

March 18, 1999

SECY-99-082

FOR: The Commissioners

FROM: William D. Travers /s/  
Executive Director for Operations

SUBJECT: QUARTERLY STATUS REPORT ON THE PROBABILISTIC RISK  
ASSESSMENT IMPLEMENTATION PLAN

PURPOSE:

To report the status of the Probabilistic Risk Assessment (PRA) Implementation Plan (PIP) for the period July 1 to December 31, 1998.

BACKGROUND:

In a memorandum dated January 3, 1996, from the Executive Director for Operations to Chairman Jackson, the staff committed to submitting quarterly reports on the status of its development of risk-informed standards and guidance. Previous progress reports were sent to the Commission quarterly beginning on March 26, 1996, with most recent update provided as SECY-98-186, dated July 31, 1998. Because of the need to meet high priority staff commitments to actions identified in the Chairman's tasking memorandum, the present PIP report covers a six-month period from July 1 to December 31, 1998.

DISCUSSION:

The principal staff accomplishments in executing the various elements of the PIP are summarized below. Detailed scheduling information, including changes with explanatory notes, is included as Attachment 1.

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It should be noted that the format of this plan is based on the organizational structure in effect

as of December 31, 1998, and does not reflect the assimilation of AEOD into other parts of the NRC.

### Section 1: Reactor Regulation

A number of milestones have been reached since the PRA Implementation Plan was last updated, and they are discussed below individually. In addition, a number of other items were completed which are described in the staff's response to the Chairman's tasking memorandum dated August 7, 1998. Perhaps the most significant of these items was submission of a paper (SECY-98-300) to the Commission that describes high-level options and a two-phased implementation strategy for modifying regulations in 10 CFR Part 50 to make them risk-informed and delineates associated policy issues. The staff is currently awaiting Commission guidance with respect to these options. After the Commission establishes requirements for the staff, the staff will prepare a plan for satisfying the Commission's requirements and incorporate the plan into the PRA Implementation Plan.

#### 1.1 Standard Review Plans for Risk-Informed Regulation

As noted in the staff requirements memorandum (SRM) for SECY-98-067, the Commission approved issuance of the final version of the application-specific regulatory guides (RGs) and standard review plans (SRPs). The final version of the risk-informed guidance documents for Inservice Testing (RI-IST), Technical Specifications (RI-TS) and Graded Quality Assurance (RI-GQA) were published in September 1998 (reference 63 FRN 48771, September 11, 1998). The final draft for trial use versions of the risk-informed guidance documents for Inservice Inspection (RI-ISI) were published in October 1998 (reference 63 FRN 57331). These guidance documents are now available for industry utilization in support of risk-informed licensing actions.

#### 1.2 Pilot Applications for Risk-Informed Regulatory Initiatives

The staff issued the safety evaluation report (SER) on the Comanche Peak RI-IST program on August 14, 1998. The SER is consistent with the RI-IST guidance published in RG 1.175 and SRP Section 3.9.7. Publication of this SER marks the completion of the staff's pilot activities in support of RI-IST programs.

By letter dated December 17, 1998, Arizona Public Service Company (APS), the licensee for the Palo Verde Nuclear Generating Station (PVNGS), withdrew as a pilot plant for risk-informed IST. APS withdrew based on minimal potential safety and cost benefits of a RI-IST program as compared to other risk-informed applications. APS believes that a risk-informed IST program, as described in Regulatory Guide 1.175, would have little safety or cost benefit at PVNGS.

On the other hand, other licensees (i.e., South Texas Project (STP) and San Onofre (SONGS)) have recently submitted RI-IST applications. The STP application is limited in scope, and is intended to provide flexibility in testing schedules for twenty-four check valves. The SONGS application is a full scope application and the licensee states that the program will be beneficial in outage management.

The staff has completed reviews and issued safety evaluations for RI-ISI program change requests for the following pilot plants:

- Surry, Units 1&2;
- Vermont Yankee;
- Arkansas Nuclear One, Unit 2 (ANO-2).

A request from ANO-1 is currently under review and scheduled to be completed by the end of July 1999.

Browns Ferry Unit 2 recently submitted an application which would combine the intergranular stress corrosion cracking augmented program inspections with the ASME Section XI inspection. The staff is working with industry to determine how, and if, the augmented programs can be included within the risk-informed program.

A standardized RI-ISI submittal format is being developed with input from industry and NEI. The standard format will minimize requests for additional information (RAIs) and expedite the review and approval of future submittals.

The staff approved the Westinghouse Owner's Group (WOG) RI-ISI topical report on December 14, 1998. The Electric Power Research Institute (EPRI) topical review was delayed until EPRI submitted responses to a June 12, 1997, RAI in November 1998. The SER on the EPRI topical report is on schedule for completion in September 1999.

The staff has completed reviews and issued safety evaluations for the following RI-TS pilot and non-pilot license amendment requests:

- North Anna, Units 1&2 Emergency Diesel Generator (EDG) Allowed Outage Time (AOT);
- Oyster Creek proposal on EDG online testing;
- San Onofre Units 2&3 EDG AOT extension request;
- Combustion Engineering Owners Group (CEOG) safety injection tank AOT extension request;
- Comanche Peak Charging pump AOT extension request.

Completion of the San Onofre and CEOG reviews marks the end of risk-informed technical specification pilot activities.

The Risk-Informed Licensing Panel held a public meeting on Wednesday, February 18, 1999, to hear industry's proposal on alternatives to adding the configuration risk management program (CRMP) to the technical specifications (TS). The industry representatives proposed numerous alternatives to placing the CRMP in the TS. The panel discussed these alternatives and decided that a concise interim guidance document (until the maintenance rule is finalized) should be developed for CRMP placement which considers a spectrum of alternatives ranging from the TS administrative controls to some form of licensee commitment. The staff is currently drafting the interim guidance.

On September 28, 1998, the staff completed its review and issued its safety evaluation report regarding the ANO, Units 1&2, request for relief from the staff position in NUREG-0737 on timing of initiation of hydrogen monitoring. This request had been made as a part of "Task Zero" of the Risk-Informed, Performance-Based Pilot Program ("Whole Plant Study") proposed

by NEI. Relating to another facet of the Whole Plant Study, the staff is continuing its review of the San Onofre request to remove hydrogen recombiners from the scope of the regulations. The staff expects to complete this review by the end of July 1999.

Approval had been granted on November 6, 1997, for South Texas to implement their graded quality assurance (QA) program. By letter dated October 14, 1998, the licensee informed the staff of some impediments to full implementation of their risk-informed approach. These impediments, and strategies for dealing with them, are discussed in Attachment 1 to SECY-98-300. In submitting SECY-98-300, the staff seeks, among other things, Commission approval to work further with South Texas in a pilot mode to resolve these impediments.

### 1.3 Inspections

The staff completed the last operating plant Maintenance Rule baseline inspection in the first week of July 1998. A total of 71 Maintenance Rule Baseline Inspections (68 operating plant sites and 3 decommissioning status plant sites) were completed since the Maintenance Rule went into effect on July 10, 1996. This included inspections of licensee methods for using PRA in Maintenance Rule programs and inspection of safety assessments performed by licensees when taking equipment out of service for maintenance in accordance with 10 CFR 50.65(a)(3).

Previous efforts to improve inspection program guidance (reported in the last PRA Implementation Plan update) have been superseded by a new initiative which began in the fall of 1998. This initiative will make the inspection program more risk-informed in a manner similar to the recent improvements to the licensee performance assessment and enforcement processes. The previously identified task to evaluate methods for presenting risk analysis results in a form most useful to inspectors is subsumed by this current initiative. Detailed implementation plans and schedules for this initiative were separately reported to the Commission as a transition plan in SECY-99-007. When an SRM is received on this plan, it will be incorporated into the PIP.

A new subtask has been added to review the final IPEEE insights report for insights that should be incorporated into inspection program guidance. This task will be completed six months after completion of the final IPEEE insights report which is due in July 2000. The commitment to perform this task is part of the plan for closure of Generic Issue 178, "Effects of Hurricane Andrew on Turkey Point."

The staff met with the Committee to Review Generic Requirements (CRGR) on December 8, 1998, to discuss the proposed inspection procedure (IP) for risk-informed graded quality assurance programs. The CRGR identified several concerns with the IP, and ultimately concluded that the proposed IP should not be issued. The staff is considering the CRGR comments and will develop an approach to address the CRGR concerns.

