FULL-SCOPE SITE LEVEL 3 PRA INITIAL PROJECT PLAN

(VERSION FOR PUBLIC RELEASE)

Background

A full-scope site Level 3 probabilistic risk assessment (PRA) for a nuclear power plant site can provide valuable insights into the relative importance of various risk contributors by assessing accidents involving one or more reactor cores as well as other site radiological sources (i.e., spent fuel pools and dry storage casks). These insights can be used to further enhance regulatory decisionmaking and to help focus limited agency resources on issues most directly related to the agency's mission to protect public health and safety.

The U.S. Nuclear Regulatory Commission (NRC) has not sponsored development of a Level 3 PRA for a nuclear power plant site since NUREG-1150,[1] although Level 3 PRAs have since been performed to some extent within both the United States and international nuclear industries. In the more than two decades that have passed since the NUREG-1150 Level 3 PRAs were performed, numerous technical advances have been made that were not reflected in the NUREG-1150 PRA models. The staff has also identified additional scope considerations not previously considered that could be addressed by performing a new full-scope site Level 3 PRA.

During the Annual Commission Meeting on Research Programs, Performance, and Future Plans on February 18, 2010, the staff proposed a scoping study to evaluate the feasibility of performing a new full-scope site Level 3 PRA for a nuclear power plant site. In a staff requirements memorandum (SRM)[2] on March 19, 2010, the Commission expressed conditional support for Level 3 PRA related activities and directed the staff to provide the Commission with various options for proceeding with this work that included costs and perspectives on future regulatory uses for Level 3 PRAs. On July 7, 2011, the NRC staff responded[3] to the SRM by providing three proposed options for proceeding with the Level 3 PRA development project. These three options consisted of (1) maintaining the status quo (i.e., continuing with evolutionary development of PRA technology); (2) conducting focused research to address identified gaps in existing PRA technology before performing a full-scope site Level 3 PRA; and (3) conducting a full-scope site Level 3 PRA. On September 21, 2011, the Commission approved[4] a modified version of the third option which extended the completion schedule from three years to four years.

Objectives

The objectives of the full-scope site Level 3 PRA (typically referred to in this plan as the Level 3 PRA study or project) are:

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[1] NUREG-1150, "Severe Accident Risk: An Assessment for Five U.S. Nuclear Power Plants," December 1990.
[2] SRM M100218, "Staff Requirements—Briefing on Research Programs, Performance, and Future Plans," dated March 19, 2010 (ADAMS Accession № ML100780578).
[3] SECY-11-0089, "Options for Proceeding with Future Level 3 Probabilistic Risk Assessment Activities," dated July 7, 2011 (ADAMS Accession № ML11090A039).
[4] SRM-SECY-11-0089, "Staff Requirements—SECY-11-0089—Options for Proceeding with Future Level 3 Probabilistic Risk Assessment (PRA) Activities," dated September, 21, 2011 (ADAMS Accession № ML112640419).

1. Develop a Level 3 PRA, generally based on current state-of-practice methods, tools, and data,[5] that (1) reflects technical advances since the last NRC-sponsored Level 3 PRAs were completed over 20 years ago, and (2) addresses scope considerations that were not previously considered (e.g., LPSD, multi-unit risk, other radiological sources)
2. Extract new insights to enhance regulatory decisionmaking and to help focus limited agency resources on issues most directly related to the agency's mission to protect public health and safety
3. Enhance PRA staff capability and expertise, and improve documentation practices to make PRA information more accessible, retrievable, and understandable
4. Demonstrate technical feasibility and evaluate the realistic cost of developing new Level 3 PRAs

Scope

The scope of the Level 3 PRA study includes all major site radiological sources,[6] all internal and external initiating event hazards typically considered in previous internal and external event PRAs,[7] and all modes of plant operation. This scope exceeds that of the NUREG-1150 studies in a number of areas. In particular, as described in SECY-11-0089, the NUREG-1150 studies did not include an assessment of accidents involving other radiological sources such as spent fuel pools, dry storage casks, and other units on site. Also, the NUREG-1150 studies only addressed at-power operation (though subsequent studies for two of the NUREG-1150 plants involved a limited analysis of low power and shutdown modes of operation) and only partially addressed external hazards.

In addition, the current Level 3 PRA study will incorporate advancements in PRA technology that have occurred since completion of the NUREG-1150 studies. Examples of these advancements include (1) increased understanding and improved modeling of severe accident phenomena, as demonstrated in the State-of-the-Art Reactor Consequence Analysis (SOARCA) Project, (2) development of improved methods for common cause failure (CCF) analysis and human reliability analysis (HRA), and (3) improved quality and quantity of data for initiating events, component failures, and operator errors.

The Level 3 PRA study will also incorporate nuclear power plant changes in operational performance and safety that have occurred since the time of the NUREG-1150 studies. Examples of these plant changes include improved operational, maintenance, and training practices; implementation of severe accident mitigation guidelines (SAMGs) and extensive damage mitigation guidelines (EDMGs); modifications to meet the station blackout (SBO) rule (10 CFR 50.63); power uprates; and higher fuel burn-up.

The Level 3 PRA study is intended to be as complete and realistic as practical; however, the scope and level of realism will be balanced against resource and schedule limitations. Therefore, not all aspects of the study will necessarily receive the same level of analytical rigor,

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[5] "State-of-practice" methods, tools, and data refer to those that are routinely used by the NRC and licensees and/or have acceptance in the PRA technical community. As described in the section on Technical Approach, some aspects of the study will require advancements in PRA technology, ranging from minor modification of existing methods to development of innovative methods to address previously unanalyzed aspects of the study (e.g., multi-unit risk).

[6] Including all reactor cores, spent fuel pools, and dry storage casks on site, but excluding fresh nuclear fuel, radiological waste, and minor radiological sources (e.g., calibration devices).

