

Non-Concurrence Process Record for NCP-2013-013

The U.S. Nuclear Regulatory Commission (NRC) strives to establish and maintain an environment that encourages all employees to promptly raise concerns and differing views without fear of reprisal and to promote methods for raising concerns that will enhance a strong safety culture and support the agency's mission.

Individuals are expected to discuss their views and concerns with their immediate supervisors on a regular, ongoing basis. If informal discussions do not resolve concerns, individuals have various mechanisms for expressing and having their concerns and differing views heard and considered by management.

Management Directive MD 10.158, "NRC Non-Concurrence Process," describes the Non-Concurrence Process (NCP). <http://pbadupws.nrc.gov/docs/ML0706/ML070660506.pdf>

The NCP allows employees to document their differing views and concerns early in the decision-making process, have them responded to, and attach them to proposed documents moving through the management approval chain.

NRC Form 757, Non-Concurrence Process is used to document the process.

Section A of the form includes the personal opinions, views, and concerns of an NRC employee.

Section B of the form includes the personal opinions and views of the NRC employee's immediate supervisor.

Section C of the form includes the agency's evaluation of the concerns and the agency's final position and outcome.

NOTE: Content in Sections A and B reflects personal opinions and views and does not represent official factual representation of the issues, nor official rationale for the agency decision. Section C includes the agency's official position on the facts, issues, and rationale for the final decision.

The agency's official position (i.e., the document that was the subject of the non-concurrence) is included in ADAMS Accession Number T SFHJCEFI 51P [c ^ Á @ Á @ Á 8 8 ^ • • q } Á ~ { à ^ ! Á } Á @ Á [[[, q * Á [{ • Á ^ - ! Á [Á q Á q | a ! Á i : a d Á - Á @ Á q ^ ! È

This record is public.

NON-CONCURRENCE PROCESS

NCP TRACKING NUMBER
NCP-2013-013

SECTION A - TO BE COMPLETED BY NON-CONCURRING INDIVIDUAL

TITLE OF SUBJECT DOCUMENT Staff Evaluation and Recommendation for Japan Lessons-Learned Tier 3 Issue on Expedited Transfer of		ADAMS ACCESSION NO. ML13256A348
DOCUMENT SIGNER Michael R. Johnson		SIGNER PHONE NO. (301) 415-1713
TITLE Deputy Executive Director for Reactors and Preparedness Progra	ORGANIZATION EDO	
NAME OF NON-CONCURRING INDIVIDUAL(S) Brian Wagner		PHONE NO. (301) 251-7595
TITLE Reliability and Risk Engineer	ORGANIZATION RES/DRA/PRB	

DOCUMENT AUTHOR DOCUMENT CONTRIBUTOR DOCUMENT REVIEWER ON CONCURRENCE

REASONS FOR NON-CONCURRENCE AND PROPOSED ALTERNATIVES

The regulatory analysis contains a lot of good work and important insights, especially considering it was performed on a very abbreviated timetable. Further, it contains a respectable range of sensitivity analyses of the major parameters. However, the analysis and the transmittal memo omit some key information and analyses that would be beneficial to inform a decision on whether to continue regulatory activity in this area. In addition, the memo's discussion of the regulatory analysis' results is misleading in some areas.

1. Contrary to NUREG/BR-0058, "Regulatory Analysis Guidelines of the USNRC" guidance which recommends that "the range of all potentially reasonable and practical approaches to the problem are considered," only a single alternative is considered. Other alternatives may be more cost beneficial. For example, transferring less fuel or discharging into a 1x8 pattern may yield the same benefits while costing significantly less than the analyzed alternative. Both the draft Spent Fuel Pool Study (ML13133A132) and the ACRS letter (ML13224A060) recommended further analysis of the 1x8 fuel pattern. The draft COMSECY transmitting the regulatory analysis claims this would not provide a substantial safety enhancement despite it not being analyzed (or even mentioned) in the attached regulatory analysis.

2. The regulatory analysis uses \$2000/person-rem as the baseline. It is known that a change in guidance is imminent that would change this value to the \$4000-\$5000/person-rem range to be more consistent with the practices of other agencies.

3. The regulatory analysis uses a 50-mile truncation as a baseline. Guidance in NUREG/BR-0058 indicates that a 50 mile truncation should be used for nuclear power plants but that the appropriate distance for other facilities should be decided on a case-by-case basis. For SFP accidents in high density pools, which are expected to release much more material than reactor accidents, this truncation can decrease the calculated consequences by nearly a factor of 10. This truncation is arbitrary and technically indefensible.

4. The SECY paper and regulatory analysis argues that no further action is necessary since the alternative does not represent a substantial safety enhancement. It is not clear how this position reconciles with the SRM to SECY-93-086, which states that the substantial standard "is not intended to be interpreted in a manner that would result in disapprovals of worthwhile safety or security improvements having costs that are justified in view of the increased protection that would be provided." The substantial safety enhancement screen should not be used to dismiss cost-beneficial results or as a reason to not compute cost-benefit information for other reasonable alternatives.

CONTINUED IN SECTION D

SIGNATURE
Brian Wagner

DATE
9/24/13

SEE SECTION E FOR IMPLEMENTATION GUIDANCE

NON-CONCURRENCE PROCESS

NCP TRACKING NUMBER

NCP-2013-013

TITLE OF SUBJECT DOCUMENT

Staff Evaluation and Recommendation for Japan Lessons-Learned Tier 3 Issue on Expedited Transfer of

ADAMS ACCESSION NO.

ML13256A348

SECTION D: CONTINUATION PAGE

CONTINUATION OF SECTION



A



B



C

5. The regulatory analysis answers the substantial safety enhancement question by comparing to the Quantitative Health Objectives (QHOs) found in the Safety Goal Policy Statement. Though this is standard practice, the QHOs were developed for reactor accidents and are not well suited for making this determination for SFP accidents. SFP accidents in high density pools can lightly contaminate very large areas, displacing millions of people and requiring extensive protective actions. Conversely, the individual LCF risk from 0-10 miles is relatively low, even for the largest releases. SFP releases would have to occur with a frequency greater than 10^{-3} per year to approach the safety goals (100x higher than the Large Early Release Frequency subsidiary objective used for reactors.) While an alternative measure of a substantial safety enhancement is not readily available, one informative metric is that, for some "high estimate" cases, the proposed alternative results in nearly a billion dollars in frequency-weighted safety benefits. The SECY paper should acknowledge the significant limitations of applying the QHOs to non-reactors to provide The Commission with relevant information to inform their decision.

6. The regulatory analysis concludes the alternative is not cost-beneficial. This is in spite of the fact that the fleet is only bounded by the high estimates (which are shown to be cost-beneficial) and not the base case estimates.

7. Though the Regulatory Analysis contains an appropriate range of estimates and sensitivity results, both the "Decision Rationale" section of the regulatory analysis and the discussion of the results in the COMSECY transmitting the regulatory analysis fail to provide a balanced view of the range of results. There are several examples of this:

o The COMSECY states that conservative assumptions are used in the regulatory analysis without making it clear that conservatives are primarily to account for variations within the group considered in the high estimates. The base case estimates represent a point estimate and contain a few minor conservatisms. The base case estimates do not bound the group of SFPs.

o The COMSECY states "it is unlikely that individual plants would meet or exceed the most conservative assumptions made in these sensitivity cases within the regulatory analysis." This is highly misleading. The cases referenced are extremely cost-beneficial so a pool even approaching these assumptions would be very cost beneficial.

o The "Decision Rationale" section of the regulatory analysis states there are other considerations discussed in Section 4.5.10 that would further decrease the benefits and make the proposed alternative less cost-justified. Though some of the items discussed would clearly decrease the benefits (e.g. credit for mitigation) others could increase or decrease the benefits. The list omits considerations which would increase the benefits such as relaxing the potentially optimistic assumptions that extensive protective actions are effective following a severe seismic event.

o The analysis concludes that the alternative is not cost-beneficial by apparently focusing on the base case estimate truncated at 50 miles and using \$2000/person-rem. Results that are cost-beneficial are downplayed as resulting from combinations of high estimates "sensitivity studies and some combinations of high estimates ... such that, in a few cases, the benefits...appear to be cost beneficial." This is inconsistent with the results of the regulatory analysis which are: all high estimates are cost beneficial regardless of what other assumptions are used; and, when considering all consequences and an updated value of \$4000/person-rem, all base cases are essentially cost neutral.

