Draft Working Group Document – Revised: February 15, 2013

NRC STAFF WORKING GROUP EVALUATION OF ALTERNATIVES FOR THE DISPOSITION OF RECOMMENDATION 1 OF THE FUKUSHIMA NEAR-TERM TASK FORCE REPORT

NOTE: *Public availability of this draft document is intended to inform stakeholders of the current status of the NRC staff's evaluation of possible activities in response to Fukushima Near-Term Task Force (NTTF) Recommendation 1. In particular, the NRC staff wants to inform stakeholders of the following changes made since the release on November 2, 2012, of the last public document on Recommendation 1 (ADAMS Accession No. ML12296A096):*

Options are now characterized as "Improvement Activities"

The nature and scope of each Improvement Activity has been changed and better described

Former Option 1 is now presented as a description of what would occur if no Improvement Activity is selected by the Commission

Cost estimates for the improvement activities have been updated.

Please note that this draft document may be incomplete or in error in one or more respects and will be subject to further revision before the NRC staff presents its recommendations for dispositioning NTTF Recommendation 1 to the Commission in a SECY paper.

Presently, the NRC is not accepting public comments on the information below. However, the NRC staff does plan to offer another opportunity for public comments on approaches to disposition NTTF Recommendation 1 in the near future, through the Federal rulemaking Web site, www.regulations.gov. The opportunity for public comment will be announced on www.regulations.gov under Docket ID NRC-2012-0173.

PURPOSE:

This paper provides the current status of the U.S. Nuclear Regulatory Commission (NRC) staff's evaluation of Recommendation 1 in the Near-Term Task Force (NTTF) Report, "Recommendations for Enhancing Reactor Safety in the 21st Century," July 12, 2011 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML11861807), taking into consideration the power reactor recommendations presented in the

Risk Management Task Force (RMTF) Report, NUREG-2150, "A Proposed Risk Management Regulatory Framework," April 2012 (ADAMS Accession No. ML12109A277).

SUMMARY:

The staff working group developed three potential regulatory improvement activities to disposition NTTF Recommendation 1. These potential improvement activities were developed after evaluation of the considerations underlying the NTTF's recommendation and consideration of the RMTF's power reactor recommendations. The potential improvement activities are:

1. Establish New Category of Beyond Design Basis Events and Associated Regulatory Requirements

2. Establish a Decisionmaking Process and Criteria for Considering Defense-In-Depth, Risk, and Safety Margins

3. Clarify the Role of Voluntary Industry Initiatives in the NRC Regulatory Process

The staff is identifying key regulatory products to be developed and key issues which need to be resolved in order to implement each improvement activity along with cost estimates and estimated time to completion. The staff is also identifying the pros and cons for implementing each activity. Although the staff believes that implementation of these improvement activities would increase the efficiency and effectiveness of NRC regulatory programs, the staff also believes that it is acceptable, from the standpoint of safety, to maintain the existing regulatory processes, policy, and framework.

BACKGROUND:

Following the accident at the Fukushima Dai-ichi nuclear power plant in March 2011, the Commission established a task force of senior NRC managers to conduct a systematic and methodical review of NRC processes and regulations to determine whether the agency should make additional improvements to its regulatory framework. The NTTF was also tasked to make recommendations to the Commission for its policy direction on this question, as set forth in Tasking Memorandum COMGBJ-11-0002 and SRM-COMGBJ-11-0002 (ADAMS Accession Nos. ML110800456 and ML 110820875, respectively). 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 (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 Commissioner Apostolakis' Risk Management Task Force (RMTF) report, NUREG-2150 (April 2012). The NRC staff did consider the RMTF recommendations regarding power reactors and believes that Commission approval of Improvement Activities 1 and 2 would be consistent with the intent of those RMTF recommendations. Implementation of the Agencywide RMTF recommendations, including those for power reactors, is being addressed by an inter-office working group led by the Office of Nuclear Regulatory Research. This RMTF working group is coordinating closely with work on NTTF Improvement Activities 1 and 2. Its proposed implementation plan for the agency-wide recommendations, including those for power reactors, will build upon the work from NTTF as guided by the Commission SRM associated with the NTTF activity. The outcome from that RMTF working group will be a Commission paper with a preliminary draft policy statement and an integrated plan on the implementation of the RMTF and NTTF recommendations.

DISCUSSION:

Staff Approach for Developing its Recommendation on Recommendation 1 and the RMTF's Recommendations for Power Reactors

The staff formed a working group consisting of senior staff members from the Office of Nuclear Reactor Regulation, Office of New Reactors, Office of Nuclear Material Safety and Safeguards, Office of Nuclear Security and Incident Response, Office of Federal and State Materials and Environmental Management Programs, Office of Nuclear Regulatory Research, and the Office of the General Counsel. The working group included one staff individual who was a member of

the RMTF, as well as the OGC individual who was assigned to support the RMTF, to ensure coordination with, and better understanding of, the RMTF efforts and the RMTF Report.

The Japan Lesson Learned Directorate (JLD) Steering Committee was informed of the working group's activities, and provided direction to the working group throughout the development of this paper. In addition, at the request of the JLD Steering Committee, a Division Director Steering Committee was established to facilitate working group development and selection of regulatory framework improvement activities.

The staff working group, with JLD Steering Committee approval, decided to limit its consideration of regulatory framework improvements to light-water nuclear power reactors only, and to exclude consideration of the NRC's regulatory framework for non-power reactors, nuclear materials (e.g., power reactor fuel, including spent fuel) at nuclear power plants. In addition, the staff decided to exclude consideration of regulatory framework issues for nuclear materials regulated by the NRC, including non-reactor materials (such as materials used in medicine and in industrial uses such as well logging). These scope limitations are consistent with both the scope of the NTTF Report and the Chairman's Tasking Memorandum directing the staff to consider the power reactor recommendations of the RMTF.

The working group reviewed both the NTTF Report and the RMTF Report and considered different approaches in developing the improvement activities. During this period, the working group held 2 public meetings, met on many different occasions with the JLD Steering Committee, met 5 times with the ACRS, and, during late calendar year 2012 and early 2013, the staff provided several rounds of briefings to individual Commissioners on the status of the Recommendation 1 effort.

Identifying the problem that NTTF Recommendation 1 is attempting to resolve

To help the staff identify and assess options for the disposition of NTTF Recommendation 1, the staff developed a problem statement describing the issue that Recommendation 1 is directed at resolving. Many stakeholders, including the ACRS, suggested that the staff develop such a problem statement to assist stakeholders in understanding the bases for the staff's ultimate recommendations for the disposition of Recommendation 1. The staff's problem statement is:

> The existing regulatory framework for power reactors effectively addresses design-basis events. However, for beyond-design-basis events[1], 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 events or accidents that may require regulatory action (e.g., extended station blackout). (addressed by Improvement Activity 1)

[1] The term "beyond-design-basis event" is frequently used but lacks an NRC regulatory definition. The term is used in this paper to describe postulated plant challenges (e.g., SBO, ATWS, external flooding) that were not included in, the set of plant events and accidents originally evaluated during the licensing process.

- A structure and criteria for consistently and predictably evaluating how risk and defense-in-depth should be addressed for an effective NRC regulatory response to a request for a change to a plant's licensing basis, 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 directly by Improvement Activity 3, but would also be partially addressed by Improvement Activities 1 and 2)

Potential Improvement Activities for the Disposition of NTTF Recommendation 1

The staff developed three potential improvement activities for the disposition of Recommendation 1. These three improvement activities are summarized below. These activities are not mutually exclusive and may be combined together in various ways to provide integrated regulatory framework improvements. The staff's estimates of costs do *not* reflect possible savings attributable to these improvement activities, either as benefits or averted costs. This decision was predicated on the staff's determination that estimates of such savings are difficult to quantify and that exclusion of such savings would be conservative from the standpoint of selecting cost-effective options.

A viable and acceptable alternative to implementing any or all of these improvement activities would be to maintain the existing regulatory processes and framework. 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 accident.

The staff emphasizes that a 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, enhanced ability of licensees to mitigate severe accidents, improved emergency planning, and other safety improvements. These activities are being accomplished under the current NRC regulatory framework. In addition, the staff notes that new reactor certification and licensing processes have requirements for addressing beyond design basis events and severe accidents[2].

[2] See NRC Standard Review Plan section 19.0, Revision 3 (draft) (ADAMS Accession No. ML12132A481) for a good discussion of these requirements.

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 improvement activity costs as the agency decides to undertake such activities in the future on an *ad hoc* basis, and may forego possible minor reductions in costs resulting from efficiencies that might be realized if regulatory process and framework improvement activities were accomplished in an integrated fashion.

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. It allows for incremental improvements of the regulatory approach with full stakeholder engagement. However, it does not provide a systematic and consistent process for addressing beyond design basis events and severe accidents, and therefore does not aid in improving the understanding of NRC's regulatory structure. It may not be as efficient at effecting identified improvements as are the focused efforts associated with the three Improvement Activities.

Improvement Activity 1: Establish New Category of Beyond Design Basis Events and Associated Regulatory Requirements

Improvement Activity 1 would use rulemaking to establish a new category of beyond design basis events. The activity would establish criteria for determining what events should be screened into the new category, and also the process to be used in this evaluation. The staff's current view is that events in this new category be drawn from what would currently be regarded as "beyond design basis" events and accidents. Depending upon the criteria selected (a policy determination to be made by the Commission), this may also result in some existing design-basis events being reclassified as falling within this category. The structures, systems, and components (SSCs) relied upon to mitigate these events would be subject to "treatment requirements" to provide assurance that those SSCs will be able to perform their intended safety functions. The specified treatment requirements provide assurance that SSCs used to mitigate the events in the new event category will be able to perform their intended safety functions. The treatment requirements will likely not be as stringent as the full set of treatment requirements currently applied to safety-related SSCs[3]. Similar to the reliability assurance program for new reactors[4], these treatment requirements would be performance-based and would include controls to ensure that subject SSCs demonstrate a high level of reliability and availability and are designed, constructed, and operated in a manner consistent with supporting technical analyses.

Both the NTTF and the RMTF reports discuss options for creating a single new event category and offer insights as to what this new category may look like. The staff has not yet decided which elements of the NTTF and RMTF recommendations on categorization should be adopted for Improvement Activity 1. 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 discussed below.

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[3] Although the term "SSC" is used here, it is understood that operator actions and licensee programs needed to assure adequate SSC performance may also be subject to special treatment requirements.

[4] See "Interim Staff Guidance on Standard Review Plan, Section 17.4, Reliability Assurance Program," DC/COL-ISG-18, March 22, 2011.

- Would the events be specified on a generic or a plant-specific basis, or by both methods?

  Different options exist for defining the categorization or determining which events would fall into the new category. A "generic" approach could be implemented in which the NRC would specify, on a fleet-wide basis, a pre-determined set of events that would define this category. Existing beyond-design-basis regulations such as the 10 CFR § 50.63 Station Blackout rule (SBO), the § 50.62 Anticipated Transients without Scram (ATWS) rule, and the § 50.54(hh) requirements for loss of large plant areas due to fires or explosions would likely be integrated into this category and a combination of risk insights and deterministic information could be used to identify other important internal and external events. If this generic approach is used, licensees with PRAs of sufficient quality might also be permitted to seek plant-specific relief from taking action to address certain events in the new category (or in the existing deterministic (safety-related) design basis itself) if they can use NRC-established criteria to demonstrate that they are not risk-significant at their facilities.

  A "plant-specific" option could be implemented in which the NRC would require licensees to perform analyses to identify specific events or accident sequences that would fall into the new event category. This analysis would be done by each individual licensee for their plants and would be subject to NRC review and approval. These analyses would need to be updated at regular intervals to determine whether, based on new information, new events or accident sequences need to be addressed. These analyses would benefit from risk-insights but would not necessarily require a PRA. Although licensees would perform the analyses, the NRC would develop and communicate clear thresholds for including events in the new category to ensure consistent standards across the fleet. If this approach is implemented, some licensees may determine that certain scenarios currently classified as design-basis events (and therefore subject to special treatment requirements for safety-related SSCs) meet the criteria for inclusion into the new regulatory category and therefore should have their treatment requirements modified to be consistent with those specified for the new event category.