### 1.10 IPE Follow-up Activities

Work on IPE follow-up activities has been deferred pending receipt of the Commission's SRM regarding SECY-98-300, which proposes options for risk-informed revisions to 10 CFR Part 50. If the Commission accepts the staff's recommended course of action and directs the staff to proceed with rulemaking, the staff believes the goals and objectives of IPE follow-up activities could be achieved within the context of the revised regulations for those licensees who choose the risk-informed alternative. IPE followup could then be limited to plants not following the "risk-informed" Part 50 alternative. If the Commission decides to make no change to Part 50, the staff will revisit its plan for IPE follow-up activities in light of other risk-informed activities identified in the response (COMSECY 98-024) to the Chairman's tasking memorandum and establish new schedules for IPE follow-up activities.

## Section 2: Reactor Safety Research

### 2.1 Regulatory Guides

The proposed final versions of the regulatory documents for risk-informed IST (RG 1.175 and SRP Section 3.9.7), risk-informed TS (RG 1.177 and SRP Section 16.1), and risk-informed GQA (RG 1.176) were approved by the Commission for issuance June 29, 1998 and published in final form. The guidance documents for risk-informed ISI, RG 1.178 (formerly DG-1063) and SRP 3.9.8, were also published for trial use.

### 2.4 Methods Development and Demonstration

Work on developing improved fire risk assessment methods, tools, and data was initiated in early June 1998. The areas for improvement were identified by the staff in late 1997 and include, for example, modeling of initiating event frequency and models of fire growth and propagation and methods for analyzing human reliability. In October 1998, the staff forwarded SECY-98-230 to the Commission. This paper, prepared in response to the SRM for SECY-98-058, summarized the findings of NRC's past fire protection research efforts and highlighted a number of areas where fire risk improvements are needed. The current status of the fire risk assessment research program was reviewed in a briefing of the ACRS Subcommittee on Fire Protection on January 21, 1999. It was noted that an early product of the research program (including an analysis of heat loss factors) has been useful in supporting the completion of IPEEE reviews.

### 2.5 IPE and IPEEE Reviews

An SER was issued on the IPE for Brown's Ferry 3 (in May 1998) which concluded that the IPE did not meet the intent of Generic Letter 88-20. The licensee has subsequently provided additional information and RES is preparing a revised SER. This SER will be the last to be issued for the IPE program.

The staff completed its review of an additional seven IPEEE submittals (bringing the total to 10) and issued the SERs for these plants. The staff concluded that all these submittals met the intent of Supplement 4 to GL 88-20. In addition, the staff completed preliminary reviews of the last five of the 75 IPEEE submittals .

The target schedule for completing the reviews of all IPEEE submittals has been changed from December 1999 to April 2000. Correspondingly, changes were made to the target schedules for issuing the draft and final IPEEE insights reports. A number of factors contributed to revising the IPEEE review schedule. Among these were that (1) there was a delay in receiving responses from industry on generic fire requests for additional information (RAIs), (2) many licensees requested additional time to respond to plant specific RAIs, and (3) staff resources were needed to complete other high priority NRC work.

## 2.8 Standards Development

ASME's project team, which includes an RES member and was supported by other RES and NRR staff and contractors, completed a draft "Standard for Probabilistic Risk Assessment for Nuclear Power Plant Applications." ASME issued this draft for public comment in January 1999. ASME will hold a public workshop on March 16, 1999. This standard (Phase 1) covers PRA Level 1 and a limited Level 2 PRA analysis, the latter permitting calculation of a large, early release frequency (LERF) for internal events, excluding internal fires. Initiation of work on Phase 2 of the standard has not yet been scheduled by the ASME. Phase 2 would cover internal fires, external events and low power and shutdown conditions. The ANS has expressed to the ASME their interest in providing the lead for Phase 2. The staff intends to support such standards development work, whether led by ASME or ANS, presuming timely initiation of the work.

### 2.12 Review of Agency Programs and Processes

As noted above, the RES and NRR staff have provided a paper to the Commission (SECY-98-300) that describes options and an implementation strategy for modifying 10 CFR 50 to make it more risk-informed. When the staff receives Commission guidance on these options, more detailed plans will be developed and incorporated into the PIP.

The PRA Steering Committee met on 5 occasions between July 1, 1998 and December 31, 1998. Guidance to the staff was provided on items such as the following:

- The charters of the PRA Steering Committee and the Risk-Informed Licensing Panel
- The study undertaken by the Center for Strategic and International Studies (CSIS) on risk informed regulation
- Approaches for risk-informed 10 CFR 50 (subsequently described in SECY-98-300) and
- A framework for risk-informing NMSS activities

In addition, the Steering Committee met with the NEI's PRA Steering Committee on November 16, 1998. This meeting included discussions on:

- Charters of the two steering committees
- On-going risk-informed pilot programs
- Potential new pilot activities and
- Risk-informed 10 CFR 50.

RES also completed a report on *Options for Incorporating Risk Insights into the 10 CFR 50.59 Process*. Recommendations regarding these options will be provided as part of the process of

modifying 10 CFR 50 to be risk-informed.

### Section 3: Analysis of Operating Experience and Training

#### 3.1 Risk-Based Trends and Patterns Analysis

Administrative Letter 98-04 was issued in July 1998 announcing the availability of the cause failure database (CCF) database. The database was sent to all nuclear utilities for their use. To date about 35 utilities have installed and activated the software. The supporting technical reports were published in July 1998 as NUREG/CR-6268 and distributed. The CCF database was used to estimate CCF parameters contained in NUREG/CR-5497, which was published in October 1998. NUREG/CR-5485, *Guidelines on Modeling Common-Cause Failures in Probabilistic Risk Assessment*, was published in November 1998.

The auxiliary feedwater system study, *Reliability Study: Auxiliary Feedwater System, 1987-1995*, NUREG/CR-5500, Volume 1, was issued and distributed in July 1998. The major findings of this study were summarized in the previous PIP update (SECY-98-186). The General Electric reactor protection system study draft report was completed and sent out for review. Comments have been received from NRC offices and from the external peer reviews by industry.

The initiating event study was completed and will be published as NUREG/CR-5750. The transmittal letter providing pertinent findings was sent out in January 1999, and the final report will be printed in February 1999. This is the first major analysis and update of initiating event frequency estimates since 1985. Also, this report is the first significant effort to update LOCA pipe break frequencies since 1975 when WASH-1400, *Reactor Safety Study*, was issued. Major findings of the study include the following: (1) combined initiating events frequencies for all initiators are lower than the frequencies used in NUREG-1150, *Severe Accident Risks: An Assessment for Five U.S. Nuclear Power Plants*, and IPEs by a factor of five and four, respectively; (2) the least risk-significant transients constitute 77% of all initiating events while events that pose a more severe challenge to the plant's mitigation systems constitute the remaining 23%; (3) the overall initiating event frequency decreased by a factor of two to three during the nine-year span; (4) most risk-significant (with respect to core damage frequency) initiators frequencies (such as total loss of feedwater flow, loss of instrument or control air, inadvertent closure of all main steam isolation valves, and total loss of condenser heat sink for BWRs) decreased at a faster rate than the overall initiating event frequency; and (5) loss-of-coolant accident frequencies are lower than those used in NUREG-1150 and industry-wide IPEs.

The NRC hosted the seventh meeting of the International Common Cause Data Exchange (ICDE) Project in September 1998. The ICDE Project operates under the auspices of OECD/NEA and includes representatives from Sweden, Finland, Germany, France, Switzerland, Great Britain, Spain, and the United States. The group has defined guidelines to facilitate CCF information exchange among the participating countries. The first exchange of information involved pump CCF events. The pump report was finalized and forwarded to NEA for publication.

#### 3.2 Accident Sequence Precursor (ASP) Program

All final analyses of the 1997 precursors have been completed. There were only five precursors for 1997, all with CCDP values less than  $10^{-4}$ . The 1997 data are consistent with the previously noted trends of a decreasing rate of occurrence of ASP events and a decreasing trend in the annual ASP index. The final report was issued in December 1998 as NUREG/CR-4674, Volume 26. The annual report to the Commission on the status of the ASP Program was issued as SECY-98-298 in December 1998. Preliminary analysis of the 1998 events continues.