[7] Deliberate malevolent acts (e.g., terrorism and sabotage) are specifically excluded from the scope of the study.

which will be a function of their relative risk significance.[8] In addition, examples of some PRA technical elements that will not be addressed in the current study, but which are good candidates for further research to advance the state-of-the-art include:

- aqueous transport and dispersion of radioactive materials
- effects of aging on structure, system, and component reliability
- consequential (linked) multiple initiating events (e.g., seismically induced fires and floods)
- digital instrumentation and control, including software

The staff intends to use the currently available suite of PRA standards (e.g., the ASME/ANS PRA standard[9]) to guide many of the technical aspects of this study. While the level 3 PRA study will be technically adequate to meet the objectives of this study, it will not necessarily be suitable for a licensee to use for licensing applications without additional effort on the part of the licensee. However, the staff intends to obtain a peer review of the study consistent with the ASME/ANS PRA standard, and a licensee might be able to use the results of this review to further enhance the PRA.

While the Level 3 PRA study is for a single multi-unit site, it is anticipated that insights can be obtained that are applicable to similar plants, and that may be used to inform or enhance regulatory decisionmaking. However, many of the insights obtained may not be applicable to all sites and all technical issues.

Resource Plan

The identification and application of resources to accomplish the Level 3 PRA study are described below. This information is divided into five topics: schedule, budget, project team composition, technical advisory group, and leveraging of existing technical information.

Schedule

Per the SRM on SECY-11-0089, the site Level 3 PRA project will be completed in 4 years. The staff has already performed significant pre-planning activities for the project early in FY 2012. For planning purposes, the technical aspects of the study are assumed to begin on April 1, 2012 (following submittal of this project plan), and be completed by March 31, 2016.

The staff believes it will meet the projected schedule for the full-scope site Level 3 PRA study given the budget and technical approach described in the subsequent sections of this plan. However, it should be emphasized that the very broad scope of the study does not allow much flexibility in the schedule and resources to address additional issues. As such, external influences that result in expanding the scope of the study or that impact the commitment of the volunteer licensee, or the availability of its staff, to support the study can potentially delay the schedule (and increase the budget).[10]

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[8] Those aspects that receive simplified treatment will be tracked so that the analytical simplifications can be appropriately considered when comparing various risk contributors.

[9] ASME/ANS RA-Sa-2009, "Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications," Addendum A to RA-S-2008, ASME, New York, NY, American Nuclear Society, La Grange Park, Illinois, February 2009.

[10] Examples of such potential influences include (1) the amount of progress on the HRA approach in response to SRM-M061020; (2) impact from recent SRM-SECY-11-0172, "Staff Requirements – SECY-11-0172 – Response to Staff Requirements Memorandum COMGEA-11-0001, 'Utilization of Expert Judgment in Regulatory Decision Making,'" dated February 7, 2012 (ADAMS

Budget

As stated in SECY-11-0089, the estimated resources for performing a full-scope site Level 3 PRA are 8 full-time equivalents (FTE) and $2 million per year over a 3-year period, for a total of 24 FTE and $6 million. The SRM on the FY 2013 budget proposal[11] allocates resources for performing the Level 3 PRA study, but it assumes a constant rate of resource expenditure over the duration of the project (i.e., 6 FTE and $1.5 million each year, for 4 years). However, one of the principal project management insights from performance of the SOARCA project was that a substantial amount of time is necessary at the end of the study to develop insights, perform external peer review, respond to the peer review comments, and finalize the study and report. As such, it is expected that the total resources for the Level 3 PRA project will not be expended at a constant rate over the life of the project. Instead, the majority of the resources are expected to be expended during the first approximately 2½ years of the project, allowing 1½ years for peer review and finalizing the study and its documentation.

The current FY 2012 budget allocates 2 FTE and $0.5 million towards the Level 3 PRA study. Based on the FY 2012 budget allocation and preliminary planning estimates for the Level 3 PRA study, in order to meet the 4-year schedule for project completion, the total required project resources of 24 FTE and $6 million will need to be apportioned as shown in Table 1 below.

Table 1 Full-Scope Site Level 3 PRA Resource Plan

Fiscal Year	NRC Staff Resources	Contractor Resources
2012	3 FTE	$1.0M
2013	8 FTE	$2.0M
2014	7 FTE	$2.0M
2015	4 FTE	$0.5M
2016	2 FTE	$0.5M
Total	24 FTE	$6.0M

Project team composition

NRC Staff

Performance of the full-scope site Level 3 PRA will necessitate the use of a multi-disciplinary team of senior and junior staff with experience in PRA; supporting technical areas (e.g., thermal-hydraulic [T-H] analysis, fires, seismic analysis, and severe accident progression); and project administration, communication, and coordination. To the extent practical, the in-house support for the study will be obtained from RES staff to minimize the impact of the project on high priority licensing activities. However, some limited support may be needed from other NRC offices, such as NRR, NRO, NMSS, and NSIR, which possess substantial expertise in one or more aspects of PRA or supporting areas. These other offices will also provide senior level

Accession № ML120380251) directing the staff to pilot draft guidance on expert elicitation in the Level 3 PRA project; and (3) impact from the response to the Fukushima accident.

