category of regulatory requirements that are now considered to be beyond design-basis requirements; (ii) permit licensees to re-designate existing design-basis requirements with low risk significance as "design-basis extension" requirements where less stringent levels of mitigation would be allowed; and (iii) permit licensees to eliminate certain non-risk-significant existing design-basis requirements. This plant-specific regulatory framework approach, which was considered but not selected by the NRC staff, is described further in Attachment 2 to Enclosure 1 where it is designated as Approach #1.

I. Estimated Safety Benefits of PRAs for Use in Support of Improvement Activities 1 and 2

The staff does not believe that a regulation requiring *current licensees* to develop and maintain a PRA can be justified at this time as necessary to implement Improvement Activities 1 and 2. A regulation requiring current licensees to perform a PRA would constitute backfitting under the Backfit Rule, 10 CFR 50.109, and be inconsistent with the comparable issue finality provisions in 10 CFR Part 52. Accordingly, such backfitting or inconsistency with issue finality provisions may not be imposed on licensees unless they demonstrate a substantial safety benefit (current guidance specifies a decrease of at least 1E-5/yr in CDF or a decrease of at least 1E-6/yr of LERF) and the burden associated with the backfitting is justified by the safety improvement (currently $2000 per person-REM averted). Based on currently available information, the NRC staff believes that a PRA regulation would be unlikely to identify substantial safety improvements beyond those that the current regulatory processes are capable of identifying.

For Improvement Activity 1 at the outset, safety improvements would only occur if the PRA provides risk information supporting licensee action or NRC adoption of a regulatory requirement which had previously been rejected on the basis of incorrect or incomplete risk information, or if the PRA identifies a previously unknown safety issue. The likelihood of such a circumstance is deemed relatively low by the staff, for the following reasons:

[15] Only the safety benefits of having a PRA are discussed in this attachment. Other potential benefits can result from having an updated PRA. Such benefits could include, but are not limited to, increased plant reliability and availability, decreased licensing costs, and increased plant operational flexibility. Because these factors are ancillary to the NRC's mission which is focused on safety and security, the staff did not attempt to estimate benefits other than those directly related to safety.

- All currently operating plants have PRAs that were initially developed from the IPE/IPEEE program that was a search for safety-significant vulnerabilities. Vulnerability was not defined but was generally applied at risk levels below the substantial safety benefit values. Vulnerabilities can be identified with conservative PRAs but may be missed with non-conservative PRAs. Internal events PRA models have improved significantly since the IPE/IPEEE models but have not identified any significant non-conservatism which could now result in previous unidentified vulnerabilities. Some vulnerabilities have been identified and fixed but any backfitting activities that could have been undertaken as a result of these reviews should already have been completed. However, recent activities mandated by Congress and the Commission to evaluate external events risk which may have been non-conservatively evaluated in the IPEEEs should be capable of identifying vulnerabilities; these vulnerabilities will be addressed as part of other ongoing efforts in response to the Fukushima events.

- The NRC staff evaluated and summarized the risk profiles of the operating fleet as reported by all licensees in the IPE and IPEEE program in NUREG-1560, "Individual Plant Examination Program: Perspectives on Reactor Safety and Plant Performance," and NUREG-1742, "Perspectives Gained from the Individual Plant Examination of External Events (IPEEE) Program." These summaries identified only SBO as an issue where the results for some plants indicated that additional backfit evaluations may have been able to justify the costs of actions beyond those required by the SBO rule. The available estimates did not exceed levels for which backfitting actions would normally be required, however, and plant specific backfits were not pursued.

- The Generic Safety Issues program has evaluated the generic risk of many issues using PRA techniques and closed or acted on these issues according to the risk results. In some cases these activities lead to backfits or more generally to development of new rules (ATWS, SBO) and, aside from a small number of new issues under evaluation, any backfitting or rulemaking activities that could have been undertaken as a result of these reviews should also have been completed. The program is still in place and new generic issues will be added as applicable.

- The environmental impact evaluation for license renewal requires plant-specific evaluation of the costs and benefits of safety improvements. The few cost beneficial modifications that have been identified in the approximately three-quarters of the fleet that have extended their licenses are generally based on very low cost and low (i.e., not substantial) benefit. Any backfitting activities that could have been undertaken as a result of these reviews should also have been completed.

- Many plants have used their PRAs to support requests for risk-informed licensing actions resulting in acceptably small increases in risk. Consistent with guidance in Regulatory Guide 1.174, changes to in-service inspections, in-service testing, allowed outage times have been requested and granted. Other more substantive changes such as implementation of the risk-informed fire protection rule, implementation of the 10 CFR 50.69 treatment requirements, and the transition to risk-managed technical specifications (Technical Specification Initiative 4b) have been and continue to be pursued. Although not a search for substantial safety benefits, the quantitative information provided in these applications includes risk estimate values which could identify substantial risk contributors, the mitigation of which could be considered in a backfit evaluation.

- The Reactor Oversight Process uses PRA techniques to estimate the risk of particular plant configurations and events associated with performance deficiencies. Although not a search for substantial safety benefits, the quantitative information provided in these applications includes risk estimate values which could identify substantial plant specific risk contributors, the mitigation of which could be considered in a backfit evaluation.

- The NRC Accident Sequence Precursor program provides annual, in-depth evaluations of the risk implications of observed events. Although not a search for substantial safety benefits, the quantitative information provided in these evaluations includes generic risk estimate values which could identify substantial risk contributors, the mitigation of which could be pursued in a backfit evaluation.

- The NRC SPAR program has developed PRAs for every operating reactor using standardized methods. The results of these SPAR models were compared with licensee PRA model results. Although not a search for substantial safety benefits, the quantitative information provided in these evaluations includes risk estimate values which could identify substantial plant specific risk contributors, the mitigation of which could be pursued in a backfit evaluation.

- NRR Office Instruction LIC-504, "Integrated Risk-Informed Decision-Making Process for Emergent Issues," sets forth an internal NRR process which describes making and documenting risk-informed decisions regarding what action the NRC should take in response to a potentially significant emergent issue at a US nuclear power plant. When feasible, this process develops risk estimates associated with the emergent issue as well as the proposed changes in risk associated with any proposed regulatory action. A number of LIC-504 evaluations have been performed to date. The quantitative information provided in LIC 504 evaluations includes risk estimate values which could identify substantial plant specific or generic risk contributors, the mitigation of which could be pursued in a backfit evaluation.

For Improvement Activity 2 on defense-in-depth, the determination as to whether a given issue challenges the defense-in-depth or whether any particular plant design provides adequate defense-in-depth might be enhanced if plant-specific risk information were available through a plant-specific PRA model meeting the Phase 4 level of quality. However, Improvement Activity 2 may be accomplished in an acceptable manner using risk information obtained from SPAR models or the licensees' current PRAs supported, as necessary, by an evaluation of the technical adequacy of the PRA to address the issue under consideration. Note also that a key purpose of defense-in-depth is to compensate for certainties (i.e., events do happen; equipment does fail) and for uncertainties, including uncertainties in PRA models. That is why defense-in-depth is a separate element of risk-informed regulation, which has five key principles[16]. Therefore, while true risk, if known, would "inform" the number of defenses that might be appropriate for a given hazard, risk as calculated by a PRA, given uncertainty including incompleteness, should be used with caution to influence decisions on the adequacy of the number of defenses between the radiological hazard and the public.

[16] The five key principles of risk-informed regulation are: (1) compliance with regulations unless an exemption is sought; (2) maintenance of adequate safety margins; (3) maintenance of adequate defense-in-depth; (4) any risk increases are small and consistent with the Commission's Safety Goal Policy Statement; and, (5) any change should be monitored using performance measurement strategies.

For these reasons and based on currently available information, the staff believes it would be difficult for the NRC to justify, using the existing quantitative cost/benefit and backfitting analysis approaches, promulgating an NRC regulation mandating PRAs for current nuclear power reactor licensees to support Improvement Activities 1 and 2.

II. Estimated Costs of Requiring Licensees to Upgrade Existing PRAs

This section explains how the staff developed its estimate of the costs of requiring nuclear power plant licensees to upgrade their existing PRAs to an acceptable level of scope and quality sufficient to support making fundamental plant-specific changes to the current licensing basis of individual plants. Such licensing basis changes could include: (i) the addition of some currently unregulated events or accidents to the new design-basis extension category of regulatory requirements that are now considered to be beyond design-basis requirements; (ii) re-designation of existing design-basis requirements with low risk significance as "design-basis extension" requirements where less stringent levels of mitigation would be allowed; and (iii) elimination of certain non-risk-significant existing design-basis requirements. A PRA of Phase 4 scope and quality would be also adequate to inform the defense-in-depth decision criteria associated with Improvement Activity 2, although a PRA of lesser scope and quality would also be sufficient.

Background

On November 2, 2012, the NRC staff provided to interested stakeholders its initial cost estimate of a PRA that would be sufficient to make fundamental changes to a plant's licensing basis. Both NEI and the PWROG provided information indicating that the staff's estimates were substantially low. This section provides the staff's detailed estimate for a PRA that would meet Phase 4 of the Commission's graded quality initiative, which is what the staff believes would be necessary to support the establishment of a plant-specific licensing basis.

The staff evaluated whether the NRC should amend its regulations to require current nuclear power plant licensees to upgrade their existing PRAs to a level of PRA quality sufficient to support a regulatory framework embodying plant-specific licensing basis based upon risk-informed considerations. Because such a regulatory framework approach would allow both the NRC and licensees to reduce certain existing regulatory requirements, the staff believes it essential that existing plant PRAs used to determine the plant-specific risk profiles of these facilities be upgraded to have acceptable scope, technical adequacy, and quality.

Because this regulatory framework approach would require rulemaking, it must be evaluated by performing both a regulatory analysis and a backfit analysis.[17] Thus, it is important to know the cost of requiring licensees to upgrade their existing PRAs to a level that would support establishing and maintaining site-specific licensing bases for each reactor facility.