### 3.4 Risk-Based Performance Indicators

In response to the Chairman's tasking memorandum, a draft program plan for the development of risk-based performance indicators was developed. AEOD participated in the preparation and conduct of the Performance Assessment Workshop held September 28 through October 1, 1998. The risk-based performance indicators will be consistent with the principles developed during the workshop. The contract to help develop and implement the risk-based PIs was placed in November 1998.

### 3.5 Operating Experience Data

The contract to develop the Reliability and Availability Data System (RADS) was placed in July 1998 after approval was obtained from the Information Technology Business Council. The RADS Coordination Group met in September to review the preliminary design document. A prototype of the system was reviewed in January 1999.

The Office of the Chief Information Officer (OCIO) provided access to the new EPIX system maintained by INPO. Selected NRC staff members have successfully accessed EPIX and tested the interface system. OCIO plans to have a permanent interface in place by the end of next quarter. Following evaluation of the EPIX system, AEOD intends to incorporate EPIX data into the NRC Reliability and Availability Data System (RADS). EPIX is expected to be one of the major data sources supporting the development of the risk-based performance indicators that was discussed earlier.

AEOD attended the second meeting of the Ad Hoc EPIX Users Group at INPO on December 8, 1998, and gave a presentation on RADS to the group. INPO provided NRC a sample of the EPIX data that will be submitted under the voluntary approach to providing reliability data. The first complete set of EPIX data will be sent to NRC in March 1999. This represents a two quarter slip in providing the reliability data to NRC that the utilities were due to provide INPO in July 1998. Following evaluation of the EPIX system, AEOD intends to incorporate EPIX data into the NRC Reliability and Availability Data System (RADS). EPIX is expected to be one of the major data sources supporting the development of the risk-based performance indicators that was discussed.

AEOD started rulemaking to revise the event reporting rules (10 CFR 50.72 and 10 CFR 50.73) to better align the reporting requirements with the NRC's current reporting needs, including a better focus on reporting safety- or risk-significant events. An advance notice of proposed rulemaking was published on July 23, 1998, a public meeting was held on August 21, 1998, and a public workshop was held on September 1, 1998. Public comments were received by September 21, 1998. An additional public meeting (table-top exercise) was held on November 13, 1998, to test key aspects of the rules and guidance for clarity and consistency by discussing

how reportability decisions could be made for example events. The rulemaking plan schedule was extended five weeks to accommodate the industry's request for this additional meeting.

### 3.6 Staff Training

The 2-week PRA Technology and Regulatory Perspectives course (P-111) was offered four times during 1998. A total of 85 resident inspectors attended the course; all but three sites were represented. The course will continue to be presented each quarter to meet anticipated needs. To date, all presentations have been at the Technical Training Center. During FY 1999, courses are scheduled at Region I, Region II and Region III.

The 4-day PRA Basics for Regulatory Applications course (P-105) was offered 9 times during 1998. A total of 181 staff members attended the training. Nine more presentations are planned for FY 1999 to meet the staff's needs.

The 3-day PRA for Technical Managers course (P-107) was offered 7 times during 1998. A total of 147 managers attended the training. The staff's goal of having two-thirds of the agency's technical managers complete it by the end of FY 1998 was met. Four additional presentations are planned for FY 1999.

More staff received PRA training during FY 1998 than any previous year. A total of 507 staff attended training. The PRA curriculum continues to be updated as the agency gains experience with respect to risk-informed regulation.

Procurement actions were completed for acquiring risk-monitor software. The NRC now has a site license for use of SCIENTECH'S Safety Monitor. Technical training staff in HR are working to integrate the Safety Monitor into the reactor technology and PRA technology curricula to improve staff understanding of configuration management, the importance of plant operations to the risk profile of the plants, and the use of the tool to gain insights regarding the industry's use of risk-informed applications. The Safety Monitor will be used to demonstrate the capabilities and limits of this and similar tools as they are being used by the industry.

### Section 6: Enforcement

The Office of Enforcement (OE) has worked with NRR in the development of additional guidance for the utilization of risk insights in the enforcement process. These interactions have included joint efforts with the Inspection Program Branch of NRR to assure that risk-informed enforcement activities align with the changes to the reactor oversight process currently underway. In addition to working with NRR, OE has held several public meetings with stakeholders in order to gather input on how risk should be incorporated into the Enforcement Policy.

The response to the Chairman's tasking memorandum provides OE's current schedule for development of risk-informed changes to the Enforcement Policy. These changes are anticipated to be presented to the Commission in March 1999. Following receipt of an SRM, this item will be included in the PIP.

The Commissioners

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COORDINATION

The Office of the General Counsel has reviewed this paper and has no legal objections.

William D. Travers  
Executive Director  
for Operations

Attachment: As stated

# ATTACHMENT 1<sup>1</sup>

## PRA IMPLEMENTATION PLAN ACTIVITY TABLE (March 1999)

### 1.0 REACTOR REGULATION

Regulatory Activity	Objectives	Methods	Target Schedule	Lead Office(s)	Status (this quarter)
1.1 STANDARD REVIEW PLANS FOR RISK-INFORMED REGULATION	Develop standard review plans (SRPs) to be used in risk-informed regulatory decisionmaking.	<ul style="list-style-type: none"> <li>* Evaluate available industry guidance</li> <li>* Develop broad-scope SRP chapters and a series of application-specific SRP chapters that correspond to industry initiatives</li> <li>* The SRPs will be consistent with the regulatory guides (RGs) developed for the industry</li> <li>* Transmit draft SRPs to the Commission for approval to issue for public comment:               <ul style="list-style-type: none"> <li>General 4/97 C<sup>2</sup></li> <li>IST 4/97 C</li> <li>ISI 8/97 C</li> <li>TS 4/97 C</li> </ul> </li> <li>* Transmit final SRPs to the Commission for approval:               <ul style="list-style-type: none"> <li>General 1/98 C</li> <li>IST 3/98 C</li> <li>ISI 12/99</li> <li>TS 3/98 C</li> </ul> </li> <li>Update and revise SRPs:               <ul style="list-style-type: none"> <li>General 6/99</li> <li>IST 8/99</li> <li>GQA 8/99</li> <li>TS 8/99</li> <li>ISI 12/00</li> </ul> </li> </ul>		NRR /RES	(Note 1.1)

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<sup>1</sup> See Abbreviations Table at the end of this report

<sup>2</sup> C = Task previously completed

Regulatory Activity	Objectives	Methods	Target Schedule	Lead Office(s)	Status (this quarter)
1.2 PILOT APPLICATIONS FOR RISK-INFORMED REGULATORY INITIATIVES	<p>Evaluate the PRA methodology and develop staff positions on emerging, risk-informed initiatives, including those associated with:</p> <ol style="list-style-type: none"> <li>1. Motor-operated valves</li> <li>2. IST requirements               <ol style="list-style-type: none"> <li>2a. Comanche Peak</li> <li>2b. Palo Verde</li> </ol> </li> <li>3. ISI requirements</li> <li>4. Graded quality assurance (GQA)</li> <li>5. Maintenance Rule</li> <li>6. Technical specifications               <ol style="list-style-type: none"> <li>6a. Commission approval</li> <li>6b. Pilot amendments Issued</li> </ol> </li> <li>7. Other applications to be identified later (e.g., applications related to diesel generator start times and hydrogen control)               <ol style="list-style-type: none"> <li>7a. ANO request for relief from the staff position in NUREG-0737 for hydrogen monitoring, on the basis of "Task Zero" of the Risk-Informed, Performance-Based Regulation Pilot Program ("Whole Plant Study") proposed by NEI.</li> <li>7b. San Onofre request to remove hydrogen recombiners</li> </ol> </li> </ol>	<p>* Interface with industry groups</p> <p>* Evaluate appropriate documentation (e.g., 10 CFR, SRP, RGs, inspection procedures, and industry codes) to identify elements critical to achieving the intent of existing requirements</p> <p>* Evaluate industry proposals</p> <p>* Evaluate industry pilot program implementation</p> <p>* As appropriate, complete pilot reviews and issue staff findings on regulatory requests</p>	<p>1. 2/96 C</p> <p>2a. 8/98 2b. withdrawn</p> <p>3. 7/99</p> <p>4. 1/98 C</p> <p>5. 9/95 C</p> <p>6a. 5/97 C</p> <p>6b. 10/98</p> <p>7a. 9/98 C</p> <p>7b. 7/99</p>	NRR/RES	<p>Completed (Note 1.2a)</p> <p>Changed (Note 1.2b)</p> <p>Completed</p> <p>New</p>