- Would the new category (or categories) be for adequate protection, safety enhancement, or both?

  The NTTF report recommends that a new event category be created and that SSCs and operator actions in this category be considered necessary for adequate protection. The RMTF Report, Appendix H offers an alternate approach where items in the new event category are considered "safety enhancements" not needed for adequate protection. An alternate approach would be to create two new categories—one for adequate protection and the other for safety enhancement events. This would allow, for example, an adequate protection rule to specify the reduced treatment requirements associated with the new category.

- Would a plant-specific PRA be required?

  Identification and categorization of beyond-design-basis events can be done with or without a requirement for licensees to have and maintain a PRA. The generic approach to event identification and categorization could make use of existing risk insights from a

number of sources; therefore, a categorization process could be developed where a plant-specific PRA would not be used for categorization. A plant-specific approach to event identification and categorization would greatly benefit from a plant-specific PRA, although it may be possible to develop some process that would not require the PRA. Either a generic or plant-specific approach could also allow, but not require, use of a plant-specific PRA, which may allow licensees with a suitable PRA to request relief from some requirements. The PRA will have to have sufficient quality to support whatever process is developed.

- Would the new events be applicable to new reactors, or also to operating plants?

  The new event category could only apply to new reactors or could also be applied to currently operating reactors. This is different than the forward-looking/retroactive discussion below, in that even if made applicable to currently operating reactors, the rule could still be made to apply only to future events and re-evaluations of currently-regulated activities based on new and significant information.

- Would the new event category be applied in a forward-looking manner, or retroactively?

  The categorization and associated treatment requirements could be made to apply only to new events, issues, and information arising after promulgation of the new rule. Alternatively, the rule could require licensees to re-evaluate the current design and operation of each facility and determine whether there were additional events that needed to be added to the new category. Special treatment requirements associated with the new event category could be applied to currently installed plant equipment or could be limited only to SSCs needed to mitigate beyond design basis events that are identified in the future. The staff notes that treatment requirements for current beyond-design-basis events (e.g., ATWS, SBO) are not standardized to the same level as the safety-related treatment requirements.

Creation of a process to identify and categorize beyond design basis events would require careful consideration of the key issues identified above in order to obtain the maximum benefit and minimize the likelihood of unintended consequences or undue burden. Significant interaction with stakeholders, including tabletop exercises would be essential.

Expected products resulting from this activity could include a rulemaking to define the events that would go into the category (or categories), regulatory guidance, and conforming changes for implementation of the proposed rule. Estimated costs for implementing Improvement Activity 1 range between $80 to $83 million for the industry and $3.4 to $3.7 million for the NRC for approaches that do not require a plant-specific PRA. Details and assumptions associated with these estimates are provided in Attachment 1. Completion of this effort is expected to take 3 to 5 years.

To provide an example of the possible outcome of implementing Improvement Activity 1, the staff believes that the NRC's overall response to the IPE and IPEEE results may have proceeded differently. Under a generic approach, risk insights from the industry as a whole could have resulted in requirements for events under the new category (or categories). Under a plant-specific approach, those core damage sequences identified at a specific plant which met

the NRC-designated thresholds would have been incorporated into the plant's licensing basis under the new category.

The primary benefit of Improvement Activity 1 is that it should provide a higher level of assurance that beyond design basis events can be prevented or mitigated. It also would aid in the public's understanding of NRC's regulations that address events that are not design basis accidents, including the regulatory controls over the SSCs that mitigate these events. However, the actual safety benefit of creating this new category of events will not be known until the categorization approach is determined (i.e., resolution of the five key issues). For example, if the generic approach is used, there is the potential for some site-specific events to be overlooked. Under a plant-specific approach, periodic changes to the plant's licensing basis may be viewed as a less predictable regulatory environment and licensing basis for the plant.

Improvement Activity 2: Establish Decisionmaking Process and Criteria for Considering Defense-In-Depth, Risk, and Safety Margins

Improvement Activity 2 would establish the Commission's expectations with regard to the risk-informed regulatory decision process for evaluating defense-in-depth, risk, and safety margins in the NRC's regulation of nuclear power reactors. It would define the objective and the principle elements of defense-in-depth and safety margins and incorporate these into the regulatory decisionmaking process. This work would include the NRC developing criteria for determining whether adequate defense-in-depth and safety margins have been addressed in the design and operation of a nuclear power plant.

One key issue that will need to be addressed as part of this activity is whether the regulatory analysis guidelines and backfit analysis guidelines should include defense-in-depth and safety margins as fundamental decision criteria. Another key issue is whether a plant-specific PRA should be used as one factor in determining whether adequate defense-in-depth has been achieved. For example, a plant-specific PRA might be used because plant-specific risk would be a principle component in any balancing process. Moreover, one level of defense would involve emergency planning. Potential acceptance guidelines for this level could involve offsite consequences. Therefore, the use of a Level 3 PRA might be needed if quantitative risk criteria are established as part of the acceptance guidelines.

Expected products resulting from this activity would include at least one Commission policy statement, possible revisions to the Regulatory Analysis Guidelines, and substantial conforming changes to several existing regulatory guides. Estimated costs for implementing Activity 2 are $1.1 million for the NRC and no incremental cost for industry, assuming that no PRA requirement is imposed on currently operating reactors. Details and assumptions associated with these estimates are provided in Attachment 1. Completion of this effort is expected to take 3 to 6 years.

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 would 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 adopted defense-in-depth criteria for barrier integrity and independence, the NRC may have been able to utilize a more rational, transparent, and predictable process to determine whether filters were needed to provide adequate defense-in-

depth. In addition, if the staff had had a well defined decisionmaking process to utilize when making other important safety decisions arising from the Fukushima event, the staff believes these decisions would be more justifiable and may have been completed more quickly with better predictability and consistency.

The major benefit of improvement activity 2 is that it provides a uniform, technically-justified, documented decision making process for defense-in-depth and how risk and safety margins are considered in the process. This would improve the NRC's ability to implement risk-informed decisionmaking. Improvement activity 2 also directly supports the Commission's PRA Policy Statement. However, there is the possibility that the NRC may not be able to develop decision criteria with sufficient detail to allow independent parties to reach similar conclusions.

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

Improvement Activity 3 would clarify the role of certain voluntary industry initiatives in NRC's regulatory processes by defining when and in what manner the NRC would incorporate such initiatives into regulatory requirements. By "industry initiative," the staff is referring to proposals made by the entire nuclear power industry, e.g., commitments made by the Nuclear Energy Institute (NEI), or proposals made by discrete groups of licensees and applicants, e.g., the BWR Owners Group.

In general, this activity would involve development of a Commission Policy Statement and any necessary implementing guidance. The Policy Statement would formalize the current Commission policy that voluntary initiatives are not to be used to avoid NRC regulatory action on adequate protection issues, as directed in the 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 Policy Statement would also direct that voluntary initiatives may be credited in the base case as defined in the Regulatory Analysis Guidelines (NUREG/BR 0058, Rev. 4) when evaluating potential backfits only if there is a low likelihood of degradation of the voluntary industry initiative over time.

The staff estimates that this activity would involve $1.0 million in costs to the NRC and $1.6 million in industry costs. Details and assumptions associated with these estimates are provided in Attachment 1. The staff estimates that Improvement Activity 3 would take 2 years to implement.

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 base case of the cost-benefit 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 voluntary initiative would not have been credited and adoption of regulation requiring backup power may have been justified.

The major benefit of Improvement Activity 3 is that it ensures that the safety benefits from voluntary industry initiatives would be consistently maintained over time by providing risk-informed regulatory oversight. A possible adverse effect is that there may be a reduced level of engagement of licensees in the solution of safety issues if proposed voluntary initiatives are not fully credited in the regulatory analysis.

In addition, the staff is considering whether to develop and implement a formal program for NRC staff oversight of those voluntary initiatives (existing as well as future) which the NRC believes are important from both safety (including risk) and regulatory perspectives, but do not themselves constitute matters of adequate protection. Such a program would include criteria for determining what voluntary industry activities are worthy of oversight, the nature of the oversight (i.e., NRC inspection/audit, or imposition of mandatory information collections with NRC review of the collected data), and the periodicity of the oversight activity. In addition, the staff is considering whether to re-evaluate if certain existing voluntary industry initiatives are being consistently maintained, which is within the staff's authority and does not require Commission approval.

Attachment 1: Regulatory Analysis (Preliminary Draft)

Regulatory Analysis (DRAFT)

NRC STAFF ALTERNATIVES FOR THE DISPOSITION OF RECOMMENDATION 1 OF THE FUKUSHIMA NEAR-TERM TASK FORCE REPORT

NOTE: *Public availability of this draft document is intended to inform stakeholders of the status of the NRC staff's evaluation of possible activities in response to Fukushima Near-Term Task Force (NTTF) Recommendation 1.*

Each Improvement Activity described in the white paper, and to which this draft Regulatory Analysis is attached, is evaluated individually as an alternative to the Regulatory Baseline. Although evaluated individually, these improvement activities could be combined together in various ways to achieve the resultant framework improvements.

This draft regulatory analysis analyzes one possible method for implementing each improvement activity. These methods are representative of possible approaches and have not received complete staff review. Therefore, they do not represent official NRC staff positions and may not conform to the latest version of the white paper. As such, these methods on which this draft Regulatory Analysis is based, may be incomplete or in error in one or more respects and will be subject to further revision before the NRC staff presents the final Regulatory Analysis with its recommendations for dispositioning NTTF Recommendation 1 to the Commission in a SECY paper.

Presently, the NRC is not accepting public comments on the information contained herein. However, the NRC staff does plan to offer another opportunity for public comments on approaches to disposition NTTF Recommendation 1 in the near future, through the Federal rulemaking Web site, www.regulations.gov. The opportunity for public comment will be announced on www.regulations.gov under Docket ID NRC-2012-0173.

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ACRONYMS AND ABBREVIATIONS

ABWR	Advanced Boiling-Water Reactor
ADAMS	Agencywide Documents Access and Management System
AP	Advanced Passive
ATWS	Anticipated Transient without SCRAM
BLS	Bureau of Labor Statistics
CFR	*Code of Federal Regulations*
DBA	Design Basis Accident
FR	*Federal Register*
FSAR	Final Safety Analysis Report
FTE	Full-Time Equivalent
IAEA	International Atomic Energy Agency
IMC	Inspection Manual chapter
IPEEE	Individual Plant Examination of External Events
LOCA	Loss of Coolant Accident
NEI	Nuclear Energy Institute
NPV	Net Present Value
NRC	U.S. Nuclear Regulatory Commission
NTTF	Near-Term Task Force
OMB	Office of Management and Budget
PRA	Probabilistic Risk Assessment
RA	Regulatory Analysis
RMTF	Risk Management Task Force
ROP	Reactor Oversight Process
SBO	Station Blackout
SRM	Staff Requirements Memorandum
SRP	Standard Review Plan
SSC	Structures, Systems, and Components
UFSAR	Updated Final Safety Analysis Report

REGULATORY ANALYSIS FOR NRC STAFF ALTERNATIVES FOR THE DISPOSITION OF RECOMMENDATION 1 OF THE FUKUSHIMA NEAR-TERM TASK FORCE REPORT

1.0 INTRODUCTION

1.1. Statement of the Problem

Following the accident at the Fukushima Dai-ichi nuclear power plant in March 2011, the Commission established a Near-Term Task Force (NTTF) of senior NRC managers to conduct a systematic and methodical review of NRC processes and regulations to determine whether the agency should make additional improvements to its regulatory framework. The NTTF was also tasked to make recommendations to the Commission for its policy direction on this question, as set forth in Tasking Memorandum COMGBJ-11-0002 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML110800456) and SRM-COMGBJ-11-0002 (ADAMS Accession No. ML 110820875)). The NTTF issued its report on July 12, 2011 (ADAMS Accession No. ML111861807) as an enclosure to SECY-11-0093 (ADAMS Accession No. ML11186A959).

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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.

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> 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 Alternatives and a staff recommendation to disposition this Task Force recommendation.

Also, on June 14, 2012, Chairman Jaczko issued a tasking memorandum (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 Commissioner Apostolakis' Risk Management Task Force (RMTF) report NUREG-2150 issued April 2012 (ADAMS Accession No. ML12109A277).