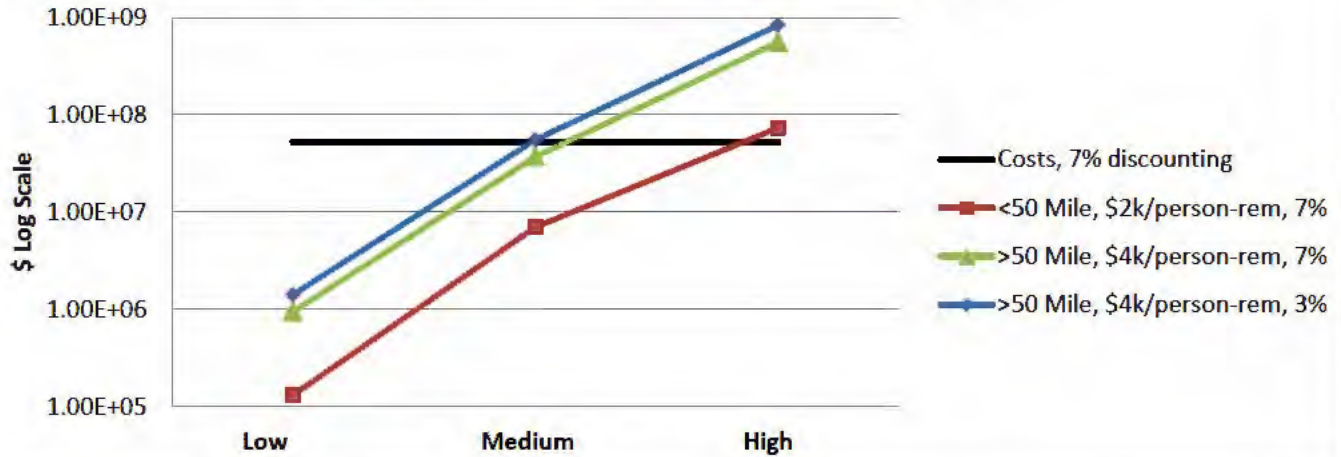
I have produced several figures and tables below to illustrate the results of the regulatory analysis. They paint a much muddier picture as to whether or not the alternative is cost-beneficial when compared to the COMSECY.

SEE SECTION E FOR IMPLEMENTATION GUIDANCE

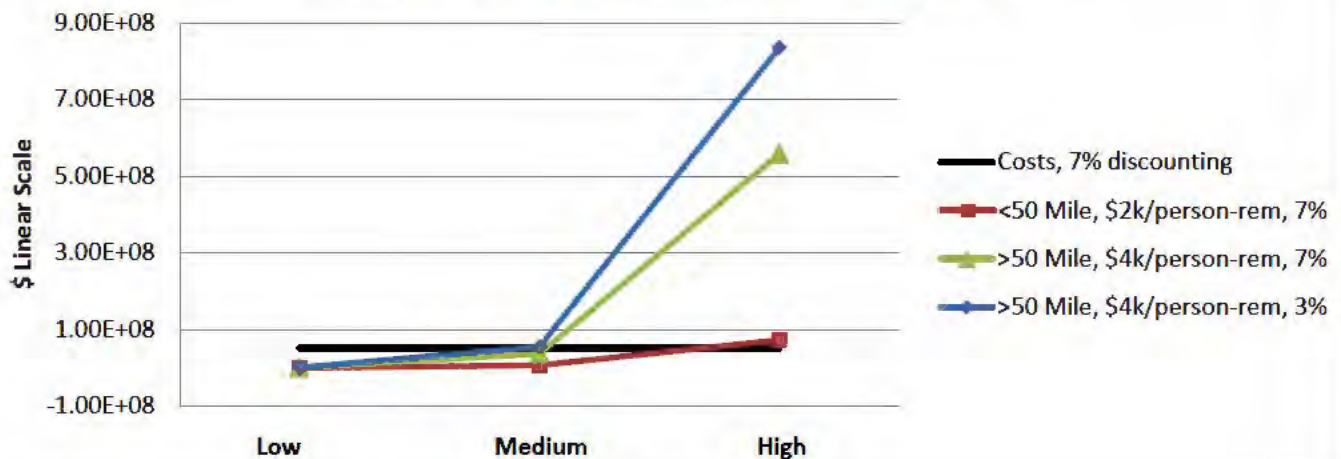
Group 1		Costs, 7% discounting	<50 Mile, \$2k/person-rem, 7%	>50 Mile, \$4k/person-rem, 7%	>50 Mile, \$4k/person-rem, 3%
Low Estimate	1	5.23E+07	1.31E+05	9.47E+05	1.42E+06
Medium Estimate	2	5.23E+07	7.01E+06	3.71E+07	5.54E+07
High Estimate	3	5.23E+07	7.31E+07	5.59E+08	8.35E+08

Costs are relatively insensitive to discounting.

Comparison of Results for Mark I/Is



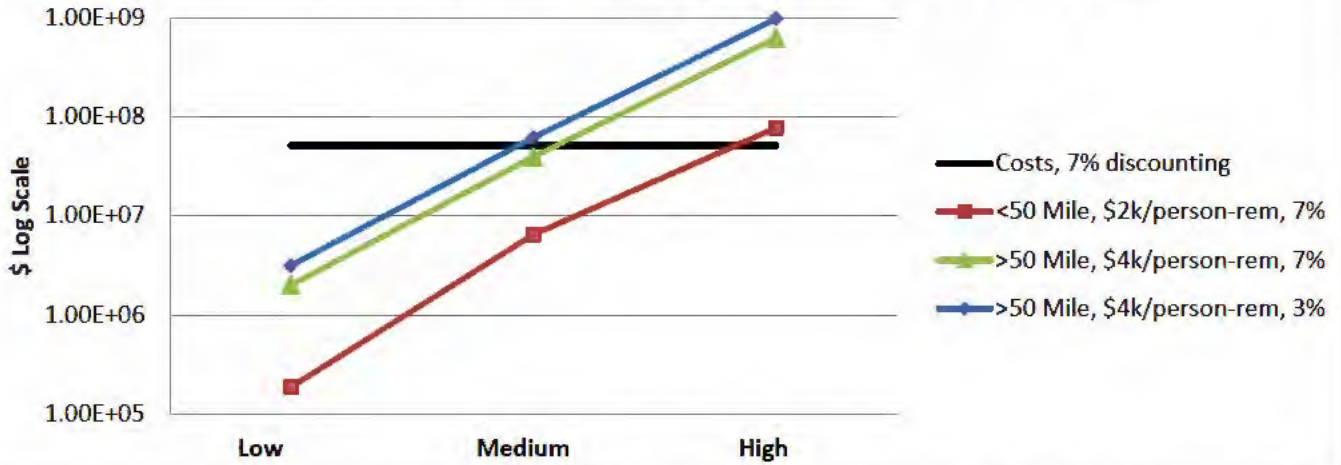
Comparison of Results for Mark I/Is



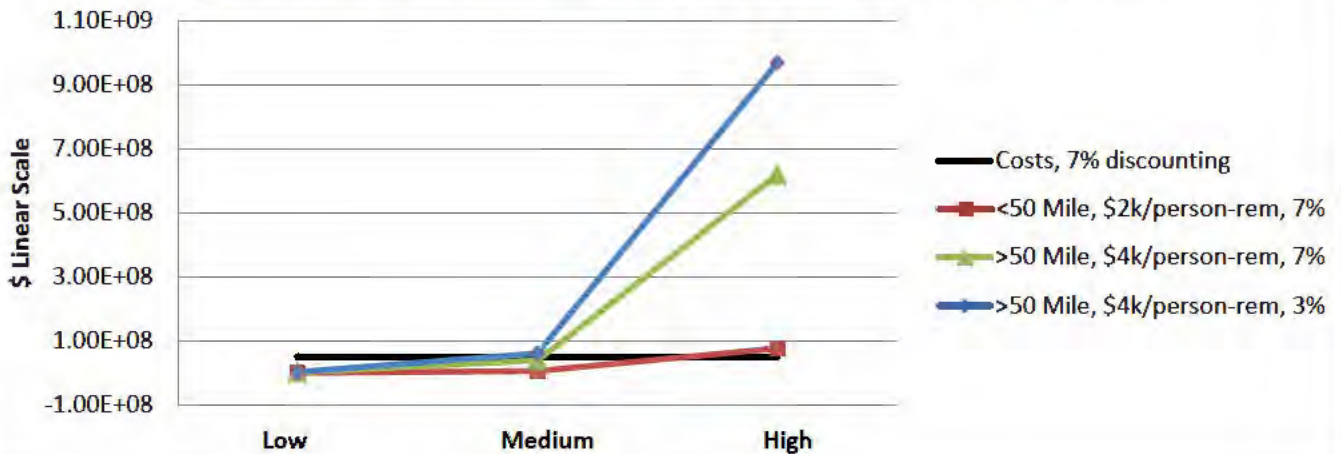
Group 2		Costs, 7% discounting	<50 Mile, \$2k/person- rem, 7%	>50 Mile, \$4k/person- rem, 7%	>50 Mile, \$4k/person- rem, 3%
Low Estimate	1	5.14E+07	1.88E+05	2.02E+06	3.15E+06
Medium Estimate	2	5.14E+07	6.48E+06	3.94E+07	6.16E+07
High Estimate	3	5.14E+07	7.70E+07	6.21E+08	9.70E+08

Costs are relatively insensitive to discounting.

