

**POLICY ISSUE  
INFORMATION**

January 2, 2014

SECY-14-0002

FOR: The Commissioners

FROM: Mark A. Satorius  
Executive Director for Operations

SUBJECT: PLAN FOR UPDATING THE U.S. NUCLEAR REGULATORY COMMISSION'S  
COST-BENEFIT GUIDANCE

PURPOSE:

The purpose of this Commission information paper (SECY) is to describe the staff's plan for updating cost-benefit guidance as directed by Staff Requirements Memorandum (SRM)-SECY-12-0110, "Consideration of Economic Consequences within the U.S. Nuclear Regulatory Commission's Regulatory Framework." This implementation plan identifies potential changes to current methods and tools related to performing cost-benefit analyses in support of regulatory, backfit, and environmental analyses.

SUMMARY:

This implementation plan focuses on updating the content and structure of the Nuclear Regulatory Commission's (NRC's) cost-benefit guidance documents, primarily NUREG/BR-0058, "Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission" and NUREG/BR-0184, "Regulatory Analysis Technical Handbook." The staff plans to implement a two-phased approach to revise the cost-benefit guidance documents. The first phase will begin harmonizing regulatory guidance across business lines by restructuring and pursuing non-policy revisions to NRC cost-benefit guidance. The second phase will identify and discuss potential policy issues for Commission consideration that could affect NRC's cost-benefit guidance and update determinations for consequences, probabilities, and uncertainties, as necessary. Additionally, this implementation plan includes the staff's plans to perform a gap analysis of regulatory guidance to identify differences in cost-benefit terminology and assumptions. All activities will be coordinated with other ongoing NRC initiatives related to updating cost-benefit guidance (e.g., Near-Term Task Force (NTTF) Recommendation 1 on regulatory framework) to ensure consistency and efficiency across the agency.

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SECY NOTE: THIS SECY PAPER, WITH THE EXCEPTION OF ENCLOSURE 5 WILL BE RELEASED TO THE PUBLIC IN 10 WORKING DAYS.

**BACKGROUND:**

The accident at the Fukushima Dai-ichi nuclear power plant in Japan raised questions regarding how the NRC's regulatory framework considers offsite property damage and the associated economic consequences caused by a significant radiological release from an NRC-licensed facility. In response to these questions, on August 14, 2012, the staff issued SECY-12-0110, "Consideration of Economic Consequences within the U.S. Nuclear Regulatory Commission's Regulatory Framework" (Agencywide Documents Access and Management System (ADAMS) Accession Number ML12173A478) for Commission consideration. The purpose of SECY-12-0110 was to provide the Commission with information and options to address the extent, if any, that the NRC's regulatory framework should be modified when addressing the economic consequences of an unintended significant release of licensed radioactive materials to the environment. In development of SECY-12-0110, the staff examined areas of the regulatory framework and the associated guidance and tools that consider economic consequences and identified potential changes to the framework.

In the SRM in response to SECY-12-0110 dated March 20, 2013 (ADAMS Accession No. ML13079A055), the Commission affirmed the agency's current approach to the issue of land contamination from reactor accidents and approved the staff's plan for enhancing the currency and consistency of the existing framework through updates to cost-benefit guidance documents. The Commission also found that economic consequences should not be treated as equivalent in regulatory character to matters of adequate protection of public health and safety.

The Commission also directed the staff to identify the potential changes to current methodologies and tools that would enhance the regulatory analysis framework in a paper describing the staff's plan for updating cost-benefit guidance. The staff prepared this Commission paper in response to this direction.

**Current Regulatory Framework:** NRC's current regulatory framework affords flexibility in accounting for the offsite economic consequences associated with unintended significant releases of radionuclides with subsequent land contamination for both nuclear power plants and nuclear materials facilities. Specifically, consideration of offsite property damage can arise during regulatory review of cost-justified substantial safety enhancements (i.e., backfit analysis), as well as regulatory and environmental analyses. The staff uses the same guidance documents to conduct these cost-benefit analyses (e.g., NUREG/BR-0058, "Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission") and is currently updating specific aspects of the NUREG/BR-0058 guidance, such as the dollar per person-rem conversion factor and replacement power costs. In SECY-12-0110, the staff recommended enhancing the currency and consistency of the existing framework through updates to cost-benefit analysis guidance documents that would assist in harmonizing cost-benefit guidance across the agency.