Accordingly, the staff evaluated NTTF Report Recommendation 1 and the RMTF report recommendations for power reactors to identify alternatives to disposition those recommendations, and analyze those alternatives.

The purpose of this regulatory analysis is to help ensure that:

- Appropriate alternatives to regulatory objectives are identified and analyzed.
- No clearly preferable alternative is available to this action.
- The costs of implementation are justified by its effect on overall protection of the public health and safety.

1.2. Objective of Proposed Action

The proposed action is needed in response to the NTTF report finding that the NRC's existing regulatory framework for power reactors does not logically and systematically address the need for new requirements to reduce the risks of beyond-design-basis events and severe accidents.

The existing regulatory framework for power reactors effectively addresses design-basis events. However, for beyond-design-basis events, 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 events or accidents that may require regulatory action (e.g., extended station blackout). This is addressed by Alternative 1.
- A structure and criteria for consistently and predictably evaluating how risk and 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). This is addressed by Alternative 2.

- A regulatory process that ensures licensee implementation and consistent long-term maintenance of voluntary industry initiatives (e.g., severe accident management guidelines). This is addressed directly by Alternative 3, but may also be partially addressed by Alternatives 1 and 2.

The primary objective is to improve the current safety regulation framework in order to regulate nuclear power plant licensees without undue burden, in an efficient, fair, and effective way, and in a manner, that provides the NRC with appropriate confidence in the margin of safety at these facilities.

2.0 IDENTIFICATION AND PRELIMINARY ANALYSIS OF ALTERNATIVE APPROACHES

This section presents the analysis of the alternatives that the NRC considered to meet the regulatory goals identified in the previous section. The NRC considered the regulatory baseline and three alternatives to change this baseline as discussed below. The alternatives are not mutually exclusive and may be combined together in various ways to provide integrated regulatory framework improvements.

2.1. Regulatory Baseline – Maintain the Existing Regulatory Framework

Maintain the existing regulatory framework reflects a Commission decision not to change the NRC's regulatory framework, but to continue with NRC's existing approach to regulating nuclear power reactors. It would not create a new category of events or reorganize the regulatory requirements to incorporate such a new category. The NTTF report criticized this regulatory framework by referring to a portion of the NRC's existing regulatory framework as a "patchwork," but concluded that the framework overall has served the NRC well in providing reasonable assurance of adequate protection of public health and safety. Under this alternative, the current regulatory framework would be retained.

This alternative does not prevent the NRC from taking actions or from changing policies, practices, or procedures. The orders and information requests issued as set forth in SECY-12-0025 (ADAMS Accession No. ML12039A103) demonstrate that the existing framework allows for assessing new information and imposing necessary actions on licensees. Maintain the existing regulatory framework would also not prevent the Commission from continuing current initiatives such as the long-term development of a policy statement regarding defense-in-depth or the staff from developing and issuing an improved rule regarding station blackout. This alternative would not limit the Commission's authority to add new design-basis or beyond-design-basis accident requirements or update the regulatory analysis guidelines. This alternative would also not prevent the NRC from issuing regulatory requirements (e.g., license condition, order, or rule) to formalize industry voluntary initiatives. All of these types of actions and activities are provided for in the current regulatory framework. However, under the regulatory baseline, these activities would be pursued as separate items to resolve particular technical issues without fundamentally changing the NRC's existing regulatory framework.

There would be no specific costs incurred by either the NRC or the nuclear power industry if this alternative is selected. The NRC and industry would incur improvement activity costs as the agency decides to undertake such activities in the future on an *ad hoc* basis, and forego possible minor reductions in costs that might be realized if framework improvement activities were accomplished in an integrated fashion. However, for the basis of this regulatory analysis, this alternative serves as the status quo baseline against which the other framework improvement alternatives are measured.

2.2. Alternative 1 – Establish New Category of Plant Events and Accidents, and Associated Regulatory Requirements

Alternative 1 would use rulemaking to establish a new event/accident categorization process for nuclear power plant structures, systems, and components (SSCs), and to define the "treatment requirements" for SSCs within the new event category (or categories) established. The staff's current view is that events in this new category be drawn from what would currently be regarded as "beyond-design-basis" events and accidents. The specified treatment requirements provide assurance that SSCs used to mitigate the events in the new event category will be able to perform their intended safety functions. The treatment requirements will likely not be as stringent as the full set of treatment requirements currently applied to safety-related SSCs[5]. Similar to the reliability assurance program for new reactors, these treatment requirements would be performance-based and would include controls to ensure that subject SSCs demonstrate a high level of reliability and availability and are designed, constructed, and operated in a manner consistent with supporting technical analyses.

Both the NTTF and the RMTF reports discuss options for creating a single new event category and offer insights as to what this new category may look like. The staff has not yet decided which elements of the NTTF and RMTF recommendations on categorization should be adopted for Improvement Activity 1. The extent to which the implementation of Alternative 1 conforms with either NTTF or RMTF recommendations depends upon how five key issues are resolved. These key issues are discussed below.

1. Would the events be specified on a generic or a plant-specific basis, or by both methods?

Many options exist for defining the categorization or determining which events would fall into the new category. A "generic" approach could be implemented in which the NRC would specify, on a fleet-wide basis, a set of events that would define this category. Existing beyond-design-basis regulations such as the 10 CFR 50.63 Station Blackout rule (SBO), the § 50.62 Anticipated Transients without Scram (ATWS) rule, and the § 50.54(hh) requirements for loss of large plant areas due to fires or explosions would likely be integrated into this category and a combination of risk insights and deterministic information could be used to identify other important internal and external events. If this generic approach is used, licensees with probabilistic risk assessments (PRAs) of sufficient quality might also be permitted to seek plant-specific relief from taking action to address certain events in the new category (or in the existing deterministic (safety-related) design basis itself) if they can use NRC-established criteria to demonstrate that they are not risk-significant at their facilities.

[5] Although the term "SSC" is used here, it is understood that operator actions and licensee programs needed to assure adequate SSC performance may also be subject to special treatment requirements.

An optional "plant-specific" option could be implemented in which the NRC would require licensees to perform analyses to identify specific events or accident sequences that would fall into the new event category. This analysis would be done on a plant-specific basis and would be subject to NRC review and approval. These analyses, performed at regular intervals, would benefit from risk-insights but would not necessarily require a PRA. Although licensees would perform the analyses, the NRC would develop and communicate clear thresholds for including events in the new category to ensure consistent standards across the fleet. If this approach is implemented, some licensees may determine that certain scenarios currently classified as design-basis events (and therefore subject to special treatment requirements for safety-related SSCs) meet the criteria for inclusion into the new regulatory category and therefore should have their treatment requirements modified to be consistent with those specified for the new event category.

2. Would the new category (or categories) be for adequate protection, safety enhancement, or both?

The NTTF report recommends that a new event be created and that SSCs and operator actions in this category be considered necessary for adequate protection. The RMTF Report, Appendix H offers an alternate approach where items in the new event category are considered "safety enhancements" not needed for adequate protection. An alternate approach would be to create two new categories—one for adequate protection and the other for safety enhancement events. This would allow, for example, an adequate protection rule to specify the reduced treatment requirements associated with the new category.

3. Would a plant-specific PRA be required?

Identification and categorization of beyond design basis events can be done with or without a requirement for licensees to have and maintain a PRA. The generic approach to event identification and categorization could make use of existing risk insights from a number of sources, and therefore a categorization process could be developed where a plant-specific PRA would not be used for categorization. A plant-specific approach to event identification and categorization would greatly benefit from a plant-specific PRA, although it may be possible to develop some process that would not require the PRA. Either a generic or plant-specific approach could also allow, but not require, use of a plant-specific PRA, which may allow licensees with a suitable PRA to request relief from some requirements. The PRA will have to have sufficient quality to support whatever process is developed.

4. Would the new events be applicable to new reactors, or also to operating plants?

The new event category could only apply to new reactors or could also be applied to currently operating reactors. This is different than the forward-looking/retroactive discussion below, in that even if made applicable to currently operating reactors, the rule could still be made to apply only to future events and re-evaluations of currently-regulated activities based on the future availability of new or revised information.

5. Would the new event category be applied in a forward-looking manner, or retroactively?

The categorization and associated treatment requirements could be made to apply only to new events, issues, and information arising after promulgation of the new rule. Alternatively, the rule could require licensees to re-evaluate the current design and operation of each facility and determine whether there were additional events that needed to be added to the new

category. Special treatment requirements associated with the new event category could be applied to currently installed plant equipment or could be limited only to SSCs needed to mitigate beyond design basis events that are identified in the future. The staff notes that treatment requirements for current beyond-design-basis events (e.g., ATWS, SBO) are not standardized to the same level as the safety-related treatment requirements. Therefore, the new special treatment requirements, if imposed on existing SSCs, may require some licensees to enhance their current procedures, programs, and analyses in order to achieve compliance.

Creation of a process to identify and categorize beyond design basis events would require careful consideration of the key issues identified above in order to obtain the maximum benefit and minimize the likelihood of unintended consequences or undue burden. Significant interaction with stakeholders, including tabletop exercises would be essential.

In brief, this alternative includes the following major elements:

a) Amend the *Code of Federal Regulations* to add a design-extension category of events to be included in the NRC's regulatory framework for nuclear power plants and specify the criteria of such events and accidents that the NRC will use to identify these events. The new categorization requirements would be imposed on existing nuclear power plants including already-approved design certifications and combined licenses, as well as future plants (including applications currently in process).

b) Establish the "regulatory treatment requirements" applicable to the systems, structures and components, and power plant activities addressed by the NRC-designated set of design-extension regulations.

c) Require nuclear power plants applicants and licensees (including applicants for design approvals and design certifications under Part 52) to comply with applicable design-extension requirements and to include in applications and final safety analysis report (FSAR) updates (as applicable) information necessary for the staff to determine whether there is reasonable assurance the requirements are met. The new requirements would specify analysis methods, assumptions, and acceptance criteria for demonstrating the ability to mitigate these design-extension events, as well as minimum treatment requirements for the involved equipment and procedures. The new categorization requirements would be imposed on existing nuclear power plants including already-approved design certifications and combined licenses, as well as future plants (including applications currently in process).

d) Prepare a new guidance document for use by applicants and licensees of nuclear power plants (including applicants for design approvals, design certifications and combined licenses under Part 52) to comply with applicable design-extension requirements. This guidance document would establish what information to include in applications and FSAR updates (as applicable) on design-extension categorization and compliance. The guidance document would also specify acceptable analysis methods, assumptions, and acceptance criteria for demonstrating the ability to mitigate these design-extension events, as well as minimum treatment requirements for the involved equipment and procedures.

e) Revise NRC guidance documents to conform to design-extension implementation requirements and to specify those design features credited only in the evaluation of design-extension events, as appropriate, to comply with the design-extension category rule.

f) Revise NRC Inspection procedures for monitoring implementation of special treatment requirements.

g) Nuclear power plant licensees will be required to provide and maintain information on design-extension categorization and compliance in their FSAR.

2.3. Alternative 2 – Establish Decisionmaking Process and Criteria for Considering Defense-In-Depth, Risk, and Safety Margins

Alternative 2 would establish the Commission's expectations with regard to the risk-informed regulatory decision process for evaluating defense-in-depth, risk, and safety margins in the NRC's regulation of nuclear power reactors. It would define the objective and the principle elements of defense-in-depth and safety margins and incorporate these into the regulatory decisionmaking process. This work would include the NRC developing criteria for determining whether adequate defense-in-depth and safety margins have been addressed in the design and operation of a nuclear power plant.

One key issue that will need to be addressed as part of this activity is whether the regulatory analysis guidelines and backfit analysis guidelines should include defense-in-depth and safety margins as fundamental decision criteria. Another key issue is whether a plant-specific PRA should be used as one factor in determining whether adequate defense-in-depth has been achieved. For example, a plant-specific PRA might be used because plant-specific risk would be a principle component in any balancing process. Moreover, one level of defense would involve emergency planning. Potential acceptance guidelines for this level could involve offsite consequences. Therefore, a Level 3 PRA would be beneficial if quantitative risk criteria are established as part of the acceptance guidelines.