[17] A backfit analysis would be required, in addition to a regulatory analysis, because the contemplation of both the NTTF and the RMTF is to conduct rulemaking to apply the new regulatory framework to existing nuclear power plants. Such an imposition would constitute backfitting. Plants licensed under 10 CFR Part 52, and design certifications under Part 52 already have PRAs as required by regulation. Therefore, it would be unnecessary to backfit those plants and designs and the issue finality provisions of Part 52 need not be addressed.

Initial Staff Estimate of PRA Cost

The NRC staff's first estimate of the cost of upgrading PRAs to support a site-specific licensing approach was described in an option summary document made public on November 2, 2012 (ADAMS Accession No. ML12296A096). Among other alternatives, this document analyzed an Option 4b which was patterned after the design-enhancement category approach recommended by the RMTF. The staff's original estimate for the one-time costs of upgrading licensee PRAs is shown in Table 1 below.

Table 1. Original Staff Cost Estimate of Industry Cost for Upgrading PRA to All Mode, All Initiating Events

Industry Costs	Hours per action	No. of actions	Labor rate	Implementation cost
Upgrade plant-specific PRA	3120	68	$105	$22,276,800
Peer review plant specific PRAs	624	68	$105	$4,455,360
			Total	$26,732,000*
Average licensee cost per unit				$393,000*

*Numbers rounded to the nearest thousand dollars

The staff then estimated the present value of the annual cost to maintain those PRAs throughout the average remaining estimated lifetime (27 years) of the operating reactor fleet ($21,000 per unit for 104 plants for a total of $2,184,000 per year for 27 years) resulting in $42,000,000 at 3% discount and $28,000,000 at 7% discount rate. Thus, the total costs of the PRA requirement were initially estimated to be $68.7 million (@ 3% discount rate) or $54.7 million (@ 7% discount rate).

Stakeholder Comments on the Initial Staff Estimates

The staff requested public comments on its November 2012 option summary document in late 2012. The staff received comments from the Pressurized Water Reactors Owners Group (PWROG) and the Nuclear Energy Institute (NEI). Among other comments provided, both commenters stated that the NRC's initial PRA cost estimates were substantially underestimated. The comments of the PWROG and NEI are presented separately below.

Pressurized Water Reactors Owners Group Comments

In its December 12, 2012, comment submission letter, the PRWOG provided the following detailed cost estimates for upgrading existing licensee PRAs:

Table 2. PWROG Cost Estimates for Upgrading Various Types of PRAs

Scope	Low Estimate	High Estimate
Internal Events (including Internal flooding)	$500,000	$1,500,000
Fire	$1,500,000	$3,000,000
Seismic	$1,500,000	$3,000,000
Other External Events	$250,000	$500,000
LPSD/SFP	$200,000	$300,000

Other	$100,000	$200,000

Based on the above estimates, the total industry cost of model upgrades would range from $168,700,000 to $339,200,000 if it is assumed that only 17 of the 68 sites require significant upgrades to their internal events PRA and an upgraded fire PRA. This PWROG estimate indicates that the initial NRC estimates of the required resources for development of full-scope, all-modes PRA models sufficient to support the proposed regulatory framework are underestimated by up to a factor of 12.

The PWROG stated that peer review costs were also underestimated by the NRC. Estimates provided by the PWROG for each peer review, excluding utility support, are as follows:

Table 3. PWROG Cost Estimates for Peer Reviews

Scope	Partial Review	Full Review
Internal Events, Other External Events, and LPSD	$60,000	$90,000
Fire and Seismic	$70,000	$124,000

As discussed above, if it is assumed that 17 of the 68 sites require fire and internal events PRA peer reviews, the total industry cost of required PRA peer reviews, including approximately 160 hours of utility labor per review, is $26,282,000 to $37,364,000. Thus, the PWROG estimated that PRA upgrade costs would range from $195 million to $377 million. The PWROG did not provide estimates of the annual costs for licensees to maintain their upgraded PRAs.

Nuclear Energy Institute Comments

In its December 13, 2012, comment submission letter, the Nuclear Energy Institute provided the following cost estimates for upgrading existing licensee PRAs:

Table 4. NEI PRA Cost Estimates

Scope	Development Cost Range	Peer Review Cost Range	Peer Review Finding Resolution Cost Range	Annual Maintenance Cost Range
Internal Events	$600,000 - $4,000,000 (Note 1)	$90,000 - $150,000	$75,000 - $250,000	$125,000 - $150,000
Fire	$1,500,000 - $4,000,000 (Note 2)	$350,000 - $625,000 (Note 3)	$130,000 - $500,000	$50,000 - $250,000
Seismic	$1,500,000 - $3,500,000	$150,000 - $250,000	$200,000 - $250,000 (Note 4)	$100,000 - $150,000

Notes:

(1) The majority of the fleet upgraded existing internal events PRAs to meet the ASME/ANS PRA Standard; the lower end of this range reflects plants that used this approach while the upper end represents those plants that undertook a substantial model reconstruction.

(2) The lower end of this range reflects the fact that not all plants include fire modeling and circuit analysis in their Fire PRA development costs.

(3) The upper end of this range reflects the fact that some plants had to do substantial documentation work to support their Fire PRA peer reviews.

(4) As no final Seismic PRA Peer Review report has been issued, these are estimates.

NRC Staff Cost Estimate

After reviewing the cost estimates provided by the PWROG and NEI, the NRC staff made its own estimate using the more detailed incremental PRA upgrade costs provided by the PWROG, added annual PRA maintenance costs similar to those provided by NEI, and applied them to the staff's estimate of the overall scope and quality of PRAs across the current operating reactor fleet.

As can be seen from Table 5 below, the staff's estimate of the present value of the total costs of a PRA requirement range from $702 million (@ 7% discount rate) to $865 million (@ 3% discount rate).

Table 5. Cost Estimates for Existing Plants to Upgrade PRAs to Achieve Phase 4 of the Graded Quality Initiative[18]

Type of PRA activity	Number of Sites (1)	Cost of Upgrade (2)	Cost of Peer Review (3)	Cost of Peer Review Comment Resolution (3)	Implementation Cost
Internal PRA Major upgrade	30	$1,500,000*	$150,000*	$250,000*	$57.0M
Internal PRA Minor upgrade	31	$500,000*	$90,000*	$75,000*	$20.6M
Fire PRA Major upgrade (4)	30	$4,000,000	$625,000*	$500,000*	$153.8M
Fire PRA Minor upgrade (4)	31	$200,000	$90,000(7)	$75,000(7)	$11.3M
Seismic PRA Major upgrade (8)	30	$3,000,000*	$250,000*	$250,000	$105.0M
Seismic PRA Minor upgrade (8)	31	$200,000 (9)	$90,000 (9)	$75,000 (10)	$11.3M
Other PRA Upgrades		(6)	(6)	(6)	(6)
				Total	$359.0M
				Annual Maintenance	$342.8M – $506.2M(5)

(1) This table uses 61 sites for the purpose of developing the estimate. The NRC 2013-2014 Information Digest (NUREG-1350, Volume 25, dated August 2013 (ADAMS Accession No. ML13241A207)), states that as of June 30, 2013, there were 62 commercial reactor sites including Vermont Yankee Nuclear Power Station. However, the operator of Vermont Yankee Nuclear Power Station announced plans to permanently cease operations, so that site was removed and a total of 61 sites was used in the table.
(2) All sites will require at least minor upgrades to appropriately clean up and develop final documentation of the technical adequacy of their PRAs.
(3) All sites will require a new Peer Review (perhaps 3 or 4 sites have a new, post-2009 peer review, but that fact is not reflected in this table). This is not currently required but experience with NFPA-805 indicates that uncertainties arising from (sometimes 14 year old) peer reviews supported by a series of "focused scope" reviews are a major obstacle to swift and efficient NRC PRA quality determination.
(4) PWROG estimated $1,500,000 to $3,000,000 for fire PRAs. This has been changed to $200,000 for plants with recent fire PRAs, and $4,000,000 to perform a fire PRA.
(5) This cost range represents the 7% and 3% net present values of annual maintenance at 61 sites by 2 additional full time employees at each site over an average remaining number of life-years per site of 24 years. Maintenance includes PRA analysts to review new information and all plant changes and incorporate changes in PRA as needed.

[18] Phase 4 is described in Staff Requirements Memorandum – COMNJD-03-0002 – Stabilizing the PRA Quality Expectations and Requirements.

(6) Insufficient information was available to estimate costs associated with upgrading PRAs to include “other initiating events.”
(7) Industry low peer review was 350,000 for review, 130,000 for resolution but low values for internal events peer reviews seem more applicable.
(8) Industry is currently reevaluating their expected ground motion hazards to determine whether a Seismic risk assessment will be required. These reevaluations will be completed by the second quarter of 2014. For planning purposes, a reasonable estimate assumes that ½ of the facilities will need to perform a risk assessment to fulfill the 50.54f letter requirements.
(9) Values estimated to be the same as a fire PRA minor upgrade.
* Estimate taken for PWROG Cost estimate report – high estimates used for Major updates, low estimates used for Minor updates.

Staff Evaluation of Alternative Approaches to Develop a New Category for Beyond Design-Basis Events and Associated Requirements

Both the NTTF and the RMTF reports discuss options for creating a single new event category but offer differing insights as to what this new category may look like and how it would be populated with events and associated requirements. The extent to which the implementation of Improvement Activity 1 conforms with either NTTF or RMTF recommendations depends upon how five key issues are resolved. These key issues are presented below:

1. Would the approach be generic, plant-specific, or a hybrid?
2. Would the category be for adequate protection, safety enhancement, or both?
3. Would a plant-specific PRA regulation be required?
4. Would the new category be applicable to new reactors only, or also to operating plants?
5. Would the category be populated on a forward-looking or retrospective basis?

The various combinations of possible answers to the five questions could result in substantially different approaches to develop a new category of accidents or events. The NRC staff considered the various combinations of answers to these questions and selected the following three approaches for establishing a new category to analyze in detail before making a recommendation on this proposed improvement activity.