Comparison of Results for PWR and BWR Mark IIIs



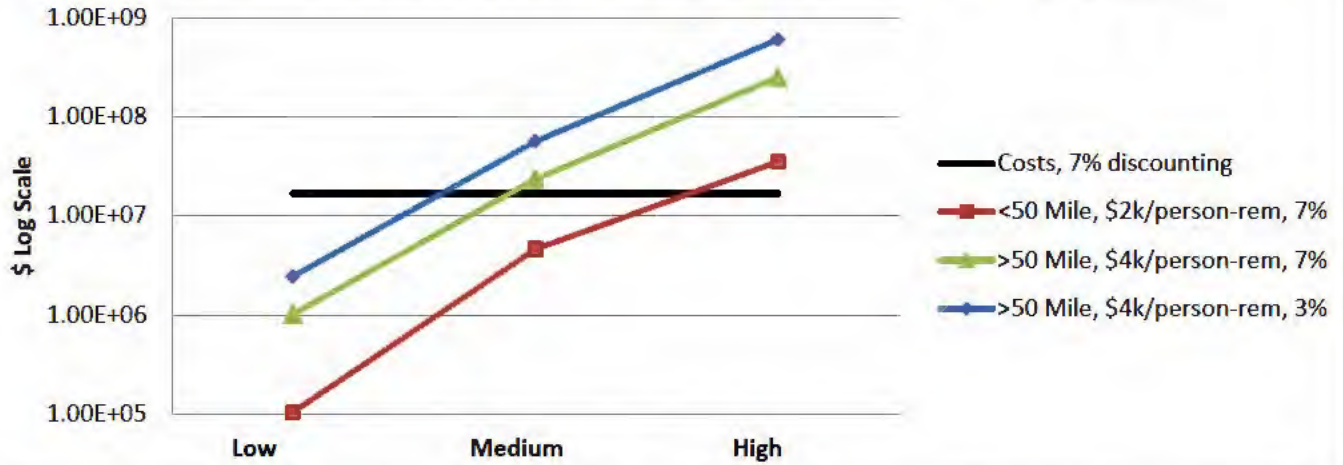
Comparison of Results for PWR and BWR Mark IIIs



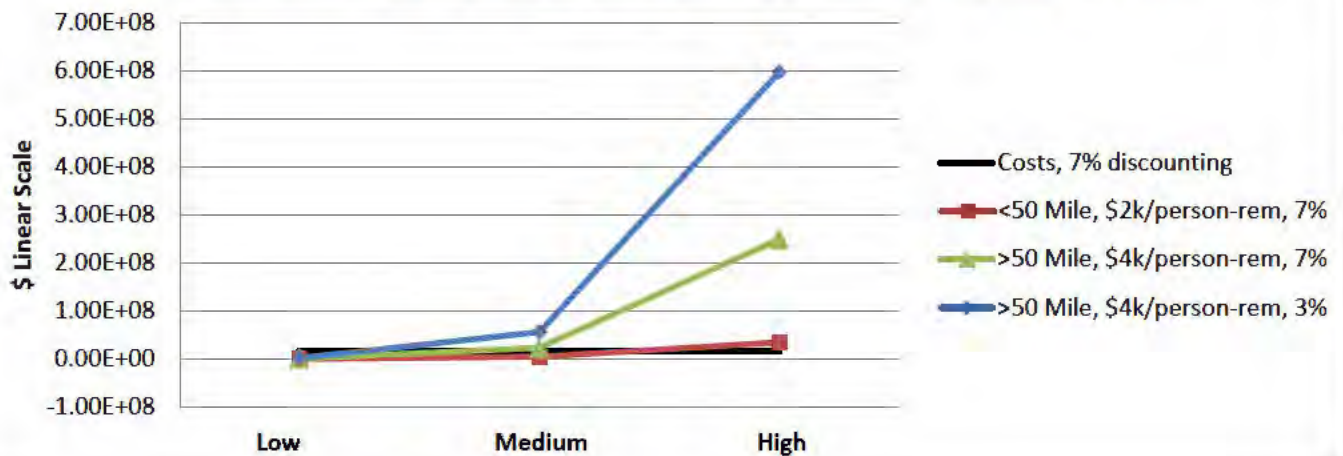
Group 3		Costs, 7% discounting	<50 Mile, \$2k/person- rem, 7%	>50 Mile, \$4k/person- rem, 7%	>50 Mile, \$4k/person- rem, 3%
Low Estimate	1	1.68E+07	1.05E+05	1.02E+06	2.45E+06
Medium Estimate	2	1.68E+07	4.63E+06	2.35E+07	5.64E+07
High Estimate	3	1.68E+07	3.49E+07	2.50E+08	5.98E+08

Note that for group 3 discounting costs at 3% would increase them by a factor of ~2. Not reflected in the graph.

Comparison of Results for New Rxs non-shared Pools



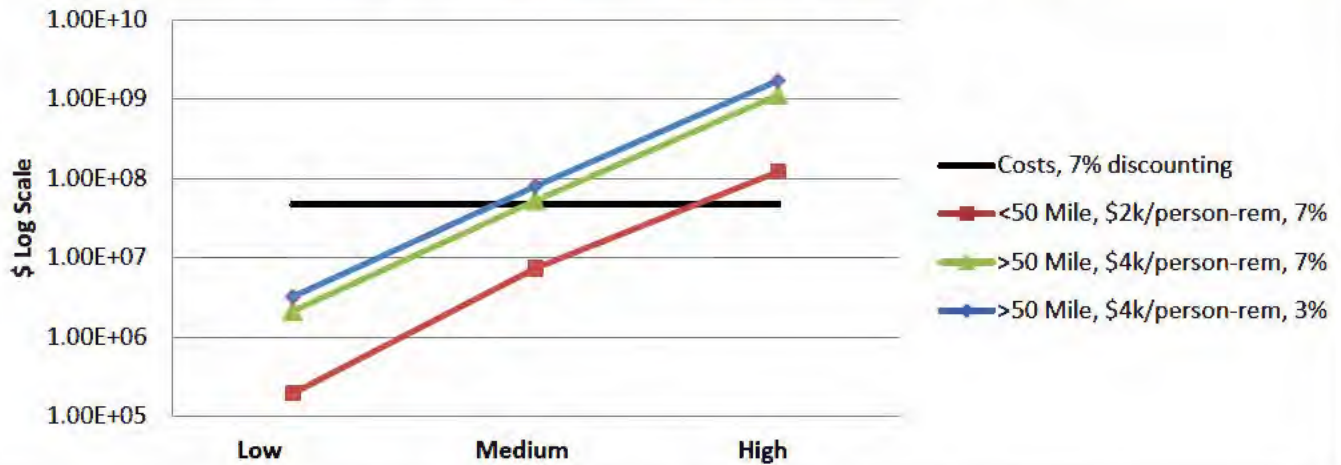
Comparison of Results for New Rxs non-shared Pools



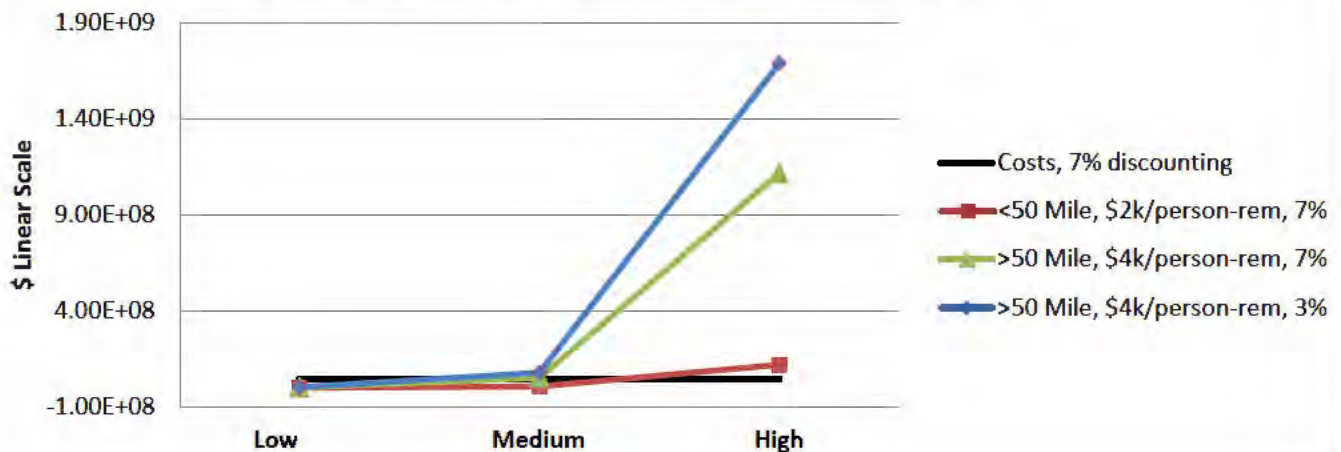
Group 4		Costs, 7% discounting	<50 Mile, \$2k/person- rem, 7%	>50 Mile, \$4k/person- rem, 7%	>50 Mile, \$4k/person- rem, 3%
Low Estimate	1	4.64E+07	1.95E+05	2.12E+06	3.21E+06
Medium Estimate	2	4.64E+07	7.33E+06	5.22E+07	7.89E+07
High Estimate	3	4.64E+07	1.20E+08	1.12E+09	1.69E+09

Costs are relatively insensitive to discounting.