**Public Interactions:** The staff held three public meetings on economic consequences in May and August 2012, and in July 2013.<sup>1</sup> Meeting participants included industry representatives,

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<sup>1</sup> The summaries for these meetings may be found on NRC's ADAMS at ML12191A144 (May 2012), ML12283A373 (August 2012), and ML13227A201 (July 2013).

private citizens, and non-governmental organizations. Additionally, the staff discussed these issues with the Advisory Committee on Reactor Safeguards (ACRS) in October and November 2012. The staff incorporated ACRS and public feedback into the implementation plan for updating cost-benefit guidance. Furthermore, the Commission held a public meeting on economic consequences on September 11, 2012. This meeting included a panel with representatives from the Environmental Protection Agency, Union of Concerned Scientists, American Nuclear Insurers, the Health Physics Society, and the Nuclear Energy Institute (NEI).

The staff also performed a literature review of international and federal agencies' economic consequence practices. Based on this review, the staff concluded that the extent to which the NRC has established and utilized systematic methodologies to calculate economic consequences for regulatory decision-making appears to be more detailed and frequently employed than those of other international regulatory bodies. The federal agencies examined appeared to have methodologies in place for assessing the benefits and costs of regulatory actions and for prioritizing activities. In addition, the NRC is participating in the Organization for Economic Cooperation and Development (OECD)/Nuclear Energy Agency (NEA) study on approaches to estimating costs of a potential nuclear accident.<sup>2</sup> The staff will consider this information as it develops proposed revisions to NRC's cost-benefit guidance.

#### DISCUSSION:

The following describes the staff's implementation plan for updating cost-benefit guidance documents used for performing regulatory, backfit, and environmental analyses. The plan aims to establish consistent, effective, and efficient regulatory guidance across the agency and take into account coordination with other Commission-directed tasks. The staff's goal is to update NUREG documents that are referenced throughout the NRC for any cost-benefit analysis, develop new guidance as needed, and keep guidance current by periodic updates. The staff is planning a two-phased approach to holistically revise NRC's cost-benefit guidance. The first phase will focus on structural and administrative issues and include ongoing updating activities and coordination with related NRC initiatives. In parallel, the staff will perform a gap analysis of the guidance to identify areas to potentially change or enhance cost-benefit practices; the staff anticipates that this gap analysis could unearth policy issues for the Commission's consideration. The second phase will address potential policy issues for the Commission's consideration related to cost-benefit guidance updates, and any policy issues from the gap analysis. Enclosure 1 provides an approximate schedule for the staff's implementation plan to update cost-benefit guidance and the other related Commission-directed activities that may inform these plans.

In the following discussion, Section 1 describes current staff activities that could affect cost-benefit guidance updates. Section 2 describes related activities that, depending on Commission direction, could affect cost-benefit guidance. Section 3 describes the basis for a two-phased approach to holistically update the guidance. Section 3A describes Phase I of the updates,

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<sup>2</sup> In May 2013, staff participated in the NEA workshop, "Approaches to Estimation of the Costs of a Nuclear Accident." Information on this workshop can be found on the NEA website: <http://www.oecd-nea.org/ndd/workshops/aecna/>.

which is limited to restructuring the guidance and non-policy updates.<sup>3</sup> Section 3B describes Phase II, which will address potential policy issues and modifications to the consequence and probability analysis methods, as appropriate. Section 4 discusses the possible relationship between cost-benefit guidance updates and the Commission's upcoming report to Congress concerning the renewal of the Price-Anderson Act (PAA) in 2021.