- A plant-specific approach using NRC-required plant-specific PRA models
- A plant-specific approach using generic risk information and plant-specific risk insights developed by an expert panel established by the licensee
- A generic approach without a PRA requirement, which would use available risk insights from licensee PRAs, NRC risk studies (e.g., SOARCA; Level 3 PRA Project), and SPAR models

The WG believes there are three reasons why the NTTF and RMTF recommended creating and populating a new category of events and accidents:

- To increase **safety**,
- To increase **coherency** of how our regulations address safety issues, and
- To reduce unnecessary licensee **burden**.

The WG evaluated the three different approaches for establishing a new category against these criteria to develop its recommended approach.

Approach #1: Plant-Specific Approach Using NRC-Required Plant-Specific PRA Models

This approach is modeled after the approach recommended by the RMTF as described in NUREG-2150, Appendix H, Alternatives 2 and 3. Licensees would be required to perform plant-specific PRAs meeting standards specified by the NRC. The PRA results would be analyzed to identify plant-specific event sequences which exceeded threshold criteria also specified by the NRC. The threshold criteria could be risk-informed or could be augmented to consider cost effectiveness. Event sequences exceeding the thresholds would be required to be mitigated by licensees to reduce risk to meet acceptance criteria established by the NRC.

The WG's evaluation of Approach #1 concluded that it would be the most thorough and systematic approach. It would be consistent with current Commission policy to increase the use of PRAs and to increase safety of new reactors by using PRAs to perform severe accident

evaluations. The WG agrees that the PRAs utilized by this approach could identify some plant-specific risk outliers that could not be identified by generic approaches. Thus, Approach #1 could **increase safety** by identifying and requiring licensees to mitigate plant-specific risk outliers. However, the WG believes there is substantial uncertainty regarding the magnitude of such safety increases. The capability of PRAs to identify unforeseen safety issues is limited because PRAs cannot identify unknown phenomena or scenarios not already incorporated into the PRA models. The NRC staff believes that Approach #1 is not likely to result in major safety benefits because all operating reactors have PRAs (of varying quality) and have used them to search for site-specific vulnerabilities (i.e., Generic Letter 88-20). Licensees also use PRAs to support risk-informed regulatory activities (e.g., 10 CFR 50.65 risk assessments and the Significance Determination Process of the Reactor Oversight Program), and to propose risk-informed alternatives to regulatory requirements (e.g., changes to Technical Specifications and in-service inspection programs). Therefore, it is likely that some potential vulnerabilities and some opportunities to reduce unnecessary burden that might be identified by a PRA have already been identified. Also, ongoing post-Fukushima actions and other external hazards reviews are addressing site-specific vulnerabilities related to seismic and flooding events (e.g., Recommendations 2.1 and 2.3). And finally, the other post-Fukushima activities, including the station-blackout/mitigation strategies Orders and rulemaking, are addressing a wide range of potential safety issues which will result in further reductions in overall risk.

Approach #1 may **reduce stakeholders'** (both internal and external) **perception of** the overall **coherency** of NRC's regulatory framework. The overall coherence of NRC's regulatory framework for power reactors has depended, from a historical perspective, on a comprehensive set of generic safety requirements addressing a complete set of external events, physical phenomena, and plant conditions and accidents that determined the fundamental basis for radiological health and safety. The staff recognizes that some NRC regulations for power reactors are written to take into account plant-specific (and site-specific) information, primarily in the area of consideration of natural phenomena. Nonetheless, most NRC technical requirements for power reactors are written to apply "generically" (if not to all plants, to all plants of a class or design as specified in the regulation, e.g., all boiling water reactors). These "generic" regulations are applied (absent an NRC exemption) uniformly to all plants within the class. Approach #1 differs significantly from this existing regulatory framework paradigm, by allowing a *plant-specific* determination of the technical requirements based upon *plant-specific risk information*. Mandating the use (as opposed to allowing the voluntary use) of a plant-specific approach for determining the technical requirements may result in the growing irrelevance of NRC generic technical requirements to the new plant-specific regulatory framework inasmuch as the technically-relevant requirements would be reflected in each plant's licensing basis/design basis. Consequently, industry stakeholders may seek to remove the "generic" technical requirements from the NRC's generic regulatory framework on the basis that they are no longer necessary to safety. While the staff believes that the generic technical issues must be retained in the NRC's regulations if only to specify the technical matters which applicants and licensees must address, the staff also believes that much of the "prescriptive" and perhaps even some aspects of the current performance-based requirements would not be needed under Approach 1 and could result in significant rewriting of the full set of technical regulations. The rewriting activity, as well as each licensee's actions to demonstrate compliance under a plant-specific approach, would require significant resource expenditures by both the NRC and licensees. Moreover, there may be reductions in NRC's regulatory efficiency as individual plants' licensing bases diverge, making it more difficult for the NRC to identify evolving trends and problems. Divergence of licensing bases may also make it more difficult for the industry (or discrete segments, such as owners groups) to effectively develop common approaches for resolving emerging issues.

On the other hand, if the NRC adopts a new regulatory paradigm of implementing risk-informed regulation on a *plant-specific basis* under Approach #1, and on that basis removes or rewrites unnecessary generic requirements, then the result would be **greater** overall **coherence between the regulatory framework** and both the plant-specific licensing bases **and the risk profiles across the entire fleet of plants**.

Approach #1 may reduce public confidence in NRC's regulatory processes, not only because of the possible perceived lack of coherence, but also because PRA results and supporting information/analyses are not transparent to and easily understood by many members of the public. During public meetings related to Recommendation 1, some stakeholders have expressed a lack of confidence in PRA results and urged the NRC not to implement a new regulatory framework based on PRA.

Approach #1 could **reduce unnecessary** licensee **burden** because the plant-specific PRAs could also be used to identify existing NRC requirements that are not risk-significant at certain plants and thus could be reduced without significantly affecting overall facility risk. However, there are significant costs associated with upgrading existing PRA models[19], maintaining the models, and inspecting the plant-specific licensing bases.

Therefore, the WG did not further consider Approach #1 because it is costly for existing Part 50 licensees and has uncertain safety benefits. The staff's detailed estimates of the benefits and costs of a rule requiring licensees to perform and update PRAs for use in this regulatory framework approach is provided in Attachment 1 to Enclosure 1.

Approach #2: Plant-Specific Approach Using Generic Risk Information and Plant-Specific Risk Insights Developed by an Expert Panel Established by the Licensee

Instead of requiring licensees to perform plant-specific PRAs, Approach #2 would require licensees to use expert panels to evaluate generic risk information and develop plant-specific risk insights to identify risk outliers for further mitigation and to identify existing, non-risk-significant requirements which could be reduced to eliminate unnecessary licensee burden.

The WG believes that expert panels (without having the benefit of an up-to-date plant-specific PRA) might not be able to identify plant-specific risk outliers. Thus, there is uncertainty over whether this approach could increase **safety**.

The WG also believes that without the benefit of a plant-specific PRA, expert panels might have trouble identifying existing, non-risk-significant requirements which could be reduced. Thus the WG believes that recommendations on how to reduce existing requirements to eliminate **burden** might be subjective and inconsistent from plant to plant.

Because Approach #2 would be based upon the same plant-specific regulatory framework paradigm as Approach 1, Approach #2 may also **reduce stakeholders'** (both internal and external) **perception** of the overall **coherency** of NRC's regulatory framework. Similarly,

[19] Costs for existing Part 50 licensees to perform and maintain PRAs consistent with the NRC-endorsed industry consensus standards have been estimated by the NRC and industry to be in the range of several hundred million dollars. The staff qualitatively estimated only the safety benefits that could result from requiring PRAs. The staff did not attempt to estimate the potential non-safety benefits that could result from having PRAs.

successful implementation of Approach 2 could **increase** overall **coherence between the regulatory framework and** the plant-specific **risk profiles across the entire fleet of plants**.

Approach #2, like Approach #1, may reduce public confidence in NRC's regulatory processes because of the perceived lack of coherence and because risk information and supporting information/analyses are not transparent to and easily understood by many members of the public. Additionally, because Approach #2 uses expert panels instead of quantitative PRAs to consider risk information, some stakeholders might not be convinced that licensee expert panel reviews could be conducted in an objective and unbiased manner. Thus, Approach #2 has an additional factor which may result in reduced public confidence in the NRC's regulatory oversight which is not present under Approach #1.

Furthermore, this approach would be very difficult for the NRC staff to implement. The NRC would have to specify criteria and thresholds for licensees to use to identify which risk outliers to mitigate and which non-risk significant existing requirements could be reduced. Without having a PRA updated to comply with NRC-endorsed industry standards, the WG believes it would be difficult to implement consistent regulatory oversight of applicants and licensees. It may also result in inconsistency in the level of safety achieved by different licensees.

Therefore, the WG does not recommend Approach #2 because of concerns about its overall effectiveness and consistency and the difficulty of NRC implementation.

Approach #3 - Generic Approach without a PRA Requirement Which Would Use Available Risk Insights from Licensee PRAs, NRC Risk Studies (e.g., SOARCA; Level 3 PRA Project) and SPAR Models

Under a generic approach the NRC would search for and identify any risk-significant new events and/or accidents, and would promulgate generic requirements for all licensees (or groups or classes of licensees) to reduce the risk posed by these new events. These new requirements (and certain existing requirements) would be grouped together in a new category established for "design-basis extension" requirements. Rulemaking would be conducted to define the new category and describe the types of requirements that it would include.

The WG's evaluation of this approach concluded that it is unlikely to directly increase **safety** beyond that already achieved by the current framework because its generic structure closely resembles and would rely on many of the same processes used under the existing generic regulatory framework. The NRC already has an extensive set of processes and programs in place to search for and evaluate new potential safety issues. Such programs include but are not limited to public petition processes for rulemaking and enforcement actions, the Accident Sequence Precursor program, the Reactor Operating Experience Program, the Generic Issues program, the Reactor Oversight (Inspection) program, the Industry Trends program, and the Agency Action Review Meeting to review ROP effectiveness and trends in industry and licensee performance. The WG does not believe that a comprehensive re-evaluation of existing generic regulatory requirements using available risk insights under Approach #3 is likely to result in increased safety by identifying additional necessary requirements not already identified by the existing processes described above. Furthermore, the NRC's mitigation strategies order (EA-12-049), the ongoing industry FLEX program, and the SBO mitigation strategies rule are being implemented to provide additional protection for existing plants against a wide range of unspecified beyond design basis accident conditions. If new or unforeseen events or conditions are identified, it is likely that the new systems and equipment being installed under these activities would provide at least partial mitigating capability for the adverse conditions. In

addition to the SBO mitigation strategies rule, other ongoing efforts in response to the other Fukushima NTTF recommendations are also investigating a wide range of safety potential concerns for possible additional requirements. Additionally, existing plants have all performed IPE and IPEEE studies to identify and mitigate certain plant-specific risk outliers associated with severe accident vulnerabilities. New reactors are required to have plant-specific PRA models which are used to identify plant-specific risk outliers and to analyze design features to prevent and mitigate severe accidents. Therefore, in light of these activities, Approach #3 would be unlikely to identify new generic requirements that would result in an increase in safety.

