UNITED STATES
NUCLEAR REGULATORY COMMISSION
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October 29, 1999

MEMORANDUM TO: Patrick Baranowsky, Chief
Operating Experience Risk Analysis Branch
Division of Risk Analysis and Applications
Office of Nuclear Regulatory Research

THROUGH: Steve Mays, Assistant Branch Chief
Operating Experience Risk Analysis Branch
Division of Risk Analysis and Applications
Office of Nuclear Regulatory Research

FROM Bennett Brady BMB
Operating Experience Risk Analysis Branch
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Office of Nuclear Regulatory Research

SUBJECT: SUMMARY OF EPIX REPORTING REQUIREMENTS SUBCOMMITTEE MEETING

Steve Mays and I attended the second meeting of the EPIX Reporting Requirements Subcommittee, October 12 and 13, 1999 at INPO headquarters in Atlanta. The complete list of attendees and agenda for the meeting are shown in Attachments 1 and 2.

The focus of the meeting was to discuss the unavailability and demand data needed to support risk-based performance indicators and probabilistic safety assessment updates. The discussion at this meeting was not to be considered a commitment of industry to provide the specified data. This commitment would take place through negotiations between NEI, INPO, and NRC. The consensus of this meeting on the data specifications will go forward in a letter to INPO's executive contacts at the utilities.

Prior the meeting, I met with staff in the principal NRC branches using reliability and availability data and held telephone conferences with the Senior Reactor Analysts in the Regions to discuss their specific needs for reliability and availability data for risk-informed applications. From these discussions, an NRC consensus position was developed on the additional data needed in EPIX for risk-informed applications. The NRC proposals for 1) reporting unavailability data, 2) categorization of demands, and 3) the systems and components for which these data are required are shown in Attachments 3, 4, and 5. Attachment 6 was also presented at the meeting and shows for each particular data element, the parameter that will be estimated, the regulatory application requiring these parameters, and the NRC branches or Regions requiring it for this application.

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Unavailability Reporting

The consensus of the meeting on reporting unavailability to EPIX was

- Utilities will report total unavailability per their current Maintenance Rule defined trains by the start and end date of the period of unavailability.
- Unplanned unavailability will be determined by any runtime, demand or functional failure for which an EPIX failure report is required.
- The EPIX system will calculate planned unavailability by subtracting unplanned unavailability from total unavailability.
- The utilities will link their EPIX key component to their Maintenance Rule and WANO/NEI 99.02 trains from which a mapping will be developed. The EPIX system will use this mapping to generate the WANO, NEI 99-02, Maintenance Rule train unavailabilities and RADS key component unavailabilities.
- The EPIX system will compute fault exposure time based on events which involve failures using ½ the average time between demands. Utilities will be allowed to override the calculated value with an entry to explain the override.
- Unavailability will be reported for all trains in any mode that a train could be required.
- Utilities will also report how many trains are required for each system for each standard EPIX plant mode (cold shutdown, defeuled, hot standby, hot shutdown, power operations, refueling and startup).
- Utilities will report the date and time of all mode transients between EPIX standard modes. The EPIX system can then generate the unavailability to meet the needs of Maintenance Rule, NEI 99-02, WANO SSPI and risk-based PIs which have different requirements based on plant mode.
- Support system unavailability will be tracked as an event or failure report when the function of a system or train is impaired as a result.
- Utilities will specify their spare trains and swing components. They will report the unavailability of spare trains and swing components.

Categorization of Demands

- The NRC proposal for categorization of demands had proposed reporting as a new category "Test demands that reasonably simulate ESF demands." NRC was asked to specify those tests that NRC considers to "reasonably simulate ESF demands."

- NRC needs to have data collection of these demands begin as soon as possible. These demands will be used in the risk-based performance indicators for the reliability indicators of mitigating systems. However, NRC is not asking the utilities to backfit the data.

Systems and Components for Reporting Additional Data

INPO had compared the additional systems that NRC had designated for reporting unavailability and demand data. Attachment 7, prepared by INPO, shows the number of BWRs (of a total of 35) and the number of PWRs (of a total of 69) that have designated the systems on our additional systems as Maintenance Rule risk-significant systems.