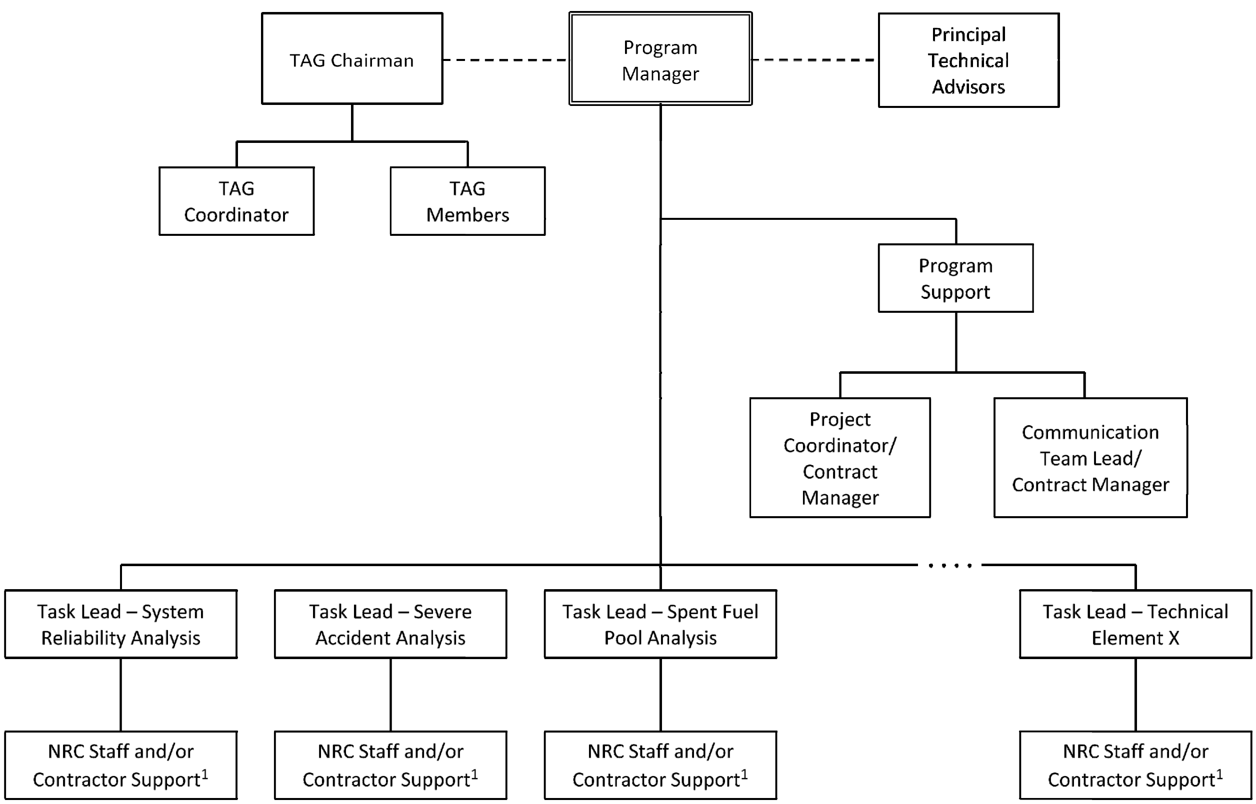
[11] SRM-COMGBJ-11-0004, "Staff Requirements – COMGBJ-11-0004 – FY 2013 Budget Proposal," dated August 19, 2011 (ADAMS Accession № ML112340065).

representatives for a technical advisory group, which is discussed later in this section. In addition, interaction with the volunteer licensee will necessitate the support of the Division of Operator Reactor Licensing (DORL) in NRR and the respective Regional office.

Figure 1 depicts the organization of the Level 3 PRA project team. The effort will be led by a Program Manager, who will oversee all aspects of the project. The Program Manager will be assisted by two Principal Technical Advisors (senior PRA experts) and a Project Coordinator, who will coordinate and manage DOE laboratory and commercial contracts, as well as assist in most aspects of project administration. Depending on the number of contracts issued as part of this study, additional project management support may be required. Organizationally, the Program Manager will report to the Chief of the PRA Branch in RES/DRA. The Principal Technical Advisors and Project Coordinator, as well as the task leaders and NRC staff support described later in this section, will be matrixed from within the existing line organization.

Communications

Due to the interest in this project and the wide spectrum of internal stakeholders, a Communications Coordinator will be assigned to oversee all internal and external communications. These communications are described in the Communications Plan that is described in a later section and included as Attachment 1 to this plan. It is recognized that the Communications Plan is a living document, and will be adjusted as the project progresses.



[1]NRC staff support and expertise will be matrixed from across the agency, as needed and as available.
Contractor support will be obtained from a combination of DOE laboratories and commercial organizations, as needed.

Figure 1 Level 3 PRA Project Team Organization

Technical Advisory Group

A technical advisory group (TAG) will be used for the Level 3 PRA project, and will consist of senior technical staff in the area of PRA, and in supporting technical areas (e.g., seismic hazard and plant response), as well as an experienced PRA representative from the Electric Power Research Institute. The TAG will meet periodically to: (1) review progress in the development of the Level 3 PRA and (2) provide insight, advice, and guidance on the technical bases, tools, methods, models, and data for the project, as well as on interpretation of the study results and on responding to comments received from the external peer reviews of the study. In this role, the TAG will serve as an ongoing review team that will provide review and feedback as the project progresses. This approach will allow the external peer reviewers to remain completely independent of the project until it is completed, and should reduce the extent of external peer review comments received.

RES/DRA staff will chair and coordinate the TAG. The TAG Chairman will be responsible for leading and moderating the TAG meetings, and will serve as the TAG spokesperson, as necessary, in briefings to NRC and project management. The TAG Coordinator, in consultation with the Level 3 PRA Project Program Manager and the TAG Chairman, will develop and disseminate the agenda for each TAG meeting. The TAG Coordinator will also be responsible for organizing and recording the minutes of the TAG meetings and maintaining an electronic repository to provide reports, publications, and other technical information as background for all TAG meetings.

Steering Committee

Consideration has been given to the establishment of a high-level steering committee to promote Office leadership awareness and engagement throughout the duration of the Level 3 PRA project. However, at this time, the staff believes the project can be successfully accomplished without creation of such a committee. While the project will address some new challenges (e.g., spent fuel and multi-unit risk), most of the project will rely on state-of-practice methods and tools. Given the current state of knowledge and staff experience in PRA technology, the staff anticipates that the Level 3 PRA TAG can resolve technical or programmatic issues that may arise. As such, it is believed that a more efficient approach is to promote Office leadership awareness through routine briefings on the approach, status, and results of the project (the attached Communications Plan indicates that Office leadership will be briefed on a semi-annual basis – and more frequently, if the situation dictates). However, if issues arise that require senior management inter-office coordination, the staff will reconsider at that time the need to establish a steering committee, which could be formed relatively quickly.

