SECY-87-219

August 31, 1987

For: The Commissioners

From: Victor Stello, Jr.
Executive Director for Operations

Subject: INTEGRATED SAFETY ASSESSMENT PROGRAM

Purpose: To inform the Commissioners of the experience gained in the Integrated Safety Assessment Program (ISAP) pilot program and to recommend continued use of the ISAP methodology as part of other NRC programs.

Background: SECY 84-133 describes the concept and implementation of the Integrated Safety Assessment Program (ISAP) in detail. To summarize, the objective of ISAP was to provide a comprehensive review for operating reactors which would address all safety issues and provide an integrated, cost-effective implementation plan using both deterministic and probabilistic techniques. ISAP was also to provide the technical bases to resolve all outstanding licensing actions, establish overall plant improvement schedules and serve as a benchmark from which future regulatory actions could be judged, on a plant-specific basis.

The ISAP pilot program was initiated in November 1984 with the issuance of the Commission's Policy Statement on the Systematic Safety Evaluation of Operating Nuclear Power Reactors (49 FR 45112). The major elements of ISAP, as presented in the policy statement, are: (1) a review of the lessons learned from the Systematic Evaluation Program (SEP), pending regulatory requirements, licensing actions and licensee plant improvement initiatives; (2) performance of a plant-specific probabilistic safety assessment (PSA); (3) a compilation and analysis of plant operating experience data; (4) the analysis in an integrated assessment of the topics resulting from (1), (2) and (3); and (5) the issuance of an integrated implementation schedule.

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As a result of changes in the FY 1986 budget appropriations, the staff did not start the implementation of ISAP until May 1985 when the pilot program was revised (SECY 85-160). The revised pilot program provided for the review of two plants that had participated in SEP and limited the review of the PSA to immediate ISAP considerations. Northeast Nuclear Energy Company and Connecticut Yankee Atomic Power Company (the licensees) volunteered Millstone Unit 1 and Haddam Neck, respectively, to participate in the pilot program. Since both plants had already participated in SEP, the technical review of the SEP lessons learned had been completed when the pilot program began. The milestones associated with the ISAP actions completed thus far and those necessary to complete the pilot program are presented in Enclosure 1.

Discussion:

From an examination of the ISAP pilot program milestones listed in Enclosure 1, it can be seen that the technical review work, the PSA and operating experience reviews have been completed for both plants. The draft Integrated Safety Assessment Report (ISAR) for Millstone Unit 1 (NUREG-1184) was issued for comment on April 14, 1987 with the final report and integrated implementation schedule to be issued in September 1987. The draft report for Haddam Neck was issued on August 18, 1987 and the final report is scheduled to be issued in October 1987. The draft ISARs for both plants are provided to the licensees, an independent peer review group, and the ACRS for comment. The licensees are to use the draft reports as the bases for developing the integrated schedules and as part of the bases for the possible elimination of low importance actions from the schedules. The final ISARs will address the comments as appropriate and will incorporate the integrated schedules. The integrated schedules or the methodology for developing an integrated schedule are expected be made part of the operating licenses.

One of the tenets of the ISAP program was the deferral of issues until they could be evaluated in an integrated assessment. However, if, during the ISAP review, the staff or licensee explicitly determines that, to protect the public health and safety, prompt action is required to be taken on an ISAP issue, then the deferral will be lifted and the action must be taken.

In this regard, two of the major findings in ISAP were identified upon the completion of the PSAs by the licensees. For Millstone Unit 1, the licensee reported that 60% of the total calculated core melt frequency was due to a failure to maintain adequate long-term decay heat removal capability. The licensee identified and implemented the immediate corrective actions it could take to reduce this contribution to

risk. The licensee also initiated an evaluation program to determine what other actions could be taken in the longer term. The ISAP review identified this evaluation program to be a high priority activity. For Haddam Neck, the licensee reported that the loss of motor control center MCC-5 in the switchgear room would cause a loss of function of critical equipment and prevent safe shutdown of the plant. This shows up as a major transient initiator and dominant contributor to the core melt frequency in the PSA. The licensee took immediate corrective actions to reduce this source of risk.