The reasons for less than 100% agreement include:

- The particular components we are interested in are reported under a different system in EPIX. For example, we asked for batteries and battery chargers in the 1E DC Power System; some utilities have reported these components in the Emergency On-site Power Supply System.
- The plant doesn't have the system (such as BWR Low Pressure Core Spray for BWR-6 plants).
- Some other system may actually provide the risk-significant safety function that we are interested in and the utility has designated that system as Maintenance Rule risk-significant. For example, the Essential Service Water System, as opposed to the Closed Component Cooling Water System, may provide the risk-significant function of suppling cooling water to safety-related components.
- The system is in the plant, serves the risk-significant safety function, but didn't meet the criteria for Maintenance Rule risk-significant because the Maintenance Rule criteria use Level I PRA risk importance measures, e.g., the Containment Spray System.
- The system is not of high risk significance at a particular plant.

- To address the possible discrepancy due to the third bullet, NRC agreed to review and define the particular risk-significant function that NRC is interested in.

- NRC will also specify the particular containment isolation valves that we would like demands reported on, i.e., those valves that a Level II/Level III PRA analysis have indicated to be of high risk-significance in preventing the release of fission products to the environment.

- INPO will examine the coding of batteries/battery charges to determine if these are reported to EPIX in the Emergency Onsite Power System.

- Industry/INPO will consider the collection of these additional systems and components in two stages - stage one being the system in the box at the top of page 2 of Attachment 5 and stage two, the systems in the box at the bottom of page 2.

The data specifications that the subcommittee proposed for consideration are consistent with the NRC proposals presented at the meeting.

EPIX MRRI Release 3.1

Prior to the meeting, INPO had provided the Project Definition for EPIX MRRI, Release 3.1. These are the software specifications for an interim release of EPIX that will provide upgrades to meet the principal user recommended changes for the next two years while the unified data reporting system is being developed.

The enhancements in EPIX that are of particular interest to NRC for RADS and risk-based performance indicators are:

- A yes/no field in the failure report that would indicate whether any function of a key component was affected by the failure.
- A yes/no field to the failure report to indicate whether this was a PRA/PSA failure that would be used in a plant specific reliability calculation
- A yes/no field to the failure report to indicate whether the failure occurred during a test or operational ESF design basis operation.
- The "discovered during" field would change from a "check all that apply" to "check one of."

The first two changes are needed to identify the PRA key component failures that we want to load into RADS. The last two changes are needed to determine if the failure occurred on an actual/spurious demand or a test demand that simulates an ESF demand for computing the demand failure probability.

EPIX 4.0

The next revision of EPIX to meet the new vision of EPIX as the industry's common reporting system for all performance indicators and equipment performance information is referred to as version 4.0. The next steps in its development are:

- INPO will prepare a letter to their executive committee including
  - the details of the data specifications being proposed,
  - what is new
  - what are the perceived benefits
  - indication of the costs
  - NRC regulatory uses of the data (Attachment 6)
  - and requesting their findings and comments

- It was suggested that all utilities pilot test the collection of data that NRC is proposing for the SSPI systems

Future Actions

A tentative schedule for EPIX 4.0 approval and development was proposed:

- November 1998 - Letter to the Executive Point of Contact (EPOC)

- November 30, 1999 - Meeting of EPIX Reporting Requirements Subcommittee
- December 1, 1999 - Meeting of EPIX Ad Hoc Group
- February 2000 - Data specifications for EPIX 4.0
- April 2000 - Ship EPIX 3.1
- Second Quarter 2000 - Pilot test EPIX 4.0 by all utilities for the SSPI systems
- Third Quarter 2000 - Begin collecting data for Stage 1 additional systems or components
- August, September 2000 - Interim feed of unavailability data for NEI 99-02 and WANO

NRC Action Items

- Send INPO the table of "NRC Needs and Uses of Reliability and Availability Data" annotated with names of NRC Divisions and Branches in time for inclusion with the letter to EPOC
- Send INPO in time to be distributed prior to the November 30 meeting
  - A definition to be applied in determining tests "that reasonably simulate ESF actual/spurious demands or a list of tests that reasonably simulate ESF
  - Risk-significant function of interest to NRC for additional proposed systems
  - List of containment isolation valves
- Send INPO a file copy of paper on "Development of Risk-based Performance Indicators" presented at the American Nuclear Society's International Topical Meeting on Probabilistic Safety Assessment (PSA '99)

