Risk Informed Activities
Completed or Not Active
(FY2018 Update)

The following risk-informed activities were removed from the public website because they are no longer active:

NRC Grow Your Own PRA Capability

Interim Staff Guidance on PRA Technical Adequacy for Advanced Light Water Reactors

Methods, Tools and Guidance for Including Digital Systems in Nuclear Power Plant PRAs

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NRC "Grow Your Own" PRA Capability

Summary Description

This NRC-wide PRA "Grow Your Own" (GYO) program was established to provide less experienced staff with high technical potential, the opportunity to have a focused, hands-on experience with risk-informed regulations, licensing actions, and decision-making. At the completion of the 3-year GYO program, those staff that pass their technical boards are recognized as reliability and risk analysts at the GG-14 level or promoted if at a lower grade.

FY 2015 Status

The initial two staff members in the program within the Office of New Reactors (NRO) and three staff members within the Office of Nuclear Reactor Regulation (NRR) completed all their required activities and passed their technical boards in the summer of 2015.

FY 2016 Status

The NRC continues to provide staff training on various aspects of PRA including use of the agency risk models/software and their application to analyze events and Licensee applications. The agency graduated 1 employees this year and currently has 8 program participants projected to graduate soon.

FY 2017 Status

Six additional staff members in the program within the Office of Nuclear Reactor Regulation (NRR) have completed their required activities and qualified by passing their technical boards in

April and May 2017. Two additional staff members are projected to graduate in the third quarter of FY 2018 from within the Office of Nuclear Reactor Regulation (NRR).

Risk-Informed Basis

Enhancing the PRA knowledge and capability of NRC staff supports the application of risk-informed decision-making.

Interim Staff Guidance on PRA Technical Adequacy for Advanced Light-Water Reactors

Summary Description

The staff is developing Interim Staff Guidance (ISG) DC/COL-ISG-028, "Assessing the Technical adequacy of the Advanced Light-Water Reactor (ALWR) Probabilistic Risk Assessment for the Design Certification Application and Combined License Application," to provide guidance to the pre-operational phase applicants and the NRC on how the NRC endorsed ASME/ANS PRA Standard (RA-Sa-2009) can be used for assessing the technical adequacy of the PRA for these pre-operational phase applications. The ISG is needed because the existing PRA Standard was developed based on current operating reactors and did not consider the status of information and experience that will not exist for ALWRs at these preoperational phases.

This ISG supplements Regulatory Guide (RG) 1.200, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities," and SRP 19.0 to address the pre-operational phases (e.g., 10 CFR Part 52 certification and licensing) for ALWRs. It is expected to be incorporated into RG 1.200, RG 1.206, and SRP 19.0, following the issuance of the next edition of the ASME/ANS PRA Standard.

FY 2015

The NRC received public comments on the draft interim staff guidance (DC/COL-ISG-028) from only one entity, the Nuclear Energy Institute (NEI). The NEI comments and ACRS discussions in 2014 were evaluated and the ISG was revised accordingly.

During the August 2015 ACRS Subcommittee on Reliability and PRA, various ACRS members identified issues with specific staff positions and approaches. These issues involved:

- Allowing a PRA-based seismic margin analysis approach at the COL stage, for which ACRS members stated that a seismic PRA should be required instead.
- Allowing applicants to only address Capability Category I (the lowest capability level in the ASME/ANS PRA Standard), for which ACRS members stated that Capability Category II should be required to be addressed.
- Designating some supporting requirements as "cannot meet" or "not applicable" (e.g., a supporting requirement that involves a walk down) while also including a clarification to

perform some action, for which some ACRS members found the designations and clarifications confusing and so they suggested changing the supporting requirement designations.

FY 2016

The staff addressed the comments from ACRS on the designations used for the supporting requirements with a plan to publish the final ISG for use in FY2017.

FY 2017

The staff issued the final ISG (DC/COL-ISG-028) for use in November 2016.

Risk-Informed Basis

This document is being developed in support of risk-informed regulations and risk-informed licensing reviews.

Methods, Tools and Guidance for Including Digital Systems in Nuclear Power Plant PRAs

Summary Description

The NRC has been investigating reliability modeling of digital systems, which encompasses both hardware and software. The objective of this research is to identify and develop methods, analytical tools, and regulatory guidance for (1) including models of digital systems in nuclear power plant probabilistic risk assessments (PRAs) and (2) incorporating digital systems in the NRC's risk-informed licensing and oversight activities.

FY 2015

Recent accomplishments and near-term objectives include the following:

- NRC support to the development of a failure mode taxonomy for a digital instrument and control (I&C) systems performed by the OECD/NEA Working Group on Risk Assessment (WGRISK) (NEA/CSNI/R(2014)16, "Failure Modes Taxonomy for Reliability Assessment of Digital I&C Systems for PRA").
- In collaboration with the Korea Atomic Energy Research Institute, the staff developed an approach for quantifying software reliability using a Bayesian Belief Network (BBN)-based model of the software development cycle quality attributes. A report describing the BBN approach will be submitted for publication in FY 2016.

- Pilot an approach for estimating the reliability of the INL Advanced Test Reactor Loop Operating Control System using PRA-based statistical testing. A report describing the statistical testing application will be submitted for publication in FY 2016.

More background on this approach can be found in the transcripts from an ACRS subcommittee meeting held in November 2014.

FY 2016

In collaboration with the Korea Atomic Energy Research Institute, the staff completed the development of an approach for quantifying software reliability using a Bayesian Belief Network (BBN)-based model. A NUREG/CR report describing the BBN approach was submitted for publication in FY 2016. The PRA-based statistical testing method was applied to the INL Advanced Test Reactor Loop Operating Control System. A NUREG/CR report describing the statistical testing application was submitted for publication in FY 2016.

FY 2017

In May 2017, the NRC published NUREG/CR-7234, "Development of a Statistical Testing Approach for Quantifying Safety-Related Digital System on Demand Failure Probability." At this time, there are no plans for future work in this area as under Project AIM, support for work in this area was eliminated.

Risk-Informed Basis

This research program aims to develop methods to quantify safety related digital I&C system failure probabilities that enable the inclusion of digital I&C components into current NPP PRAs.