

August 8, 2001

Dr. George E. Apostolakis, Chairman
Advisory Committee on Reactor Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

SUBJECT: RISK-BASED PERFORMANCE INDICATORS: PHASE-1 REPORT

Dear Dr. Apostolakis:

I am responding to your letter dated June 19, 2001, regarding the recommendations resulting from the 483rd meeting of the Advisory Committee on Reactor Safeguards (ACRS), held during June 6-8, 2001. At the meeting, we presented results and held discussions regarding the draft Phase-1 risk-based performance indicator (RBPI) development report.

The enclosure addresses the proposed recommendations.

Sincerely,

/RA/

William D. Travers
Executive Director for Operations

Enclosure: As stated

cc: Chairman Meserve
Commissioner Dicus
Commissioner McGaffigan
Commissioner Merrifield
SECY

LETTER DATED: 8 / 8 /01

SUBJECT: RISK-BASED PERFORMANCE INDICATORS: PHASE-1 REPORT

Distribution:

OERAB RF	BSheron, NRR
RES Action Item #2001140	RBorchardt, NRR
RES RF	CPaperiello, EDO
DRAA RF	WKane, EDO
EDO RF	PNorry, EDO
EDO#20010252	SReiter, CIO
ACRS RF	JCraig, EDO
TBoyce, NRR	SBurns, OGC
MJohnson, NRR	KCyr, OCG
MSatorius, NRR	HMiller, RA/RI
SCollins, NRR	ISchoenfeld, EDO
BBoger, NRR	WDean, NRR
JJohnson, NRR	LReyes, RA/RII
JDyer, RA/RIII	EMerschhoff, RA/RIII

DOCUMENT NAME: A:\APOSTOLAKISLTR.WPD

***SEE PREVIOUS CONCURRENCE**

To receive a copy of this document, indicate in the box "C" copy w/o attach/encl "E" copy w/attach/encl "N" no copy

OFFICE	OERAB	E	OERAB	C	OERAB	C	RES	C	RES	C
NAME	HHamzehee*		SMays*		PBaranowsky*		SNewberry		RZimmerman*	
DATE	7/19/01		7/19/01		7/19/01		7/26/01		7/20/01	
OFFICE	RES*	C	NRR*	E	EDO					
NAME	AThadani RZfor		WBorchardt		WDTravers					
DATE	7/26/01		7/26/01		8/8/01					

OFFICIAL RECORD COPY

OAD in ADAMS? (Y or N)	Y	Publicly Available? (Y or N)	Y
-------------------------------	----------	-------------------------------------	----------

Template RES-006 Accession Number ML012110254 RES File Code 2C-3

Staff Responses to ACRS Letter on Draft Phase-1 RBPI Development Report

1. A rational framework has been established for evaluating RBPIs and handling the relevant aleatory and epistemic uncertainties in evaluating PIs from available data.

Staff Response:

The staff agrees with this conclusion.

2. The staff should continue to develop RBPIs as part of the ongoing effort to make the reactor oversight process (ROP) more objective and scrutable.

Staff Response:

RES is currently reviewing the comments received from stakeholders on the draft Phase-1 RBPI report in two public meetings and written comments in response to a *Federal Register* Notice. RES will also include the ACRS comments in its review. After this effort is completed, NRR and RES intend to meet in August 2001 to discuss the results of the stakeholder comments, and decide on future development efforts for RBPIs.

3. The staff should develop methods for assessing tradeoffs between introducing new PIs versus reducing baseline inspections.

Staff Response:

The staff intends to follow the change process for PIs discussed in Inspection Manual Chapter 0608, "Performance Indicator Program." This change process includes a decision as to whether the new PIs are justified based on their feasibility and the information regarding attributes not currently monitored, solicitation of input from stakeholders, and consideration of the incremental burden on licensees and possible adjustments to the baseline inspection program. If justified, these issues are then examined as part of a pilot program with a concurrent opportunity for additional public comment. Any changes to the risk-informed baseline inspection program would be made as described in IMC 0040, "Preparing, Revising, and Issuing Documents for the NRC Inspection Manual." The RBPI Phase 1 Report provides an assessment of attributes of plant performance monitored by the RBPIs. The staff intends to consider this assessment and any potential adjustments to the baseline inspection program as part of the change process.

4. The staff should investigate establishing thresholds that depend on the baseline core damage frequency (CDF) of the plant.

Staff Response:

The NRC staff does not agree that the thresholds for performance indicators (potential RBPIs or current ROP indicators) should be dependent on the baseline plant CDF. The sliding scale of Regulatory Guide 1.174 was based on acceptable values for permanent changes in plant performance. The ROP philosophy is to monitor temporary performance degradations that must be corrected to bring plant performance back to the existing acceptable baseline performance. The degree of NRC inspection, enforcement, and oversight are dependent on the magnitude of those changes in risk. We intend to continue using the ROP approach for the RBPI threshold development.

5. The Phase 1 report states that the green/white thresholds used in the current ROP correspond to changes in CDF (Δ CDF) that vary by more than an order of magnitude among plants. The green/white thresholds in the ROP should be reevaluated.

Staff Response:

The interpretation by the ACRS of the report statement on pages A-10 and A-16 of the Phase-1 report is correct. In general, the staff agrees with the ACRS that the green/white thresholds can be refined using risk information. However, this may only be possible for the indicators in the initiating events and mitigating systems cornerstones, and may not be possible for the other cornerstones where comparable risk information is not available for setting performance thresholds. As discussed with the ACRS, the staff initially developed the green/white thresholds using historical information on the performance of plants, and anticipated refining them as improved risk models were developed. The staff will decide on the appropriate extent of this effort as part of any Phase 2 development efforts for the RBPI program, and would incorporate any changes to the current PIs using the change process in IMC 0608.