**Section 1. Current Cost-Benefit Staff Initiatives:** Per Commission direction, the staff is pursuing several initiatives that could affect cost-benefit guidance. These include:

- Update to Replacement Energy Guidance: Per SRM-SECY-12-0110, the staff is continuing to develop a new replacement energy NUREG document. The purpose of this NUREG is to replace two NUREGs<sup>4</sup> that address the costs for replacement energy on a short-term and long-term basis, respectively.<sup>5</sup> The staff intends to provide the Commission notice before issuance of the draft NUREG for replacement energy costs. The staff expects to publish the draft NUREG in Spring 2014 for public comment.
- Update to Dollar per Person-Rem Conversion Factor Guidance: Per SRM-SECY-12-0110, the staff continues its work to update NUREG-1530, "Reassessment of NRC's Dollar per Person-Rem Conversion Factor Policy." NUREG-1530 provides guidance for monetizing the health detriment resulting from radiation exposure. The staff continues work on determining an updated dollar per person-rem conversion factor<sup>6</sup> as well as a methodology for systematically updating it in the future. Through interagency meetings, the staff is considering the knowledge developed by other federal agencies in this area. The staff will engage external stakeholders and seek approval from the Commission prior to finalizing this NUREG, which is expected in late 2014.
- Regulatory Gap Analysis: Per SRM-SECY-12-0110, the staff will "provide the Commission with a regulatory gap analysis prior to developing new guidance for application across business lines." This analysis will focus on current NRC guidance,

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<sup>3</sup> Staff efforts to update the dollar per person-rem conversion factor policy and replacement energy are the exceptions. Per SRM-SECY-12-0110, the staff is continuing to pursue these updates, as described in Section 1.

<sup>4</sup> NUREG/CR-4012, ANL-AA-30, Vol. 4, "Replacement Energy Costs for Nuclear Electricity-Generating Units in the United States: 1997 – 2001, dated August 1977; NUREG/CR-6080, ANL-93/19, "Replacement Energy, Capacity, and Reliability Costs for Permanent Nuclear Reactor Shutdowns," dated July 1993.

<sup>5</sup> Short-term replacement energy costs would be incurred if a nuclear power plant had to extend an outage due to installing new equipment. Long-term replacement energy costs would be incurred if a nuclear power plant had a disruption in operations that prevented the nuclear power plant from operating for an extended period of time (e.g., significant release of radioactive material).

<sup>6</sup> Per NUREG-1530, the dollar per person-rem conversion factor is determined by multiplying the value of statistical life (the dollar value of the health detriment) and a risk-cancer factor (a risk factor that establishes the nominal probability for stochastic health effects attributable to radiological exposure).

methodologies, and tools used for cost-benefit determinations and identify any differences across NRC business lines (e.g., material users, fuel cycle facilities, reactors) and across analyses (i.e., regulatory, backfitting, and environmental analyses). Differences in cost-benefit practices across individual analyses and across business lines may be justified based on the applications of the cost-benefit determination. An explanation of these differences will be provided within the Phase I revision of NUREG/BR-0058. Further, this analysis may also identify where further guidance is needed to ensure consistency across the agency. Therefore, the staff will complete this analysis prior to developing any new guidance which may be necessary to harmonize methods and approaches.<sup>7</sup> The staff anticipates completing this analysis by the end of 2014. The regulatory guidance gap analysis will be used, as appropriate, in both phases of the revisions to cost-benefit guidance.

- Qualitative Factors: As directed by SRM-SECY-12-0157, "Consideration of Additional Requirements for Containment Venting Systems for Boiling Water Reactors with Mark I and Mark II Containments," dated March 12, 2013 (ADAMS Accession No. ML13078A017), the staff will "seek detailed Commission guidance regarding the use of qualitative factors in a future notation voting paper." This notation vote paper is also linked to the staff's recommendation for the disposition of Recommendation 1 of the NTTF Report, described below in Section 2. The qualitative factors paper is due two months after the issuance of the SRM on the Recommendation 1 notation vote paper. The response from the Commission will inform revisions to cost-benefit guidance.
- Cumulative Effects of Regulation (CER): In SRM-SECY-12-0137, "Implementation of the Cumulative Effects of Regulation Process Changes," dated March 12, 2013 (ADAMS Accession No. ML13071A635), the Commission directed the staff to "engage industry to seek volunteer facilities to perform 'case studies' to review the accuracy of cost and schedule estimates used in NRC's regulatory analysis."<sup>8</sup> Historically, the industry has noted that the NRC's costs estimates in regulatory analyses are low. The NRC is engaging with the industry to better understand this concern, listening to the industry's recommendations on how the NRC could improve these analyses, and discussing how the industry can provide more timely and detailed input for these analyses. The NRC staff conducted a public meeting on CER on September 19, 2013, to, in part, better understand the industry's efforts, timeline, and expected format for the case studies. During that meeting, the NRC committed to having additional public meetings. The NRC staff understands that NEI has made significant progress on the case studies since September and plans to have a public meeting in early 2014 to discuss industry's case studies findings and lessons learned. Ultimately, the results and lessons learned from the case studies may be used, as applicable, in the revisions to cost-benefit guidance.