Attachments: As stated

cc: J. Bishop, INPO
G. Masters, INPO
T. Brooks, NEI
S. Floyd, NEI

Attachment 1

EPIX REPORTING REQUIREMENTS SUBCOMMITTEE

October 12 -13, 1999

Attendees

Joe Bishop	INPO
Bennett Brady	NRC
Tony Brooks	INPO
Nancy Fletcher	INPO
Greg Krueger	PECO Energy Company
Kim Hulsey	INPO
Neil Lossing	INPO
Jim Lynch	INPO
Jim Maddox	Watts Bar
Glen Masters	INPO
Steve Mays	NRC
Craig Nierode	Monticello
John Ramsdell	San Onofre
Steve Rowe	ANO
Mike Strait	ConEd

Attachment 2

AGENDA	DRAFT EPIX Reporting Requirements Subcommittee October 12 -13, 1999 Room 210
Tuesday, October 12	Review definitions for unavailability Develop model for SSPI system to fit PSA model by NSSS vendor type Gain consensus on additional scope for unavailability
Wednesday, October 13	Develop model for additional systems to fit PSA model by NSSS vendor type Gain consensus on additional scope for demands Gain consensus on segmentation of demands Develop schedule for implementation of unavailability and demand data reporting Gain consensus on report to full Ad Hoc Working Group

Attachment 3

NRC PROPOSAL FOR REPORTING UNAVAILABLE HOURS TO EPIX

- Unavailability is estimated by dividing the number of hours that an SSC was not available (i.e., was out-of-service for maintenance or test or because of faults or failures) to perform its intended function by the total number of hours that the function may be needed.

- U_T = Hours out-of-service for maintenance or test or because of faults or failures/Hours that the function may be needed

- The types of unavailable hours are
  - Planned unavailable hours (preventive maintenance or testing)
  - Unplanned unavailable hours (corrective maintenance)
  - Fault exposure hours (in an unknown failed state)

- Total unavailable hours for trains may be reported as the total number of unavailable hours for each Maintenance Rule-defined train for the selected systems

- For the purposes of estimating total unavailable hours for key components, it may be assumed that
  - Key component total unavailable hours = Total unavailable hours of its train

- Key component unplanned unavailable hours may be computed as the time from the EPIX discovery time/date to the EPIX equipment return to availability time/date

- Planned unavailable hours for key components may be estimated as
  - Key component total unavailable hours - key component unplanned unavailable hours

- Fault exposure hours may be estimated as
  - ½ the mean time between demands

  where
  - mean time between demands = The time period/Estimated total demands per time period, as reported to EPIX

  with the option that utilities may over write this estimate if they have knowledge of the time of failure or of the time of the last demand with
  - "Zero," for a failure that is annunciated when it occurs or the basic cause of failure was related to the demand on the component,
  - "The time from the known time of failure to the time of discovery" if the time of failure is known with certainty,

- "The time from the last demand to the time of discovery," if the component has been in a failed state since the last demand or surveillance test (such as the component was not correctly realigned following the last surveillance test.), or
- "One-half the time since the last demand," if the time of failure is unknown but the date/time of the last demand is known.

- Additional information is also needed on the
  - Plant mode at the time of unavailability

NRC PROPOSAL FOR CATEGORIZATION OF DEMANDS IN EPIX

PRESENT CATEGORIZATION:

For key components in SSPI systems:

- Non-test demands (actual counts, reported by quarter) - demand to function in non-test capacity (includes actual/spurious demands and operational demands)
- Test demands (one time estimate[1]) - demand to function in a test evolution (includes surveillance tests, return-to-service tests, stroke tests, calibrations, post-modification tests)

For key components in Maintenance Rule risk-significant systems:

- Total demands (one time estimate[2]) - sum of all test and non-test demands

PROPOSED CATEGORIZATION:

(For systems and components in Attachment 3)

- Non-Test Demands - actual counts
  - Total non-test demands - (already reporting quarterly to EPIX for SSPI key components)
  - ESF-related demands
- Test Demands - may be estimated
  - Total test demands - (already reported in EPIX for SSPI key components)
  - Test demands that reasonably simulate ESF demands

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[1] Updates to one-time estimates should be done within 60 days of a significant change in the operating or testing schedule (such as modifying a testing interval by more than 25 percent).