6. The derivations of decision rules (thresholds for RBPIs) given in Appendix F to the RBPI Phase 1 report should be expanded to include plant- or design-specific prior distributions.

Staff Response:

The generic prior distributions developed from operating experience included the plant-to-plant variability in the calculation. The use of the constrained non-informative prior based on that calculation provided the optimum false positive/false negative performance indication for RBPIs. The staff will investigate whether the plant-specific or design-specific priors would be of more value.

7. The staff should continue to explore “alternative” RBPIs.

Staff Response:

The staff will consider investigating alternative RBPIs that represent performance at a system, function, or cornerstone level.

8. The potential for unintended impacts of RBPIs on plant performance is a concern and should be carefully considered in the development of the RBPIs.

Staff Response:

The staff agrees with this recommendation. This issue has also been raised by external stakeholders, and will be assessed as part of the change process in IMC 0608.

9. The staff does not have the up-to-date risk information needed to develop RBPIs for shutdown operations; therefore, the staff's work should focus on full-power operations until such information is developed.

Staff Response:

The staff examined the feasibility of RBPIs for shutdown operations as part of the Phase-1 report. The shutdown PIs could be a significant enhancement to the current Significance Determination Process (SDP). The staff recognizes the limitations of the current shutdown models and data. The staff will consider the current state of risk information and the burden of collecting additional information as an input to its decision on whether to continue the shutdown work.

10. There should be a publicly available peer review of the SAPHIRE code and, eventually, the Standardized Plant Analysis Risk (SPAR) models.

Staff Response:

The SAPHIRE code has undergone extensive reviews and the information is publically available (NUREG/CR-6688, October 2000). The staff believes that this review is sufficient to establish confidence that the code's calculational functions are performed correctly. As such, the staff has concluded that resources that would be used for a peer review of the SAPHIRE code would be better allocated to other NRC projects. However, the staff agrees that the Revision 3i SPAR models should undergo a QA type of peer review to establish confidence in the models by stakeholders. This will be further discussed at the August 2001 meeting with the RES and NRR staff.

The QA process established for the Level 1, Revision 3i SPAR models meets the intent of the proposed ASME Standard on PRA to the extent required, commensurate with the level of detail in the models and their intended purpose. The Revision 3i SPAR model QA process consists of two parts, an independent, internal QA review of each model by the contractor, Idaho Engineering and Environmental Laboratory, and an external QA process comprised of an onsite QA review of the SPAR model for each plant against the licensee's plant PRA. The onsite QA review is conducted in conjunction with the benchmarking of the SDP Notebooks conducted by NRR. During this review, the event tree structure, the systems success criteria, dependency matrix, equipment failure probabilities, and human error probabilities in the Revision 3i SPAR model are compared with those in the licensee's model. In addition, the results for the baseline CDF and various sensitivity runs obtained using the Revision 3i SPAR model are compared to the results obtained using the licensee's PRA model. Significant differences in the two sets of results are discussed with

the licensee in an effort to understand the reason for such differences. Based on the results of this onsite review, appropriate changes are then made to the SPAR model where justified. The purpose of this review is to ensure that the SPAR model adequately reflects plant responses to various accident initiators. To date, 44 Revision 3i SPAR models have been produced; 3 of these have received the detailed onsite QA review described herein. We plan to complete the onsite QA reviews of the remainder of the 70 SPAR models as they are produced over the next several years.

11. It is premature to initiate a pilot program for RBPIs.

Staff Response:

The staff agrees that it is premature to initiate a pilot program for the complete set of RBPIs. As stated previously, implementation of the RBPIs would follow the change process for the ROP PIs described in IMC 0608. There are several key issues that must be addressed prior to implementation. They are summarized in the RBPI Report, and include verification of the risk models by licensees and verification of the data used to establish performance measures. These issues will be discussed as part of the August 2001 meeting between NRR and RES to decide on future development efforts for RBPIs. However, the industry has recently expressed an interest to pilot some of the at-power RBPIs in an effort to enhance the current safety system unavailability performance indicators in the ROP. This selected subset of the RBPIs may be considered for early evaluation using the IMC 0608 process.

ROUTING AND TRANSMITTAL SLIP	Date 7/17/2001
-------------------------------------	----------------

TO: (Name, office symbol, room #, building, agency/post)	Initials	Date
1. H. Hamzehee - Concur - Mark Y or N for OAR in ADAMS and Y or N for Publicly Available		
2. S. Mays - Concur		
3. P. Baranowsky - Concur		
4. S. Newberry - Concur		
5. R. Zimmerman - Concur		
6. A. Thadani - Concur		
7. NRR - Concur		
8. W.D. Travers - Signature		
9. Nancy - Put Template and Accession Number - Distribute		
10.		

	Action		File		Note and Return
	Approval		For Clearance		Per Conversation
	As Requested		For Correction		Prepare Reply
	Circulate		For Your Information		See Me
	Comment		Investigate	X	Concurrence/Signature
	Coordination		Justify		

REMARKS

Risk-Based Performance Indicators: Phase-I Report

- ▶ The format of the EDO Cover Letter is consistent with the previous ones.
- ▶ Responses have been coordinated with NRR.
- ▶ The extended due date to EDO is 7/26/01.

FROM: (Name, org. symbol, Agency/Post)	Room # - Bldg.
	Phone #