Regulatory Activity	Objectives	Methods	Target Schedule	Lead Office(s)	Status (this quarter)
1.3 INSPECTIONS	<p>Provide guidance on the use of plant-specific and generic information from individual plant examinations (IPEs) and other plant-specific PRAs.</p> <p>Provide PRA training for inspectors and senior reactor analysts (SRAs).</p>	<ul style="list-style-type: none"> <li>* Develop IMC 9900 technical guidance on the use of PRAs in the power reactor inspection program</li> <li>* Revise IMC 2515 Appendix C on the use of PRAs in the power reactor inspection program</li> <li>* Propose guidance options for inspection procedures (IPs) related to 50.59 evaluations and regular maintenance observations</li> <li>* Review core IPs and propose PRA guidance where needed</li> <li>* Complete revision to proposed core IPs except for IP 71007 and 82701.</li> <li>* Issue final GQA IP</li> <li>* Develop, Test &amp; Implement programs for incorporating risk principles into inspection program that are linked with risk-informed improvements in Licensee Performance Assessment and Enforcement</li> <li>* Review IPEEE insights report and extract guidance for inspectors</li> <li>* Identify inspector functions that should utilize PRA methods, as input to AEOD/TTD for their development and refinement of PRA training for inspectors</li> <li>* Develop consolidated and comprehensive 2—3 week PRA for regulatory applications training course</li> <li>* Conduct training for Maintenance Rule baseline inspections</li> <li>* Conduct training courses according to SRA training programs</li> <li>* Develop rotational assignments for SRAs to gain working PRA experience</li> </ul>	<p>6/97 C</p> <p>7/97 C</p> <p>10/97 C</p> <p>10/97 C</p> <p>6/98 C</p> <p>deferred</p> <p>12/99</p> <p>12/00</p> <p>7/96 C</p> <p>10/97 C</p> <p>8/96 C</p> <p>Ongoing</p> <p>Ongoing</p>	<p>NRR</p> <p>NRR</p> <p>NRR</p> <p>NRR</p> <p>NRR/AEOD</p> <p>NRR</p> <p>AEOD</p> <p>NRR/RES</p>	<p>Changed (Note 1.3a)</p> <p>Changed (Note 1.3b)</p> <p>New (Note 1.3c)</p>

Regulatory Activity	Objectives	Methods	Target Schedule	Lead Office(s)	Status (this quarter)
	Continue to provide expertise in risk assessment to support regional inspection activities and to communicate inspection program guidance and examples of its implementation.	<ul style="list-style-type: none"> <li>* Monitor the use of risk in inspection reports</li> <li>* Develop new methodologies and communicate appropriate uses of risk insights to regional offices</li> <li>* Update inspection procedures as needed</li> <li>* Assist regional offices as needed</li> <li>* Conduct Maintenance Rule baseline inspections</li> </ul>	Ongoing Ongoing Ongoing Ongoing 7/98C	NRR	
1.4 OPERATOR LICENSING	Monitor insights from human reliability analyses (HRAs) of PRAs (including IPEs and individual plant examinations, external events (IPEEEs)) and operating experience to identify possible enhancements for inclusion in planned revisions to guidance for operator licensing activities (initial and requalification).	<ul style="list-style-type: none"> <li>* Revise the Knowledge and Abilities Catalogs (NUREGs-1122 and 1123) to incorporate operating experience and risk insights</li> <li>* Revise the Examiner Standards (NUREG-1021), as needed to reflect PRA insights</li> </ul>	8/95 C  3/97 C	NRR	
1.5 EVENT ASSESSMENT	<p>Continue to conduct quantitative event assessments of reactor events while at power and during low- power and shutdown conditions.</p> <p>Assess the desirability and feasibility of conducting quantitative risk assessments on non-power reactor events.</p>	<ul style="list-style-type: none"> <li>* Continue to evaluate 50.72 events using accident sequence precursor (ASP) models</li> <li>* Define the current use of risk analysis methods and insights in current event assessments</li> <li>* Assess the feasibility of developing appropriate risk-assessment models</li> <li>* Develop recommendations on the feasibility and desirability of conducting quantitative risk assessments</li> </ul>	Ongoing  TBD	NRR	
1.6 USE OF PRA IN RESOLUTION OF GENERIC SAFETY ISSUES	Audit the adequacy of licensee analyses in IPEs and IPEEEs to identify plant-specific applicability of generic safety issues closed out based on IPE and IPEEE programs.			NRR/RES	Now tracked as part of tem 1.10
1.7 REGULATORY EFFECTIVENESS EVALUATION	Assess the effectiveness of major safety issue resolution efforts for reducing risk to public health and safety.			RES/NRR	It is tracked now as item 2.11

Regulatory Activity	Objectives	Methods	Target Schedule	Lead Office(s)	Status (this quarter)
1.8 ADVANCED REACTOR REVIEWS	Continue staff reviews of PRAs for design-certification applications.	* Continue to apply current staff review process	9/98	NRR	Completed (Note 1.8a)
	Develop SRP to support review of PRAs for design certification reviews of evolutionary reactors (ABWR and System 80+).	* Develop draft SRP for technical staff review and concurrence	Dropped	NRR	Changed (Note 1.8b)
	Develop independent technical analyses and criteria for evaluating industry initiatives and petitions regarding simplification of emergency preparedness (EP) regulations.	* Finalize SRP	Dropped	NRR/RES	Changed (Note 1.8b)
		* Reevaluate risk-based aspects of the technical bases for EP (NUREG-0396) using insights from NUREG-1150, the new source term information from NUREG-1465, and available plant design and PRA information for the passive and evolutionary reactor designs	12/96 C		
	Modify 10 CFR Part 52 and develop guidance on the use of updated PRAs beyond design certification (as described in SECY 93-087).	* Develop draft guidance and rule	Dropped	NRR	Changed (Note 1.8)
	* Solicit public comment	Dropped		Changed (Note 1.8)	
		* Finalize staff guidance and rule	Dropped		Changed (Note 1.8)
1.9 ACCIDENT MANAGEMENT	Develop generic and plant-specific risk insights to support staff audits of utility accident management (A/M) programs at selected plants.	* Develop plant-specific A/M insights/information for selected plants to serve as a basis for assessing completeness of utility A/M program elements (e.g., severe-accident training)	TBD	NRR/RES	Changed (Note 1.9)

Regulatory Activity	Objectives	Methods	Target Schedule	Lead Office(s)	Status (this quarter)
1.10 IPE FOLLOW-UP ACTIVITIES	Evaluate specific improvements and analyses proposed as basis for resolution of generic safety issues at specific plants.  Use results from the staff review of IPEs to identify potential safety issues and determine an appropriate course of action to address these potential issues.  Determine appropriate approach for tracking the regulatory uses of IPE/IPEEE results.	* Evaluate analyses of issues requested in Generic Letter 88-20	5/99	RES	
		* Evaluate other issues (e.g., SGTR induced severe accident)	deferred	NRR	Changed (Note 1.10)
		* Evaluate unsolicited analyses of selected voluntary generic issues (GSI23) submitted by licensees.	12/99	NRR	Changed (Note 1.10)
		* Recommendations to Commission regarding Follow up on accident management programs and licensee-stated actions.	deferred	NRR/regions	Changed (Note 1.9)
		* Assess reduction in risk associated with facility modifications.	deferred	NRR/RES	Changed (Note 1.10)
		* Identify plant improvements implemented by licensees	deferred	NRR/RES	Changed (Note 1.10)
		* Determine in accordance with the backfit rule if additional plant-specific or generic plant improvements that would further reduce the risk of severe accidents are warranted.	deferred	NRR/regions	Changed (Note 1.10)
		* Define use for information, clarify "regulatory use," and assess the most effective methods for data collection	5/98 C	NRR	
* If appropriate, develop approach for linking IPE/IPEEE databases	deferred	NRR/RES	Changed (Note 1.10)		

### Section 1 Notes

9. The proposed versions of the draft RG and SRP for ISI were issued for use in September 1998. The final versions will be completed by December 1999 after the staff completes its safety evaluation of the EPRI methodology in September 1999.
- 1.2a The staff issued the safety evaluation report (SER) on the Comanche Peak risk-informed inservice testing program on August 14, 1998. This is a change from the previous date of July 1998. The SER was issued two weeks after the target schedule to allow for incorporation of additional details.
- 1.2b The three RI-ISI pilot applications have been completed on schedule since the last PRA Implementation Plan report. The staff granted the licensee's request that ANO-1 be a pilot for the application of the EPRI method for class 1, PWR piping. The date was changed from December 1998 to July 1999 to correspond to the scheduled completion of the (new) fourth pilot (i.e., ANO-1).
- 1.3a The staff is presently considering comments from the CRGR and is developing a revised approach to provide GQA inspection guidance.
- 1.3b Previous activities supporting development of risk-informed inspection program guidance reported in the last PRA Implementation Plan update have been superceded by the most recent initiative which began in the fall of 1998. This initiative will result in a re-definition of the inspection program. The previously identified task to evaluate methods for presenting risk analysis results in a form most useful

to inspectors is subsumed by this current initiative. Detailed implementation plans and schedules for this initiative were separately reported to the Commission as a Transition Plan in SECY-99-007.