Technical Staffing Approach

As mentioned at the beginning of this section, due to the broad scope of the Level 3 PRA project, there will be a large number of technical tasks to be accomplished. These tasks may include, but are not limited to, the following:

- Internal initiating event analysis
- Event tree development and analysis
- System success criteria determination
- System reliability model (e.g., fault tree) development and analysis
- Human reliability analysis

- Data analysis
- Accident sequence quantification
- Internal fire analysis
- Internal flood analysis
- Seismic event analysis
- High wind analysis
- Other external hazard analysis
- Low power and shutdown risk analysis
- Severe accident progression and source term analysis
- Environmental transport of radionuclides and consequence analysis
- Emergency response and population movement modeling (i.e., analysis of evacuation timing)
- Spent fuel pool risk analysis
- Dry storage cask risk analysis
- Multi-unit effect analysis
- Model integration
- Integrated uncertainty analysis
- Improved documentation methods

To facilitate accomplishment of these tasks, an individual NRC task leader will be assigned to each task, with additional support provided by NRC staff and contractors. In some cases, task leaders will be responsible for more than one task, either due to the close relationship of two or more technical tasks, or due to the broad expertise of the specific task leaders. Coordination of all tasks will be the responsibility of the Program Manager, with assistance from the Principal Technical Advisors. A preliminary staffing plan for the technical tasks of the Level 3 PRA study is provided in Table 2. It should be noted that due to staff availability limitations, the positions identified in Table 2 will most likely be part-time positions. Also, these positions may be filled by more than one person, with each person working on one or more tasks or subtasks (e.g., MACCS2 analyst-1 may involve one person working part time on developing the MACCS2 input deck and a second person working part time specifically on emergency preparedness modeling).

Consistent with the objectives of the Level 3 PRA project, less experienced staff will be used where appropriate as a means to enhance the PRA capability of the staff. However, it is anticipated that a significant amount of information from the licensee's existing PRA model will be adapted for use in the Level 3 PRA study. Therefore, many of the basic PRA tasks that are typically used for training new PRA analysts will not be performed for this study (e.g., constructing system fault trees). Instead, much of the work that will need to be performed for the Level 3 PRA study (i.e., the work that is not likely to be part of the licensee's existing PRA model) involves scope items that typically require a higher degree of PRA expertise (e.g., addressing multi-unit risk, spent fuel risk, and seismic risk). As such, we expect that the study will provide several opportunities to enhance and augment the skills of mid-career PRA staff. While the training opportunities for less experienced staff may be limited, identifying such opportunities will remain a priority for the project.

Contractor Support

While one of the objectives of the study is to enhance NRC in-house PRA capability, as mentioned above, it is also recognized that addressing some of the more complex and

Table 2 Level 3 Full-Scope Site Level 3 PRA Technical Task Staffing Plan

NRC Task Lead	NRC Task Support	Tasks
Sr. internal events PRA analyst	PRA analyst-1	Internal initiating event analysis
		Event tree development
		System reliability modeling
		Data analysis
		Update SPAR model
		Accident sequence quantification
		Advanced documentation
		ASME-standard-type peer review
Sr. human reliability analyst	PRA analyst-1	Human reliability analysis
Sr. “all hazards” PRA Analyst	PRA internal hazards analyst-1	Internal fire PRA
		Internal flood PRA
	PRA external hazards analyst-1	Seismic PRA
		High winds, external floods, and other events PRA
Sr. low power and shutdown PRA analyst	PRA analyst-2	Low power and shutdown PRA
Sr. thermal-hydraulic/ Level 2 PRA analyst	MELCOR analyst-1	System success criteria determination and event timing
		Severe accident progression and source term analysis
Sr. Level 2 and Level 3 PRA analyst	MELCOR analyst-1	Severe accident progression and source term analysis
	MACCS2 analyst-1	Consequence analysis
Sr. spent fuel pool/dry cask storage PRA/ thermal-hydraulic analyst	Spent fuel pool/dry cask storage PRA/ thermal-hydraulic analyst-1	Spent fuel pool PRA
		Dry cask storage PRA
Principal Technical Advisors	None	Multi-unit effect analysis
		Integrated uncertainty analysis
		PRA quality

innovative aspects of the study will require the use of contracted experts from diverse sources based on their knowledge and experience with PRA and PRA-related activities. Consistent with this philosophy, it is envisioned that contracts will be awarded to both Department of Energy national laboratories and commercial organizations.

The staff has undertaken market research to identify organizations capable of providing the necessary support for this project. This market research effort consisted of (1) development and posting of two Sources Sought Notices on FedBizOpps.gov and (2) information collection on potential qualified organizations via internet searches, review of organization literature, and discussions with cognizant NRC Staff. The Sources Sought Notices were entitled "Level 1 Probabilistic Risk Assessment Modeling Support for the Development of a Full-Scope, Comprehensive, Level 3 PRA" and "Thermal-Hydraulic and Severe Accident Progression Modeling Support for the Development of a Full-Scope, Comprehensive, Level 3 Probabilistic Risk Assessment," and were posted in October and November 2011, respectively.

<u>Leveraging of existing technical information</u>

As noted previously, performance of the full-scope site Level 3 PRA study involves an extensive number of technical tasks, and consequently, the need to obtain or develop numerous models and substantial data. The level of effort to accomplish this work is a function of the amount of information and models already available at the NRC for the volunteer site and the amount that is obtainable from the licensee. The staff has a Standardized Plant Analysis Risk (SPAR) model for internal events for all operating nuclear power plants. SPAR models are in-house PRA models that NRC staff use to support various risk-informed activities. Depending on the specific site that is the subject of the study, additional existing information may include an expanded SPAR model that addresses internal fires, external hazards, and/or plant shutdown conditions; a PRA developed by the licensee that covers internal events, internal flooding, and, possibly, external hazards; a fire PRA developed by the licensee to support transition to NFPA 805; a Severe Accident Mitigation Alternatives analysis as part of a license renewal application; an updated seismic hazards analysis as part of a Combined License application; a complete or partial MELCOR input deck; and SOARCA project analyses.

The Level 3 PRA project team will leverage the existing and available information on the volunteer site, in addition to related research efforts (e.g., SPAR external event modeling, NFPA 805 research, and generic issue evaluations), to enhance the efficiency in performing the study. The staff will develop an inventory of information on the volunteer site available at the NRC for supporting the Level 3 PRA study. This inventory will be developed through consultation with the cognizant staff in the PRA organizations of all NRC Offices, as well as in Offices and Divisions that are responsible for related technical areas (e.g., seismic events, fire protection, and emergency preparedness) and the NRR/DORL plant project manager. Correspondingly, initial interactions with the volunteer licensee will focus on determining what relevant information is currently available at the site or at licensee offices.