The WG determined that Approach #3 could reduce unnecessary regulatory **burden** from generic requirements which are found to be non-risk significant based upon an integrated consideration of available risk information. However, a generic approach would not facilitate removal or reduction of generic requirements which are not risk-significant at a particular facility because of unique plant-specific or site-specific considerations.

The WG determined that Approach #3 would increase **coherency** because the establishment of the new "design-basis extension" category of requirements would make it clear to both internal and external stakeholders that the NRC regulations may go beyond the existing "design basis" in certain instances and would not always require "safety-grade" regulatory treatment requirements for the equipment required by the regulations in the new category. The WG notes that the new category would be consistent with IAEA and other international standards and recommendations.

However, because the new "design-basis extension" category established under Approach #3 is not expected to significantly enhance safety, the WG concluded that it was of primary importance to minimize the implementation cost and burden of the approach to both licensees and to the NRC. By minimizing costs, resources to establish the new category would not be diverted from other ongoing NRC and licensee efforts to enhance nuclear power reactor safety. For these reasons, the WG proposes the simplified generic approach for establishing the new design-basis extension category described in Enclosure 1.

Staff Evaluation of Alternative Approaches to Address Voluntary Industry Initiatives

A Brief History of Crediting Industry Initiatives in NRC's Regulatory Analyses

Prior to Revision 2 of the Regulatory Analysis Guidelines (NUREG/BR-0058), there was no formal NRC guidance on how to treat voluntary industry initiatives in Regulatory Analyses.[20]

The NRC issued Revision 2 of the Regulatory Analysis Guidelines in November 1995.

- For base case calculations, "no credit" was to be given for voluntary actions taken by licensees.
- However, for sensitivity analysis purposes, costs and benefits were displayed with "full" credit for voluntary activities.
- In addition, the guidelines specified that if voluntary programs are effective, such that there are no problems, there is no need to codify them in the regulations.
- There was no formal program for reviewing and accepting voluntary industry initiatives.

The following quote from the Regulatory Analysis Guidelines reflects the NRC's concerns with voluntary industry initiatives at that time:

> Most voluntary actions are discretionary, and their impacts are primarily ongoing and future-oriented. Voluntary programs might be characterized as adopting vague requirements, lacking in NRC enforceability, and resulting in nonuniform programs across all licensees. The NRC intends to be able to impose regulatory requirements in lieu of voluntary programs that, for any number of reasons, are not providing the level of safety assurance the NRC deems necessary. This would be the case, for example, when voluntary programs are nonuniform across all licensees. As a result, some licensees may not have a program, or established programs could easily dissipate by licensee action alone, perhaps without NRC's knowledge. Furthermore, if credit is provided for voluntary initiatives and values and impacts associated with the proposed regulatory action are reduced, meaningful health and safety improvements could not be assumed in the future because they would remain uncodified and voluntary in nature, not subject to enforcement on the part of the NRC.[21]

The staff noted that this practice of reviewing initiatives is informal and relies on judgments that are not explicitly acknowledged or systematically documented. There is no formal NRC definition of an industry initiative or formal NRC approval of criteria to use in evaluating them. There is no tracking or repository of industry initiatives, and there is no program in place to verify that licensees follow through on proposed initiatives.[22]

In 1996, the Commission expressed concern regarding the NRC's monitoring of voluntary programs or activities initiated by the industry in lieu of the imposition of regulatory

[20] SECY-99-178, "Treatment of Voluntary Initiatives in Regulatory Analyses," dated July 9, 1999 (ADAMS Accession No. ML992370072), page 2

[21] NUREG/BR-0058, Revision 2, "Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission," dated November 1995 (ADAMS Accession No. ML111180434), page 19

[22] SECY-97-303, "'The Role of Industry (DSI-13)' and Use of Industry Initiatives," dated December 31, 1997 (ADAMS Accession No. ML12263A785)

requirements.[23] The Commission directed the staff to develop and activate a procedure to verify that such voluntary industry programs are, in fact, being carried out. The Commission also requested the staff to inform the Commission of possible methods for determining the effectiveness of these programs.

In 1997, the Commission appeared to change its view on voluntary industry actions when it disapproved a proposed rule on shutdown operations and directed the staff to review current regulatory analysis methodology in light of the ongoing evaluation of a proposal, known as Direction Setting Issue (DSI) 13, to increase NRC reliance on industry activities as an alternative for NRC regulatory activities. The Commission directed the staff to submit, for Commission review, options that would address possible revisions to the regulatory analysis methodology, particularly with regard to recognition of existing initiatives and voluntary actions in the cost-benefit analyses.[24]

In 1999, the staff submitted its proposed revisions to the regulatory analysis methodology regarding treatment of voluntary initiatives in regulatory analyses.[25] The Commission approved the staff's recommended approach.[26] The NRC issued Revision 3 to the Regulatory Analysis Guidelines incorporated the revised methodology in July 2000.[27] This approach remains the NRC's current position with respect to the treatment of voluntary initiatives in regulatory analyses.

- Develop two sets of value-impact estimates: one based on "no credit" and the other based on "full credit" for industry initiatives. These results will have equal weight and will be presented for sensitivity analysis purposes. If the overall value-impact result does not tilt from an overall net cost to an overall net benefit (or vice versa), there is no need to proceed further.
- If the results are highly sensitive to that level of variation, such that the overall value-impact conclusion shifts or the final recommendation changes, the analyst would proceed to develop a "best estimate" base case.

At the time this approach was developed, the staff and the Commission expected that a formal process for reviewing and accepting voluntary industry initiatives would be developed (as a result of DSI-13) and that this would increase NRC's assurance that industry initiatives will be effective long-term alternatives to regulatory actions.[28]

However, the NRC withdrew the proposed voluntary industry initiative program in 2001 after overwhelmingly negative feedback from stakeholders.[29,30] Some industry stakeholders

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[23] "Staff Requirements – Briefing on NRC Inspection Activities, 10:00 a.m., Friday, May 31, 1996, Commissioners' Conference Room, One White Flint North, Rockville, Maryland (Open to Public Attendance)," dated July 30, 1996 (ADAMS Accession No. ML003754984)

[24] SRM-SECY-97-168, "Issuance for Public Comment of Proposed Rulemaking Package for Shutdown and Fuel Storage Pool Operation," dated December 11, 1997 (ADAMS Accession No. ML003752569)

[25] SECY-99-178, "Treatment of Voluntary Initiatives in Regulatory Analyses," dated July 9, 1999 (ADAMS Accession No. ML992370072)

[26] SRM-SECY-99-178, "Treatment of Voluntary Initiatives in Regulatory Analyses," dated August 26, 1999 (ADAMS Accession No. ML003752222)

[27] NUREG/BR-0058, Revision 3, "Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission," dated July 2000 (ADAMS Accession No. ML023290519)

[28] Regulatory Analysis Guidelines, Revision 3, page 23

[29] 65 FR 53050, "Proposed Guidelines for Including Industry Initiatives in the Regulatory Process," dated August 31, 2000

perceived the proposed guidelines on industry initiatives as imposing a burdensome obstacle to open and candid interactions between the regulator and the industry. A public interest group stated that it is "…categorically opposed to the regulatory retreat under way at the U.S. Nuclear Regulatory Commission (NRC) under the guise of voluntary industry initiatives (in lieu of regulation)...The NRC plans to supplant regulation with voluntary initiatives that are non-enforceable, remove the public from the process, and fail to address significant safety issues....Proposed guidelines will limit the ability of the public to meaningfully participate in the decisions that affect the health and safety of our families, homes, and communities...." In view of the stakeholders' reluctance to embrace the proposed guidelines, the staff concluded that implementing this largely voluntary process would be ineffective.

In summary, the current NRC policy is that the current regulatory framework does not preclude voluntary initiatives serving as substitutes for NRC regulatory action for safety enhancements. Issues related to adequate protection of public health and safety are deemed the responsibility of the NRC and should not be addressed through industry initiatives. The current Regulatory Analysis Guidelines state that the NRC encourages voluntary initiatives and credits them in regulatory analyses supporting regulatory decisionmaking. However, there is no formal NRC process for reviewing and accepting voluntary industry initiatives and there is no formal NRC program in place for verifying that voluntary initiatives have been effectively implemented or maintained over time.

Relying on Industry Initiatives

This background discussion has focused on the history of crediting industry initiatives in NRC's regulatory analyses. A separate and more fundamental policy issue is whether it is appropriate to allow an industry initiative to serve as a substitute for NRC regulatory action. The following paragraphs provide more background on the history of that policy issue.