- 1.3c This task will be completed six months after completion of the final IPEEE insights report which is due in July 2000.
- 1.8 In the SRM for SECY-94-182, the Commission instructed the staff to develop a rule that would require COL applicants and holders to maintain, update, and use a PRA for the life of the facility. In the last few Rulemaking Activity Plan updates sent to the Commission, the staff stated this rulemaking activity is on hold. Since the staff does not now see any significant interest by a U.S. utility in requesting a COL for an evolutionary LWR design, we are giving this task a low priority. The priority for this task will be revised if a COL becomes likely. This activity will be tracked in the Rulemaking Activity Plan and will be dropped from the PRA Implementation Plan.
- 1.8a FSER of final ALWR review issued 9/98 (NUREG-1512)
- 1.8b No additional design certification submittals are presently anticipated. The need for an SRP will be reassessed if such submittals become likely.
- 1.9 The staff is reconsidering the necessity of audits and exploring ways to achieve the goals and objectives of the audits within the context of the evolving risk-informed inspection program.
- 1.10 Work on IPE follow-up activities has been deferred pending receipt of the Commission's staff requirements memorandum regarding SECY-98-300, which proposes options for risk-Informed revisions to 10 CFR Part 50. If the Commission accepts the staff's recommended course of action and directs the staff to proceed with rulemaking, the staff believes many of the goals and objectives of IPE follow-up activities could be achieved within the context of the regulations after they have been made more risk-informed. The staff is currently developing a more limited IPE follow-up program that would be complementary with the Part 50 risk-informed approach that is currently under Commission consideration.

## 2.0 REACTOR SAFETY RESEARCH

Regulatory Activity	Objectives	Methods	Target Schedule	Lead Office(s)	Status (this quarter)
2.1 REGULATORY GUIDES	Develop RGs to provide a basis for the industry to use in risk-informed regulation.	<ul style="list-style-type: none"> <li>* Transmit draft PRA RGs to the Commission for approval to issue for public comment: <ul style="list-style-type: none"> <li>General</li> <li>IST</li> <li>ISI</li> <li>GQA</li> <li>TS</li> </ul> </li> <li>* Transmit final PRA RGs to the Commission for approval: <ul style="list-style-type: none"> <li>General</li> <li>IST</li> <li>ISI</li> <li>GQA</li> <li>TS</li> </ul> </li> <li>Update and revise PRA RGs: <ul style="list-style-type: none"> <li>General</li> <li>IST</li> <li>GQA</li> <li>TS</li> <li>ISI</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>C</li> <li>C</li> <li>C</li> <li>C</li> <li>C</li> <li>1/98 C</li> <li>3/98 C</li> <li>12/99</li> <li>3/98 C</li> <li>3/98 C</li> <li>6/99</li> <li>8/99</li> <li>8/99</li> <li>8/99</li> <li>12/00</li> </ul>	RES/NRR	<p>Note 1.1</p> <p>New</p>
2.2 TECHNICAL SUPPORT	Provide technical support to NRC staff using risk assessment in risk-based regulation activities and technical reviews; issue risk assessments and statistical analyses; and develop guidance for agency uses of risk assessment.	<ul style="list-style-type: none"> <li>* Continue to provide ad hoc technical support to agency PRA users</li> <li>* Expand the use of PRA models available; expand the scope of available models to include external, low-power, and shutdown events; refine the tools needed to use these models; and continue maintenance and user support for SAPHIRE and MACCS computer codes</li> <li>* Support agency efforts in reactor safety improvements in former Soviet Union countries</li> <li>* Load plant-specific PRAs in SAPHIRE to support various risk-informed regulatory activities, e.g., pilot applications, resolution of generic issues, and Maintenance Rule inspections.</li> </ul>	<ul style="list-style-type: none"> <li>Continuing</li> <li>Continuing</li> <li>Continuing</li> <li>Ongoing</li> </ul>	RES	(Note 2.2)
2.3 SUPPORT FOR NRR STANDARD REACTOR PRA REVIEW					Subsumed by Section 1.8, "Advanced Reactor Reviews"

Regulatory Activity	Objectives	Methods	Target Schedule	Lead Office(s)	Status (this quarter)
2.4 METHODS DEVELOPMENT AND DEMONSTRATION	Develop, demonstrate, maintain, and ensure the quality of methods for performing, reviewing, and using PRAs and related techniques for existing reactor designs.	<ul style="list-style-type: none"> <li>* Final report on development and demonstration of methods for incorporating aging effects into PRAs.</li> <li>* Develop and demonstrate methods for incorporating human errors of commission in PRAs.</li> <li>* Conduct application of ATHENA for fire risk assessment</li> <li>* Develop improved methods and data for assessing likelihood of fire-induced circuit failures</li> <li>* Identify and prioritize key areas to improve fire risk analysis</li> <li>* Develop and demonstrate methods for assessing reliability/risk of digital systems</li> </ul>	<ul style="list-style-type: none"> <li>5/99</li> <li>9/98 C</li> <li>7/99</li> <li>9/99</li> <li>9/98</li> <li>9/00</li> </ul>	RES	<ul style="list-style-type: none"> <li>Changed (Note 2.4a)</li> <li>New (note 2.4b)</li> <li>Completed (Note 2.4c)</li> </ul>
2.5 IPE AND IPEEE REVIEWS	Evaluate IPE/IPEEE submittals to obtain reasonable assurance that the licensees have adequately analyzed plant design and operations to discover vulnerabilities; and document significant safety insights resulting from IPE/IPEEEs.	<ul style="list-style-type: none"> <li>* Complete the reviews of the three outstanding IPE submittals: Susquehanna Crystal River SER for Browns Ferry 3</li> <li>* Revised SER for Browns Ferry3</li> <li>* Continue regional IPE presentations.</li> <li>* Issue IPE insights report for public comment.</li> <li>* Issue final IPE insights report</li> <li>* Issue preliminary IPEEE insights report</li> <li>* Initiate review of eight additional IPEEE submittals</li> <li>* Complete contractor evaluations of twelve IPEEE submittals.</li> <li>* Complete reviews of IPEEE submittals.</li> <li>* Issue draft IPEEE insights report for comment</li> <li>* Issue final IPEEE insights report</li> </ul>	<ul style="list-style-type: none"> <li>6/98 C</li> <li>6/98 C</li> <li>6/98 C</li> <li>3/99</li> <li>12/97 C</li> <li>10/96 C</li> <li>12/97 C</li> <li>1/98 C</li> <li>6/98 C</li> <li>6/98 C</li> <li>4/00</li> <li>7/00</li> <li>1/01</li> </ul>	RES	<ul style="list-style-type: none"> <li>(Note 2.5a)</li> <li>Changed (Note 2.5b)</li> <li>Changed (note 2.5b)</li> <li>Changed (Note 2.5b)</li> </ul>