Interactions with the Electric Power Research Institute

As stated in the SRM on SECY-11-0089, "[t]he staff should explore the benefits of working collaboratively, as appropriate, with the Electric Power Research Institute." Shortly after issuance of the SRM, the staff communicated with a representative from the Electric Power Research Institute (EPRI), under the existing Memorandum of Understanding between EPRI and RES, to discuss potential areas of collaboration on the Level 3 PRA study. The EPRI representative stated that EPRI did not have resources available for new initiatives, including supporting the Level 3 PRA project. However, the EPRI representative did identify a number of ongoing projects with a nexus to the Level 3 PRA project (e.g., in the area of seismic fragility analysis and seismic PRA), and raised the possibility of collaborating in those specific areas. In addition, the EPRI representative has agreed to participate as a member of the Level 3 PRA TAG.

Site Selection

As mentioned previously, the choice of the subject site for the Level 3 PRA study can have a significant impact on the effort required. This, in turn, can impact the completeness and quality of the study. As such, NRC staff identified a preliminary list of criteria for selecting an appropriate site for the study (e.g., multi-unit site, information availability, and geographic location). A public meeting was then held on November 10, 2011, to obtain external stakeholder views on the preliminary site selection criteria, which were used to update the list of site selection criteria (the meeting summary can be found at ADAMS Accession No. ML113200061).

As noted in SECY-11-0089, licensee willingness to cooperate is critical to the success of the Level 3 PRA study. Therefore, consistent with the SRM on SECY-11-0089, following the public meeting the staff sent a letter to the Nuclear Energy Institute (NEI), formally requesting their assistance in identifying a licensee volunteer for the study.[12] This letter provided the revised set of site selection criteria, as well as a preliminary estimate of the licensee resources that would likely be needed to support the study. Based on the results of NEI's interaction with prospective volunteer licensees and consideration of the site selection criteria, NEI informed the staff by letter dated February 14, 2012, that operating Units 1 and 2 at Vogtle Electric Generating Plant are willing to participate in the Level 3 PRA study.[13]

Vogtle is a dual-unit site[14] consisting of two licensed, operating Westinghouse four-loop pressurized-water reactors (PWRs) with large dry containments, located 26 miles southeast of Augusta, Georgia. The licensee PRA for Vogtle, Units 1 and 2, uses the linked-fault tree approach. Also, while Vogtle is not transitioning to NFPA 805, a fire PRA was performed for the plant as part of the Individual Plant Examination of External Events. As part of that fire PRA, an electric cable raceway database was developed for the safe shutdown (10 CFR 50, Appendix R) components. EPRI is currently working with Vogtle to perform a seismic PRA involving an innovative approach to fragility analysis. While this fragility analysis approach does not meet the definition of "state of practice," and is not likely to be used in the Level 3 PRA study, other information from the Vogtle seismic PRA may be useful to the Level 3 PRA study.

While the NRC does not have an existing MELCOR input deck for Vogtle, the input deck for Byron (also, a Westinghouse four-loop PWR with large dry containment) can be used as a basis for building the Vogtle input deck. As part of license renewal, Vogtle has performed a Severe Accident Mitigation Alternatives (SAMA) analysis, which involves development of a MACCS2

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[12] T.J. McGinty, U.S. Nuclear Regulatory Commission, letter to A. Marion, Nuclear Energy Institute, "Request for Assistance in Identifying a Licensee Volunteer for the Full-Scope Site Level 3 Probabilistic Risk Assessment Study," December 6, 2011 (ADAMS Accession № ML113330813).

[13] A. Marion, Nuclear Energy Institute, "Response to December 6, 2011 Letter Requesting Support in Identifying a Licensee Volunteer for the Full-Scope Site Level 3 Probabilistic Risk Assessment Study," February 14, 2012 (ADAMS Accession № ML12059A329).

[14] Southern Nuclear Operating Company recently received a combined construction and operating license for two additional nuclear reactors at the Vogtle site. The two new reactors are not within the scope of this study.

input deck.[15] Also, as mentioned previously, initial interactions with Vogtle will focus on determining what other relevant or updated licensee information is available to support the study.

From an offsite consequence perspective, the emergency planning zone (EPZ) population for Vogtle is relatively low compared to the typical nuclear plant site, and the EPZ is about half rural and half Federal reservation at the Department of Energy Savannah River Site. As such, the offsite health consequences and costs from emergency response actions at Vogtle are not likely to be representative of most other nuclear plant sites. However, given the plant features and information provided in the previous paragraphs, the Vogtle site is believed to be an appropriate site for the Level 3 PRA study.

Technical Approach

This section describes, at a high level, the technical approach to be followed for the full-scope site Level 3 PRA study. A more detailed project plan will be developed after assessing the extent of information and models currently available for the volunteer site, and identifying the scope and nature of technical work to complete the study. This section addresses the following topics: technical approach philosophy, proposed tools and models, and key challenges and gaps in PRA technology.

Technical approach philosophy

Consistent with the objectives of this project, the Level 3 PRA study will generally be based on current state-of-practice methods, tools, and data. As previously stated, “state-of-practice" methods, tools, and data refer to those that are routinely used by the NRC and licensees and/or have acceptance in the PRA technical community.

As discussed in SECY-11-0089, the staff performed a scoping study to support planning and conducting future Level 3 PRA activities. One of the objectives of the scoping study was to provide insight on the PRA technology to be used for various options for proceeding with future Level 3 PRA activities. To accomplish the objectives of the scoping study, several technical working groups comprised of staff from RES, NMSS, NRO, NRR, and NSIR were established to address specific Level 3 PRA technical elements that were viewed as particularly complex and challenging.

The state-of-practice methods to be used for the technical aspects of the Level 3 PRA study will be primarily identified based on the results of the earlier scoping study and through additional interactions targeting the NRC’s experts in each technical area. Several such additional interactions have already occurred and it is expected that the remainder will occur in the March 2012 timeframe. Once the inventory of NRC and licensee information and models is completed for Vogtle, Units 1 and 2, the Level 3 PRA project staff will interact again with the experts to gauge the level of effort and schedule required to complete each task of the study and determine the level of support needed from the different NRC organizations. After a list of proposed methods or approaches has been compiled, it will be provided to the TAG for review and comment.