In 1996, the staff identified "the role of industry" as an issue (DSI-13) that affects the basic nature of NRC activities and the means by which this work is accomplished.[31] In its description of this issue, the staff noted that the existing interaction had evolved absent an overall explicit policy statement. Prior to this date, the NRC had allowed voluntary industry actions to serve as a substitute for NRC regulatory actions on several occasions. One example is when the Commission directed the staff to approve the installation of hardened vents for Mark I containments under 10 CFR 50.59.[32]

In 1997, the Commission directed the staff to evaluate further reliance on industry activities as an alternative to NRC regulatory activities and to develop guidance to describe the process and the general decision criteria the NRC would use for evaluating proposals. The staff provided the results of its evaluation to the Commission in 1999. The Commission responded with the statement below which is still the NRC's current policy:

> The Commission has approved the staff's recommendation that voluntary industry initiatives will not be used in lieu of regulatory action where a question of

[30] 66 FR 43597, "Notice of Withdrawal of Proposed Voluntary Industry Initiative Program," dated August 20, 2001

[31] "Strategic Assessment Issue Paper, Direction Setting Issue 13 (DSI) 13 - The Role of Industry," dated September 13, 1996 (ADAMS Accession No. ML051590494)

[32] SRM-SECY-89-017, "Mark I Containment Performance Improvement Program," dated July 11, 1989 (ADAMS Accession No. ML12291B088)

> adequate protection of public health and safety exists. Voluntary industry initiatives are approved as an appropriate substitute for NRC regulatory action where the action to be taken is needed to meet existing requirements or for cases where substantial increase in overall protection can be achieved with costs of implementation justifying the increased protection. The Commission has agreed that the current regulatory framework does not preclude voluntary industry initiatives and existing regulatory processes can be used to support implementation of voluntary initiatives. The staff should move forward, working with industry and other stakeholders, in the development of the process and guidelines for use of industry initiatives in the regulatory process. The guidelines should be provided to the Commission for review prior to their implementation.[33]

In 2000, the Regulatory Analysis Guidelines were revised to include a statement implying that it is the agency's policy to encourage voluntary initiatives.[34]

In summary, the current policy is that voluntary initiatives may serve as a substitute for regulatory action where the action to be taken is needed to meet existing requirements or for cases where a substantial increase in overall protection can be achieved with costs of implementation justifying the increased protection but not for issues of adequate protection. However, there is no process in place for reviewing and overseeing voluntary initiatives. Again, it should be noted that the guidelines for use of industry initiatives in the regulatory process mentioned in the previous quote were developed and issued for public comment but were later withdrawn.

Three Types of Industry Initiatives

The current version of the Regulatory Analysis Guidelines provides the following description of three types of industry initiatives:

Industry initiatives can generally be put into one of the following categories:

(1) those put in place in lieu of, or to complement, a regulatory action to ensure that existing requirements are met,

(2) those used in lieu of, or to complement, a regulatory action in which a substantial increase in overall protection could be achieved with costs of implementation justifying the increased protection, and

(3) those that were initiated to address an issue of concern to the industry but that may or may not be of regulatory concern.

Fukushima

The Fukushima Dai-ichi event highlighted that some measures previously put in place as voluntary initiatives in the United States to deal with severe accidents (e.g., severe accident management guidelines (SAMGs) and hardened vents), could have played a significant role in

[33] SRM-SECY-99-063, "The Use by Industry of Voluntary Initiatives in the Regulatory Process," dated May 27, 1999 (ADAMS Accession No. ML003752062)

[34] The footnote on page 5 includes the following statement: "The Commission also believes that this approach…is consistent with the agency's policy of encouraging voluntary initiatives."

preventing or mitigating the accident. However, NRC assessments performed after the Fukushima event reinforced that these specific examples were not subject to NRC inspection or enforcement activities. In addition, the implementation and maintenance of the industry initiatives did not, in some cases, provide the desired degree of confidence that equipment or procedures would have worked as the NRC had intended when an industry initiative was accepted in lieu of taking a regulatory action. As discussed below, both the Near-Term Task Force and the Risk Management Task Force expressed concerns that in some cases use of licensee voluntary initiatives has led to inefficiencies and potentially less robust resolutions of issues. The lack of inspection and enforcement for such initiatives, which has been NRC's practice, may have contributed to some measures implemented as part of voluntary initiatives to degrade over time.

Enforceability

The NRC's ability to enforce industry initiatives is limited. An industry initiative is not directly enforceable, but a licensee's failure to meet a formal commitment could be the basis for a notice of deviation and any associated finding would be captured by the Reactor Oversight Process. Actions taken to address Type 2 industry initiatives are developed and implemented by licensees outside the scope of existing regulatory requirements, and they can be documented in written commitments. Traditional enforcement would not be possible, although an inspector could write a notice of deviation from the licensee's commitments. While a deviation is within the enforcement guidance, it is not captured by the Reactor Oversight Process unless there is an associated finding. A finding can be associated with a regulatory requirement or a licensee's self-imposed standard. In the case of deviations, a finding exists if the licensee failed to implement a self-imposed standard, the issue was within the licensee's ability to foresee and correct and therefore should have been prevented, and the issue is more than minor in accordance with Reactor Oversight Process program guidance. If the Reactor Oversight Process inspection program issues a finding, the significance of the finding would be determined in the significance determination process and it would be assigned a color. This finding will be an input into the overall inspection level for the plant. Licensees could respond by putting the finding into their corrective action program and by making changes to conform to the regulatory commitment or by revising the regulatory commitment. One of the goals of the current working group recommendation for Improvement Activity 3 is to providing guidance regarding what type and level of NRC oversight is appropriate for future Type 2 industry initiatives. If NRC oversight activities determine that multiple licensees are failing to implement or maintain a particular voluntary initiative, the NRC may conclude that the industry initiative was ineffective, and that there may be a need for regulatory action (e.g., order, rulemaking) to address the safety concern or substantial safety enhancement issue.

Alternative Approaches for Addressing Voluntary Initiatives

Approach #1 - Credit initiatives in regulatory analyses only if highly likely to be implemented and maintained in the future; increase NRC oversight of significant voluntary industry initiatives

Under this approach the NRC would clarify the role of Type 2 industry initiatives in NRC's regulatory processes by (1) re-affirming the Commission's expectation that industry initiatives may not be used in lieu of NRC regulatory action where a question of adequate protection of public health and safety exists; (2) specifying when industry initiatives may be credited in the baseline case for regulatory analyses; and (3) providing guidance regarding what type and level of licensee documentation and NRC oversight is appropriate for future voluntary initiatives. Additionally, the staff would re-evaluate whether the most risk/safety significant existing Type 2

industry initiatives are being adequately maintained. The staff would verify those initiatives where an acceptable measure of effectiveness cannot be identified (one time audit, inspection, or request for information). Depending on the results of the verification activity, the staff might take further action, including pursuing a regulatory requirement.

The bases for selecting this alternative are:

- May result in safety enhancements being installed more quickly than if implemented via rulemaking (for some issues not related to adequate protection)
- Ensures that that the safety benefits from voluntary industry initiatives would be consistently maintained over time by providing risk-informed regulatory oversight
- Provides for monitoring and feedback to ensure that voluntary initiatives (whether used in lieu of or to support implementation of regulatory requirements) are improved as needed
- Maintains the incentive for licensees to take action in advance of establishment of requirements and recognizes the effects of actions taken
- Improves the clarity of NRC regulatory processes by providing guidance on the handling of industry initiatives
    - Sets clear criteria for determining when and how voluntary industry initiatives would be integrated into regulatory processes
    - Clarifies to all stakeholders how voluntary initiatives fit into the NRC's regulatory framework
    - Defines how industry initiatives should be addressed within NRC inspection and oversight processes.

Countervailing considerations that should be evaluated are:

- Improvement Activity 3 may not support efficiency
    - Licensees may be less likely to interact with the NRC on safety issues
    - Licensees may be less likely to develop industry initiatives for Type 2 issues.
    - NRC regulatory oversight activities for voluntary initiatives may be less efficient and effective than oversight of enforceable regulatory requirements.

Approach #2 - Explore change in current Commission policy

Under this approach, the SECY paper on NTTF Recommendation 1 would recommend that the Commission direct the staff to explore changing the current Commission policy on treatment of Type 2 industry initiatives,[35] by adopting a new policy of not providing any credit to such industry initiatives in NRC decisionmaking including, but not limited to, regulatory analysis, backfit analysis and/or Part 52 issue finality discussions supporting a new or changed generic regulatory requirement (*i.e*., a regulation, or orders issued to multiple addressees). The new policy would explicitly direct the removal of all guidance to the staff in the current NRC Regulatory Analysis Guidelines associated with crediting industry initiatives in determining the baseline for performing the regulatory analysis and backfit analysis. The new policy would state that voluntary industry initiatives are not an appropriate substitute for NRC regulatory action in cases where a substantial increase in overall protection can be achieved with costs of implementation justifying the increased protection. Voluntary industry initiatives could still serve

[35] The NRC's current policy is that "[v]oluntary industry initiatives are approved as an appropriate substitute for NRC regulatory action where the action to be taken is needed to meet existing requirements or for cases where substantial increase in overall protection can be achieved with costs of implementation justifying the increased protection." See SRM-SECY-99-063 (May 27, 1999).

as a mechanism for facilitating and standardizing implementation of regulatory requirements (Type 1 initiatives).

The SECY paper would recommend a process—similar to what was used by the NTTF Recommendation 1 working group—to explore a change to the current Commission Policy in this regard. The staff would develop a proposed change in policy, the proposed bases for the change, the likely effect on future NRC regulatory actions when confronting new regulatory issues, and a discussion of additional considerations associated with such a policy change. Stakeholder input would be obtained, and then the staff would develop a preliminary draft policy statement that would address industry initiatives with respect to at least the following two matters:

- Reiterating the current Commission direction that industry initiatives may not be relied upon to address matters of adequate protection
- Adoption of a new Commission policy of not providing any credit to such industry initiatives in NRC decisionmaking including, but not limited to, regulatory analysis, backfit analysis and/or Part 52 issue finality discussions supporting a new or changed generic regulatory requirement

The Commission would follow its routine process of issuing the proposed policy statement for public comment (perhaps with a public meeting to allow the public to obtain clarification on any aspects of the proposed policy statement which have changed from that presented in the preliminary draft policy statement).