In brief, this alternative includes the following major elements:

a) Develop and issue a Commission Policy Statement that includes:

- Discussion on expectations regarding the use of risk-informed regulatory decision making that considers defense-in-depth, risk, and safety margins; including an explanation of what is meant by balancing defense-in-depth, risk, and safety margin.

- Explicit description of defense-in-depth that includes its objective, why it is needed, and a proposed strategy for accomplishing defense-in-depth (e.g., multiple barriers, level of defense).

- Explicit definition of safety margin as it applies to nuclear power plants.

- Explanation of how defense-in-depth and safety margins compensate for uncertainty.

- Expectations on having and maintaining plant-specific probabilistic risk assessment (PRA) models (Note: If plant-specific PRA are required to implement this alternative than rulemaking is required to specify this new requirement).

- Description of how the current PRA Policy statement supports the promulgation of regulations or a new Policy Statement and associated SRM directing the transition of the NRC to risk-informed regulatory decision making process, including a schedule for key events and activities.

b) Develop new (e.g., Management Directive) or revising existing implementing guidance to conform to the issued policy statement. Implementing guidance would include:

- Decision criteria for implementing the strategy for achieving defense-in-depth and associated decision criteria for use in determining whether adequate defense-in-depth was achieved.

- Decision criteria for evaluating whether sufficient safety margin exists in the design of a nuclear power plant.

- A method for integrating risk insights with defense-in-depth and safety margins (e.g., explanation of how risk and safety margins are considered in determining whether acceptable defense-in-depth exists).

- Revision to the NUREG/BR-0058, "Regulatory Analysis Guidelines" and NUREG/BR-0184, "Regulatory Analysis Technical Evaluation Handbook," to implement some of the concepts presented in the technology-neutral framework specified in NUREG-1860 to better integrate safety goals and defense-in-depth and to conform to the established defense-in-depth criteria and risk assessment methods.

- Conforming changes to existing regulatory guides

2.4. Alternative 3 – Clarify the Role of Voluntary Industry Initiatives in the NRC Regulatory Process

Alternative 3 would clarify the role of voluntary industry initiatives[6] in NRC's regulatory processes by defining when and in what manner the NRC would incorporate such initiatives into regulatory requirements. While it is current NRC staff practice not to rely on voluntary industry initiatives in lieu of regulatory action to resolve matters related to providing reasonable assurance of adequate protection, the proper role of such initiatives in other regulatory areas is not as clear. To implement this alternative, the NRC staff would develop a Commission Policy Statement and any necessary implementing guidance.

Specifically, this alternative includes the following major elements:

[6] By "industry initiative," the staff is referring to proposals made by the entire nuclear power industry, e.g., commitments made by the Nuclear Energy Institute (NEI), or proposals made by discrete groups of licensees and applicants, e.g., the BWR Owners Group.

a) Prepare and issue a Commission Paper to define when and in what manner the NRC would incorporate such initiatives into regulatory requirements. (e.g., rules, orders, license conditions) relating to voluntary industry initiatives and provide a recommendation on how past voluntary initiatives would be addressed using this approach.

b) Prepare and issue a Commission Policy Statement to formalize the current Commission policy that voluntary initiatives are not used to avoid NRC regulatory action on adequate protection issues, as directed in the 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 Policy Statement would direct that voluntary initiatives may be credited in the base case as defined in the Regulatory Analysis Guidelines (NUREG/BR-0058, Rev. 4) when evaluating potential backfits only if there is a low likelihood of degradation of the voluntary industry initiative over time.

c) Revise and issue applicable Management Directives, Office Instructions, Inspection Procedures, and related guidance to describe ways of complying with the Commission Policy Statement requirements.

d) Revise and issue NRC's Regulatory Analysis Guidelines and Handbook for preparing plant-specific and generic backfit analyses that conform to the new policy.

e) Issue new reporting requirements to include the new features and functions important for providing protection from selected beyond-design-basis events in the licensing basis for a nuclear power plant. The items included in this new chapter would be subject to reporting requirements, change control processes, and other provisions important for implementing and maintaining parts of the licensing basis for a nuclear power plant.

f) Establish expectations for NRC region review of licensee voluntary initiatives on a recurring basis in order to provide feedback to NRC headquarters on whether the programs as implemented resolve the problems and concerns and meet the stated objectives that were the focus of the voluntary initiative.

3.0 ESTIMATION AND EVALUATION OF VALUES AND IMPACTS

This section of the Regulatory Analysis discusses the benefits and costs of each action alternative relative to the regulatory baseline. Ideally, all costs and benefits would be converted into monetary values. The total of benefits and costs would then be algebraically summed to determine for which alternative the difference between the values and impacts was greatest. However, for this regulatory analysis, the assignment of monetary values to benefits is not attempted because the staff believes that, for the following reasons, meaningful quantification is not possible:

- There are difficulties in translating the principal health and safety benefit of the proposed process alternatives (increased confidence in the margins of safety) into an estimate of risk reduction.

- Significant industry cost savings may result through use of PRA techniques 1) to reduce operation and maintenance costs while meeting or exceeding safety requirements or 2) to request and receive exemptions from unnecessarily conservative regulatory requirements. However, whether these benefits are realized is subject to the licensee pursuing and achieving these savings.

- Regulatory efficiency estimates are dependent on implementation and are subject to large uncertainties.

As a result, non-quantifiable attributes will remain the primary benefits so the staff must apply subjective judgment to determine which of the alternatives best solves the problem identified in section 1.0 of this regulatory analysis. Thus, section 4.0 discusses the benefits and present estimates of the costs to industry and to the NRC during and following implementation of each alternative.

3.1. Identification of Affected Attributes

This section identifies the factors within the public and private sectors that the regulatory alternatives (discussed in Section 2) are expected to affect. These factors are classified as attributes using the list of potential attributes provided by the NRC in Chapter 5 of its Regulatory Analysis Technical Evaluation Handbook. The basis for selecting each attribute is presented below.

Affected attributes are the following:

- Industry Implementation. This attribute accounts for the projected net economic effect on the affected licensees to implement the mandated changes. Costs include procedural and administrative activities. Additional costs above the regulatory baseline are considered negative and cost savings are considered positive.

- Industry Operation. This attribute accounts for the projected net economic effect due to routine and recurring activities required by the proposed alternative on all affected licensees.

- NRC Implementation. This attribute accounts for the projected net economic effect on the NRC to place the proposed alternative into operation. NRC implementation costs and benefits incurred in addition to those expected under the regulatory baseline are included. Additional rulemaking, policy statements, new or expedited revision of guidance documents and inspection procedures are examples of such costs.

- NRC Operation. This attribute accounts for the projected net economic effect on the NRC after the proposed action is implemented. Additional inspections, evaluations, or enforcement activities are examples of such costs.

- Improvements in Knowledge. This attribute accounts for the projected net economic value of new information, especially from assessments of the safety of licensee activities. Some NRC actions have as their goal the improvement in the state of knowledge for such factors as accident probabilities or consequences, with an ultimate objective of facilitating safety enhancement, reducing uncertainty. This attribute is qualitative in nature.

- Regulatory Efficiency. This attribute measures regulatory and compliance improvements resulting from the proposed action. These include changes in industry reporting requirements and the NRC's inspection and review efforts. Achieving consistency with international standards groups may also improve regulatory efficiency. This attribute is qualitative in nature.

Attributes that are not expected to be affected under any of the alternatives include the following: public health (accident), public health (routine), occupational health (accidental), occupational health (routine), offsite property, onsite property, other government, general public, antitrust considerations, safeguards and security considerations, and environmental considerations.

3.2. Methodology Overview

This section describes the process used to evaluate benefits and costs associated with the proposed regulatory framework alternatives. The benefits (values) include desirable changes in affected attributes, e.g., monetary savings and improved security and safety. The costs (impacts or burdens) include undesirable changes in affected attributes, e.g., increased monetary costs, and decreased security and safety.

The regulatory analysis methodology is specified by various guidance documents. The two documents that govern the NRC's voluntary regulatory analysis process are NUREG/BR-0058, Revision 4, "Regulatory Analysis (RA) Guidelines of the U.S. Nuclear Regulatory Commission," dated September 2004 (RA Guidelines), and NUREG/BR-0184, "Regulatory Analysis Technical Evaluation Handbook," dated January 1997 (RA Handbook). The regulatory analysis identifies all attributes impacted by the proposed alternative and analyzes them either quantitatively or qualitatively as described in the previous section.

The analysis evaluates several attributes on a quantitative basis. These include industry implementation, industry operation, NRC implementation, and NRC operation. Quantitative analysis requires a baseline characterization, including factors such as the number of licensees affected, the nature of activities being conducted, and the types of new activities that will be implemented because of the proposed alternative. However, licensees may respond to a new regulatory framework in different ways. It is beyond the scope of this analysis to individually characterize and analyze each affected licensees' approach if it deviates from the norm. The analysis proceeds quantitatively for these attributes by making general assumptions. The remainder of this section describes the most significant analytical data and assumptions used in the quantitative analyses of these attributes.

This analysis also relies on a qualitative evaluation of two attributes as discussed in the previous section due to the subjective nature of the impact.[7]

3.2.1. Analysis Model

This regulatory analysis measures the incremental impacts of the proposed regulatory framework alternative to the "continue with the existing regulatory framework" baseline, which reflects anticipated behavior in the event that the proposed alternatives are not adopted.

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[7] The regulatory efficiency attribute also is evaluated qualitatively by definition. See NRC's *Regulatory Analysis Technical Evaluation Handbook,* Section 5.5.14.

Section 4 presents the estimated incremental costs and savings of each alternative relative to continuing with NRC's existing regulatory framework (regulatory baseline).

For the quantified portion of the regulatory analysis, the NRC staff develops expected values for each cost and benefit. The NRC staff then discounts the consequences in future years to the current year of the regulatory action. Finally, the NRC staff sums the costs and the benefits for each alternative and compares them.

After performing a quantitative regulatory analysis, the NRC staff will add attributes that could only be qualified. Based on the qualification of each attribute, uncertainties, sensitivities, and the quantified costs and benefits, the staff will make a recommendation for each alternative. If the benefits, both quantified and qualified, are judged to be greater than the quantified and qualified costs, then the staff will recommend the alternative should be implemented. If the benefits, both quantified and qualified, are judged to be less than the quantified and qualified costs, then the staff will recommend the alternative should not be implemented.

Key inputs into the analysis model are discussed in the following subsections.

3.2.1.1. Regulatory Baseline

The regulatory baseline used in this analysis is to continue with NRC's existing approach to regulating nuclear power plants. It would not create a new category of events or reorganize the regulatory requirements to incorporate such a new category as proposed in the alternative regulatory frameworks. This baseline assumes full compliance with existing NRC requirements, including current regulations and relevant orders. This is consistent with RA Guidelines, which states that, "in evaluating a new requirement…, the staff should assume that all existing NRC and Agreement State requirements have been implemented."

3.2.1.2. Discount Rates

In accordance with guidance from the Office of Management and Budget (OMB) and NUREG/BR-0058, Rev. 4, present-worth calculations are used to determine how much society would need to invest today to ensure that the designated dollar amount is available in a given year in the future. By using present-worth, costs and benefits, regardless of when averted in time, are valued equally. Based on OMB guidance Circular No. A-4, September 17, 2003), present-worth calculations are presented using both 3 percent and 7 percent real discount rates. The 3 percent rate approximates the real rate of return on long-term government debt, which serves as a proxy for the real rate of return on savings. This rate is appropriate when the primary effect of the regulation is on private consumption. Alternatively, the 7 percent rate approximates the marginal pretax real rate of return on an average investment in the private sector, and is the appropriate discount rate whenever the main effect of a regulation is to displace or alter the use of capital in the private sector.

Although the NRC is not bound to follow OMB guidance, the NRC has historically voluntarily complied with the present-worth calculations developed in OMB Circular No. A-4 and have stated such in the RA Guidelines and RA Handbook.

3.2.2. Data

The data and assumptions used in analyzing the quantifiable impacts associated with the proposed alternatives are discussed in this subsection. Information on attributes affected by

the proposed regulatory framework alternatives were obtained from experienced NRC staff. The NRC staff considered the potential differences between the new requirements and the current requirements and has incorporated the proposed incremental changes described in alternatives 1,2, and 3 into this regulatory analysis.