The performance of a PSA by the licensees not only identified areas of significant risk where immediate corrective actions were necessary, but the PSA also identified areas, such as plant-specific design changes resulting from generic NRC requirements or licensee initiatives, that, while developed to increase plant safety or availability, actually increased risk. For Millstone Unit 1, the licensee reported, after performing a probabilistic evaluation, that the system the licensee designed, using deterministic methods, to meet NRC generic requirements for degraded grid voltage protection for Class 1E power systems would increase the likelihood of station blackout by 240%.* The degraded grid protection system has been redesigned by the licensee taking into account the PSA findings and implementation is planned for the next refueling outage. For Haddam Neck, the licensee was planning to add a new system to supply the nitrogen blanket for the demineralized water storage tank due to availability problems in the old system. However, the PSA indicated that the new system would be prone to a single failure that might lead to loss of this storage tank. In this case, the licensee is modifying the current system rather than adding a new system.

The staff's review of the PSA and the operating experience analysis identified several areas, although not requiring immediate actions, that could be significant contributors to risk. These areas were included in the integrated analysis for each plant and will be implemented according to the priority determined in the integrated assessment.

*The licensee reported that the Millstone Unit 1 electrical bus arrangement, due to its lack of symmetry, is not readily compatible with a modification which requires an auto-reinstatement of load-shed feature. The staff has investigated the generic implications of the licensee's degraded grid protection findings and, based on the unique design of the Millstone 1 electrical bus arrangement, has concluded that the identified problem is plant-specific.

Performance of the PSAs by the licensees, and review of the PSAs and operating experience analyses by the staff have led to better understanding of the plant's operating characteristics and capabilities by both the licensees and the staff. It should be noted that the performance of an operating experience review by the staff not only identified new areas to be evaluated in the integrated analysis and a better understanding of the plant, but also served to verify the findings in the PSA.

The ISAP integrated assessment performed by the licensee has the potential to identify what were originally separate review areas, find common elements between them and propose a single integrated action to resolve the separate concerns. For Millstone Unit 1, it was found that a single modification could resolve separate staff concerns in the areas of tornado missile protection, station blackout and fire protection. The integrated assessment also provided an opportunity for the staff and licensee to address pending requirements on a plant-specific basis. For example, the staff and licensees discussed potential requirements for topics such as severe accidents, station blackout and Mark-I containments in light of existing plant design and the plant-specific PSA to provide a greater understanding of plant operating characteristics and to make additional recommendations for plant modifications to effect an immediate reduction in risk in advance of resolution of these topics and formal issuance of the requirements.

The result of the integrated assessment is the list of actions to be implemented by the licensees. The development by the licensees of an action prioritization methodology, using the PSA and operating experience as prioritization tools, allows the licensees for the first time in a formal documented manner to evaluate the priority of all proposed actions in light of the significance of all other existing actions. The resulting integrated implementation schedules will provide a stable and predictable basis for both the licensees and staff to manage current workloads to estimate resources for future projects.

In summary, the benefits of performing a PSA and operating experience review are demonstrated by the identification of areas of significant risk requiring immediate action, the identification of areas designed to increase safety but which actually increase risk and the identification of areas for consideration in the integrated assessment. The ISAP integrated assessment demonstrated the benefits of proposing a single resolution to several issues. The ISAP prioritization of actions benefits the licensee and the NRC by providing a rational schedule for implementation of actions and provides a basis for the possible elimination of actions that were determined to have low safety significance.

The staff believes that the experience with the ISAP pilot program has demonstrated the potential benefits to licensees, the public and the NRC of integrated assessments utilizing plant-specific PSAs and operating experience reviews. The staff has concluded that the most cost-effective way to extend those benefits to additional plants would be to combine the features of the ISAP approach with the implementation of the Commission's severe accident policy.