The bases for selecting this alternative are:

- The new policy avoids the complexities associated with the current Recommendation 1 working group proposal to increase oversight of certain voluntary initiatives that are not requirements. Those complexities include development of criteria for determining if there is a "high likelihood" that an industry alternative will be maintained and development of guidance for determining when and what manner of oversight would be appropriate for future industry initiatives.
- The new policy would likely reduce the time for NRC determination as to whether a regulatory action is justified, because the regulatory analysis and backfitting determination will be less complex. The reduced complexity would be due to the removal of the NRC Regulatory Analysis Guidelines requirements associated with when the NRC would consider industry initiatives in determining baselines for regulatory analyses.
- The new policy would likely make it easier for NRC decision makers to decide whether or not to proceed with generic regulatory action.
- The new policy would likely increase public confidence in the NRC's regulatory process.
- The NTTF Report's discussion supports the proposed policy change: "[V]oluntary industry initiatives should not serve as a substitute for regulatory requirements but as a mechanism for facilitating and standardizing implementation of such requirements." (NTTF Report, page viii).
- A letter from NEI dated August 15, 2013, appears to be consistent with this proposed policy change: "If the issue addressed by a voluntary initiative constituted a legitimate risk to the public health and safety, the NRC can and would establish mandatory, legally-binding requirements to ensure that the public was adequately protected."[36] In 1999, the

[36] Letter from Joseph E. Pollock, NEI, to David L. Skeen, NRC, dated August 15, 2013 (ADAMS Accession No. ML13234A022), page 3

view of an NEI representative during a workshop on DSI-13 was summarized by the NRC staff as follows: "The NEI representative who served as the session Chairman stated that NEI's position was that an industry initiative should never be a substitute for regulatory action that passes the adequate protection standard or passes a backfit test that justifies a substantial increase in overall protection. This is not to say that a voluntary industry initiative could not complement such actions."[37]

Countervailing considerations that should be evaluated are:

- Under this new policy, it may be necessary for the NRC to do a backwards look at existing Type 2 industry initiatives and determine if any of those issues are cost justified substantial safety enhancements. This would likely result in a modest increase in necessary rulemaking activities which could delay issuance of lower priority rules due to resource limitations.
- The new policy would not be consistent with how risk assessments are performed. As stated in the Commission's PRA Policy Statement, PRA evaluations in support of regulatory decisions should be as realistic as practicable. This includes allowing "credit" for plant features and procedures irrespective of whether there is a related regulatory requirement in place.
- The new policy appears to create an artificial and perhaps illogical distinction between a generic "industry initiative," versus an applicant/licensee plant-specific commitment which is not required by law, and therefore is also "voluntary" to the same extent as a generic industry initiative.
- The new policy may be viewed as reducing the flexibility of the decision maker, inasmuch as there would be only two choices under the NRC's control: adopt the generic requirement or do nothing.
- The rulemaking process, by design, is slower, more deliberative, and less susceptible to change than what could be put in place using an industry initiative. Some may view the delay and the greater difficulty of changing a regulation as undesirable from a safety perspective.
- The industry has commented that the new policy may reduce the incentive of the industry to participate in the development of solutions to issues or have less incentive to propose alternate approaches because no credit would be given to such industry initiatives in regulatory analysis, backfit analysis and/or Part 52 issue finality discussions supporting a new or changed generic regulatory requirement. The NRC will impose the generic requirement in all cases if it can be justified.
- This proposed policy is at odds with the PRA practice (and PRA policy statement) that PRA models be as realistic as practicable. PRA models include features in a plant that are not required by law as an accepted practice. Failing to credit the "as-built and operated plant" in any risk assessment would be contrary to the Commission's PRA policy statement. (Also, see RIS 2008-15)

[37] SECY-99-063, "The Use by Industry of Voluntary Initiatives in the Regulatory Process," dated March 2, 1999 (ADAMS Accession No. ML12265A505), Attachment page 3

Approach #3 – Maintain Status Quo on Voluntary Industry Initiatives

Under this approach, the SECY paper on NTTF Recommendation 1 will contain no recommendation for an improvement activity directed at any aspect of voluntary industry activities. This essentially leaves the current Commission policy and direction on voluntary industry actions unaffected and untouched by NTTF Recommendation 1. The discussion on Improvement Activity 3 would be removed entirely from the current draft of the SECY paper, and Enclosure 1 would contain a discussion of why the staff ultimately decided not to recommend an improvement activity in this area, even though the last White Paper included such a proposal for public comment.

The bases for selecting this alternative are:

- NTTF Recommendation 1 did not contain a specific recommendation on industry initiatives. In the instances where the NTTF noted problems with specific industry initiatives (SAMGs and hardened vents), the NRC is taking action such that there will no longer be reliance on those industry initiatives.
- The Recommendation 1 working group considered the importance of NRC action on voluntary industry initiatives to be low, when compared to most of the other potential improvement activities identified early by the working group. Industry stakeholders have commented that the NRC has not demonstrated systematic inadequacies with voluntary industry initiatives. Although minor discrepancies were identified in the special inspections following the Fukushima accident, the NRC staff has identified no systematic problem with the many industry voluntary initiatives that are in place.
- The NRC Reactor Oversight Process allows for some oversight of voluntary initiatives if desired (e.g., licensee commitments regarding shutdown risk) and evaluates the risk of licensee performance deficiencies even when not explicitly covered by a regulation. Plant-specific backfits can be pursued at facilities that are not implementing an initiative effectively. Therefore, there is less need for a formal policy statement, additional oversight, or revised implementing guidance.

Countervailing considerations that should be evaluated are:

- There would continue to be a lack of clear guidance to inspectors about what aspects of voluntary initiatives should be looked at and a lack of clarity about what regulatory action to take, if any, when a discrepancy with a voluntary initiative is found.
- NTTF Recommendation 1 specifically mentioned voluntary industry initiatives as a contributor to the NRC's "patchwork" approach to regulation.
- Special inspections regarding SAMGs and hardened vents revealed some inconsistencies in implementation and maintenance of these initiatives over time. There could be other safety-significant initiatives (e.g., shutdown risk measures) that also have not been consistently maintained.

Staff Conclusion:

During consideration of the pros and cons of the various approaches described above, the working group and the Steering Committee both had conflicting views on the best path forward. The staff ultimately selected Approach #1 and intends to enhance its effectiveness by developing a comprehensive oversight program for voluntary initiatives that is transparent to the public and may include reporting requirements for licensees. The staff believes that such an approach is preferable because some safety enhancements could be put in place more quickly and efficiently via industry initiatives than by the more resource-intensive and time-consuming rulemaking process. For example, industry proposed flexible mitigation strategies and equipment following the accident at Fukushima Dai-ichi and began work to implement them while the NRC was still working on mitigation strategies orders. The staff also believes that the proposed enhanced documentation and oversight program will ensure that any safety-significant voluntary industry initiatives relied upon by the NRC in lieu of issuing a regulation will be effectively implemented and maintained over time.

COMPARISON OF IMPROVEMENT ACTIVITIES TO NTTF RECOMMENDATION 1 AND RMTF POWER REACTOR RECOMMENDATIONS

The NRC staff studied in detail Recommendation 1 of the NTTF and interviewed members of that task force to ensure understanding of what had been proposed. The staff also followed the efforts of the RMTF and included a member of that task force on its inter-office working group that was tasked with developing a notation vote paper with options and a staff recommendation to disposition NTTF Recommendation 1 (SRM-SECY-11-0093).

The NRC staff has developed three proposed improvement activities to address NTTF Recommendation 1 and the related RMTF recommendations for power reactors. These improvement activities are intended to address the underlying intent of the recommendations, as understood by the staff, but do not fully implement every aspect of each of the recommendations. The staff's recommendations differ from the NTTF and RMTF for the following reasons:

- The staff has had more time to consider the regulatory framework issues raised by the NTTF, as compared with the limited 90-day period afforded the NTTF to consider those same issues
- The NRC has taken a number of post-Fukushima actions to improve safety, including issuing three Orders and initiating two rulemaking activities to address the areas of greatest potential risk, consistent with the NTTF recommendations
- The staff has had the benefit of the views of internal staff, as well as the public (including the nuclear power plant industry), and is cognizant of the concerns on resources and prioritization of issues

The following tables summarize how the three proposed improvement activities relate to NTTF Recommendation 1 and the related RMTF recommendations for nuclear power reactors. They also explain the NRC staff's rationale for not recommending full implementation of the NTTF or RMTF proposals.

Table 1: Comparison Of Staff-Proposed Improvement Activities To NTTF Recommendation 1		
Recommendation	**Relevant Improvement Activities**	**Remarks**
1. Logical, consistent, coherent framework for adequate protection	1, 2, 3	Each of the three proposed improvement activities provides additional regulatory clarity, predictability, reliability, and efficiency over the current framework as currently implemented.

Table 1: Comparison Of Staff-Proposed Improvement Activities To NTTF Recommendation 1		
Recommendation	**Relevant Improvement Activities**	**Remarks**
		Activity 1 would result in rules and orders currently considered to be "beyond design basis" to clearly specify well-defined performance goals, treatment requirements, documentation and change control requirements, and reporting requirements. Activity 2 would formalize by Commission Policy Statement and implementing guidance the defense-in-depth philosophy, elements and decision criteria to support regulatory decisions. Activity 3 would re-affirm the existing Commission policy that industry initiatives may not be used in lieu of NRC regulatory action where a question of adequate protection of public health and safety exists. It will also provide graded oversight of Type 2 industry initiatives.
1.1 Policy statement for risk-informed defense–in-depth for extended design basis (adequate protection)	2	Activity 2 directly supports risk-informed decisions by developing decision criteria to assess defense-in-depth adequacy. The staff does not propose defining adequate protection, or to treat defense-in-depth as relevant only to adequate protection.
1.2 Initiate rulemaking to implement a risk-informed defense-in-depth framework consistent with policy statement in 1.1	None	The staff is recommending a defense-in-depth Policy Statement and implementing guidance. A defense-in-depth regulation is not needed for transparency or consistent NRC decision-making if a Policy Statement and implementing guidance are adopted.