[15] MACCS2 input decks developed for SAMA analyses are relatively simplistic and would have to be significantly modified for use in Level 3 PRAs.

Proposed tools and models

As discussed in Enclosure 1 to SECY-11-0089, the staff envisions the use of the following NRC tools and models for performing the Level 3 PRA study:

- Systems Analysis Programs for Hands-on Integrated Reliability Evaluation (SAPHIRE), Version 8
- MELCOR Severe Accident Analysis Code
- MELCOR Accident Consequence Code System, Version 2 (MACCS2)
- Vogtle, Units 1 and 2, SPAR model, Version 8.15

SAPHIRE is the NRC's standard software application for performing PRAs. This code was developed and is maintained by the NRC through contracts with Idaho National Laboratory (INL). The latest version in use, SAPHIRE 8, has increased capability for handling large complex modes and can be used to analyze both internal and external hazards and all plant operating states.

MELCOR is a fully integrated, engineering-level computer code whose primary purpose is to model the progression of postulated accidents in both light water reactors and in non-reactor systems such as spent fuel pools and dry storage casks. The MELCOR code is routinely used for performing thermal-hydraulic analysis to determine system success criteria and accident sequence timing and to inform severe accident progression analysis.

MACCS2 is a general-purpose tool used to evaluate the public health effects and economic costs of mitigation actions for severe accidents at diverse reactor and non-reactor facilities. This code was developed and is maintained by the NRC through contracts with SNL. The principal phenomena considered are atmospheric transport and deposition under time-variant meteorology, short- and long-term mitigation actions and exposure pathways, deterministic and stochastic health effects, and economic costs.

The MELCOR and MACCS2 codes were used in performance of the SOARCA project. The SOARCA project involved significant advances in the state-of-the-art accident progression and consequence modeling in MELCOR and MACCS2, respectively. The Level 3 PRA study will take advantage of the modeling advances that occurred as part of the SOARCA project, as well as other current and recent research related to these two codes.

The consequence modeling for the Level 3 PRA study will necessarily include consideration of emergency preparedness (EP) response and population movement. To facilitate EP modeling, the WINMACCS code will be used as an interface with MACCS2. WINMACCS is also being upgraded based on experience with SOARCA.

As mentioned previously, SPAR models are in-house PRA models that NRC staff use to support various risk-informed activities. The Level 1 PRA SPAR models address the likelihood of reactor core damage resulting from general transients (including anticipated transients without scram), transients induced by loss of a vital alternating current or direct current bus, transients induced by a loss of cooling (service) water, loss-of-coolant accidents, and loss of offsite power. The SPAR models use a standard set of event trees for each plant design class and standardized input data for initiating event frequencies, equipment performance, and human performance, although these input data may be modified to be more plant- specific, when needed. The system fault trees contained in SPAR models are generally not as detailed as those contained in licensees' PRA models. As part of the Level 3 PRA study, the set of Vogtle SPAR model event trees and fault trees will be expanded, as appropriate.

Besides the technical capabilities of these NRC tools, they offer the advantages that they are generally available, the staff is familiar with their use, and, if necessary, the staff has the ability to modify these tools. This latter advantage may be of particular importance in addressing such expanded scope items as multi-unit risk, spent fuel pools, and dry storage casks. Similarly, there is advantage to using a SPAR model as the starting point of the Level 3 PRA study, since staff are familiar with these models and how to modify them, and can leverage the previous effort to develop the model for the volunteer site.

<u>Risk metrics</u>

The MACCS2 code is currently undergoing modification. The set of risk metrics provided as part of the full-scope site Level 3 PRA will depend on the state-of-practice of the MACCS2 code as the study progresses. A tentative list of risk metrics that will be provided includes the following:

- Number of early fatalities
- Number of latent cancer fatalities
- Population dose (person-rem) at various locations
- Individual early fatality risk, as defined in the Quantitative Health Objectives (QHOs)[16]
- Individual latent cancer fatality risk, as defined in the QHOs
- Offsite economic costs

In addition to the consequence measures identified above, it is envisioned that reactor core damage frequency (CDF) and large early release frequency (LERF) will be computed in intermediate steps, since these measures (which are Commission-approved surrogate metrics for individual latent cancer fatality risk and early fatality risk, respectively) are consistent with current risk-informed regulatory programs and applications (e.g., the significance determination process used to support the reactor oversight process, and risk-informed license amendment submittals).

In regard to the risk metric pertaining to offsite economic costs, as stated in SECY-11-0089, the staff previously considered the possibility of developing additional safety goals based on the risk of land contamination and overall societal impact, but based on limitations in the analytical tools at the time, the staff recommended not pursuing this effort.[17] However, due to the improvement[18] in existing analytical tools (i.e., MACCS2), it is currently envisioned that the Level 3 PRA study would estimate the offsite economic costs from emergency response actions and from intermediate- and long-term protective actions.

<u>Key challenges and gaps in PRA technology</u>

As discussed previously in the section on project scope, there are a number of gaps in current PRA technology that will not be addressed in the current study, but which are good candidates for further research to advance the state-of-the-art. However, there are several other gaps in

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[16] 51 FR 30028, "Safety Goals for the Operations of Nuclear Power Plants," August 21, 1986.
[17] SECY-00-0077, "Modifications to the Reactor Safety Goal Policy Statement," March 30, 2000.
[18] The basic structure for estimating economic risk exists in the current MACCS2 code, but some of the economic input values and code related to economic modeling may need to be updated for use in the Level 3 PRA study.

PRA technology and other challenges that will need to be addressed to the extent practical in the Level 3 PRA study. Figure 2 displays the scope elements of the full-scope site Level 3 PRA (in the top white boxes) and the principal tasks for each scope element. The methods for addressing these tasks are categorized in Figure 2 using the following color scheme:

Green G : A consensus method is available that requires no modification (e.g., the fault tree approach for system reliability analysis and the parameter estimation approach for independent component failures).

Yellow Y: Methods exist, but limited effort is required to either improve them or to select among several consensus approaches (e.g., reactor coolant pump seal leakage model and common-cause failure modeling).