Comparison of Results for Shared Pools



Comparison of Results for Shared Pools



Ratio of Benefits to Costs, 7% discounting

		Group 1	Group 2	Group 3	Group 4
\$2000/person-rem <50 miles	Low	0.003	0.004	0.006	0.004
	Medium	0.134	0.126	0.276	0.158
	High	1.398	1.499	2.085	2.582

\$4000/person-rem >50 miles	Low	0.018	0.039	0.061	0.046
	Medium	0.709	0.767	1.405	1.124
	High	10.680	12.089	14.901	24.085

Benefit/Cost < 0.1	Very not beneficial
0.1 < Benefit/Cost < 0.5	Not beneficial
0.5 < Benefit/Cost < 2	Borderline
2 < Benefit/Cost < 10	Cost beneficial
10 < Benefit/Cost	Very beneficial

NON-CONCURRENCE PROCESS

NCP TRACKING NUMBER
NCP-2013-013

TITLE OF SUBJECT DOCUMENT

Staff Evaluation and Recommendation for Japan Lessons-Learned Tier 3 Issue on Expedited Transfer of

ADAMS ACCESSION NO.

ML13256A348

SECTION B - TO BE COMPLETED BY NON-CONCURRING INDIVIDUAL'S SUPERVISOR

NAME

Doug Coe

TITLE

Deputy Director

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ORGANIZATION

Division of Risk Analysis, Office of Nuclear Regulatory Research

COMMENTS FOR THE NCP REVIEWER TO CONSIDER

Comments of Supervisor, D. Coe, Deputy Director, Division of Risk Analysis, RES

The regular supervisor is not available for the foreseeable future, therefore as the next higher supervisor who has been engaged in dialog with several staff and managers over these various issues, I am providing Section B comments in lieu of the regular supervisor. The following comments are not intended to either approve or disapprove of the points made in the non-concurrence.

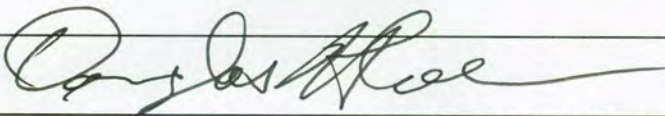
This non-concurrence aims to improve clarity and understandability through use of plain language and visual/graphical forms to communicate the Regulatory Analysis (RA) and its assumptions. My recent discussions with the document sponsors and other concurring officials have consistently supported improving the clarity and transparency of the RA results within the time constraints available to do so. Through this dialog and the points made in this non-concurrence, it appears to me that important assumptions in the RA that were used to support the staff conclusions, such as the use of \$2000 per person-rem-avoided and limiting the consequence analysis to a 50 mile radius from a site, and the cost-benefit implications of using higher values for both, have been and will be made more clear and that this should aid in understanding the basis for the RA results regarding cost-benefit. A more important issue raised in this non-concurrence, I believe, is the use of the QHOs.

The staff has compared the calculated health risks from spent fuel pools to the Quantitative Health Objectives (QHOs) and concluded that a substantial safety enhancement is not achieved by expediting spent fuel transfer to dry storage. Even if a RA were to demonstrate such a proposed backfit were potentially cost-beneficial, a backfit may not be justified due to the former conclusion. Simply stated, a slow accident progression if one should occur suggests a high confidence of evacuating the public. Coupled with a low probability of an accident, this reduces the estimated public health risk to substantially less than the QHOs even if reducing that risk further can be shown to be potentially cost-beneficial. The separateness of the evaluations for public health risk and cost-benefit appears consistent with the Commission's recent affirmation (SRM-SECY-12-0110) that it intends to continue to keep separate the "regulatory character" of adequate protection of public health and safety from the regulatory character of economic consequences. However, using the QHOs for this purpose requires consideration of several factors.

The use of the QHOs for this type of determination may not be the only possible quantitative risk approach, so any Commission-endorsed use here may set a significant precedent and should therefore be carefully considered. Toward that end, recent dialog within the staff has sought to understand the basis for the QHOs, including the reactor-centric nature of the QHOs and justification for extending their use to non-reactor accidents, their emphasis on risk from direct exposure to releases during the accident at specific distances from the accident site (1 mile and 10 miles), the apparent intent that the QHOs represent the maximum allowed total risk from a site (versus their use as a threshold criteria for individual specific accidents), and any past staff or Commission use of QHOs in a manner that may bear on the present case. If such factors have been duly considered, then it may still be possible to use the QHOs for determining whether a proposed backfit is a substantial safety enhancement. As noted, other quantitative risk approaches may be possible (for example, since we have been able to define an acceptable maximum 'small' increase in risk, i.e. RegGuide 1.174, it seems that we might similarly be able to define an acceptable minimum 'substantial' decrease in risk). Given the importance of such precedents for backfit decisions, I believe the ongoing dialog is a healthy contribution to this decision process.

CONTINUED IN SECTION D

SIGNATURE



DATE

9/30/13

SEE SECTION E FOR IMPLEMENTATION GUIDANCE

NON-CONCURRENCE PROCESS

NCP TRACKING NUMBER
2013-013

TITLE OF SUBJECT DOCUMENT
Staff Evaluation and Recommendation for Tier 3 Issue on Expedited Transfer of Spent Fuel

ADAMS ACCESSION NO.
ML13256A348

SECTION C - TO BE COMPLETED BY DOCUMENT SPONSOR

NAME
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TITLE
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(301) 415-3091

ORGANIZATION
Office of Nuclear Reactor Regulation - Japan Lessons-Learned Project Directorate (NRR/JLD)

SUMMARY OF ISSUES
SEE ATTACHED

ACTIONS TAKEN TO ADDRESS NON-CONCURRENCE

SEE ATTACHED

SIGNATURE--DOCUMENT SPONSOR

TITLE Deputy Director

ORGANIZATION NRR/JLD

DATE 11/12/13

SIGNATURE--NCP REVIEWER

TITLE Deputy Director

DATE 11/12/13

ORGANIZATION NRR

DATE

NCP OUTCOME

Non-Concurring Individual: CONCURS NON-CONCURS WITHDRAWS NON-CONCURRENCE (i.e., discontinues process)

AVAILABILITY OF NCP FORM

Non-Concurring Individual: WANTS NCP FORM PUBLIC WANTS NCP FORM NON-PUBLIC

CONTINUED IN SECTION D

SEE SECTION E FOR IMPLEMENTATION GUIDANCE

NON-CONCURRENCE PROCESS

NCP TRACKING NUMBER
2013-013

TITLE OF SUBJECT DOCUMENT

Staff Evaluation and Recommendation for Tier 3 Issue on Expedited Transfer of Spent Fuel

ADAMS ACCESSION NO.

ML13273A572

SECTION D: CONTINUATION PAGE

CONTINUATION OF SECTION

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As the document sponsor, I first want to commend the non-concurer for raising his views on the paper. The fact that the NRC has an established process for individuals to raise differing views, and that individuals feel comfortable and confident in exercising that process, is a reflection of the NRC's strong safety culture. In addition, the fact that the agency has historically demonstrated its ability to work collaboratively to address important issues such as these while recognizing that is not always possible nor appropriate to achieve unanimous consensus on such issues, reflects that we can effectively and reasonably balance our need to consider differing views against our needs to be a timely, effective, and consistent regulator.

As with any issue that involves both complex technical and regulatory aspects, it is not surprising that different views and perspectives will arise. The NRC places strong emphasis on considering those views as part of its decision making process and documenting its response to those views. The views expressed in this non-concurrence raise good questions which were considered in the development of the regulatory analysis and the Commission paper. Most of the views expressed are focused on prior Commission policy decisions and standard practices for how the NRC performs regulatory analyses. While good questions, they do not provide a compelling reason for the staff to deviate from Commission policy or past practice. Instead, as discussed in greater detail in the enclosure, the staff is confident that each of the concerns is addressed in the regulatory analysis through the use of bounding or conservative assumptions and/or sensitivity studies. In addressing the concerns, the staff has included additional information in both the body of the paper and its enclosure to provide the Commission with the information necessary to make an informed decision as well as providing the Commission with a copy of the non-concurrence and staff response.