Attachment 5

NRC PROPOSAL FOR SYSTEMS AND COMPONENTS FOR REPORTING UNAVAILABLE HOURS AND DEMAND DATA CATEGORIZATION

PRESENT SYSTEMS (SSPI Systems)

Systems for reporting major key components[2]

CODE	SYSTEM NAME
	PWR
BQ	High Pressure Safety Injection
BA	Auxiliary/Emergency Feedwater
BP	Residual Heat Removal/Low Pressure Safety Injection
	BWR
BJ	High Pressure Coolant Injection
BG	High Pressure Core Spray
BN	Reactor Core Isolation Cooling
BL	Isolation Condenser
BO	RHR/Low Pressure Coolant Injection

Systems for reporting one or two types of key components used in PSAs

CODE	SYSTEM	KEY COMPONENT
EK	Emergency On-site Power Supply	Diesel generators

PROPOSED ADDITIONAL SYSTEMS

Systems for reporting major key components[3]

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[2] Pumps, valves required to open, isolate, regulate or maintain pressure to perform risk-significant function, and circuit breakers required to change state to maintain power to risk-important components (individual breakers for components such as pumps and valves are included in component records)

[3] Pumps, valves required to open, isolate, regulate or maintain pressure to perform risk-significant function, and circuit breakers required to change state to maintain power to risk-important components (individual breakers for components such as pumps and valves are included in component records)

CODE	SYSTEM
BI	Essential Service Water
CC	Closed/Component Cooling Water
	PWR
CB	CVC/Safety Injection Function
BE	Containment Spray
	BWR
BM	Low Pressure Core Spray

Systems for reporting only one or two types of key components used in PSAs

CODE	SYSTEM	KEY COMPONENT
EJ	DC Power System - Class 1E	Batteries/Battery Chargers
	Containment Isolation Function	Containment isolation valves not reported in above systems
SB	Main Steam	PORVs, Safety Valves, Safety/Relief Valves, Safety/ADS Valves
	PWR	
AB	Reactor Coolant	PORVs and associated Block Valves, Safety Valves

NRC NEEDS AND USES OF RELIABILITY AND AVAILABILITY DATA

DATA NEEDED	DATA USED TO CALCULATE	REGULATORY APPLICATION	SPECIFIC USE	NRC BRANCHES
Unavailability				
Total unavailable hours by plant mode	Total Unavailability	Input to SPAR and other NRC specific models for risk assessment at full power operation and at low power/shutdown	Risk models are used to estimate CDF, CDP, CCDP and LERF to be used in	
			1) Risk assessment of operational events	NRR/DSSA/SPSB SRAs in Regions RES/DSARE/REAHFB RES/DRAA/OERAB NRR/DRIP/REXB
			2) Significance Determination Process	SRAs in Regions NRR/DSSA/SPSB
			3) Risk-informed inspections	SRAs in Regions NRR/DSSA/SPSB
			4) Review, prioritization, and resolution of generic issues	RES/DSARE/REAHFB RES/DET/ERAB
			5) Accident Sequence Precursor Program	RES/DRAA/OERAB