Orange O: No method has been developed and/or demonstrated in an integrated PRA application, but existing methods or approaches could be adapted with moderate effort (e.g., human reliability analysis for actions following a seismic event or core damage).

This category also includes elements for which methods exist, but substantial effort may be required to implement them (e.g., seismic fragility analysis if it is necessary to estimate seismic fragilities for a large number of structures, systems, and components as part of the Level 3 PRA study).

Red R: New method development is necessary, which could require significant effort (e.g., addressing multi-unit risk).

Approaches will need to be developed or improved to address technical elements in the "non-green" categories, above. In improving or developing these methods, the Level 3 PRA study will strive to be as realistic as practical, avoiding excessively conservative assumptions or analytical simplifications. However, as mentioned previously, the desire for realism will need to be balanced against resource and schedule limitations. Accordingly, not all aspects of the study will necessarily receive the same level of analytical rigor. Consistent with the philosophy of PRA, the level of analytical rigor will be a function of risk significance, to ensure that conservative assumptions and modeling limitations do not result in inappropriate risk insights.

Based on the number of "red" and "orange" entries in Figure 2, the greatest challenges for the Level 3 PRA study are posed by the current limits in the modeling of multi-unit site risk (as opposed to single unit risk), in spent fuel PRA technology (i.e., for spent fuel pools and dry storage casks), and in human reliability analysis (HRA) for other than internal events and internal fires. These challenges are briefly discussed below. The general approach to addressing these challenges for the Level 3 PRA study will be to primarily rely on existing research and the collective expertise of the TAG and contractors, and to perform limited new research only for a few specific technical areas (e.g.., multi-unit risk). Specific research activities, either past or current, that are expected to contribute to the resolution of these challenges are identified in the following discussions.

Modeling of site risk

In order to evaluate the risk of the entire NPP multi-unit site, the study needs to address all site radiological sources.[19] As discussed in SECY-11-0089, because the Commission's safety

[19] As stated previously, these sources include all reactor cores, spent fuel pools, and dry storage casks on site, but exclude fresh nuclear fuel, radiological waste, and minor radiological sources (e.g., calibration devices).

Internal events	Internal floods	Internal fires	Seismic and other external hazards	Low power and shutdown	Severe accident progression	Consequence analysis
Initiating event analysis [Y]	Identification and screening analysis [G]	Screening analysis [G]	Screening/ bounding analysis [G]	Initiating event analysis [G]	Plant damage state analysis [G]	Source term binning [G]
Accident sequence analysis [Y]	Plant response analysis [G]	Plant response analysis [Y]	Plant response analysis [G]	Accident sequence analysis [G]	Accident progression and source term analysis [Y]	Modeling of emergency preparedness response and development of MACCS2 input deck [G]
Success criteria analysis [G]				Success criteria analysis [G]		
Systems analysis [G]				Systems analysis [G]		
Data analysis [Y]	Flood frequency analysis [G]	Fire initiation analysis [G]	Event frequency analysis* [O]	Data analysis [O]		
		Fire damage analysis [G]	Fragility analysis [O]			
Human reliability analysis [G]	Human reliability analysis [O]	Human reliability analysis [G]	Human reliability analysis [O]	Human reliability analysis [O]	Human reliability analysis [O]	Human reliability analysis [O]
Quantification [G]	Quantification [G]	Quantification [G]	Quantification [G]	Quantification [G]	Quantification [G]	Consequence calculation [G]
						Risk integration [R]
Uncertainty analysis [G]	Uncertainty analysis [G]	Uncertainty analysis [G]	Uncertainty analysis [G]	Uncertainty analysis [G]	Uncertainty analysis [O]	Uncertainty analysis [O]

Spent fuel pool [O]

- Initiating event analysis
- Accident sequence analysis
- Success criteria analysis
- Systems analysis
- Data analysis
- Human reliability analysis
- Quantification
- Uncertainty analysis

Dry cask storage [O]

- Initiating event analysis
- Accident sequence analysis
- Success criteria analysis
- Systems analysis
- Data analysis
- Human reliability analysis
- Quantification
- Uncertainty analysis

Site risk [R]

- Initiating event analysis
- Equipment and operator dependency analysis
- Model integration
- Risk metrics
- Uncertainty analysis

*Event frequency analysis is categorized as “Orange” for external flooding, only. For seismic and other “non-flooding” external hazards, this element is characterized as “Green.”

Figure 2 Level 3 PRA Project Scope Elements and Principal Tasks

goals, Quantitative Health Objectives (QHOs), and subsidiary numerical objectives have traditionally been applied on a per reactor basis, most PRAs developed to date do not explicitly consider multi-unit accidents in which initiating events lead to reactor core damage in multiple units at the same site.[20] Current PRA models therefore do not appropriately identify and address dependencies between systems at multi-unit sites, particularly those with highly complex support system dependencies involving systems and subsystems that are shared by multiple units. Such dependencies are also not addressed as they pertain to spent fuel pools and dry storage casks.

To understand the contribution of these multi-unit and non-reactor effects to the overall site risk, PRA models need to be enhanced to address the following:

- Initiating events common to multiple reactors and/or spent fuel pools and dry casks
- Common or dependent equipment and operator actions between multiple reactors and/or spent fuel pools and dry casks
- Shared stacks, ventilation systems, or other pathways for combustible gases
- Effects of core damage, radiological release, and mitigation actions on operator response (including control room habitability)
- Integrated models for all site radiological sources, including consideration of model end-states, risk metrics, and mission times
- Integrated uncertainty analysis for overall site risk

It is anticipated that addressing the multi-unit and non-reactor effects on overall site risk will be one of the most complex challenges of the full-scope site Level 3 PRA. Accordingly, the initial task of the Level 1 PRA contract support effort discussed previously will be to research the risk impacts and related issues associated with the operation of multiple nuclear power plant units at a single site.