Available cost information is in this regulatory analysis. However, some of this analysis is qualitative with regard to the potential values and impacts of the proposed regulatory framework alternatives because it was not possible to develop a quantitative estimate that has a reasonable level of certainty and defensibility.

It should be recognized that the costs and benefits of implementing the proposed alternative regulatory frameworks would vary widely for licensees dependent on facility design, facility vintage, and licensing history. A further complicating factor is that these regulatory framework alternatives are process enhancements. Licensees may not know the actual cost-benefits achievable until they begin implementing the new regulatory framework at their facilities.

3.2.2.1. Labor Rates

The NRC's labor rates are determined using the methodology in Section 5.2 of NUREG/CR-4627, "Generic Cost Estimates." This methodology considers only variable costs that are directly related to the implementation, operation, and maintenance of the proposed NRC activities. The NRC's 2012 incremental hourly labor rate includes those variable expenditures related to implementation and operation costs associated with regulatory actions. The calculated rate is $126. The NRC full-time equivalent (FTE) annual incremental labor rate is $173,000, based upon the productive labor year average of 1375 hours.

Similarly, industry incremental labor rates are calculated based on the Employer Costs for Employee Compensation data table available on the Bureau of Labor Statistics Web site (www.bls.gov). These tables were used to select an appropriate mean hourly labor rate plus fringe cost to perform the estimated procedural, licensing, and utility related work necessary during and following implementation of the proposed alternatives. In establishing this labor rate, wages paid for the individuals performing the work plus the associated fringe benefit component of labor cost (i.e., the time for plant management over and above those directly expensed) are considered incremental expenses and are included. A representative industry hourly labor rate of $58.91 is used, which is from the Bureau of Labor Statistics Employer Costs for Employee Compensation data set, compensation component, "Total compensation," employer/employee characteristics, "4400000000 Utilities" reported for the second quarter of year 2012 and is equivalent to an annual salary of approximately $123,000. A multiplier of 2.0, which includes fringe and indirect management cost, was applied and resulted in an incremental hourly labor rate of $118. The industry FTE annual labor rate is $245,000.

3.2.2.2. Applicability

The proposed alternative frameworks are applicable to all U.S. light water power reactors, including operating reactors, evolutionary light water reactors, and small modular light water reactors. The impacts of these alternatives on all 103 currently operating nuclear power plants, 6 nuclear power plants under construction (e.g., Vogtle Units 3 and 4, Virgil C. Summer Units 2 and 3, Watts Bar Unit 2, and Bellefonte Unit 1), 24 plants whose applications are under review (refer to table 3-1 for listing of proposed new reactors), seven design certification applications (refer to table 3-1 for listing) are considered in this regulatory analysis.

Table 3-1: List of Combined License Applications under Review and Design Certifications Issued and Applications Under Review

Combined License Applications Under Review	Design Certification Issued or Applications Under Review
• Bell Bend, • Bellefonte Units 3 and 4, • Callaway Unit 2, • Calvert Cliffs Unit 3, • Comanche Peak Units 3 and 4, • Fermi Unit 3, • Grand Gulf Unit 3, • Levy County Units 1 and 2, • Nine Mile Point Unit 3, • North Anna Unit 3, • River Bend Unit 3, • Shearon Harris Units 2 and 3, • South Texas Units 3 and 4, • Turkey Pont Units 6 and 7, • Victoria Units 1 and 2, and • William States Lee Units 1 and 2	• Advanced Passive 1000 (AP1000) Pressurized-Water Reactor • Economic Simplified Boiling-Water Reactor • U.S. Evolutionary Power Reactor • U.S. Advanced Pressurized-Water Reactor • Advanced Boiling-Water Reactor (ABWR) Design Certification Renewal (Toshiba) • ABWR Design Certification Renewal (General Electric-Hitachi) • ABWR Aircraft Impact Design Certification Amendment

Seven of these COL applications are in advanced review and have a target date for their Commission held mandatory hearing in the 2015 -2016 timeframe. This regulatory analysis models these seven units to begin operation in 2020. The impacts on the remaining 19 nuclear power plant applicants (whose application reviews were deferred or suspended) and on future applicants were not quantified in this regulatory analysis, even though changes to regulations and policies resulting from the proposed alternatives, if implemented, could affect these future nuclear power plants when licensing activities are resumed.

3.2.2.3. Nuclear Power Plant License Expiration

Other than those operating reactors that have indicated they would not seek a license renewal or have announced either an early (e.g., Kewaunee, Oyster Creek) or permanent closure (e.g., Crystal River Unit 3), this analysis assumes that the remaining operating reactors' license term will include a 20-year license extension. As a result, the average operating license expiration date for the 103 currently operating nuclear power plants is during year 2039. Given the analysis begins in 2013, the average remaining life will be 26 years from implementation and any recurring costs will be discounted over that time period. Any costs incurred over future years are discounted back to 2013 dollar values.

For those plants currently under construction, the average first year in operation is forecasted to occur in 2017. Including a 20-year license extension, these plant licenses, on average, will expire in 2077. The incremental costs associated with these alternatives and incurred over this period are discounted back to 2013 dollar values.

For nuclear power plant applications currently under review, the average first year in operation is forecasted to occur in 2020. Including a 20-year license extension, these plant licenses, on average and if issued on the schedule forecasted, will expire in 2080.

3.2.2.4. Other Key Data and Assumptions

All monetized costs are expressed in 2013 dollars and are modeled either on an annual recurring cost basis or on a one-time implementation basis. Ongoing costs of operation related to the alternatives are assumed to begin in 2014 unless otherwise stated, and are modeled on an annual cost basis.

Estimates were made for one-time implementation costs. The staff assumes that these costs will be incurred in the first year of the analysis unless otherwise noted.

Estimates were made for recurring annual operating expenses for each alternative. The values for annual operating expenses are modeled as a constant expense for each year of the analysis horizon. An annuity calculation was performed to discount these annual expenses to 2013 dollar values.

3.2.3. Sensitivity Analysis

3.2.3.1. Discount Rate Sensitivity

Current trends in the marketplace have provided returns on investments well below the 3 percent and 7 percent historical discount rates, which OMB Circular No. A-4 is based. The NRC is providing a zero discount rate (e.g., undiscounted values) as a sensitivity analysis to model a period of historically low interest rates and to address uncertainties in when future costs may be incurred . NRC regulatory analyses typically provide the undiscounted values for the costs and benefits for information purposes, but have not provided them as a sensitivity analysis. However, the NRC is reporting the undiscounted costs and benefits as part of the sensitivity analysis based on current market trends and future predictions.

4.0 PRESENTATION OF RESULTS

This section presents the analytical results and findings including discussion of supplemental considerations, uncertainties in estimates, and results of sensitivity analyses on the overall benefits and costs that are expected to be affected by the proposed alternatives. To the extent that the affected attributes could be analyzed quantitatively, the net effect of each alternative has been calculated and is presented below. As previously discussed, some values and impacts could be evaluated only on a qualitative basis.

4.1. Regulatory Baseline – Maintain the Existing Regulatory Framework

Under this regulatory baseline, there would be no structural changes to existing staff policies or processes that associate regulatory requirements with design bases events. Emergent issues with potential safety impact (including those currently underway as a result of the Fukushima accident) would be handled as they are currently. Risk-informed regulations and guidance would be developed as needed to address additional activities selected through stakeholder and NRC interactions. The risk-informed regulations would remain predominantly voluntary alternatives unless backfitting considerations are met. Voluntary industry initiatives would not be permitted for issues involving adequate protection, consistent with current Commission direction, but would continue to be considered as appropriate for addressing some safety issues that arise. The NRC's approach to the defense-in-depth philosophy would be to continue to retain it as a general philosophy that is implicitly implemented in various regulations and reflected as a "key principle" of risk-informed regulation. There would be no new category

of accidents incorporated through the regulations (e.g., extended design-basis accidents). These issues would be addressed on a case by case basis for each emergent issue as the resolution of the issue moves thorough the decision making process and any rule or guidance developed as part of the emergent issue resolution.

The regulatory baseline does not prevent NRC from taking actions or from changing policies, practices, or procedures. The orders and information requests issued as set forth in SECY-12-0025 demonstrate that the existing framework allows for assessing new information and imposing necessary actions on licensees. This alternative would also not prevent the Commission from continuing current initiatives such as the long-term development of a policy statement regarding defense-in-depth, or the staff from developing and issuing an improved rule regarding station blackout. This alternative would not limit the Commission's authority to add new design-basis or beyond-design-basis accident requirements, or update the regulatory analysis guidelines. Maintaining the existing regulatory framework would also not prevent NRC from issuing regulatory requirements (e.g., license condition, order, or rule) to formalize industry voluntary initiatives. All of these types of actions and activities are provided for in the current regulatory framework. However, under this alternative, these activities would be pursued as separate items to resolve particular technical issues without fundamentally changing the NRC's existing regulatory framework.

This alternative defines the baseline for this analysis. As such, there are no incremental costs or resource impacts associated with this alternative.

4.1.1. Improvements in Knowledge

The regulatory baseline continues the current regulatory framework's capability to improve existing regulatory knowledge and provides the basis for assessing any improvements in knowledge offered by each of the considered alternatives.

The NRC's current regulatory framework has served well and provides reasonable assurance of adequate protection. This alternative supports the NRC strategic plan and the principles of good regulation by:

- Maintaining Safety – Operating reactors in the U.S. continue to be safe. The current framework has proved sufficient to address new issues as they arise, including the major regulatory actions taken after the Three Mile Island Unit 2 and Fukushima Dai-ichi events.

- Promoting Openness – Using the current emergent issue by emergent issue resolution process provides ample opportunity for all stakeholders to provide input on defense-in-depth and safety margin implications but such input requires extensive resources (both funds and schedule) to reach resolution.

- Promoting Risk-Informed Performance – The current regulatory framework includes risk-informed, performance based regulations, which consider risk insights embedded in:

    - Mandatory implementation of § 50.65, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants" (Maintenance Rule)

    - Regulatory Analysis Guidelines

- Reactor Oversight Process (ROP) and its significance determination process

- Voluntary alternative rules
  - § 50.46a. "Acceptance criteria for reactor coolant system venting systems" – (draft final) risk-informed redefinition of large-break loss of coolant accident
  - § 50.48, "Fire protection" – § 50.48(c), *National Fire Protection Association Standard NFPA 805.* National Fire Protection Association (NFPA) Standard 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants, 2001 Edition (NFPA 805)
  - § 50.69, "Risk-informed categorization and treatment of structures, systems and components for nuclear power reactors"

- Voluntary license amendment applications (e.g., Technical Specifications 4b risk-informed completion times)

However, defense-in-depth would remain as a philosophy; there would be no new category of events or accidents, no new direction on voluntary industry initiatives, and no PRA requirement for currently operating nuclear power plants.

4.1.2. Regulatory Efficiency

This alternative establishes the following standards in regulatory efficiency that was compared to any improvements offered by each of the considered alternatives.

- Providing efficiency – Several of the improvement activities discussed in the alternatives evaluated in this regulatory analysis may require Commission policy decisions. If the Commission directs the staff to implement any of these improvements, it may be more efficient to undertake these activities in an integrated fashion rather than individually, as they occur, under the existing regulatory framework. There is no necessary incremental resource expenditures for NRC or licensees associated with maintaining the existing framework relative to the current level. Any improvement actions would be identified and justified on their own merits, as currently is the practice.

- Providing reliability – The current NRC regulatory approach ensures that regulations are not unjustifiably in a state of transition, but change as necessary to reflect new information.

- Timeliness – The current NRC processes for evaluating new information and taking appropriate action could be timelier. For example, Generic Issues, on average, take about eight years to resolve. Maintaining the existing regulatory framework would not provide as great an impetus for improving these processes compared to adopting Alternatives 1, 2, or 3.

- Clarity – This alternative may not support the openness principle of good regulation, because it does not address the apparent "patchwork" and therefore does not aid the public in understanding NRC's regulatory structure.