DATA NEEDED	DATA USED TO CALCULATE	REGULATORY APPLICATION	SPECIFIC USE	NRC BRANCHES
	Total Unavailability	Risk-based performance indicators of train and system unavailability for full-power operations and for low power/shutdown	To provide risk-related measures of equipment performance and trends for the new reactor oversight process to determine if plant performance is meeting thresholds.	NRR/DIPM/IIPB NRR/DIPM/IQMB RES/DRAA/OERAB
		Verify licensee input in their models for	1) Regulatory Guide 1.174 applications	RES/DRAA/PRAB NRR/DSSA/SPSB
			2) Review of risk-analyses performed by licensees	RES/DRAA/PRAB
Hours unavailable for planned maintenance and testing	Planned unavailability	Review of risk-informed requests for technical specification changes for AOTs and LCOs	To measure the change in risk as input to decision making on licensee proposed changes for plant-specific tech spec changes	NRR/DRIP/RTSB
<u>Reliability</u>				
Number of failures by failure mode, Number of ESF demands, Number of test demands that simulate ESF demands, Hours of run time	Probability of failure on demand Operating failure rate Standby failure rate	Risk-based performance indicators of component, train, and system reliability for full power operations and for low power/shutdown	To provide risk-related measures of equipment performance and trends for the new reactor oversight process to determine if plant performance is meeting thresholds.	RES/DRAA/OERAB NRR/DIPM/IIPB

DATA NEEDED	DATA USED TO CALCULATE	REGULATORY APPLICATION	SPECIFIC USE	NRC BRANCHES
		Input to SPAR and other NRC specific models for risk assessment at full power operation and during low power/ shutdown	Risk models are used to estimate CDF, CDP, CCDP and LERF for	
			1) Risk assessment of operational events	NRR/DSSA/SPSB SRAs in Regions RES/DSARE/REAHFB RES/DRAA/OERAB NRR/DRIP/REXB
			2) Significance Determination Process	SRAs in Regions NRR/DSSA/SPSB
			3) Risk-informed inspections	SRAs in Regions NRR/DSSA/SPSB
			4) Review prioritization, and resolution of generic issues	RES/DSARE/REAHFB RES/DET/ERAB
			5) Accident Sequence Precursor Program	RES/DRAA/OERAB
		Verify licensee input in their models for	1) Regulatory Guide 1.174 applications	RES/DRAA/PRAB NRR/DSSA/SPSB
			2) Review of risk-analyses performed by licensees	RES/DRAA/PRAB

Acronyms

NRR – Office of Nuclear Reactor Regulation

NRR/DIPM/IIPB – Division of Inspection Program Management/Inspection Program Branch
NRR/DIPM/IQMB – Division of Inspection Program Management/Quality Assurance, Vendor Inspection, Maintenance and Allegations Branch
NRR/DSSA/SPSB -Division of Systems Safety and Analysis/Probabilistic Safety Assessment Branch
NRR/DRIP/REXB - Division of Regulatory Improvement Programs/Events Assessment, Generic Communications, and Non-Power Reactors Branch
NRR/DRIP/RTSB - Division of Regulatory Improvement Programs/Technical Specifications Branch

RES - Office of Nuclear Regulatory Research
RES/DSARE/REAHFB - Division of Systems Analysis and Regulatory Effectiveness/Regulatory Effectiveness Assessment and Human Factors Branch
RES/DRAA/OERAB - Division of Risk Analysis and Applications/Operating Experience Risk Analysis Branch
RES/DRAA/PRAB - Division of Risk Analysis and Applications/Probabilistic Risk Analysis Branch
RES/DET/ERAB - Division of Engineering Technology/Engineering Research Applications Branch

SRAs In Regions - Senior Reactor Analysts in Regions I, II, III, and IV

NUMBER OF PLANTS THAT HAVE DESIGNATED THE ADDITIONAL SYSTEMS PROPOSED BY NRC AS MAINTENANCE RULE RISK-SIGNIFICANT

Added Scope For Risk-based PIs

Plant	System	Risk-significant (Number of Stations)
BWR	Essential Ser. Wtr	35 plants
BWR	Closed/Comp Cooling	31 plants
BWR	Low Pressure Core Spray	31 plants
BWR	ADS (MS)	31 plants
BWR	1E DC Power	19 plants
BWR	Containment Isol.	29 plants
BWR	CVC / Makeup (CRDS)	33
PWR	Essential Ser. Wtr.	69 plants
PWR	Closed/Comp Cooling	68 plants
PWR	Contain. Spray	62 plants
PWR	1E DC Power	32 plants
PWR	Contain. Isol.(Leak Cont.)	50 plants
PWR	CVCS	63 plants

Memorandum Dated: 10/29/99

Subject: Summary of EPIX Reporting Requirements Subcommittee Meeting

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