A detailed response to each of the non-concurrence items is provided in the attachment.

SEE SECTION E FOR IMPLEMENTATION GUIDANCE

Non-Concurrence Process Documentation

NCP-2013-013; Section C (Document Sponsor)

Summary of Issues

In SECY-11-0137, "Prioritization of Recommended Actions to be Taken in Response to Fukushima Lessons Learned" (ADAMS Accession No. ML11272A111), the staff identified the expedited transfer of spent fuel to dry cask storage as an issue warranting further consideration as part of the activities following the accident at the Fukushima Daiichi nuclear facility in Japan. The staff prioritized this issue in the Tier 3 category and said it requires further study to determine if regulatory action is warranted. In SECY-12-0095, "Tier 3 Program Plans and 6-Month Status Update in Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Subsequent Tsunami" (ADAMS Accession No. ML12165A092), the staff described a plan involving various stages of assessments to help determine if regulatory action is warranted for the expedited transfer of spent fuel from spent fuel pools (SFPs) into dry cask storage. In a memorandum to the Commission entitled, "Updated Schedule and Plans for Japan Lessons-Learned Tier 3 Issue on Expedited Transfer of Spent Fuel," dated May 7, 2013 (ADAMS Accession No. ML13105A122), the staff outlined updated plans involving three possible phases of evaluations to determine if regulatory action is warranted to require licensees to expedite transfer of spent fuel from SFPs to dry cask storage. The staff aligned the ongoing research activities related to the report entitled, "Consequence Study of a Beyond-Design-Basis Earthquake Affecting the Spent Fuel Pool for a U.S. Mark I Boiling Water Reactor," dated October 2013 (SFP study; ADAMS Accession No. ML13256A342) with the previously established Tier 3 program plan while considering the schedule to support the agency's ongoing waste confidence efforts. The staff's objective with this integration was to facilitate the public's involvement in these activities and related policy issues.

The result of the Tier 3 effort was a COMSECY and related analyses providing the first (Phase 1) evaluation to determine if additional studies were warranted. That COMSECY and enclosed analysis (referred to as a "regulatory analysis" in previous draft) is the subject of the NCP-2013-013. The stated purpose of the COMSECY is:

The purpose of this memorandum is to provide the Commission with information and a recommendation on whether additional study is warranted to assess possible regulatory action to require expedited transfer of spent fuel from nuclear power plants' spent fuel pools to dry cask storage. The staff's assessment, as documented in this memorandum, concludes that the expedited transfer of spent fuel to dry cask storage would neither provide a substantial increase in the overall protection of public health and safety nor sufficient safety benefit to warrant the expected implementation costs. Therefore, the staff recommends that no further generic assessments be pursued related to possible regulatory actions to require the expedited transfer of spent fuel to dry cask storage and that this Tier 3 Japan lessons learned activity be closed.

The issues raised in the nonconcurrence relate to the presentation of the information being provided to the Commission and also to the recommendation that no further generic assessments be pursued. In preparing the paper and recommendation, the staff followed the normal processes of routinely meeting with the Japan Lessons Learned Steering Committee and ensuring alignment between the Executive Director for Operations and management of the various NRC offices contributing to or affected by the assessment and recommendations. Additional discussion and the action taken for each of the points raised in NCP-2013-013 are provided below.

Specific Issue Summaries and Actions Taken

1. *Contrary to NUREG/BR-0058, "Regulatory Analysis Guidelines of the USNRC" guidance which recommends that "the range of all potentially reasonable and practical approaches to the problem are considered," only a single alternative is considered. Other alternatives may be more cost beneficial. For example, transferring less fuel or discharging into a 1x8 pattern may yield the same benefits while costing significantly less than the analyzed alternative. Both the draft Spent Fuel Pool Study (ML13133A132) and the ACRS letter (ML13224A060) recommended further analysis of the 1x8 fuel pattern. The draft COMSECY transmitting the regulatory analysis claims this would not provide a substantial safety enhancement despite it not being analyzed (or even mentioned) in the attached regulatory analysis.*

Summary/Discussion

The Tier 3 Program Plan provided in SECY-12-0095 and the memorandum to the Commission dated May 7, 2013 describe the issue being evaluated as whether or not to pursue additional studies to help determine if regulatory actions should be taken to require the expedited transfer of spent fuel from SFPs to dry cask storage. This question arises from the premise that reducing the amount of spent fuel in SFPs will reduce the heat load in the pools if there is a loss of heat removal or inventory and reduce the amount of radioactive material that might be released if a lack of cooling results in a zirconium fire within the SFP. The purpose of the Tier 3 activity, supported by the SFP study and previous studies, was to assess if there was a reasonable likelihood that additional studies and more refined assessments would support future regulatory actions to require expedited transfer of spent fuel or if the current regulatory requirements were likely to be deemed sufficient for protection of public health and safety and protection of the environment. The focus of the assessment and the COMSECY was therefore on the safety benefits of expedited transfer of spent fuel, resulting in plants moving from high density loading patterns to low density loading patterns in SFPs.

The SFP study and previous assessments did identify the possible benefits of changing the arrangement of spent fuel while keeping a high density loading within the SFP (e.g., going from the current 1x4 pattern to a 1x8 pattern). The SFP study also identified possible enhancements to mitigating capabilities (e.g., makeup or sprays to the SFP) to address specific periods of time when the heat load was higher due to recently discharged spent fuel assemblies. While these types of actions were not the primary focus of the COMSECY and related analysis, the staff provides the following discussion within the memorandum:

In addition to assessing whether further studies of expedited transfer of spent fuel to dry cask storage are warranted, the SFP study and staff's interactions with stakeholders identified other possible improvements to the storage of spent fuel. Examples include the possible investigation of alternate loading patterns (e.g., the 1 x 8 high-density loading pattern assessed in the SFP study, in addition to the standard 1 x 4 high-density loading pattern), capability of licensees to directly offload fuel into more coolable patterns, and the possible enhancement of mitigation strategies during identified periods when the heat load from recently discharged fuel assemblies is especially high. The staff has taken note of these possible improvements, but determined that they do not provide a substantial safety enhancement warranting generic regulatory action. This finding reflects the low probability of the initiating events that would challenge the integrity of the spent fuel pools and the fact that these alternative actions would have similar or

lesser safety benefit as that estimated for the expedited transfer of spent fuel. So even though these alternatives would likely involve lower costs than the expedited transfer of spent fuel to dry cask storage, the staff finds that they do not satisfy the criterion for a substantial safety enhancement. However, licensees will be informed of and encouraged to assess and implement, as appropriate, such improvements on their own initiative to help manage the risks associated with plant specific SFP designs, operating practices, and mitigation capabilities.

The staff did not present a detailed assessment supporting the above conclusion or proceed, as it did for the primary topic of expedited transfer of spent fuel (comparing high-density to low-density loadings), to more detailed backfit and regulatory analyses. The above discussion was expanded slightly to address the comment but more generally relies on the observation that the estimated low frequencies for the potential conditions in which these actions would be beneficial would result in a similar finding as for expedited transfer – that additional studies would be unlikely to support a conclusion that possible regulatory actions would provide a substantial safety improvement.

Action

The staff had previously noted the possible alternatives in the COMSECY and revised the paragraph to address the issues raised in NCP-2013-013. The discussion was expanded slightly to refer to the estimated low frequencies of initiating events as the major contributor to the likely conclusion that these alternatives would not be a substantial safety increase. The discussion was also revised to mention the lower costs of these alternatives compared to expediting the transfer of spent fuel to dry casks.

Conclusion

The schedule for preparation of the COMSECY was coordinated and aligned with the comment period for the environmental impact statement related to the Waste Confidence Decision to ensure its availability to members of the public providing comments on the environmental impact statement. The staff could have performed additional assessments of these alternatives in terms of the costs and benefits to include in the paper. The lower costs of these alternatives may have resulted in the calculated benefits exceeding the estimated costs. However, the additional detailed evaluations would not have changed the conclusion that these actions would not constitute a substantial safety improvement in accordance with the NRC's backfit requirements. Beyond the actions taken to clarify the limited assessment performed, no additional changes or delays in providing the paper to the Commission are needed.