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<sup>7</sup> This excludes the ongoing staff efforts to update the dollar per person-rem conversion factor policy and replacement energy costs.

<sup>8</sup> In a letter from Adrian Heymer to Lawrence Kokajko dated May 21, 2013 (ADAMS Accession No. ML13143A299), Mr. Heymer indicated that the industry is willing to support the NRC in the development of the case studies and that an industry task force is being developed to assist in communication and coordination between participants.

All deliverables related to the case study will be posted publicly to the CER docket on [www.regulations.gov](http://www.regulations.gov), NRC-2013-0102.

**Section 2. Related NRC Initiatives:** In addition to the cost-benefit staff initiatives listed above, the staff will coordinate plans to update cost-benefit guidance with the results of the following:

- Disposition of Near-Term Task Force Recommendation 1: As outlined in SECY-13-0132, “NRC Staff Recommendation for the Disposition of Recommendation 1 of the Near-Term Task Force Report,” implementation of the staff’s three proposed improvement activities would be incorporated in the Phase II revisions to cost-benefit guidance, if directed by the Commission. These activities include:
  - Improvement Activity 1 - Establish a design extension category of events and associated regulatory requirements
  - Improvement Activity 2 - Establish Commission expectations for defense-in-depth
  - Improvement Activity 3 - Clarify the role of voluntary industry initiatives in the NRC regulatory process

**Section 3. Basis for Two-Phased Approach to Revising Cost-Benefit Guidance:** There are currently three main NUREGs that provide guidance for cost-benefit analysis.<sup>9</sup> The staff is planning a two-phased approach to holistically revise NRC’s cost-benefit guidance. The first phase will focus on structural and administrative issues and include staff activities from Sections 1 and 2, as appropriate. In parallel, the staff will perform a gap analysis of the guidance to identify areas to potentially change or enhance cost-benefit practices; the staff anticipates that this gap analysis could unearth policy issues for the Commission’s consideration. The second phase will address potential policy issues for the Commission’s consideration related to cost-benefit guidance updates, and any policy issues from the gap analysis. The goal of this approach is to increase the transparency of NRC’s cost-benefit guidance, make the guidance more user-friendly and organized, and respond efficiently to future potential policy issues. Enclosure 2 contains more information about the basis for this approach.

**Section 3A. Phase I Revisions to Cost-Benefit Guidance:** Phase I will focus on structural issues, terminology conformity, and administrative issues. Enclosure 3 contains a representation of the interrelationship among the NRC’s cost-benefit references once the restructuring is complete. The staff expects to update and rename NUREG/BR-0058 during Phase I by mid-2015.

- Consolidating Cost-Benefit Guidance: The staff plans to restructure the three main NRC cost-benefit guidance documents. Process information contained in NUREG-1409 and NUREG/BR-0184 will be incorporated into NUREG/BR-0058 and the name of this updated guidance document will be changed to “Cost-Benefit Guidance.” The newly

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<sup>9</sup> The guidance documents are NUREG/BR-0058, Revision 4, “Regulatory Analysis Guidelines,” dated September 2004 (ADAMS Accession No. ML042820192), NUREG/BR-0184, “Regulatory Analysis Technical Handbook,” dated January 1997 (ADAMS Accession No. ML050190193), and NUREG-1409, “Backfitting Guidelines,” dated July 1990 (ADAMS Accession No. ML032230247).

updated NUREG/BR-0058 will be expanded to discuss NRC's regulatory analyses, backfitting guidelines, and National Environmental Policy Act (NEPA) analyses.