- Regulatory Certainty – This alternative would not change the backfitting rule under 10 CFR50.109 because of any of the analyzed regulatory framework changes.

However should future emergent issues occur the resultant regulatory response to this new information would be addressed using the current framework. For example, rules, requirements, and/or orders could be issued to address a future significant nuclear power plant event, should one occur.

4.2. Alternative 1 – Establish New Category of Plant Events and Accidents, and Associated Regulatory Requirements

This alternative would establish a consistent regulatory approach, reflected in the power reactor regulatory framework, for categorization of plant events and accidents. The NRC would also specify the NRC treatment requirements[8] to be applied to those structures, systems, and components (SSCs) needed to address plant events and accidents in the newly defined category of events and accidents.

A key element of this alternative is the establishment of these treatment requirements. In the staff's view, establishing a new category of plant events and accidents and the categorization of SSCs into the new category, by themselves, would offer little additional benefit to the NRC and licensees. It is only when establishment of a new category of plant events and accidents leads to application of a specified (and reduced) set of risk-informed treatment requirements for SSCs needed to meet the new category of plant events and accidents, will there be any significant benefits for the NRC or nuclear power plant applicants and licensees. Accordingly, this alternative involves both categorization of plant events and accidents, and the associated regulatory requirements.

Methods for addressing plant events and accident categorization may be incorporated into the NRC's regulatory framework using a wide array of approaches although it would generally follow the approach described below.

This alternative would:

- Establish a new category of plant events and accidents;
- Specify the NRC regulations that address the new category;
- Specify the regulatory treatment requirements applicable to be applied to SSCs necessary to address events and accidents in this new category; and
- Require applicants and licensees for nuclear power plants (including applicants for design approvals and design certifications under Part 52) to comply with applicable design requirements for categorization and the minimum treatment requirements specified in the regulations, and to include in applications and FSAR updates (as applicable) information on plant events and accidents categorization and compliance.

The new categorization requirements would be imposed on existing nuclear power plants (including already-approved design certifications and combined licenses, as well as future plants (including applications currently in process).

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[8] Treatment requirements are the set of NRC regulations imposed on safety-related SSCs because of those SSCs' importance to providing reasonable assurance of adequate protection. These regulations, termed "special treatment requirements," are listed in 10 CFR 50.69(b).

4.2.1.1. Industry Implementation

The industry implementation costs include developing infrastructure and processes to support the event categorization of SSCs, perform the categorization, address the impacts resulting from event category treatment, and update and revise the plant UFSAR and design certification documents.

Supplement Categorization Infrastructure

Each licensee, applicant, and design certification holder will need to supplement existing infrastructure and processes to support the event categorization of SSCs. At a minimum, this involves the review and revision of procedures governing the SSC categorization process, establishment of a categorization decision-making panel, training, and establishment of a supporting working group that provides the decision-making panel with the relevant information to enable the panel to make the categorization decisions. Much of this infrastructure and processes may already exist from previous categorization efforts to meet maintenance rule monitoring and for other purposes (e.g., risk-informed Inservice Inspection applications, risk-informed Technical Specifications, 10 CFR 50.69 categorization activities).

Operating Plants

It is estimated that this activity will be performed on a site-basis (e.g., 65 sites) and will require 3 person-months to review and revise existing plant processes to accommodate categorization requirements to conform with the final rule. Training is estimated to require 8 person-days, approximately 1 day training for 5 panel members plus 3 working group members.

Plants Under Construction, COL Applicants, and Design Certification Holders and Applicants

It is estimated that the categorization infrastructure activity will be performed in a similar fashion as the operating plants and it is presumed that logical groupings (e.g., by site or by reactor design certification technology) would perform this activity. This results in ten logical groups (Vogtle Units 3 & 4; VC Summer Units 2 & 3; Bellefonte Unit 1; and 7 Design Certification holders or applicants working with new plant applicants). Watts Bar Unit 2 categorization infrastructure activities are assumed to be coordinated with those of Watts Bar 1.

Performing the Categorization

Each licensee, applicant, and design certification holder will need to expend resources in evaluating the SSCs to determine categorization, both for the working group to complete the initial work of developing and gathering the relevant information on SSC/function significance and for the panel to convene and make the decision regarding SSC categorization.

This one-time cost is a function of the number of events that are specified into the new rule category generically and would be performed by the 75 entities consisting of 65 operating plant sites and 10 logical groupings. Assuming the events are specified generically, it is estimated that a 3-person working group would require two weeks to develop and prepare the information for consideration by the decision panel. It is estimated that the 5-member panel and the 3-person working group would need to spend an average of 5 days per event reviewing the information and making the categorization decisions. In addition, it is expected that over time,

the process would become much more efficient, and these costs probably can be reduced, particularly if efficiencies are identified for categorizing groups of components.

Implement the Event Category Treatment

Following categorization, licensees, applicants, and design certification holders may incur impacts that result from revised treatment requirements. These include changes to 1) plant procedures to implement the revised approach (e.g., changes to procedures governing procurement, receipt inspection, testing), 2) equipment specifications, 3) plant databases, and 4) training of plant personnel to implement the revised approach.

It is estimated that the 75 entities consisting of 65 operating plant sites and 10 logical groupings will require 9 person-months to review and revise plant procedures (e.g., changes to procedures governing procurement, receipt inspection, testing), 2) equipment specifications, 3) plant data bases, and 4) training of personnel

The estimated one-time implementation costs for these three activities are detailed in the table below.

Table 4-1: Alternative 1 – Industry Event Categorization (2013 dollars)

	FTE Required	No. of actions	Yearly rate	Implementation Cost
Supplement categorization infrastructure	0.25	75	$245,000	$4,700,000
Perform the categorization	.6	75	$245,000	$11,000,000
Implement the event categorization treatment	.75	75	$245,000	$13,800,000
			Subtotal	**$29,500,000**
			Per Unit Cost[9]	**$222,000**

*Implementation costs rounded to the nearest hundred thousand dollars. Per unit cost rounded to the nearest thousand dollars.

Update COL Applications, UFSAR and Design Certification Documents

Nuclear power plants applicants and licensees (including applicants for design approvals and design certifications under Part 52) would need to include in applications, FSAR updates, and DCD submittals (as applicable) information necessary for the staff to determine whether there is reasonable assurance the requirements are met. The new requirements would specify analysis methods, assumptions, and acceptance criteria for demonstrating the ability to mitigate these design-extension events, as well as minimum treatment requirements for the involved equipment and procedures. The new categorization requirements would be imposed on existing nuclear power plants (including already-approved design certifications and combined licenses, as well as future plants (including applications currently in process). The final rule would specify the schedule for updating the these documents. For the purpose of this

[9] Per unit cost includes 103 operating plants, 6 plants under construction, and 24 COL applicants for a total of 133 units.

regulatory analysis, the staff assumed that these FSAR submittals could be completed within the FSAR periodic update schedule specified under 10 CFR 50.71(e)(4). The regulatory analysis estimates for the currently operating reactors, the 33 plant licensees were modeled to submit their UFSAR amendments in 2015 and the remaining 32 plant licensees were modeled to submit their UFSAR amendments in 2016. For the plants under construction, those six plant applicants were modeled to submit their FSAR amendments in 2019, one year before operation. Updates to the seven design certifications issued to date or currently under review were modeled to submit their amendments in 2020. The incremental activities for including the analysis methods, assumptions, and acceptance criteria for demonstrating the ability to mitigate these design-extension events, as well as minimum treatment requirements for the involved equipment and procedures is estimated to require 1.2 FTE per UFSAR or DCD amendment to revise, concur, package, and submit to the NRC.

The estimated incremental one-time industry implementation costs for applicants and licensees and to update their UFSARs and design certification documents to reflect the licensing bases for demonstrating the ability to mitigate design-extension events, as well as minimum treatment requirements for the involved equipment and procedures range from $18.6 million (7% NPV) to $20.9 million (3% NPV) in 2013 dollars. The undiscounted cost is $22.9 million and provided as part of the sensitivity analysis.

Table 4-2: Alternative 1 – Industry Update UFSAR and Design Certification Documents (2013 dollars)

	Document	FTE		FTE Annual	Cost		3% NPV		7% NPV	
Year	Updates	Unit	Total	NRC Cost	Unit	Total	Unit	Total	Unit	Total
2014	0	0	0	$245,000	$0	$0	$0	$0	$0	$0
2015	33	1.2	39.6	$245,000	$294,000	$9,702,000	$277,123	$9,145,000	$256,791	$8,474,000
2016	32	1.2	38.4	$245,000	$294,000	$9,408,000	$269,052	$8,610,000	$239,992	$7,680,000
2017	0	0	0	$245,000	$0	$0	$0	$0	$0	$0
2018	0	0	0	$245,000	$0	$0	$0	$0	$0	$0
2019	6	1.2	7.2	$245,000	$294,000	$1,764,000	$246,220	$1,477,000	$195,905	$1,175,000
2020	7	1.2	8.4	$245,000	$294,000	$2,058,000	$239,049	$1,673,000	$183,088	$1,282,000
				Totals:		**$22,900,000**		**$20,900,000**		**$18,600,000**
				Per Unit Cost		**$172,000**		**$157,000**		**$140,000**

*Totals rounded to the nearest hundred thousand dollars. Per unit costs rounded to nearest thousand dollars.

Table 4-3: Alternative 1 – Industry Implementation (2013 dollars)

Activity	Undiscounted	3% NPV	7% NPV
Event Categorization	**$29,500,000**	**$29,500,000**	**$29,500,000**
Update UFSAR and Design Certification Documents	**$23,000,000**	**$20,900,000**	**$18,700,000**
Total	**$52,500,000**	**$50,400,000**	**$48,200,000**
Per Unit Cost	**$395,000**	**$379,000**	**$362,000**

*Totals rounded to the nearest hundred thousand dollars. Per unit costs rounded to nearest thousand dollars

4.2.1.2. Industry Operation

It is expected that SSC monitoring efforts performed under 10 CFR 50.65, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants" (Maintenance Rule), address a significant portion of any special treatment monitoring requirements that are expected. However, these monitoring activities may need to be expanded to consider SSC performance issues (in addition to maintenance-related issues) that fall outside the scope of the maintenance rule. From a practical standpoint, licensees typically evaluate all failures for maintenance rule impact, therefore expanding the monitoring scope to consider failures other than those that are maintenance-related can be readily addressed by current programs and result in negligible incremental cost.

4.2.1.3. NRC Implementation

This alternative would entail the staff completing the following activities:

- Prepare and issue an Advance Notice of Proposed Rulemaking to begin the process of amending its regulations to categorize plant events and accidents related to beyond-design-basis events and severe accidents

- Prepare and issue a Regulatory Basis that establishes the regulatory, technical, and legal basis for establishing the design extension category(ies) and required decisionmaking process for balancing defense-in-depth, risk, and safety margins

- Prepare and issue a Commission notation vote paper (based on the Regulatory Basis) that establishes whether to proceed in establishing new event categorization and required decisionmaking process for balancing defense-in-depth, risk, and safety margins.

- Prepare and issue a proposed rule to amend 10 CFR 50.2 to explicitly define design basis accident (DBA) and create a new category to classify accidents and events, amend 10 CFR 50.34 and comparable changes to Part 52 to require analysis of DBAs and events to be included in the application, and to amend 10 CFR 50.71 to require inclusion in the updated FSAR.

- Prepare and issue a new guidance document that accompanies the rulemaking. In this guidance document, the staff would recommend those plant events and accidents that would be placed into the new category and specify its treatment requirements.

- Revise existing regulatory guidance to conform the design features credited only in the evaluation of events and standard review plan sections to conform the review of licensee/applicant implementation of event categorization requirements.

- Prepare and issue NRC inspection procedure for monitoring licensee implementation of special treatment requirements.

- Staff review of the UFSAR and DCD amendment submittals

Implement the Event Category Treatment

The estimated one-time implementation costs for the NRC to prepare and issue the regulatory documents defining event categorization and guidance for an acceptable decisionmaking process are provided in Table 4-4.