2. *The regulatory analysis uses \$2000/person-rem as the baseline. It is known that a change in guidance is imminent that would change this value to the \$4000-\$5000/person-rem range to be more consistent with the practices of other agencies.*

Summary/Discussion

In the Staff Requirements Memorandum (SRM) for SECY-12-0110, "Consideration of Economic Consequences Within the U.S. Nuclear Regulatory Commission's Regulatory Framework," the Commission directed:

The Commission has approved the staff's recommended Option 2, to enhance the currency and consistency of the existing framework through updates to guidance documents integral to performing cost-benefit analyses in support of regulatory, backfit, and environmental analysis, subject to the following comments and additional direction. The staff should identify the potential changes to current methodologies and tools that would enhance regulatory analysis guidance under current Option 2 in a comprehensive paper on Option 2 implementation so it is clear how Option 2 "would help harmonize regulatory guidance across the agency" in both the reactor and materials programs arenas. The development of implementation approaches for Option 2 will likely expose policy issues (e.g., use of a particular decontamination level) during the staff's efforts to improve guidance for estimating offsite economic costs or to identify potential areas to develop new guidance, as needed, for other regulatory applications, and these issues should be brought to the Commission for review and approval. Given this, the Option 2 paper should be a notation vote paper. However, the staff may continue with ongoing staff activities described in SECY-12-0110 to update guidance documents (i.e., an update to NRC's dollar per person-rem conversion factor policy and an update to replacement energy costs).

In addition, the Commission stated:

The staff should provide to the Commission any cost benefit model developed for use in guidance documents to address offsite property damage costs. This would include any proposed methodology for changing the calculated value of averted dose referenced in NUREG-1530 [Reassessment of NRC's Dollar Per Person-Rem Conversion Factor Policy (December 1995)].

The staff is aware that the traditional \$2000 per person-rem conversion factor may change as a result of ongoing assessments. However, the value of the dollar per person-rem conversion factor is a matter of Commission policy. Therefore, the staff followed the established processes and guidance and addressed the possible change in the conversion factor via sensitivity studies included in the enclosure to the COMSECY (see Section 4.4.1.4.1, Tables 19-22 and Appendix D). Sensitivity studies allow the decisionmakers to take into account the contributions of offsite doses to the cost/benefit assessments and to see the differences that result from an increase in the conversion factor from \$2000 to \$4000 per person-rem.

Actions

To clarify the discussion and highlight the importance of the dollars per person-rem conversion factor, the staff added the following sentences to the COMSECY:

... Sensitivity studies were also conducted on key factors such as the dollars per person-rem conversion factor and consideration of consequences beyond 50 miles to measure each attribute's effect upon the overall result. The sensitivity of the dollars per person-rem conversion factor is important to consider because related guidance is currently being updated. The sensitivity of consequences beyond 50 miles is important to consider for accidents involving SFP fires as the spread of radioactive materials could extend over long distances. ...

Conclusion

While it is a valid observation that the current \$2000 per person-rem conversion factor is currently being reevaluated and might be revised should the Commission decide to do so in the future, it is appropriate to follow the current processes and guidance as directed by the Commission and address the issue through inclusion of sensitivity studies. The additional discussion of this issue in the COMSECY is an improvement and provides the needed information to the Commission for their deliberations.

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- 3. The regulatory analysis uses a 50-mile truncation as a baseline. Guidance in NUREG/BR-0058 indicates that a 50 mile truncation should be used for nuclear power plants but that the appropriate distance for other facilities should be decided on a case-by-case basis. For SFP accidents in high density pools, which are expected to release much more material than reactor accidents, this truncation can decrease the calculated consequences by nearly a factor of 10. This truncation is arbitrary and technically indefensible.*

Summary/Discussion

The COMSECY and its enclosure point out that accidents involving spent fuel pool fires have the potential to involve releases that would contaminate much larger areas than are calculated for most reactor accidents. This potential is also a major point made by the SFP study and other references in the regulatory analysis (e.g., NUREG-1738, "Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants"). The Tier 3 assessment addresses this issue by including sensitivity studies in the enclosure provided with the COMSECY (see Section 4.4.1.4.2, Tables 23-26, and Appendix D). Sensitivity studies allow the decisionmakers to take into account the possible contamination of larger land areas within the cost/benefit assessment.

In terms of the assessment and primary basis for the staff's recommendation, the sensitivity studies reflecting both the increase in dollars per person-rem and impacts beyond 50 miles are addressed in Section 4.4.1.4.3 and are shown in Tables 27 through 30 in the enclosure provided with the COMSECY. A summary is provided below for the base case assessments for each grouping of spent fuel pools at the traditional discount factors (3% and 7%) considered for regulatory analyses:

Group	Net Benefit 3% Discount Factor	Net Benefit 7% Discount Factor
1 (BWRs - Mark I/II)	+173,000	-15,265,000
2 (PWRs, BWRs - Mark III)	+7,693,000	-12,007,000
3 (New Reactors)	+20,637,000	+6,785,000
4 (PWR Shared Pool)	+28,457,000	+5,762,000

To help place the discussions in context, the majority of plants are in either Group 1 or 2. In addition, the staff has typically put more weight on the cases performed at the 7% discount rate when assessing costs and benefits, consistent with OMB Circular A-94, and uses other discount rates to indicate the sensitivity of the results to the choice of discount rate. An additional point (to be discussed further below) is that the assessments included in the COMSECY and related analyses were performed to help determine if additional studies should be undertaken and not, per se, to justify proposing a regulatory requirement. With this in mind, the staff made some simplifying and generally conservative assumptions that tend to increase the calculated benefits of moving to low density SFP loadings. These assumptions and their influence on the calculations need to be considered when looking at the results and using them in making a recommendation on the likely outcome of additional studies on this topic. In the more realistic studies envisioned if the Commission were to direct the staff to proceed to Phase 2 of Tier 3 plan, the staff would revisit assumptions such as crediting mitigation for low density pools and not for high density pools and other factors that inflated the benefits of expediting the transfer of spent fuel. In addition, Phase 2 assessments would include the additional risks introduced by additional cask loadings and the risks associated with dry cask storage. The recommendation that additional studies of this issue are unlikely to result in future regulatory actions is based on the calculated results included in the sensitivity studies but with full consideration of the assumptions and general approach taken for these assessments.

Actions

To clarify the discussion and highlight the importance of the possible contamination of larger land area, the staff added the following sentences to the COMSECY:

... Sensitivity studies were also conducted on key factors such as the dollars per person-rem conversion factor and consideration of consequences beyond 50 miles to measure each attribute's effect upon the overall result. The sensitivity of the dollars per person-rem conversion factor is important to consider because related guidance is currently being updated. The sensitivity of consequences beyond 50 miles is important to consider for accidents involving SFP fires as the spread of radioactive materials could extend over long distances. ...

Conclusion

The presentation of the information in the COMSECY and regulatory analysis is a reasonable way to ensure the Commission has the needed information and is made aware of the issues that influence the assessments and recommendation. The additional discussion of this issue in the COMSECY is an improvement and provides the needed information to the Commission for their deliberations.

- 4. The SECY paper and regulatory analysis argues that no further action is necessary since the alternative does not represent a substantial safety enhancement. It is not clear how this position reconciles with the SRM to SECY-93-086, which states that the substantial standard "is not intended to be interpreted in a manner that would result in disapprovals of worthwhile safety or security improvements having costs that are justified in view of the increased protection that would be provided." The substantial safety enhancement screen should not be used to dismiss cost-beneficial results or as a reason to not compute cost-benefit information for other reasonable alternatives.*

Summary/Discussion

The safety goal screening evaluation, as outlined in the regulatory analysis guidelines (NUREG/BR-0058), is designed to answer when a regulatory requirement should not be imposed generically on nuclear power plants because the residual risk is already acceptably low. This evaluation is intended to eliminate some proposed requirements from further consideration independently of whether they could be justified by a regulatory analysis on their net value basis. The safety goal evaluation can also be used for determining whether the substantial added protection standard of 10 CFR 50.109(a)(3) is met. However, the guidance is not intended to remove all flexibility and judgment from the backfit process and therefore points out that the safety goal screening evaluation is not intended to block worthwhile safety or security improvements that would otherwise be found to be cost-beneficial. Use of this guidance therefore requires a judgment by the NRC staff and Commission as to whether the safety goal screening evaluation provides an unreasonable finding on whether a proposed action provides a marginal or substantial safety improvement. In this case, the staff finds and includes in the COMSECY that the safety goal evaluation identifies safety improvements as marginal and that this finding is consistent with previous studies and the prevailing view of the staff. However, even though the staff finds that a possible requirement to expedite the transfer of spent fuel does not meet the safety goal screening evaluation as a substantial safety improvement, the staff prepared and provides to the Commission for their consideration an analysis of the cost/benefits in terms of the NRC's backfit process and within a broader regulatory analysis.

As previously mentioned, the staff did not prepare or provide to the Commission cost/benefit assessments of other possible regulatory actions, such as requiring alternate loading patterns within a high density pool or requiring enhancements to accident mitigation capabilities. In these cases, the staff finds that if the major action is a marginal safety improvement, similar or lesser actions would likewise not provide a substantial safety improvement.