Table 1: Comparison Of Staff-Proposed Improvement Activities To NTTF Recommendation 1		
Recommendation	**Relevant Improvement Activities**	**Remarks**
1.3 Modify Regulatory Analysis Guidelines to more effectively implement defense-in-depth in balance with risk-based guidelines	2, 3	The Regulatory Analysis Guidelines would be updated to include defense-in-depth criteria. The guidance would also be changed to strengthen the cost-benefit section regarding how Type 2 industry initiatives are credited.
1.4 Evaluate the insights IPE and IPEEE for generic or plant-specific requirements	None	This recommendation is not addressed by the staff's proposed improvement activities. The staff concluded that the low likelihood of identifying plant-specific design or operational safety concerns would not support the resources (staff and industry) that would be expended in this activity.
Voluntary safety initiatives by licensees should not take the place of needed regulatory requirements. (NTTF Report, pp. 19, 21)	3	Activity 3 partially addresses this NTTF comment by proposing that Type 2 industry initiatives not be credited in the baseline case as defined in the Regulatory Analysis Guidelines unless it is well documented and there is a high likelihood that each licensee will effectively implement and maintain the initiative over time.
The current NRC regulatory approach (requirements for design-basis events, beyond design-basis events, and voluntary initiatives) has resulted in a "patchwork" of regulatory requirements and other safety initiatives.	1, 3	Design basis events, and especially design basis accidents, are acceptably addressed in the current regulatory structure and are well-understood by various stakeholders. Improvement Activity 1 addresses the NTTF observation regarding "beyond design-basis events" Improvement Activity 3 adds formal structure and NRC oversight to address the NTTF issue with voluntary industry initiatives.

Table 2: Comparison Of Staff-Proposed Improvement Activities To RMTF Power Reactor Recommendations		
Recommendation	**Relevant Improvement Activities**	**Remarks**
PR-R-1 *OR-R-1(portion)* *Design-basis events and accidents should be reviewed and revised to integrate insights from operating history and modern methods such as PRA.* *NR-R-1(portion)* *Changes pursued for operating reactors (OR-R-1) should also consider applicability to new reactors.*	None The staff's proposed Recommendation 1 improvement activities differ from these RMTF recommendations.	The staff is proposing to retain the current approach for design-basis accidents because creating and implementing a new framework would generate additional regulatory complexity and costs but provide no clear safety benefit. Insights from operating history and PRA will be incorporated into Improvement Activity 1 as necessary when new design-basis extension events are identified. Licensees may submit individual risk-informed license amendment or exemption requests that are processed in the current framework. These requests may propose and demonstrate the acceptability of any proposed revisions to design-basis events and accidents found to be appropriate for a specific plant.
NR-R-1(portion) *GIV-R-1* *Promote adoption of risk-informed approaches for the selection of relevant scenarios (e.g., alternatives to the single failure criterion) for design-basis accidents*	None The staff's proposed Recommendation 1 improvement activities differ from these RMTF recommendations.	New reactor design basis events have been and will continue to be established by using risk-informed and performance-based approaches. For Generation IV reactors, NRC is working with DOE to apply risk-informed and performance-based approaches to determine design basis events applicable to the Next Generation Nuclear Plant design.
PR-R-2 *OR-R-2* *NR-R-2* *GIV-R-2* *Establish by rule a design-enhancement category of regulatory treatment for beyond-design-basis accidents.*	1 The staff's proposed Recommendation 1 Improvement	The staff is recommending a policy statement and internal staff guidance to formalize the *de facto* category of generic events traditionally considered to be beyond design basis. NRC already uses risk as one element of determining safety significance. A site specific approach

Table 2: Comparison Of Staff-Proposed Improvement Activities To RMTF Power Reactor Recommendations		
Recommendation	**Relevant Improvement Activities**	**Remarks**
Category should use risk as a safety measure, be performance-based, provide for periodic updates, include consideration of costs, and be implemented on a site-specific basis	Activity 1 implements the intent of these RMTF recommendations.	(including periodic updates) is not recommended because of high costs and limited safety improvements that would result.
PR-R-3 *OR-R-3* *NR-R-3* *GIV-R-3* *Reassess methods for estimating frequency and magnitude of external hazards. Implement consistent process including deterministic and PRA methods. Risks from beyond-design-basis external hazards should be considered in the design-enhancement category*	1 (partial) The staff's proposed Recommendation 1 Improvement Activity 1 partially implements these RMTF recommendations. The Recommendation 1 working group did not fully consider all aspects of these RMTF recommendations. Consideration could be deferred to NTTF Rec. 2.1 and 2012 Appropriations Bill activities.	Other NTTF recommendations are being implemented that address this recommendation for power reactors. For example, NTTF 2.1 is reassessing seismic and external flooding hazards. The mitigation strategies order and related station blackout mitigation strategies rulemaking provide additional defense-in-depth for preventing and mitigating unspecified external events. The 2012 Appropriations Bill also requires the NRC to reassess external hazards. The ASME/ANS PRA standards development activity for external hazards, which the NRC participates in and endorses, provides methods for estimating frequency and magnitude of external hazards; an update of these standards is currently underway. Moreover, it is part of the ASME/ANS protocol to continually update their standards on a regular periodic basis.

Table 2: Comparison Of Staff-Proposed Improvement Activities To RMTF Power Reactor Recommendations		
Recommendation	**Relevant Improvement Activities**	**Remarks**
PR-R-4 *OR-R-4* *NR-R-4* *GIV-R-4* *Establish a systematic program for collection, evaluation, and communication of external hazard information*	None The Recommendation 1 working group did not consider these RMTF recommendations which are not directly related to regulatory framework. Consideration could be deferred to NTTF Rec. 2.2 and 2012 Appropriations Bill activities.	NTTF recommendation 2.2 will consider this recommendation for seismic and external flooding. Other external hazards will also be included, consistent with the 2012 Appropriations Bill. In addition, this recommendation may be pursued regardless of the regulatory framework and could be integrated into Improvement Activity 1. The ASME/ANS PRA standards development activity for external hazards, which the NRC participates in and endorses, provides methods for collection and evaluation of external hazards (e.g., frequency, fragility analysis); an update of these standards is underway. Moreover, it is part of the ASME/ANS protocol to continually update their standards on a regular periodic basis.
PR-R-5 *OR-R-5* *NR-R-5* *GIV-R-5* *Apply risk-informed and performance-based defense-in-depth concepts in a more quantitative manner*	2 The staff's proposed Recommendation 1 Improvement Activity 2 would implement these RMTF recommendations.	Activity 2 would directly address this recommendation by defining defense-in-depth and associated attributes and criteria to facilitate regulatory decision-making.

Table 2: Comparison Of Staff-Proposed Improvement Activities To RMTF Power Reactor Recommendations		
Recommendation	**Relevant Improvement Activities**	**Remarks**
PR-R-6 *OR-R-6* *NR-R-6* *GIV-R-6* *Develop and implement guidance for security regulatory activities using language in common with safety activities and harmonizes methods with risk assessment and the proposed risk-informed and performance-based defense-in-depth*	None The Recommendation 1 working group did not consider these RMTF recommendations.	The staff excluded security regulatory issues from the scope of the staff's activities for the disposition of NTTF Recommendation 1. These RMTF recommendations are being addressed separately by NSIR under the RMRF.

VOLUNTARY INDUSTRY INITIATIVES IDENTIFIED BY THE STAFF IN ITS EFFORTS TO DISPOSITION NTTF RECOMMENDATION 1

SECY-01-0121, "Industry Initiatives in the Regulatory Process," July 5, 2001 (ADAMS Accession No. ML011630126), identified three types of industry initiatives:

1. A Type 1 initiative is developed in response to an issue of potential safety concern that would complement regulatory actions within existing regulatory requirements. However, where it is determined that the safety concern involves the assurance of adequate protection, or other criteria described in Title 10, Section 50.109, of the Code of Federal Regulations (10 CFR 50.109), the NRC shall pursue rulemaking. In such a case, the Type 1 industry initiative may form the basis for an acceptable method of meeting the new regulation through endorsement in a regulatory guide.

2. A Type 2 initiative is developed in response to a potential safety concern that is a potential cost-beneficial safety enhancement outside existing regulatory requirements. Such industry initiatives may be used to provide safety enhancements without the need for regulatory action. However, where it is determined that the proposed industry initiative is not effective in addressing the safety concern, the NRC may pursue rulemaking in accordance with the criteria described in 10 CFR 50.109.

3. A Type 3 initiative is developed as an information-gathering mechanism, or a means to address issues of concern to the applicable industry group that are not potential safety concerns, do not involve adequate protection issues, are outside existing regulatory requirements, and are not likely to yield cost-beneficial safety enhancements. These voluntary industry initiatives may be used by the applicable industry group to address economic or efficiency issues.

The NRC staff identified a number of industry initiatives and classified each using the above taxonomy; these are presented in Table 4. Note that the distinction between the various types of initiatives is not always clear. Some of the Type 2 initiatives listed (underground piping, MOVs, Rosemount transmitters, etc.) do have an underlying regulatory requirement for the specific function served by the components.

Table 1: Partial List of Industry Initiatives	
Description	**Type***
Boron Corrosion • NRC issued a 10 CFR 50.54(f) request for information (GL 88-05), which stated: The principal concern is whether the affected plants continue to meet the requirements of General Design Criteria 14, 30, and 31 of Appendix A to Title 10 of the *Code of Federal Regulations* (CFR) Part 50 when the concentrated boric acid solution or boric acid crystals, formed by evaporation of water from the leaking reactor coolant, corrode the reactor coolant pressure boundary. Industry developed boric acid corrosion prevention programs to ensure compliance…	1
Guidelines for the management of materials issues • NEI 03-08, Rev. 2 (ADAMS Accession No. ML101050337)	1
Steam generator program • NEI 97-06 • SECY-00-0116: *As for the new NEI-97-06 steam generator industry initiative, it will result in voluntary and enforceable changes to plant technical specifications.* • SECY-00-0116: *This industry initiative will involve license amendments by all pressurized water reactor (PWR) licensees to change from deterministic to performance-based technical specifications. In response to the staff's ongoing regulatory development effort, the PWR industry focused its efforts on improving existing SG inspection guidance and developing additional guidelines on other programmatic elements related to SG tube integrity. The industry's efforts to improve industry guidance culminated in the NEI 97-06 industry initiative, developed through the NEI Nuclear Strategic Issues Advisory Committee, which establishes a framework for structuring and strengthening existing SG programs. This industry initiative discusses regulatory interfaces, licensee responsibilities, and a protocol for revising referenced guidelines. It also defines the performance criteria that licensees shall use to measure tube integrity. It should be noted that the final staff review of NEI-97-06 is still in progress.*	1

* The distinction between the various types of initiatives is not always clear. Some of the Type 2 initiatives listed (underground piping, MOVs, Rosemount transmitters, etc.) do have an underlying regulatory requirement for the specific function served by the components.