In the Severe Accident Policy Statement (50 FR 32138), the Commission mandated that each licensee perform a systematic plant examination to search for vulnerabilities to severe accidents. The concept of systematic plant examinations has features in common with ISAP. That is, both programs are trying to identify plant vulnerabilities and develop plant-specific methods of resolving the vulnerabilities. The severe accident systematic plant examinations will be used to identify vulnerabilities that are beyond the defined design basis events and the single failure criteria which are the principal bases of the ISAP evaluation. In the ISAP approach, all issues are analyzed at one time. An operating experience analysis is performed which serves to identify plant vulnerabilities, to validate the PSA and together with the PSA serves as a tool in the development of implementation schedules. If the ISAP approach is combined with the implementation of the severe accident policy, then once the systematic plant examination has been completed for a plant, the identified vulnerabilities and current licensing actions would be prioritized for the development of a cost-effective, risk-based implementation plan. This combination of programs would require that the systematic plant examination provide information not only on severe accidents, but also on design basis events as required in ISAP.

The Commission presently has before it SECY-87-172, "Integrated Schedules Policy Statement." The program addressed by that policy statement provides licensees the opportunity to develop integrated schedules based upon a prioritization process developed by the licensee and approved by the staff. It is not presently a requirement of this program that a PSA be performed and used in the prioritization process. Experience with the ISAP pilot program has shown the benefits of using a plant-specific PSA in prioritizing implementation schedules, including the opportunity to justify elimination of items from the schedule because of their low impact on safety improvement. Continuation of the ISAP program in combination with the severe accident program, as discussed above, would provide licensees with valuable insights that could be used in the development of integrated schedules for NRC requirements as well as licensee initiatives.

The staff believes that it is in the best interest of the public, the industry and the NRC to extend the benefits of the ISAP approach by continuing ISAP not as a separate program, but rather as an important element of the implementation program for the severe accident policy. The objective of this new program would be to perform a comprehensive review of plant for vulnerabilities to severe accidents and to address current safety issues to provide an integrated, cost-effective implementation plan. The program would also serve as a benchmark from which future proposed regulatory actions could be judged on a plant-specific basis. The results of the program could also be used by licensees to develop integrated schedules.

The staff met with the Advisory Committee on Reactor Safeguards (ACRS) on July 7 and 9, 1987, to discuss the results of the Millstone Unit 1 ISAP review and to discuss potential approaches for the continuation of ISAP. The ACRS met with the Commission on August 6, 1987, to discuss, among other things, the ACRS's evaluation of the ISAP pilot program. The staff's proposal in this paper is consistent with the ACRS's conclusions.

Recommendation: That the Commission approve the staff plan to extend the benefits of the ISAP approach to all licensees as an element of the implementation program for the Severe Accident Policy Statement; that is, to combine the features of the ISAP pilot program and the systematic plant examination provision of the Severe Accident Policy Statement.

Original signed by
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Enclosure:
ISAP Pilot Program Milestones

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*See previous concurrence sheet

RES SP's reviewed & and concurs 8/26

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Recommendation: That the Commission approve the staff plan to extend the benefits of the ISAP approach to all licensees as an element of the implementation program for the Severe Accident Policy Statement; that is, to combine the features of the ISAP pilot program, the Generic Letter 83-20 integrated schedules program, the systematic plant examination provision of the Severe Accident Policy Statement and comprehensive, operating experience evaluations.

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Enclosures:
1. ISAP Pilot Program Milestones

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Recommendation: The staff intends to extend the benefits of the ISAP approach to all licensees as an element of the implementation program for the Severe Accident Policy Statement. The program would combine the features of the ISAP pilot program, the Generic Letter 83-20 integrated schedules program, the systematic plant examination provision of the Severe Accident Policy Statement, and comprehensive operating experience evaluations. The staff recommends that the Commission approve proceeding in this manner.

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Recommendation: The staff recommends that the Commission approve the incorporation of the ISAP approach and experience into the implementation of the Generic Letter 83-20 integrated schedules program and with the proposed severe accident program.

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1. ISAP Pilot Program Milestones

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Recommendation: It is recommended that the Commission approve the integration of ISAP with the Generic Letter 83-20 integrated schedules program and with the proposed severe accident program.

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1. ISAP Pilot Program Milestones

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