Table 4-4: Alternative 1 – Staff Prepare Rulemaking and Associated Guidance Documents (2013 dollars)

Activity	FTE Required	No. of actions	Yearly Rate	Implementation Cost
Prepare and issue an Advance Notice of Proposed Rulemaking	0.5	1	$173,000	$86,500
Prepare and issue a Regulatory Basis that establishes the regulatory, technical, and legal basis for establishing the event category(ies) and required decisionmaking process for balancing defense-in-depth, risk, and safety margins	1.2	1	$173,000	$207,600
Prepare and issue a Commission notation vote paper (based on the Regulatory Basis)	0.5	1	$173,000	$86,500
Prepare and issue a proposed rule	1.5	1	$173,000	$259,500
Prepare and issue NRC guidance for implementing an acceptable decisionmaking process and which includes conforming changes to existing guidance documents that are impacted	1.75	1	$173,000	$302,750
Prepare and issue the final rule	1.2	1	$173,000	$207,600
Prepare and issue final guidance document including conforming changes to impacted guidance	1.4	1	$173,000	$242,200
Prepare and issue NRC inspection procedure for monitoring licensee implementation of special treatment requirements	0.4	1	$173,000	$69,200
			Total	**$1,500,000**

*Implementation costs were rounded to the nearest hundred thousand dollars.

Review COL Applications, UFSAR and Design Certification Documents

The NRC staff would need review COL applications, FSAR updates, and DCD submittals to verify whether there is reasonable assurance the requirements are met. The staff estimates that it would require 0.2 FTE to complete and document the staff's review of the UFSAR submission as it relates to the licensee's implementation of design enhancement category special treatment requirements. The estimated incremental NRC review costs range

from $2.2 million (7% NPV) to $2.5 million (3% NPV) in 2013 dollars. The undiscounted cost is $2.7 million and provided as part of the sensitivity analysis.

Table 4-5: Alternative 1 – Staff Review of COL Applications, UFSAR, and DCD Submissions (2013 dollars)

Year	UFSAR Amendments	FTE		FTE Annual NRC Cost	Cost		3% NPV		7% NPV	
		Unit	Total		Unit	Total	Unit	Total	Unit	Total
2014	0	0	0	$173,000	$0	$0	$0	$0	$0	$0
2015	33	0.2	6.6	$173,000	$34,600	$1,142,000	$32,614	$1,076,000	$30,221	$997,000
2016	32	0.2	6.4	$173,000	$34,600	$1,107,000	$31,664	$1,013,000	$28,244	$904,000
2017	0	0	0	$173,000	$0	$0	$0	$0	$0	$0
2018	0	0	0	$173,000	$0	$0	$0	$0	$0	$0
2019	6	0.2	1.2	$173,000	$34,600	$208,000	$28,977	$174,000	$23,055	$139,000
2020	7	0.2	1.4	$173,000	$34,600	$242,000	$28,133	$197,000	$21,547	$151,000
				Totals:		**$2,700,000**		**$2,500,000**		**$2,200,000**

*Totals rounded to the nearest hundred thousand dollars

Summary

Alternative 1 NRC implementation cost estimates are provided in Table 4-6.

Table 4-6: Alternative 1 – NRC Implementation (2013 dollars)

Activity	Undiscounted	3% NPV	7% NPV
Implement Event Category Treatment	$1,500,000	$1,500,000	$1,500,000
Staff Review of COL Applications, UFSAR, and DCD Submissions	$2,700,000	$2,500,000	$2,200,000
Total	**$4,200,000**	**$4,000,000**	**$3,700,000**

*Numbers rounded to the nearest hundred thousand dollars

4.2.1.4. NRC Operation

This alternative includes NRC regional personnel performing periodic inspections of the licensees' implementation of special treatment requirements applied to SSCs required to comply with the new rule. The NRC estimates that these inspections would be performed as part of the routine NRC baseline inspection activities performed at each reactor unit described in NRC Inspection Manual chapter (IMC) 0307, "Reactor Oversight Process Self-Assessment Program" (ADAMS Accession No. ML090300565). IMC 0307 Appendix B, "Reactor Oversight Realignment" (ADAMS Accession No. ML112990461) describes how the NRC conducts its periodic review of the Reactor Oversight Process (ROP) to ensure the most effective overall application of inspection resources. The outcome of this process is to improve the alignment of inspection resources across the inspection program to improve the inspectors' ability to identify risk significant licensee performance deficiencies. It is not intended that this review should result in a net increase of inspection resources to complete the baseline inspection program since addition of a new inspection requirement would need to be offset by a deletion of another requirement such that the overall budgeted ROP inspector resource requirement remains the same. As a result, there are no incremental costs associated with

the performance of NRC inspections related to the licensees' implementation of special treatment requirements required to comply with the new rule.

4.2.1.5. Improvements in Knowledge

This alternative establishes the following standards in improvements in knowledge as compared to the current regulatory framework:

- Maintains safety – Would establish requirements to improve assurance that an adequate level of public protection against reactor accidents is maintained.

- Increased Alignment with International Regulators – Increases alignment between the NRC and its counterpart foreign regulatory bodies and international organizations, such as the International Atomic Energy Agency (IAEA), which have adopted the concept of a design-extension event category for addressing beyond-design-basis events

- Uncertainty – The magnitude of Alternative 1's safety benefit may not be known until a substantial amount of work is done to develop event selection criteria, identify candidate events, and evaluate them against the selection criteria. Additionally, Alternative 1 provides a framework for addressing safety concerns.

4.2.1.6. Regulatory Efficiency

This alternative establishes the following standards in regulatory efficiency as compared to the regulatory baseline:

- Promotes Openness and Clarity – Would increase the transparency to the public and licensees of NRC's methods for addressing design-basis and beyond-design-basis accidents and events.

- Improved Efficiency – Provides clarity of treatment requirements for SSCs credited in meeting the new event category acceptance criteria that could reduce administrative burden and associated costs of maintaining equipment required to prevent or mitigate beyond-design-basis events.

4.2.1.7. Alternative 1 Total Estimated Burden

Table 4-7: Alternative 1 – Total Estimated Burden (2013 dollars)

Attribute	Undiscounted	3% NPV	7% NPV
Industry Implementation	$52,500,000	$50,400,000	$48,200,000
Industry Operation	--	--	--
Total Industry	***$52,500,000***	***$50,400,000***	***$48,200,000***
Per Unit Cost	***$395,000***	***$379,000***	***$362,000***
NRC Implementation	$4,200,000	$4,000,000	$3,700,000
NRC Operation	--	--	--
Total NRC	***$4,200,000***	***$4,000,000***	***$3,700,000***
Total	**$56,700,000**	**$54,400,000**	**$51,900,000**

*Attribute totals rounded to the nearest hundred thousand dollars. Per unit cost rounded to nearest thousand dollars.

4.3. Alternative 2 – Establish Decisionmaking Process and Criteria for Considering Defense-In-Depth, Risk, and Safety Margins

This alternative would establish the Commission's expectations with regard to risk-informed regulatory decision process for evaluating defense-in-depth, risk, and safety margins in the NRC's regulation of nuclear power reactors. It would define the objective and the principle elements of defense-in-depth and safety margins and incorporate these into the regulatory decisionmaking process. This work would include the NRC developing criteria for determining whether adequate defense-in-depth and safety margins have been addressed in the design and operation of a nuclear power plant.

The Commission would issue a policy statement that would articulate the Commission's views on the need to consider defense-in-depth, risk, and safety margins. It would clearly describe the need for defense-in-depth, its objectives, and the strategy to be taken to achieve defense-in-depth. In spite of the long-term and widespread use of safety margins in the design of nuclear power reactors, the term has not explicitly been defined. The policy statement would define safety margins and explicitly define its objectives, and the elements and principles related to safety margins. Along with the policy statement, the NRC would establish a decision process that would provide guidance for considering defense-in-depth, risk, and safety margins. This would include the NRC developing criteria for determining whether adequate defense-in-depth and safety margins have been addressed in the design and operation of a nuclear power plant while using risk insights.

4.3.1. Industry Implementation

This attribute is not expected to be affected by the staff's establishment of a decisionmaking process and criteria for considering defense-in-depth, risk, and safety margins.

4.3.2. Industry Operation

This attribute is not expected to be affected by the staff's establishment of a decisionmaking process and criteria for considering defense-in-depth, risk, and safety margins.

4.3.3. NRC Implementation

This alternative would establish the Commission's expectations with regard to the risk-informed regulatory decision process for evaluating defense-in-depth, risk, and safety margins in the NRC's regulation of nuclear power reactors. It would define the objective and the principle elements of defense-in-depth and safety margins and incorporate these into the regulatory decisionmaking process. This work would include the NRC developing criteria for determining whether adequate defense-in-depth and safety margins have been addressed in the design and operation of a nuclear power plant. This alternative would be accomplished by completing the following activities:

- Prepare and issue a proposed Commission Policy Statement to explain what is meant by considering defense-in-depth, risk, and safety margin. The policy statement would establish a methodology for consideration of margin, levels of defense and calculated risk, with respect to crediting additional features to account for uncertainties. The NRC would incur the costs of drafting the Commission paper containing the proposed policy statement for Commission approval and publication

for public comment. The staff estimates that 1.2 FTEs are required to draft the Commission paper and publish the proposed policy statement.

- Prepare and issue a Management Directive that establishes the policy, objectives, procedures, and guidance for risk-informed regulatory decisions.

- Revise and issue the Regulatory Analysis Guidelines and Handbook criteria and assessment tools to conform with the policy for considering defense-in-depth, risk, and safety margin.

- Revise and issue other regulatory guidance documents (e.g., regulatory guides, NUREGs, SRP chapters) to make conforming changes.

The estimated one-time implementation costs for these activities are detailed in the table 4-8.

Table 4-8: Alternative 2 – NRC Implementation (2013 dollars)

Activity	FTE Required	No. of actions	Yearly Rate	Implementation Cost
Prepare and issue a proposed Commission Policy Statement regarding risk-informed regulatory decisionmaking	1.2	1	$173,000	$207,600
Resolve public comments and prepare final policy statement	1.2	1	$173,000	$207,600
Prepare and issue a Management Directive that establishes the policy, objectives, procedures, and guidance for risk-informed regulatory decisions.	1.7	1	$173,000	$294,100
Revise the Regulatory Analysis Guidelines and Handbook based on defense-in-depth criteria and risk assessment	0.2	2	$173,000	$69,200
Revise existing NRC guidance documents to make conforming changes	0.1	20	$173,000	$346,000
			Total	**$1,100,000**

*Implementation costs rounded to the nearest hundred thousand dollars.

4.3.4. NRC Operation

The incremental recurring costs for NRC operation are negligible.

4.3.5. Improvements in Knowledge

This alternative establishes the following standards in improvements in knowledge as compared to the current regulatory framework:

- Balanced Risk – This alternative provides a uniform and technically justified concept of defense-in-depth, establishes a process on how it is to be balanced with risk and

safety margins, and supports risk-informed regulation by more clearly defining three of the key principles: defense-in-depth, safety margins, and risk.

- Advances in PRA Methodology – This alternative provides for the 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.

- Uncertainty – This alternative could have implementation challenges such as the inability for the staff to come to consensus on the full set of decision criteria for balancing of defense-in-depth, risk, and safety margin. In addition, the decision criteria adopted under this alternative, in fact, may not result in reduction of uncertainty with respect to balancing of defense-in-depth, risk, and safety margin.

4.3.6. Regulatory Efficiency

This alternative establishes the following standards in regulatory efficiency as compared to the current regulatory framework:

- Improved Regulatory Effectiveness – This alternative regulatory approach would use state-of-the-art technologies and risk insights to improve the effectiveness and realism of NRC actions.

- Promotes Openness – Provides many opportunities for stakeholders to provide input on defense-in-depth and safety margin implications, appropriately informs, and meaningfully involves stakeholders in the regulatory process.

- Regulatory Consistency – This alternative establish criteria and a process for balancing defense-in-depth, risk, and safety margins, which provides for consistency of regulatory activities with the degree of risk reduction they achieve.

- Improved Clarity – This alternative regulatory approach would clarify the relationship between defense-in-depth, safety margins, and risk in NRC's regulatory processes and provide a clear nexus between regulations and agency goals.

- Promotes Regulatory Reliability – Regulatory actions are not in a state of transition, and that results in a stable regulatory process

- Reduced Regulatory Flexibility – This alternative may reduce Commission flexibility and discretion in making decisions on individual circumstances.