Information in NUREG/BR-0184 and NUREG-1409 will be updated and captured in a series of appendices to, or volumes of, NUREG/BR-0058. For example, when discussing how to quantify the offsite property attribute, NUREG/BR-0058 will contain a specific appendix that will provide the process for quantification. This structure will provide a single point of reference as well as allow staff to update, as needed, individual volumes or appendices. The staff has successfully used this format in the past.<sup>10</sup> Once the information in NUREG/BR-0184 and NUREG-1409 is sufficiently captured, the staff will withdraw these guidance documents.

In addition, the staff will make conforming changes to NRC guidance documents that reference NUREG-1409 and NUREG/BR-0184. For example, the Standard Review Plans for Environmental Reviews for Nuclear Power Plants, NUREG-1555 and its Supplement 1, refer to NUREG/BR-0058 and NUREG/BR-0184. Therefore, the restructuring changes would require conforming changes of NUREG-1555 and its supplement.<sup>11</sup>

- **Administrative Changes:** The staff plans to make changes to how it prepares regulatory analyses, including adding a methodology description to the regulatory analysis, which will explain how the staff conducted the cost-benefit analysis and replacing the outdated term "value-impact," used in NUREG/BR-0184, with the term "cost-benefit."

**Section 3B Phase II Revisions to Cost-Benefit Guidance:** Phase II will focus on a holistic revision of cost-benefit guidance. The Phase II revision will include policy issues related to cost-benefit guidance<sup>12</sup> and a review of the consequence and probabilistic methodology used in regulatory analyses. While the staff will already begin to harmonize across business lines in Phase I, information from the regulatory gap analysis and other staff initiatives will be incorporated within Phase II to ensure agency-wide consistency.

- **Policy Issues:** During the Phase I revisions, as well as through other NRC actions, policy issues may arise related to cost-benefit guidance. The staff would develop any such policy issues for the Commission's consideration and direction. Also, Phase I and II revisions would consider any policy decisions from Commission direction on

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<sup>10</sup> "Consolidated Guidance About Materials Licenses," NUREG-1556, is an example of this structure.

<sup>11</sup> In a related situation, Regulatory Guide (RG) 4.2, "Preparation of Environmental Reports for Nuclear Power Stations," identifies information to be provided by a nuclear power plant applicant to support the staff's assessment of the potential environmental impacts of the proposed nuclear power facility. This RG will soon undergo a major revision. In this case, the Phase I revisions to the cost-benefit guidance will be incorporated into the appropriate RG 4.2 sections.

<sup>12</sup> This excludes the policy issues associated with the update to replacement energy and the dollar per person-rem conversion factor policy, which the staff is currently pursuing as directed by SRM-SECY-12-0110.

NTTF Recommendation 1, qualitative factors, regulatory guidance gap analysis, and CER.

- Consequence and Probabilistic Methodology Review: Currently, the regulatory analysis provided within NUREG/BR-0184 is based on data from the Three Mile Island and Chernobyl accidents, which occurred in 1979 and 1986, respectively. For example, the exposure levels for occupational workers due to an accident are based on the exposure to occupational workers from Three Mile Island as the low estimate and Chernobyl as the high estimate; these levels may be outdated and less appropriate for assessing consequences of future potential accidents.

The methodology review will also include determining whether updates are needed for the use of risk information in cost-benefit guidance. If updates are needed, the staff will seek Commission direction, as appropriate.

- MACCS2: The methodology review would include reviewing the MELCOR Accident Consequence Code System, Version 2 (MACCS2) and enhancing MACCS2 user's guide. The MACCS2 user's guide would be enhanced to provide analysts guidance on sources for input data to support cost-benefit analyses performed at the NRC (e.g., regulatory analysis, NEPA severe accident mitigation alternatives/severe accident mitigation design alternatives (SAMA/SAMDA)). MACCS2 will also be evaluated to determine if any modifications or additional guidance updates are needed.
- Periodic Review of Cost-Benefit Guidance: Based on the timeframe for the two phases and the information gathered during the process, the staff will establish a formal timeframe for periodically reviewing whether updates to NUREG/BR-0058 are necessary. These periodic reviews will help ensure that NRC's cost-benefit guidance is kept current on a consistent basis.