Regulatory Activity	Objectives	Methods	Target Schedule	Lead Office(s)	Status (this quarter)
2.6 GENERIC SAFETY ISSUES PROGRAM	Conduct generic safety issue management activities, including prioritization, resolution, and documentation, for issues relating to currently operating reactors, for advanced reactors as appropriate, and for development or revision of associated regulatory and standards instruments.	* Continue to prioritize and resolve generic safety issues	Continuing	RES	
2.7 NEI INITIATIVE TO CONDUCT "WHOLE PLANT" RISK STUDY	Review NEI initiative to conduct three pilot "whole plant" risk-informed studies of requirements vs. risk and cost.	* Agree on ground rules for study * Complete study	TBD TBD	RES/NRR	Note 2.7
2.8 PRA STANDARDS DEVELOPMENT	Work with industry to develop national consensus standard for PRA scope and quality.	* Initiate Phase 1 activity * Issue initial ASME draft standard * Issue draft standard for select public comment * Finalize Phase 1 standard * Initiate Phase 2 effort	9/97 C 7/98 C 1/99 C 12/99 TBD	RES	Note 2.8
2.9 LOW POWER AND SHUTDOWN BENCHMARK RISK STUDY	Collect studies of LP&S risk as a benchmark for assessing the need for further staff activities.	* Collect and review existing LP&S risk information (domestic and foreign) * Initiate additional work	6/99 6/99	RES	Changed Note 2.9
2.10 SAFETY GOAL REVISION	Assess need to revise Commission's Safety Goal to make core damage frequency a fundamental goal and make other changes.	* Initiate discussion with ACRS * Make recommendation to Commission * Provide information paper * Provide final recommendations	2/98 C 4/98 C 4/99 7/99	RES	Note 2.10
2.11 REGULATORY EFFECTIVENESS EVALUATION	Assess the effectiveness of major safety issue resolution efforts for reducing risk to public health and safety.	* Develop process/guidance for assessing regulatory effectiveness * Apply method to assess reduction in risk * Evaluate resulting effectiveness of station blackout and ATWS rules and Unresolved Safety Issue A-45 * Propose modifications to resolution approaches, as needed * Identify other issues for assessment if appropriate	Ongoing Ongoing TBD TBD Ongoing	RES/NRR	

Regulatory Activity	Objectives	Methods	Target Schedule	Lead Office(s)	Status (this quarter)
2.12 REVIEW OF AGENCY PROGRAMS AND PROCESSES	Perform a broad review of the agency's process to search for opportunities to make these activities more risk informed	* Identify options for modifying Part 50 to be risk-informed (SECY 98-300)	12/98	RES/NRR/AEOD	Completed
		* Provide recommendations on Part 50 risk-modifications	TBD		Note 2.9
		* Identify options for incorporating risk insights into the 10 CFR 50.59 process	12/98		Completed
		* PRA Steering Committee	Ongoing		

## Section 2 Notes

- 2.2 The Office of Nuclear Regulatory Research has an ongoing effort of developing plant-specific input decks (i.e., loading into SAPHIRE plant-specific PRAs) which are used to explore “what if” questions and to assess issues of a plant-specific or generic nature. For example, SAPHIRE models were used in the development of guidance for risk-informed IST, ISI, GQA, and TS, the ranking and resolution of generic issues, and in Maintenance Rule inspections.
- 2.4(a) Draft report issued for comment November 1998
- 2.4b Key areas identified in SECY-98-230, prioritization discussed with ACRS Fire Protection Subcommittee January 22, 1999
- 2.4c Methods developed in this area has been deferred until FY2000 because of budget constraints in FY1999
- 2.5(a) Staff review of Browns Ferry 3 IPE submittal indicated it did not meet the intent of GL-88-20; licensee responses to RAIs provided additional information and RES is preparing a revised SER.
- 2.5(b) The target schedule for completing the reviews of all IPEEE submittals has been changed from December 1999 to April 2000. Correspondingly, changes were made to the target schedules for issuing the draft and final IPEEE insights reports. A number of factors contributed to revising the IPEEE review schedule. Among these were that (1) there was a delay in receiving responses from industry on generic fire requests for additional information (RAIs), (2) many licensees requested additional time to respond to plant specific RAIs and (3) staff resources were needed to complete other high priority NRC work.
- 2.7 The staff has subsumed its interactions with the NEI on the “whole plant study” into the recommended approach to risk-inform 10CFR 50 as discussed in SECY-98-300.
- 2.8 Draft standard provided for comment: to select public in November 1998 and to general public in January 1999; ASME anticipates publication of final standard 12/99 at the latest. The standard will set forth the criteria and methods for developing and applying PRA methodology to commercial nuclear power plants and applies to PRAs used to support design, procurement, construction operation and maintenance. The standard is limited to a Level 1 analysis (i.e., core damage frequency) and a Level 2 analysis sufficient to evaluate the LERF for internal events at full power, excluding internal fires. The standard defines requirements in five areas: (1) Technical requirements for developing a PRA that estimates a realistic CDF and LERF, (2) documentation requirements for providing traceability of the analysis, (3) configuration control requirements for updating and maintaining the PRA so that it represents the as-built and as-operated plant, (4) peer review requirements for verifying that the above requirements were properly interpreted and implemented and (5) application process requirements for determining if the technical requirements are necessary and sufficient for the application. ASME has not initiated Phase 2 activity (internal fires, external events and low power and shutdown operations).

- 2.9 Work delayed due to higher priority work as described in the staff's response to the Chairman's Tasking Memorandum(CTM).
- 2.10 Work delayed due to higher priority work described in the CTM and the RES Self-Assessment Program.

3.0 ANALYSIS AND EVALUATION OF OPERATING EXPERIENCE, AND TRAINING

Regulatory Activity	Objectives	Methods	Target Schedule	Lead Office	Status (this quarter)	
3.1 RISK-BASED TRENDS AND PATTERNS ANALYSIS	<p>Use reactor operating experience data to assess the trends and patterns in equipment, systems, initiating events, human performance, and important accident sequence.</p> <p>Evaluate the effectiveness of licensee actions taken to resolve risk-significant safety issues.</p> <p>Develop trending methods and special databases for use in AEOD trending activities and for PRA applications in other NRC offices.</p>	* Trend performance of risk-important components	3/00	AEOD	Changed (Note 3.1)	
		* Trend performance of risk-important systems	5/00		Changed (Note 3.1)	
		* Trend frequency of risk-important initiating events	7/98		Completed	
		* Trend human performance for reliability characteristics	TBD			
		* Trend reactor operating experience associated with specific safety issues and assess risk implications as a measure of safety performance	As needed			
		* Develop standard trending and statistical analysis procedures for identified areas for reliability and statistical applications	C			
		* Develop special software and databases (e.g., common-cause failure) for use in trending analyses and PRA studies	C (Periodic updates)			
3.2 ACCIDENT SEQUENCE PRECURSOR (ASP) PROGRAM	Identify and rank risk significance of operational events.	* Screen and analyze LERs, AITs, IITs, and events identified from other sources to obtain ASP events	Ongoing	AEOD	Note3.2	
		* Perform licensee and NRC staff peer review of each ASP analyses	Annual report, Ongoing	AEOD		
		* Complete quality assurance of Revision 2 of the simplified plant-specific models	C	RES		
		* Complete feasibility study for low-power and shutdown models	C	RES		
		* Complete initial containment performance and consequence models.	C	RES		
		* Complete initial development of the LERF models	5/99	RES		
		* Complete Revision 3 of the Level 1 simplified plant-specific models	6/01	RES		
		* Complete LERF prototype review and checkout process	9/00	AEOD		New
		* Complete external event models for fire and earthquake	TBD	RES		
		* Complete low-power and shut down models	TBD	RES		

Regulatory Activity	Objectives	Methods	Target Schedule	Lead Office	Status (this quarter)
	Provide supplemental information on plant-specific performance.	* Share ASP analyses and insights with other NRC offices and regions	Annual report	AEOD	
3.3 INDUSTRY RISK TRENDS	Provide a measure of industry risk that is as complete as possible to determine whether risk is increasing, decreasing, or remaining constant over time.	<ul style="list-style-type: none"> <li>* Develop program plan to integrate NRR, RES, and AEOD activities using design and operating experience to assess the implied level of risk and how it is changing</li> <li>* Implement program plan elements to include plant-specific models and insights from IPEs, component and system reliability data, and other risk-important design and operational data in an integrated framework to periodically evaluate industry trends</li> </ul>	<p>C</p> <p>1/01</p>	AEOD	
3.4 RISK-BASED PERFORMANCE INDICATORS	Establish a comprehensive set of performance indicators and supplementary performance measures which are more closely related to risk and provide both early indication and confirmation of plant performance problems.	<ul style="list-style-type: none"> <li>* Identify new or improved risk-based PIs which use component and system reliability models and human and organizational performance evaluation methods</li> <li>* Develop test and issue for public comment candidate PIs/performance measures</li> <li>* Implement risk-based PIs with Commission approval</li> </ul>	<p>C</p> <p>9/00</p> <p>1/01</p>	AEOD	