4.3.7. Alternative 2 Total Estimated Burden

Table 4-9: Alternative 2 – Total Estimated Burden (2013 dollars)

Attribute	Undiscounted	3% NPV	7% NPV
Industry Implementation	--	--	--
Industry Operation	--	--	--
Total Industry	--	--	--
NRC Implementation	$1,100,000	$1,100,000	$1,100,000
NRC Operation	--	--	--
Total NRC	***$1,100,000***	***$1,100,000***	***$1,100,000***
Total	***$1,100,000***	***$1,100,000***	***$1,100,000***

*Numbers rounded to the nearest hundred thousand dollars

4.4. Alternative 3 – Clarify the Role of Voluntary Industry Initiatives in the NRC Regulatory Process

Alternative 3 would clarify the role of certain voluntary industry initiatives in NRC's regulatory processes by defining when and in what manner the NRC would incorporate such initiatives into regulatory requirements.

In general, this activity would involve development of a Commission Policy Statement and any necessary implementing guidance. The Policy Statement would formalize the current Commission policy that voluntary initiatives are not to be used to avoid NRC regulatory action on adequate protection issues, as directed in the 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 Policy Statement would also direct that voluntary initiatives may be credited in the base case as defined in the Regulatory Analysis Guidelines (NUREG/BR-0058, Rev. 4) when evaluating potential backfits only if there is a low likelihood of degradation of the voluntary industry initiative over time.

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4.4.1.1. Industry Implementation

The NRC may conclude that it requires information to determine whether the safety benefits from specific voluntary industry initiatives were consistently maintained over time and to determine if additional regulatory actions are appropriate. Assuming a Generic Letter is used to request this information, each power reactor licensee and holder of construction permits in active or deferred status, pursuant to Section 182(a) of the Atomic Energy Act of 1954, as amended, and 10 CFR 50.54(f), is required to submit a response.

The burden to collect this information and respond is estimated to average approximately 50 hours per response. This estimate includes the time for reviewing instructions, searching existing data sources, gathering data, performing necessary analyses, and completing and reviewing the collection of information. This estimate represents the average level of effort per plant; actual levels of effort may vary.

The estimated one-time implementation costs for these activities are detailed in the Table 4-10.

Table 4-10: Alternative 3 – Industry Implementation Cost Estimate

	FTE Required	No. of actions	Yearly rate	Implementation Cost
Prepare and submit response to generic letter	0.025	109	$245,000	$667,625
			Total	**$700,000**

*Total rounded to the nearest hundred thousand dollars.

4.4.1.2. Industry Operation

The incremental recurring costs for industry operation are negligible as full credit is given to the licensees' current industry initiative program, including its program effectiveness.

4.4.1.3. NRC Implementation

This alternative would entail clarifying the role of voluntary industry initiatives in NRC's existing regulatory processes by completing the following activities:

- Prepare and issue a Commission paper to define the Commission's policy on when or under what circumstances the NRC would impose explicit regulatory requirements (e.g., rules, orders, license conditions) relating to voluntary industry initiatives and provide a recommendation on how past voluntary initiatives would be addressed using this approach. The NRC would incur the costs of drafting the Commission paper containing the proposed policy statement for Commission approval and publication for public comment. The staff estimates that 1.2 FTEs are required to draft the Commission paper and publish the proposed policy statement.

- Prepare and issue the final Commission Policy Statement to affirm the Commission's direction not to use voluntary industry initiatives in lieu of regulatory action where a question of adequate protection exists. In addition, the policy would address the Commission's expectations for voluntary industry initiatives proposed to resolve issues not involving a question of adequate protection and resolve public comments. The NRC would incur the costs of completing the final policy statement following closure of the public comment period. The staff estimates that 1.2 FTEs are required to draft the final policy statement.

- Revise and issue applicable Management Directives, NRC's Regulatory Analysis Guidelines and Handbook, and related guidance to describe ways of complying with the Commission Policy Statement requirements. The NRC would incur the incremental costs of revising existing guidance documents to conform to the final policy statement. The NRC would incur the costs for making these conforming changes in 19 guidance documents as part of planned updates to these documents. The staff estimates that on average 0.05 FTE per document are required to make these routine conforming changes.

- Revise and issue an Office Instruction and an Inspection Procedures, on treatment for proposed and currently implement voluntary initiatives that conform to the new policy and inspection attributes. The items included in this new inspection chapter would address reporting requirements, change control processes, and other

provisions important for implementing and maintaining parts of the licensing basis for a nuclear power plant. The staff estimates that 0.4 FTE per document are required to make the required conforming changes.

- Prepare and issue a generic letter to inform the staff's evaluation of current industry initiative practices. The staff estimates that 0.4 FTE are required to prepare and issue this generic letter.

- Evaluate the industry initiative data collection responses to determine whether the safety benefits from specific voluntary industry initiatives were consistently maintained over time and to determine if additional regulatory actions are appropriate. The staff would document this evaluation in a regulatory basis document. The staff estimates that 1.0 FTE is required to complete and document this evaluation.

The estimated one-time implementation costs for these activities are detailed in Table 4-11.

Table 4-11: Alternative 3 – NRC Implementation

	FTE Required	No. of actions	Yearly Rate	Implementation Cost
Prepare and issue a proposed Commission Policy Statement regarding the treatment of voluntary initiatives	1.2	1	$173,000	$207,600
Resolve public comments and prepare the final Commission Policy Statement	1.2	1	$173,000	$207,600
Revise NRC guidance documents to conform to the Commission Policy Statement	0.05	19	$173,000	$164,350
Prepare and issue an office instruction and an inspection manual chapter providing guidance on oversight of voluntary initiatives	0.4	2	$173,000	$138,400
Prepare and issue a generic letter to inform the staff's evaluation of current industry initiatives practices	0.4	1	$173,000	$69,200
Evaluate the industry initiative data collection responses and to determine whether the safety benefits from specific voluntary industry initiatives were consistently maintained over time to determine if additional regulatory actions are appropriate	1.0	1	$173,000	$173,000
			Total	**$1,000,000**

*Implementation costs rounded to the nearest hundred thousand dollars.

4.4.1.4. NRC Operation

This alternative includes NRC regional personnel performing periodic inspections of the licensees' voluntary initiative programs to provide feedback to NRC headquarters on whether the programs as implemented resolve the problems and concerns and meets the stated objectives that were the focus of the voluntary initiative. The NRC estimates that these inspections would be performed as part of the routine NRC baseline inspection activities performed at each reactor unit described in IMC 0307. IMC 0307 Appendix B describes how the NRC conducts its periodic review of the ROP to ensure the most effective overall application of inspection resources. The outcome of this process is to improve the alignment of inspection resources across the inspection program to improve the inspectors' ability to identify risk significant licensee performance deficiencies. It is not intended that this review should result in a net increase of inspection resources to complete the baseline inspection program since addition of a new inspection requirement would need to be offset by a deletion of another requirement such that the overall budgeted ROP inspector resource requirement remains the same. As a result, there are no incremental costs associated with the performance of NRC inspections related to the licensees' implementation of voluntary initiatives.

4.4.1.5. Improvements in Knowledge

As documented in SECY-99-143, "Revisions to Generic Communication Program," the industry has stated that voluntary initiatives can result in more efficient utilization of resources in certain circumstances." In addition, the staff has concluded that utilization of industry initiatives can provide effective resolution of emergent issues while optimizing resource expenditures. The staff notes that to achieve effective resource utilization, it is important for the industry to remain an active participant and to work for the timely resolution of emergent issues. This alternative provides an enhanced process for overseeing that the initiative benefits are achieved to provide reasonable assurance that the health and safety of the public will be maintained, that the industry initiative is conducted in compliance with the Commission's regulations, as applicable, and that the industry initiative will not be inimical to the common defense and security.

The data collected on industry initiatives implementation and program maintenance will inform the staff's evaluation as to whether the safety benefits from specific voluntary industry initiatives were consistently maintained over time and whether any additional regulatory actions are appropriate.

Consequently, this alternative will enhance NRC ability to protect public health and safety and provide for the common defense. The documented regulatory analysis of the information collection evaluation would result in increased public confidence in regulation and resolve any misconception that the staff encouraged the use on industry commitments at the expense of regulatory action.

4.4.1.6. Regulatory Efficiency

This alternative establishes the following standards in regulatory efficiency as compared to the current regulatory framework:

- Improved Clarity – This alternative regulatory approach would clarify the role of voluntary industry initiatives in NRC's regulatory processes by defining when or under what circumstances the NRC would incorporate such initiatives into regulatory requirements.

- Improved Accountability – This alternative regulatory approach would improve accountability by providing specific evaluation criteria for use by industry in determining when a voluntary industry initiative could be acceptable and by increasing the NRC region inspection oversight of existing voluntary initiatives on a risk-informed basis.

- Industry Participation – This alternative may discourage licensees from proposing solutions to regulatory issues if the NRC will issue a legally binding requirement in spite of such voluntary proposals. Although Alternative 3 might provide some efficiency gains by clarifying the handling of industry initiatives, the overall effect may result in a reduction in efficiency caused by the revised role of the industry and other stakeholders in offering solutions to potential safety issues.

4.4.1.7. Alternative 3 Total Estimated Burden

Table 4-12: Alternative 3 – Estimated Burden (2013 dollars)

Attribute	Burden
Industry Implementation	$700,000
Industry Operation	--
Total Industry	***$700,000***
NRC Implementation	$1,000,000
NRC Operation	--
Total NRC	***$1,000,000***
Total	**$1,700,000**

*Numbers rounded to the nearest hundred thousand dollars

5.0 Totals

The following summary table provides the quantified and qualified costs and benefits for the alternatives. For the quantitative analysis, the "best estimate" values are used and a range of estimates is provided based on the sensitivity assumptions of discount rate and PRA costs.

Table 5-1: Summary of Benefits and Costs by Option (2013 dollars)

Net Monetary Savings (or Costs) – Total Present Value	Non-Monetary Benefits/Costs
Regulatory Baseline: Maintain Existing Regulatory Framework **Industry:** $0 **NRC:** $0 **Regulatory Baseline Incremental Total:** $0 **Benefits:** None quantified.	**Qualitative Costs:** • Timeliness. • Clarity **Qualitative Benefits:** • Maintaining Safety. • Promoting Openness • Promoting Risk-Informed Performance • Providing Efficiency • Providing Reliability • Regulatory Certainty
Alternative 1 – Categorization of Plant Events and Accidents Related to Beyond-design-basis Events and Severe Accidents **Industry:** ($50.4 million) using a 3% discount rate ($48.2 million) using a 7% discount rate **NRC:** ($4.0 million) using a 3% discount rate ($3.7 million) using a 7% discount rate **Alternative 1 Total:** ($54.4 million) using a 3% discount rate ($51.9 million) using a 7% discount rate **Benefits:** None quantified.	**Qualitative Costs:** • Uncertainty **Qualitative Benefits:** • Maintains Safety • Increased Alignment with International Regulators • Promotes Openness and Clarity • Improved Efficiency
Alternative 2 – Establish Process and Considerations for Balancing Defense-In-Depth, Risk, and Safety Margins **Industry:** $0 **NRC:** ($1.1 million) **Alternative 2 Total:** ($1.1 million) **Benefits:** None quantified.	**Qualitative Costs:** • Uncertainty • Reduced Regulatory Flexibility **Qualitative Benefits:** • Balanced Risk • Advances in PRA Methodology • Improved Regulatory Effectiveness • Promotes Openness • Regulatory Consistency • Improved Clarity • Promotes Regulatory Reliability
Alternative 3 – Clarify the Role of Voluntary Industry	**Qualitative Costs:**

Net Monetary Savings (or Costs) – Total Present Value	Non-Monetary Benefits/Costs
Initiatives in the NRC Regulatory Process **Industry:** ($0.7 million) **NRC:** ($1.0 million) **Alternative 3 Total:** ($1.7 million) **Benefits:** None quantified.	• Industry Participation **Qualitative Benefits:** • Enhanced Process to Achieve Initiative Benefits • Improved Clarity • Improved Accountability • Improved Public Perception

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