**Section 4. Price-Anderson Act:** SRM-SECY-12-0110 stated that "the staff paper should address if and how Option 2 may influence future NRC recommendations to Congress regarding renewal of the Price-Anderson Act." The PAA was enacted into law in 1957 and is codified in Section 170 of the Atomic Energy Act (AEA). The PAA creates, in effect, a statutory public insurance system for nuclear accidents. The PAA has been renewed several times and was most recently revised and extended through December 31, 2025, by Section 602 of the Energy Policy Act of 2005 (Public Law 109-58). Section 606 of the Energy Policy Act of 2005 amended the PAA's reporting requirement; the Commission must submit a report to Congress by December 31, 2021, on the need for continuation or modification to the PAA.<sup>13</sup>

As described in Enclosure 4, cost-benefit analyses provide a basis for the NRC to make an informed decision on whether to approve or disapprove a prospective regulatory or licensing action. These analyses could be used to determine whether the benefit of a new safety or security requirement, in terms of estimated averted property damages, exceeds the cost of implementing such a requirement. The PAA, on the other hand, concerns the liability for damages resulting from a radiological accident and establishes a two-tiered insurance system to

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<sup>13</sup> Codified at Section 170p. of the AEA.



cover such potential liability. The two-tiered system is based upon reactor licensees obtaining primary insurance from private sources and a secondary retrospective private liability system made up of contributions from the licensees. Under the PAA, the premiums which make up the secondary system are inflation-adjusted (based upon the Consumer Price Index).<sup>14</sup> Thus, the amount the private insurance industry is willing to fund (in the case of the primary insurance) and inflation (in the case of the secondary system) determine the extent of any changes to the amount of PAA insurance liability. The staff has not historically used cost-benefit analyses as a means to inform the Commission's report to Congress. As described in Enclosure 4, the staff does not plan to use cost-benefit analyses to prepare the required report to Congress, which is due in December 2021. If the staff uncovers a policy issue while preparing this report, the staff will seek Commission direction.

RESOURCES:

Minimal resources are currently included in the FY 2014 Congressional Budget Justification and FY 2015 Performance Budget to identify potential changes to current methods and tools related to performing cost-benefit analyses in support of regulatory, backfit, and environmental analyses. A detailed breakdown of resources by business line and preliminary estimates of resources for future years are provided in Enclosure 5. To fund the shortfall in FY 2014 and FY 2015, resources will be reallocated to these efforts contingent upon their importance in relation to other business line activities including consideration of the priorities established through the Agency's Common Prioritization of Rulemaking process. FY 2016 resources will be addressed through the planning, budget, and performance management process.

COORDINATION:

The Office of the General Counsel has reviewed this Commission paper and has no legal objection. The Office of the Chief Financial Officer has reviewed this Commission paper for resource implications and has no objection.

***/RA Michael F. Weber for/***

Mark A. Satorius  
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Enclosures:

1. Project Schedule
2. Basis for Two-Phased Approach
3. Mapping of Cost-Benefit Guidance Updates
4. Price Anderson Act
5. Resource Estimates - Official Use Only

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<sup>14</sup> Section 170t. of the AEA.

cover such potential liability. The two-tiered system is based upon reactor licensees obtaining primary insurance from private sources and a secondary retrospective private liability system made up of contributions from the licensees. Under the PAA, the premiums which make up the secondary system are inflation-adjusted (based upon the Consumer Price Index).<sup>15</sup> Thus, the amount the private insurance industry is willing to fund (in the case of the primary insurance) and inflation (in the case of the secondary system) determine the extent of any changes to the amount of PAA insurance liability. The staff has not historically used cost-benefit analyses as a means to inform the Commission's report to Congress. As described in Enclosure 4, the staff does not plan to use cost-benefit analyses to prepare the required report to Congress, which is due in December 2021. If the staff uncovers a policy issue while preparing this report, the staff will seek Commission direction.

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**Enclosures:**

1. Project Schedule
2. Basis for Two-Phased Approach
3. Mapping of Cost-Benefit Guidance Updates
4. Price Anderson Act
5. Resource Estimates - Official Use Only

**ADAMS Accession No.: ML13274A495, WITS 201300073 \*Concurrence via email**

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<sup>15</sup> Section 170t. of the AEA.