Table 1: Partial List of Industry Initiatives	
Description	**Type***
Boiling Water Reactor Vessel Internals Project • SECY-01-0121: *A Type 1 example of an existing program that complements existing regulatory requirements via an industry initiative is the Boiling Water Reactor Vessel and Internals Project (BWRVIP). This program, in which all U.S. BWR licensees participate, was instituted in 1994, initially to address the potential consequences of intergranular stress corrosion cracking (IGSCC) in the BWR core shroud. The project subsequently expanded in scope to address all BWR safety-related austenitic stainless steel and Alloy 600 components, the reactor vessel, and safety-related piping. This industry-led program developed, in safety-significance priority, approximately 50 generic industry guidelines for inspection scope and frequency, flaw evaluation, and mitigation and repair. All BWR owners committed to adhere to the program or inform the staff of any plant-specific deviations. Further, since the BWRVIP representatives agreed on which components are safety-related, actions taken to inspect, evaluate, and repair these components are covered by the individual licensees' quality assurance (QA) programs, as governed by Appendix B to 10 CFR Part 50.*	1
Dedication of Commercial Grade Items • Endorsed by NRC in a regulatory guide as an acceptable means, in whole or in part, of meeting a new or existing regulation.	1

* The distinction between the various types of initiatives is not always clear. Some of the Type 2 initiatives listed (underground piping, MOVs, Rosemount transmitters, etc.) do have an underlying regulatory requirement for the specific function served by the components.

Table 1: Partial List of Industry Initiatives	
Description	**Type***
Low power/shutdown risk (or "Shutdown issues") • NUMARC 91-06 • Has not been endorsed by the NRC but has been recognized by the NRC as providing an acceptable means of addressing an NRC issue or concern. • SECY-00-0116: *In the case of shutdown risk, the staff had completed an analysis indicating that industry actions could be justified as a cost-beneficial safety enhancement; however, the Commission concluded that rulemaking should not proceed given the initiatives taken by the industry to maintain an acceptable level of risk during shutdown conditions. Licensee implementation of commitments in this area is not enforceable, but NRC monitoring provides a basis for determining if future regulatory action becomes necessary.* • SRM-SECY-00-0116: *This risk-significant issue is not explicitly required by existing regulations. The staff, using an older version of NUREG/BR-0058 which did not allow any credit for industry initiatives, found this issue to be valid for backfitting as a safety enhancement pursuant to 10 CFR 50.109. The rulemaking was discontinued since the Commission concluded that existing industry practices provide an adequate level of safety. The Commission also directed that NUREG/BR-0058 be updated to permit appropriate credit for industry initiatives. No enforcement would presently be appropriate.* • See also presentations about shutdown risk from Operating Experience Gateway internal web site: http://nrr10.nrc.gov/ope-info-gateway/shutdown-risk.html	2

* The distinction between the various types of initiatives is not always clear. Some of the Type 2 initiatives listed (underground piping, MOVs, Rosemount transmitters, etc.) do have an underlying regulatory requirement for the specific function served by the components.

Table 1: Partial List of Industry Initiatives	
Description	**Type***
Severe Accident Management Guidelines • NEI 91-04, Revision 1 (ML072850981). Appendix E includes NRC staff comments on the draft formal industry position. • Has not been endorsed by the NRC but has been recognized by the NRC as providing an acceptable means of addressing an NRC issue or concern. • Temporary Instruction 2515/184 evaluated the status of Severe Accident Management Guidelines (SAMGs). See http://www.nrc.gov/NRR/OVERSIGHT/ASSESS/SAMGs.html • See also: Policy Statement on Severe Reactor Accidents Regarding Future Designs and Existing Plants (August 8, 1985; 50 FR 32138). • See NTTF Recommendation 8. Also, for more information about the ongoing NRC activity "Onsite Emergency Response Capabilities," see Regulations.gov Docket ID NRC-2012-0031.	2
Hydrogen igniter backup power for BWRs and ice condensers • GSI-189 • Regulatory Analysis: ML051450060. The decision rationale on page 55 of the regulatory analysis for the proposed action to address generic safety issue 189 (ADAMS Accession No. ML051450060) explains that the decision to take no further regulatory action was based on the assumption that voluntary licensee actions would be implemented as described and that the NRC would revisit rulemaking in the future, if necessary. • Requirements based on mitigation strategies order (EA-12-049).	2

* The distinction between the various types of initiatives is not always clear. Some of the Type 2 initiatives listed (underground piping, MOVs, Rosemount transmitters, etc.) do have an underlying regulatory requirement for the specific function served by the components.

Table 1: Partial List of Industry Initiatives	
Description	**Type***
Industry Initiative on Underground Piping and Tanks Integrity • NEI 09-14 • NEI letter describing initiative: ML093350032 • NEI revision to the initiative: ML13079A318 • NRC Buried Piping Action Plan, Revision 3: ML13099A380 • See http://www.nrc.gov/reactors/operating/ops-experience/buried-piping-activities.html	2
•	
Heavy load lifts • NEI 08-05 ML082180666 • NRC safety evaluation: ML082410532 • NRC endorsement: RIS 2008-28 (ML082460291) • See also 2007 operating experience brief on this topic: http://nrr10.nrc.gov/rorp/docs/HeavyLoadsBrief200702.pdf • See also inspection guidance FY2007-03, Rev. 2	2
Motor Operated valves • Endorsed by NRC as providing an acceptable means of addressing an NRC issue or concern. • Joint Owners Group Motor-Operated Valve Periodic Verification Program • Established to address Generic Letter 96-05 • RIS 2011-13	2
Piping Erosion/Corrosion • NUMARC guidance located in Appendix A to NUREG-1344 • Generic Letter 89-08 • Endorsed by NRC as providing an acceptable means of addressing an NRC issue or concern.	2

* The distinction between the various types of initiatives is not always clear. Some of the Type 2 initiatives listed (underground piping, MOVs, Rosemount transmitters, etc.) do have an underlying regulatory requirement for the specific function served by the components.

Table 1: Partial List of Industry Initiatives	
Description	**Type***
Substandard Non-Safety-Related Molded Case Circuit Breakers • NUMARC 90-14 • Endorsed by NRC as providing an acceptable means of addressing an NRC issue or concern. • Generic Letter 88-10	2
Station Blackout (Diesel Reliability portion) • NSAC-108 • Endorsed by NRC as providing an acceptable means of addressing an NRC issue or concern. • Generic Letter 84-15 • USI-A-44 • Regulatory Guide 1.155	2
Safety culture initiative • NEI 09-07	2
Station Blackout (Diesel Reliability portion) • Endorsed by NRC as providing an acceptable means of addressing an NRC issue or concern.	2
Motor Operated valves • Endorsed by NRC as providing an acceptable means of addressing an NRC issue or concern. • Established to address Generic Letter 96-05	2
Piping Erosion/Corrosion • Endorsed by NRC as providing an acceptable means of addressing an NRC issue or concern.	2

* The distinction between the various types of initiatives is not always clear. Some of the Type 2 initiatives listed (underground piping, MOVs, Rosemount transmitters, etc.) do have an underlying regulatory requirement for the specific function served by the components.

Table 1: Partial List of Industry Initiatives	
Description	**Type***
Comprehensive Procurement Initiative • NUMARC 90-13 • Endorsed by NRC as providing an acceptable means of addressing an NRC issue or concern.	2
Oil Loss in Rosemount Transmitters • NUMARC 91-02 • Endorsed by NRC as providing an acceptable means of addressing an NRC issue or concern. • See resolution of generic safety issue 176: http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr0933/sec3/176r1.html	2
Substandard Non-Safety-Related Molded Case Circuit Breakers • NUMARC 90-14 • Endorsed by NRC as providing an acceptable means of addressing an NRC issue or concern.	2
Fraudulent Flanges • NUMARC 88-01 • Endorsed by NRC as providing an acceptable means of addressing an NRC issue or concern.	2
IPE/IPEEE commitments • GL 88-20	3
Groundwater Protection • Package: ML061910196 • Final: ML072610036	3

* The distinction between the various types of initiatives is not always clear. Some of the Type 2 initiatives listed (underground piping, MOVs, Rosemount transmitters, etc.) do have an underlying regulatory requirement for the specific function served by the components.

Table 1: Partial List of Industry Initiatives	
Description	**Type***
Data gathering rule Proposed rule to gather data for PRA 1996	3
Industry Consensus • Initiative taken to address industry, non-regulatory issue	3
Shortage of Qualified personnel • Initiative taken to address industry, non-regulatory issue	3
Fitness for Duty Data Collection • Initiative taken to address industry, non-regulatory issue	3
Reducing Automatic trips • Initiative taken to address industry, non-regulatory issue	3
Radiation Exposure Control • Initiative taken to address industry, non-regulatory issue	3
Personnel Access Data System • NEI-95-06 • Guideline to address industry, non-regulatory issue	3
ECCS Acceptance Criteria • Voluntary industry collection of data to ensure safety of current plants regarding previously-unconsidered phenomena. This data was collected voluntarily to eliminate the need for an NRC generic letter seeking information on the underlying matter. • See draft proposed rule: ML112520249. The data collection is discussed on page 15.	3

* The distinction between the various types of initiatives is not always clear. Some of the Type 2 initiatives listed (underground piping, MOVs, Rosemount transmitters, etc.) do have an underlying regulatory requirement for the specific function served by the components.

Table 1: Partial List of Industry Initiatives	
Description	**Type***
Air Operated Valve Program • See NEI letter dated 3/27/2001: ML010950310	3

* The distinction between the various types of initiatives is not always clear. Some of the Type 2 initiatives listed (underground piping, MOVs, Rosemount transmitters, etc.) do have an underlying regulatory requirement for the specific function served by the components.