Actions

A discussion was added to Section 3 of the enclosure, which deals with the QHO screening evaluation as a test of substantial safety enhancements. Section 3 of the enclosure is specifically mentioned in the COMSECY during the discussion on QHOs.

Conclusion

The staff followed established processes and guidance and provided their findings to the Commission for consideration. Despite finding that the expedited transfer of spent fuel does not constitute a substantial safety improvement, the staff prepared and provided cost/benefit assessments to support Commission deliberations on this issue. The additional discussion of this issue in the COMSECY is an improvement and provides the needed information to the Commission for their deliberations.

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5. *The regulatory analysis answers the substantial safety enhancement question by comparing to the Quantitative Health Objectives (QHOs) found in the Safety Goal Policy Statement. Though this is standard practice, the QHOs were developed for reactor accidents and are not well suited for making this determination for SFP accidents. SFP accidents in high density pools can lightly contaminate very large areas, displacing millions of people and requiring extensive protective actions. Conversely, the individual LCF risk from 0-10 miles is relatively low, even for the largest releases. SFP releases would have to occur with a frequency greater than 10^{-3} to approach the safety goals (100x higher than the Large Early Release Frequency subsidiary objective used for reactors.) While an alternative measure of a substantial safety enhancement is not readily available, one informative metric is that, for some "high estimate" cases, the proposed alternative results in nearly a billion dollars in frequency-weighted safety benefits. The SECY paper should acknowledge the significant limitations of applying the QHOs to non-reactors to provide The Commission with relevant information to inform their decision.*

Summary/Discussion

The staff presented the safety goal evaluation and cost/benefit assessments as part of the backfit and broader regulatory analyses because SFPs are part of nuclear power facilities and therefore contribute to the overall risk for which the safety goals and quantitative health objectives were formulated. It is true that the focus of the safety goal policy statement and the subsidiary criteria (e.g., core damage frequency and large early release frequency) are primarily related to reactor accidents. However, SFP accidents are similar enough to reactor cores (as compared to other types of NRC regulated materials and facilities) to be covered by much of the guidance developed for reactor accidents. The safety goal evaluation was also used in previous NRC assessments of SFP issues (e.g., NUREG-1353 and NUREG-1738). Particular issues and differences related to using the safety goal screening evaluation for SFP accidents, such as the possible contamination of larger land areas, were addressed in the paper by providing sensitivity studies.

In addition to the staff's general belief that the safety goal evaluation is an appropriate tool for this assessment, the Commission has provided direction to the staff on developing new or different criteria for evaluating costs/benefits and the treatment of economic consequences in regulatory decisions. In the Staff Requirements Memorandum (SRM) for SECY-12-0110, the Commission directed:

The identification of new areas to develop guidance for other regulatory applications under Option 2 should be limited and should be resourced as a lower priority than activities under Option 2 associated with applying SOARCA insights and improving guidance and analysis tools (such as the MACCS2 computer code) based on up-to-date data and advancements in accident consequence assessment knowledge.

The staff should provide the Commission with a regulatory gap analysis prior to developing new guidance for application across business lines (e.g., materials, fuel cycle facilities, or emergency preparedness).

Actions

To clarify the discussion and highlight the possible issues related to the use of the safety goal screening evaluation as part of the staff's finding that possible regulatory actions for SFPs are unlikely to result in substantial safety improvements; the following discussion was added to Section 3, "Substantial Safety Enhancement Evaluation," in the analysis that is enclosed to the COMSECY:

Comparing this analysis results to the NRC Safety Goal Policy Statement involves important limitations. First, the safety goal is intended to encompass all accident scenarios on a nuclear power plant site, including those involving reactors and spent fuel. This analysis does not examine reactor scenarios that would need to be considered, although the analysis does consider the most important contributors to SFP risk. As a result, comparison of the calculated individual latent cancer fatality (LCF) risk to the NRC Safety Goal Policy Statement is incomplete. However, it is intended to show that SFP risk is less than one percent of the individual LCF risk that corresponds to the safety goal for latent cancer fatalities. It is unlikely that the additional accident scenarios provided above would contribute significantly to a risk that would challenge the Commission's Safety Goal Policy Statement.

The QHOs effectively establish expectations related to the frequency of severe accidents associated with nuclear reactors and the potential for release of radioactive materials from an operating reactor core. Previous NRC evaluations of SFPs, including NUREG-1353 and NUREG-1738, compared the estimated risks from SFP accidents to the QHOs as part of the rationale for determining appropriate regulatory actions. Some considerations in comparing SFP risks to the QHOs are that the potential consequences of a SFP accident can exceed those of reactor accidents in terms of the amount of long-lived radioactive material released, the land area affected, and the economic consequences. The safety goal relates to the risks to an individual from nuclear power in comparison to other risks that an individual faces. The staff uses the safety goal in regulatory decisionmaking processes as a measure of health consequences to determine if a potential action provides a substantial safety improvement. Although a SFP accident might affect larger areas and more people than a reactor accident, the risks to individuals remains bounded by the assessment of the population close to the

facility. For this reason, the staff uses the existing QHOs for determining whether the substantial safety enhancement threshold is met.

The significant difference between the calculated consequences of a SFP accident and a reactor accident has led some stakeholders to propose alternate performance measures to help in the decisionmaking process. Such measures could include a revised consideration of economic consequences, collective dose to populations, or other estimates that reflect the large consequences and reduce the influence of the low event frequencies and implementation of protective actions in assessing the overall societal risks associated with SFP accidents. However, the Commission has previously directed that these performance measures should be consistent with the overall safety goals the Commission policy established and should not be so conservative that it creates a de facto new policy.¹

The development of surrogate measures for SFPs could be useful if the conditional probability of a significant SFP accident is very high for particular event scenarios (a so-called cliff-edge effect). Although the staff has used various conservative assumptions in this assessment in order to estimate the potential benefits of reducing the density of spent fuel stored in pools, the expected ability of pools to retain their integrity and the availability of mitigation capabilities leads the staff to conclude that exceeding design basis values associated with SFPs are unlikely to result in such a cliff-edge effect and that the frequency of damage to stored fuel is appropriately low to satisfy overall societal risk goals. Therefore, the staff has not identified this as an area for which it needs to develop new methodologies, guidance, or criteria. In the SRM for SECY-12-0110, "Consideration of Economic Consequences within the U.S. Nuclear Regulatory Commission's Regulatory Framework," the Commission directed the staff to proceed with improvements to the guidance for estimating offsite economic costs. The staff is continuing its efforts and planning related to the SRM and is scheduled to provide the Commission with a paper in December 2013. Factors considered likely to change as a result of the staff's activities (e.g., dollars per person-rem conversion factor) have been addressed in this evaluation through the presentation of additional cases and sensitivity studies.

The staff has concluded that the continued operation of nuclear power plants with high-density loadings in their SFPs does not challenge the NRC's safety goals or related QHOs. Therefore, a regulatory action to require reducing the inventory of spent fuel in the pools would not provide a substantial safety improvement. If the proposed regulatory action did not provide a substantial safety enhancement, the NRC's guidance would instruct the staff to stop the evaluation. In this case, although the staff determined that expedited transfer does not provide a substantial safety enhancement, the staff proceeded to perform a cost-benefit analysis to provide additional information to support the Commission's deliberations.

To address concerns that the discussion is buried within the regulatory analysis, a reference to this specific section and discussion is included in the COMSECY where the topic of using the QHOs is introduced.

¹ Commission Guidance on Implementation of the NRC's Safety Goal Policy," memorandum from the Secretary of the Commission to the EDO, dated November 6, 1987.

Conclusion

The staff followed established processes, guidance and precedence established in previous evaluations of possible regulatory changes related to SFPs. The addition of more detailed discussion of this issue in the regulatory analysis is an improvement and provides additional information to the Commission for their deliberations.

- 6. Despite the fleet only being bounded by the high estimates (which are shown to be cost-beneficial) and not the base cases, the regulatory analysis concludes the alternative is not cost-beneficial.*

Summary/Discussion

The staff provided within the cost/benefit analysis a number of cases that consist of combinations of assumptions for various parameters or conditions. The calculations including parameters assumed to be at the lower end of their expected ranges were labeled “low estimate” cases. The calculations including conservative assumptions for most parameters (as is typical for generic regulatory assessments) were labeled as “base case.” Another set of calculations using bounding assumptions (e.g., conditional failure probabilities of 100%) were labeled “high estimate” cases. The presentation of these cases was not intended to be taken as probability distributions for various parameters such that the high estimate cases actually represented some small number of plants. It is not surprising that the benefits outweigh the costs for high estimate cases given the bounding assumptions compounded upon each other and effectively increased the frequency of releases by more than an order of magnitude in comparison to the values used in Appendix D of the SFP study.