Regulatory Activity	Objectives	Methods	Target Schedule	Lead Office	Status (this quarter)
3.5 OPERATING EXPERIENCE DATA	Compile operating experience information in database systems suitable for quantitative reliability and risk analysis applications. Information should be scrutable to the source at the event level to the extent practical and be sufficient for estimating reliability and availability parameters for NRC applications.	<ul style="list-style-type: none"> <li>* Manage and maintain SCSS and the PI data base, provide oversight and access to NPRDS/EPIX, obtain INPO's SSPI, compile IPE failure data, collect plant-specific reliability and availability data</li> <li>* Develop, manage, and maintain agency databases for reliability/availability data (equipment performance, initiating events, CCF, ASP, and human performance data)</li> <li>* Determine need to revise LER rule to eliminate unnecessary and less safety-significant reporting</li> <li>* Determine need to revise reporting rules and to better capture ASP, CCF, and human performance events</li> <li>* Publish revised LER rule</li> <li>* Develop database to collect reliability and availability data (RADS)</li> </ul>	<p>Ongoing</p> <p>Ongoing</p> <p>6/98 C</p> <p>6/98 C</p> <p>2/00</p> <p>4/00</p>	AEOD	<p>Changed (note 3.5)</p> <p>New</p>
3.6 STAFF TRAINING	Present PRA curriculum as presently scheduled for FY 1998.	<ul style="list-style-type: none"> <li>* Continue current contracts to present courses as scheduled</li> <li>* Maintain current reactor technology courses that include PRA insights and applications</li> <li>* Improve courses via feedback</li> <li>* Review current PRA course material to ensure consistency with Appendix C</li> </ul>	<p>Ongoing</p> <p>Ongoing</p> <p>Ongoing</p> <p>C</p>	AEOD	

Regulatory Activity	Objectives	Methods	Target Schedule	Lead Office	Status (this quarter)
	Develop and present Appendix C training courses.	* Prepare course material based on Appendix C	C	RES/AEOD	
		* Present courses on Appendix C	C		
	Determine staff requirements for training, including analysis of knowledge and skills, needed by the NRC staff.	* Review JTAs performed to date	C	AEOD	
		* Perform representative JTAs for staff positions (JTA Pilot Program)	C		
		* Evaluate staff training requirements as identified in the PRA Implementation Plan and the Technical Training Needs Survey (Phase 2) and incorporate them into the training requirements analysis	C		
		* Analyze the results of the JTA Pilot Program and determine requirements for additional JTAs	C		
		* Complete JTAs for other staff positions as needed	C		
		* Solicit a review of the proposed training requirements	C		
		* Finalize the requirements	C		
	Revise current PRA curriculum and develop new training program to fulfill identified staff needs.	* Prepare new courses to meet identified needs	Ongoing	AEOD	
		* Revise current PRA courses to meet identified needs	Ongoing		
		* Revise current and new PRA course to include RG and SRP information	9/97 C		
		* Revise current reactor technology courses as necessary to include additional PRA insights and applications	Ongoing		
	Present revised PRA training curriculum.	* Establish contracts for presentation of new PRA curriculum	Ongoing	AEOD	
		* Present revised reactor technology courses	Ongoing		
		* Improve courses based on feedback	Ongoing		

### Section 3 Notes

3.1 Date changed due to budget priorities and staffing restrictions

3.2 Funding and staffing currently planned for FY 00 and beyond will not support the continuation of the annual ASP program analysis as done currently. This will result either in a delay in completion of event analyses, a limitation in the number of analyses that can be done, or both.

3.5 Date changed to accommodate industry's request for an additional public meeting (table-top exercise) early in the process of drafting the rules and guidelines

4.0 NUCLEAR MATERIALS AND LOW-LEVEL WASTE SAFETY AND SAFEGUARDS REGULATION

Regulatory Activity	Objectives	Methods	Target Schedule	Lead Office(s)	Status (this quarter)
<p>4.1 VALIDATE RISK ANALYSIS METHODOLOGY DEVELOPED TO ASSESS MOST LIKELY FAILURE MODES AND HUMAN PERFORMANCE IN THE USE OF INDUSTRIAL AND MEDICAL RADIATION DEVICES</p>	<p>Validate risk analysis methodology developed to assess the relative profile of most likely contributors to misadministration for the gamma stereotactic device (gamma knife).</p>	<ul style="list-style-type: none"> <li>* Hold a workshop consisting of experts in PRA and HRA to examine existing work and to make recommendations for further methodological development</li> <li>* Examine the use of Monte Carlo simulation and its application to relative risk profiling</li> <li>* Examine the use of expert judgement in developing error rates and consequence measures</li> </ul>	<p>8/94 C</p> <p>9/95 C</p> <p>9/95 C</p>	<p>NMSS</p>	
	<p>Continue the development of the relative risk methodology, with the addition of event tree modeling of the brachytherapy remote after loader.</p>	<ul style="list-style-type: none"> <li>* Develop functionally based generic event trees</li> </ul>	<p>TBD</p>	<p>RES/ NMSS</p>	
	<p>Extend the application of the methodology and its further development into additional devices, including teletherapy and the pulsed high dose rate after loader.</p>	<ul style="list-style-type: none"> <li>* Develop generic risk approaches</li> </ul>	<p>TBD</p>	<p>RES/ NMSS</p>	
<p>4.2 CONTINUE USE OF RISK ASSESSMENT OF ALLOWABLE RADIATION RELEASES AND DOSES ASSOCIATED WITH LOW-LEVEL RADIOACTIVE WASTE AND RESIDUAL ACTIVITY.</p>	<p>Develop decision criteria to support regulatory decision-making that incorporates both deterministic and risk-based engineering judgment.</p>	<ul style="list-style-type: none"> <li>* Conduct enhanced participatory rulemaking to establish radiological criteria for decommissioning nuclear sites; technical support for rulemaking, including comprehensive risk-based assessment of residual contamination</li> <li>* Develop guidance for implementing the radiological criteria for license termination</li> <li>* Work with DOE and EPA to the extent practicable to develop common approaches, assumptions, and models for evaluating risks and alternative remediation methodologies (risk harmonization)</li> </ul>	<p>8/94 C Final rule published 7/97 C</p> <p>3/98 C</p> <p>Ongoing</p>	<p>RES/NMSS</p>	
<p>4.3 DEVELOP GUIDANCE FOR THE REVIEW OF RISK ASSOCIATED WITH WASTE REPOSITORIES.</p>	<p>Develop a branch technical position on conducting a performance assessment of an LLW disposal facility.</p>	<ul style="list-style-type: none"> <li>* Solicit public comments</li> <li>* Publish final Branch Technical Position</li> </ul>	<p>5/97 C</p> <p>TBD, dependent on resources</p>	<p>NMSS/RES</p>	

Regulatory Activity	Objectives	Methods	Target Schedule	Lead Office(s)	Status (this quarter)
4.4 ASSESS RISK ASSESSMENT OF MATERIAL USES.	Develop and demonstrate a risk assessment for industrial gauges containing cesium-137 and cobalt-60 using PRA and other related techniques.	* Develop and demonstrate methods for determining the risk associated with industrial gauges containing cesium-137 and cobalt-60	9/98	RES	Completed
	The assessment should allow for modification based on changes in regulatory requirements.  Use empirical data as much as practicable.	* Issue final report as a NUREG	4/99		Changed (Note 4.4a)
	Develop and demonstrate risk assessment methods for application to medical and industrial licensee activities.	* Through working group with contractor assistance, identify and document a technical basis for a risk-informed approach to the regulation of nuclear byproduct material, and develop plans for a graded approach to nuclear byproduct material regulation based on risk information	2/99	NMSS	Changed (Note 4.4b)
4.5 USE OF PRA IN REGULATING NUCLEAR MATERIALS	Develop a framework for applying PRA to nuclear material uses, similar to the one developed for reactor regulation (SECY-95-280), where appropriate.	* Provide plan for developing framework * Complete scoping effort * Complete framework	6/98 C 3/99 TBD	NMSS	Changed (Note 4.5)

#### Section 4 Notes

- 4.4(a) NMSS completed review of the draft NUREG in January 1999; Final scheduled for publication in April 1999
- 4.4(b) Schedule for SECY paper extended to allow for coordination with SECY being prepared as part of Regulatory Activity 4.5.
- 4.5 Schedule for this SECY extended because of unanticipated technical difficulties and a short term need to divert resources to higher priority efforts

5.0 HIGH-LEVEL NUCLEAR WASTE REGULATION

Regulatory Activity	Objectives	Methods	Target Schedule	Lead Office(s)	Status (this quarter)
5.1 REGULATION OF HIGH-LEVEL WASTE	Develop guidance for the NRC and CNWRA staffs in the use of performance assessment (PA) to evaluate the safety of HLW programs.	<ul style="list-style-type: none"> <li>* Assist the staff in pre-licensing activities and in license application reviews</li> <li>* Develop a technical assessment capability in total- system and subsystem PA for use in licensing and pre-licensing reviews</li> <li>* Combine specialized technical disciplines (earth sciences and engineering) with those of system modelers to improve methodology</li> </ul>	Ongoing	NMSS	
	Identify significant events, processes, and parameters affecting total system performance.	<ul style="list-style-type: none"> <li>* Perform sensitivity studies of key technical issues using iterative PA (IPA)</li> </ul>	Ongoing	NMSS	
	Use PA and PSA methods, results, and insights to evaluate proposed changes to regulations governing the potential repository at Yucca Mountain.	<ul style="list-style-type: none"> <li>* Assist the staff in maintaining and refining the regulatory structure in HLW disposal regulations that pertain to PA</li> <li>* Apply IPA analyses to advise EPA in its development of a Yucca Mountain regulation</li> <li>* Apply IPA analyses to develop a site-specific regulation for a Yucca Mountain site</li> </ul>	Ongoing	NMSS	Note 5.1(a)
	Continue PA activities during interactions with DOE during the pre-licensing phase of repository development, site characterization, and repository design.	<ul style="list-style-type: none"> <li>* Provide guidance to the DOE on site characterization requirements, ongoing design work, and licensing issues important to the DOE's development of a complete and high-quality license application</li> <li>* Compare results of NRC's iterative performance assessment to DOE's Viability Assessment (VA) to identify major differences/issues</li> </ul>	Ongoing	NMSS	Note 5.1(b)
5.2 PRA APPLICATION TO SPENT FUEL STORAGE FACILITIES	Demonstrate methods for PRA of spent fuel storage facilities.	<ul style="list-style-type: none"> <li>* Prepare user needs letter to RES</li> <li>* Conduct ISA of dry-cask storage system</li> </ul>	4/97 C  6/99	RES/NMSS	Note 5.2

Regulatory Activity	Objectives	Methods	Target Schedule	Lead Office(s)	Status (this quarter)
5.3 CONTINUAL USE OF RISK ASSESSMENT IN SUPPORT OF RADIOACTIVE MATERIAL TRANSPORTATION	Use PRA methods, results, and insights to evaluate regulations governing the transportation of radioactive material.	<ul style="list-style-type: none"> <li>* Update the database on transportation of radioactive materials for future applications</li> <li>* Revalidate the results of NUREG-0170 for spent fuel shipment risk estimates</li> </ul>	<p>6/01</p> <p>12/99</p>	NMSS	

Section 5 Notes

- 5.1(a) SECY-98-225 forwarded a draft proposed 10CFR63 for Commission approval in 9/98
- 5.1(b) DOE provided the viability assessment for NRC review in 12/98; staff will report its findings to the Commission in a 3/99 SECY.
- 5.2 Because of resource constraints, the staff has completed an ISA for a particular dry cask storage system in lieu of the broader project that was originally planned. The report is undergoing peer review and will be published in 6/99.

6.0 REACTOR ENFORCEMENT

Regulatory Activity	Objectives	Methods	Target Schedule	Lead Office(s)	Status (this quarter)
6.1 CONSIDERATION OF RISK IN THE ENFORCEMENT PROCESS	Ensure the consistent Application of the Enforcement Policy in the Area of Risk Informed Enforcement Actions.	<ul style="list-style-type: none"> <li>* Prepare an enforcement guidance memorandum (EGM)</li> <li>* Update the Enforcement Manual to reflect the guidance developed in the EGM</li> </ul>	<p>6/ 97 C</p> <p>8/98 C</p>	<p>OE</p> <p>OE</p>	
6.2 RISK INSIGHTS DURING WEEKLY ENFORCEMENT PANELS	Ensure risk-informed decisions are made in developing enforcement actions.	* Include regional senior reactor analyst evaluation on paneled enforcement cases when warranted	Ongoing	OE	
6.3 CHANGE THE ENFORCEMENT POLICY SUPPLEMENTS TO INCLUDE ADDITIONAL EXAMPLES OF HOW RISK SHOULD INFLUENCE SEVERITY LEVEL	Provide the staff with more useful guidance for determining the Severity Level of Violations.	* Interface with NRR (SPSB) to consider additional examples for the policy supplements	Spring 99	OE	

## ABBREVIATIONS

ABWR	advanced boiling-water reactor
AEOD	Office for Analysis and Evaluation of Operational Data
ACRS	Advisory Committee on Reactor Safeguards
AFW	auxiliary feedwater
AIT	augmented inspection team
ANO	Arkansas Nuclear One
AOT	allowed outage time
A/M	accident management
APS	Arizona Public Service
ASME	American Society of Mechanical Engineers
ASP	accident sequence precursor
ATWS	anticipated transient without scram
BF3	Browns Ferry Unit 3
C	completed
COL	combined construction and operating license
CCF	common-cause failures
CFR	<i>Code of Federal Regulations</i>
CRGR	Committee to Review Generic Requirements
CY	calendar year
CNWRA	Center for Nuclear Waste Regulatory Activities
DOE	Department of Energy
EDG	emergency diesel generator
EGM	Enforcement Guidance Memorandum
EP	emergency preparedness
EPA	Environmental Protection Agency
EPIX	Equipment Performance and Information Exchange
FY	fiscal year
HLW	high-level waste
HRA	human reliability analysis
GSI	generic safety issue
GQA	graded quality assurance
JTA	job task analysis
IE	initiating event
IMC	inspection manual chapter
INPO	Institute of Nuclear Power Operations
IP	inspection procedure
IPA	iterative performance assessment
IPE	individual plant examination
IPEEE	individual plant examination, external events
IIT	incident inspection team
IST	inservice testing
ISI	inservice inspection
LAN	local area network
LER	licensee event report
LOSP	loss of offsite power
LLW	low-level waste

LP&S	low power and shutdown
MACCS	MELCOR Accident Consequence Code System
MR	Maintenance Rule
NEI	Nuclear Energy Institute
NOED	notice of enforcement discretion
NPRDS	nuclear plant reliability data system
NRR	Office of Nuclear Reactor Regulation
NMSS	Office of Nuclear Material Safety and Safeguards
OCIO	Office of the Chief Information Officer
OE	Office of Enforcement
OGC	Office of the General Counsel
PA	performance assessment
PI	performance indicator
PIP	PRA Implementation Plan
PIPB	Inspection Program Branch, NRR
PM	project manager
PRA	probabilistic risk assessment
RAI	request for additional information
RCP	reactor coolant pump
RES	Office of Nuclear Regulatory Research
RG	regulatory guide
SAMG	severe-accident management guidance
SAPHIRE	Systems Analysis Programs for Hands -on Integrated Reliability Evaluations
SBO	station blackout
SECY	Office of Secretary of the Commission
SER	safety evaluation report
SGTR	steam generator tuber rupture
SONGS	San Onofre Nuclear Generating Station
SPSB	Probabilistic Safety Assessment Branch
SCSS	sequence coding and search system
SRP	standard review plan
SRA	senior reactor analysts
SRM	staff requirements memorandum
SSPI	Safety System Performance Indicator
TBD	to be determined
TTD	Technical Training Division
TS	technical specifications
TU	Texas Utilities
FY	Fiscal Year
VA	viability assessment