For the purpose of this assessment – which is supporting only a decision on whether or not resources should be spent on additional studies – the staff provided the high estimate cases for the Commission to consider in their deliberations. The low and high estimate case results were presented alongside the base case analysis results to provide an indication of the relative impacts of the assumptions that were made in the analysis. There is also an element of subjective judgment regarding the results of this assessment and the likely outcome of additional studies. If directed by the Commission to proceed with Phase 2 of the Tier 3 plan, the staff would revisit assumptions for various parameters and simplifications (e.g., crediting mitigation for low density pools and not for high density pools) that inflated the benefits of expediting the transfer of spent fuel. In addition, Phase 2 assessments would include the additional risks introduced by additional cask loadings and the risks associated with dry cask storage. The conclusion that additional studies of this issue are unlikely to result in future regulatory actions is based primarily on the base case calculations and the judgment of the staff regarding likely results of future studies.

Actions

To clarify the discussion and acknowledge the role of staff judgment in the assessment, the COMSECY was revised to:

(Page 7) ... Within the enclosed analysis, the staff provides a “base case” which generally used conservative assumptions for key parameters such as conditional probabilities of SFP liner failures and loss of adequate cooling to increase the calculated benefits of expedited transfer of spent fuel (i.e., to skew the calculations towards pursuing additional studies). The benefits calculated for the base case evaluations are less than the estimated costs for requiring expedited transfer of spent fuel to dry cask storage. Although the base case is used as the primary basis for the staff’s recommendation, the staff also analyzed additional cases where key parameters are varied to provide low and high estimates of the calculated benefits. The staff used bounding or conservative values in the analysis for several parameters, particularly in the high estimate cases, to ensure that design, operational, and other site variations among the new and operating reactor fleet were addressed and to generally increase the calculated benefits from the proposed action. Sensitivity studies were also conducted on key factors such as the dollars per person-rem conversion factor and consideration of consequences beyond 50 miles to measure each attribute’s effect upon the overall result. ...

(Page 8) ... The cost-benefit analysis also includes sensitivity studies and some combinations of high estimates for important parameters resulting in large economic consequences such that, in some cases, the calculated benefits from expedited transfer of spent fuel to dry cask storage outweigh the associated costs (see Appendix D in enclosed supporting analysis). However, even in these cases, there is not a substantial safety improvement in terms of public health and safety. In the staff’s judgment, it is unlikely that individual plants would meet or exceed the most conservative assumptions made in these sensitivity cases within the supporting analysis and the “base case” remains the primary basis for the staff’s recommendation. Based on the generic assessment and the other considerations detailed in this paper, the staff finds that additional studies are not needed to reasonably conclude that the expedited transfer of spent fuel to dry cask storage would neither provide a substantial increase in the overall protection of public health and safety, nor sufficient safety benefit to warrant the expected implementation costs. Therefore, the staff finds that additional studies of expedited transfer of spent fuel is not needed.

Conclusion

The possible communication challenges associated with presenting the “high estimate” cases was raised by the staff and the ACRS. The role of judgment within the process needs to be considered and when combined with the conservative and simplifying assumptions, the COMSECY reflects the position of the NRC staff and management that additional studies would be unlikely to justify additional regulatory requirements for SFPs. The revised wording clarified the role of staff judgment in the assessment.

7. *Though the Regulatory Analysis contains an appropriate range of estimates and sensitivity results, both the “Decision Rationale” section of the regulatory analysis and the discussion of the results in the COMSECY transmitting the regulatory analysis fail to provide a balanced view of the range of results. There are several examples of this:*
- *The COMSECY states that conservative assumptions are used in the regulatory analysis without making it clear that conservatives are primarily to account for variations within the group considered in the high estimates. The base case estimates represent a point estimate and contain a few minor conservatisms. The base case estimates do not bound the group of SFPs.*
 - *The COMSECY states “it is unlikely that individual plants would meet or exceed the most conservative assumptions made in these sensitivity cases within the regulatory analysis.” This is highly misleading. The cases referenced are extremely cost-beneficial so a pool even approaching these assumptions would be very cost beneficial.*
 - *The “Decision Rationale” section of the regulatory analysis states there are other considerations discussed in Section 4.5.10 that would further decrease the benefits and make the proposed alternative less cost-justified. Though some of the items discussed would clearly decrease the benefits (e.g. credit for mitigation) others could increase or decrease the benefits. The list omits considerations which would increase the benefits such as relaxing the potentially optimistic assumptions that extensive protective actions are effective following a severe seismic event.*
 - *The analysis concludes that the alternative is not cost-beneficial by apparently focusing on the base case estimate truncated at 50 miles and using \$2000/person-rem. Results that are cost-beneficial are downplayed as resulting from combinations of high estimates “sensitivity studies and some combinations of high estimates ... such that, in a few cases, the benefits...appear to be cost beneficial.” This is inconsistent with the results of the regulatory analysis which are: all high estimates are cost beneficial regardless of what other assumptions are used; and, when considering all consequences and an updated value of \$4000/person-rem, all base cases are essentially cost neutral.*

I have produced several figures and tables below to illustrate the results of the regulatory analysis. They paint a much muddier picture as to whether or not the alternative is cost-beneficial when compared to the COMSECY.

Summary/Discussion

The COMSECY and related analysis present the information mentioned above but in the context of the staff’s assessment and the general conclusion that additional studies would be unlikely to lead to additional regulatory requirements for SFPs. Within the assessment, there are various uncertainties related to individual plants but the purpose of this activity is to provide a generic assessment on whether or not additional studies would likely lead to a rulemaking or other imposition of new requirements on licensees regarding SFPs. Much of the individual

points above were previously addressed and so the primary contention is assumed to relate to how the information is presented.

As discussed in the COMSECY, the SFP accident scenarios are low frequency, high consequence events. The fact that the calculated benefits (averted dose and property damage) for the high estimate cases exceed the estimated costs is not surprising given the bounding assumptions for loss of SFP integrity and subsequent zirconium fires effectively raise the calculated frequency of a major release by over one order of magnitude compared to the value used in Appendix D of the SFP study. The staff evaluated and provided its findings related to each step in the regulatory analysis process.

- The first test is whether additional studies were likely to support a finding that expediting the transfer of spent fuel or other actions related to the SFP would be a substantial safety improvement. The COMSECY and regulatory analysis document the staff's finding that additional studies would not support a substantial safety improvement finding. Approaches or presentation of information that would support an alternate view are mentioned but not adopted or recommended. The approach taken is consistent with Commission direction in its SRM related to SECY-12-0110.
- Notwithstanding a finding that expedited transfer of spent fuel or other actions discussed could provide a minor safety improvement but not a substantial safety improvement, the COMSECY and supporting analysis provide a cost/benefit assessment. As previously discussed, the base case assessments (recognizing the conservative and simplifying assumptions) do not show that the benefits of expediting spent fuel movement exceed the associated costs. The bounding assumptions used in the high estimate cases do lead to higher frequencies and consequences from releases and therefore the benefits appear to outweigh the costs. However, if directed to move on with Phase 2 of the Tier 3 plan, the staff would revisit assumptions for various parameters and simplifications (e.g., crediting mitigation for low density pools and not for high density pools) that inflated the benefits of expediting the transfer of spent fuel. In addition, Phase 2 assessments would include the additional risks introduced by additional cask loadings and the risks associated with dry cask storage. The staff and management continue to believe that additional studies of this issue are unlikely to justify requiring a backfit for existing nuclear power plants to expedite the transfer of spent fuel from storage pools to dry cask storage.
- Finally, the staff prepared and provides to the Commission a broader regulatory analysis that includes not only the health benefits associated with averted dose to the public and workers but also broader societal benefits associated with reducing damages to property. Similar to the discussion above for the backfit-related cost/benefit assessment, the broader regulatory analysis is provided in the enclosure to the COMSECY. The points mentioned above for the backfit assessment and mentioned in previous discussions of factors such as dollars per person-rem conversion factors and consequences beyond 50 miles are not repeated here. The staff and management continue to believe that additional studies of this issue are unlikely to support future regulatory actions.

Actions

There were no changes to the COMSECY and related regulatory analysis beyond the previously mentioned additions and revisions to address specific points.

Conclusion

The staff followed established processes and guidance and provided their findings to the Commission for consideration. In preparing the paper and recommendation, the staff followed the normal processes of routinely meeting with the Japan Lessons Learned Steering Committee and ensuring alignment between the Executive Director for Operations and management of the various NRC offices contributing to or affected by the assessment and recommendations. Alternatives and sensitivity studies are provided in the paper to support Commission deliberations on this issue. No additional changes to the paper or regulatory analysis appear to be warranted.