Spent fuel PRA technology

As discussed in SECY-11-0089, process areas not related to reactor core operations that can contribute to nuclear site accident risk include those associated with onsite nuclear spent fuel handling and storage. Principal risk-related studies that have previously been performed in these areas include a study of the spent fuel pool accident risk at decommissioning nuclear power plants (NUREG-1738[21]), the dry cask storage PRA (NUREG-1864[22]), the EPRI PRA of bolted storage casks (EPRI TR-1009691[23]), and the NMSS dry cask storage and transportation security assessments. Although these and other limited risk-related studies have addressed various aspects of the risk of accidents involving spent fuel pools and dry cask storage, additional or significantly enhanced PRA technology must be developed to enable a meaningful comparison and relative ranking of these process area risk contributors as part of a comprehensive site Level 3 PRA. Example spent fuel PRA areas for improvement include: success criteria determination, HRA, accident phenomena, and source term analysis. Some of these areas are expected to be addressed to some degree as part of the current RES spent fuel

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[20] SECY-05-0130, "Policy Issues Related to New Plant Licensing and Status of the Technology-Neutral Framework for New Plant Licensing," dated July 21, 2005 (ADAMS Accession № ML051670388), points out that the safety goal policy could be interpreted to mean that the QHOs should be applied on a per site basis, rather than a per reactor basis.
[21] NUREG-1738,"Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants," February 2001.
[22] NUREG-1864, "A Pilot Probabilistic Risk Assessment of a Dry Cask Storage System at a Nuclear Power Plant," March 2007.
[23] EPRI TR-1009691, "Probabilistic Risk Assessment (PRA) of Bolted Storage Casks: Updated Quantification and Analysis Report," EPRI, Palo Alto, CA, December 2004.

pool scoping study (ADAMS Accession No. ML12115A085), expected to be completed in Summer 2012.

Human reliability analysis for other than internal events and internal fires

Currently, state-of-practice HRA methods exist for addressing operator performance in Level 1 internal events PRA[24] and in internal fire PRA.[25] RES is also currently developing an improved HRA approach in response to SRM-M061020,[26] and aspects of this new approach will be used to the extent that they are available consistent with the schedule for the Level 3 PRA project. However, as discussed in SECY-11-0089, state-of-practice methods do not currently exist for post-core damage and external events HRA modeling, and such modeling is beyond the scope of the approach being pursued in response to SRM-M061020. Post-core damage HRA modeling primarily involves operator actions incorporated into Severe Accident Management Guidelines (SAMGs) and Extensive Damage Mitigation Guidelines (EDMGs). SAMGs were developed and implemented by the nuclear industry in response to the accident at Three Mile Island, Unit 2, to provide tools and strategies for managing the in-plant aspects and mitigating the results of a severe accident. Following the terrorist attacks on September 11, 2001, the NRC required licensees to implement EDMGs as described in Title 10 of the Code of Federal Regulations, Section 50.54(hh).

Since the operator actions addressed in both the SAMGs and EDMGs are "knowledge-based" (as opposed to "rule-based"), evaluators (i.e., the decision-makers responding to the severe accident) need to use their knowledge and problem solving skills to identify an appropriate course of action under unfamiliar severe accident conditions. In addition, many of the SAMG and EDMG strategies to mitigate the effects of one problem result in adverse effects on another problem. Evaluators must therefore make risk-benefit decisions when considering different strategies. Since the most appropriate response to a given condition cannot be determined in advance, the definition of what constitutes a failure and the identification of post-core damage human failure events or recovery actions that can be credited in the PRA model presents a unique challenge.

In addition to addressing challenges associated with the modeling of SAMGs and EDMGs, state-of-practice methods do not currently exist for addressing operator performance in response to various external events (e.g., seismic events and external flooding) or when the reactor is at low power or shut down. Therefore, these areas will require further investigation. Current NRC research into a single model for human reliability[27] may be helpful, depending on the schedule for completing the research vis-à-vis the schedule for completing the Level 3 PRA study.

Additional modeling issues

In addition to the above, there are several other technical elements of a full-scope site Level 3 PRA that may present a challenge or where no single consensus state of practice exists (i.e.,

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[24] NUREG-1842, "Evaluation of Human Reliability Analysis Methods Against Good Practices," U.S. Nuclear Regulatory Commission, Washington, D.C., September 2006.
[25] NUREG-1921/EPRI 1019196, "EPRI/NRC-RES Fire Human Reliability Analysis Guidelines," Draft Document for Public Comment, U.S. Nuclear Regulatory Commission, Washington, D.C., July 2009.
[26] Response to SRM-M061020, "Meeting with the Advisory Committee on Reactor Safeguards, 2:30 p.m., Friday, October 20, 2006, Commissioners' Conference Room, One White Flint North, Rockville, Maryland (Open to Public Attendance)," dated November 8, 2006.
[27] SRM M061020, "Staff Requirements - Meeting with Advisory Committee on Reactor Safeguards," dated November 8, 2006 (ADAMS Accession № ML063120582).

the “non-green” items in Figure 2), and an approach may need to be chosen, improved upon, or developed. These include:

- Level 2 and Level 3 PRA uncertainty analysis
- Integration of support system initiating event models
- Conditional steam generator tube rupture
- Reactor coolant pump seal loss-of-coolant accident (LOCA) model
- Common-cause failure (CCF) modeling and data
- Complete electric cable raceway database
- Seismic fragilities
- Frequency of external flooding
- Operational data for low power and shutdown plant operating states
- Severe accident progression modeling
- Mission time (for severe accident progression, consequence analysis, and non-reactor radiological sources)

Current research and other activities are already addressing some of these aspects. For example, under a Memorandum of Understanding (MOU) with EPRI, RES and EPRI are currently developing an approach to integrate support system initiating event models into a PRA. Recent research has investigated the risk-significance of steam generator tube rupture occurring subsequent to core damage. Those licensees choosing to comply with NFPA-805 need to compile electric cable raceway databases, and some licensees (e..g, Vogtle) that have not elected to follow NFPA-805 may still have compiled full or partial databases as part of other fire PRA or Appendix-R-related efforts. Severe accident progression modeling has been, or is being, addressed through a number of NRC research projects (e.g., SOARCA, the SPAR Integrated Capabilities Modeling project, and the Advanced Level 2 PRA project). Also, the SOARCA uncertainty analysis is underway and should help to inform the approach for integrating uncertainties in the Level 3 PRA study.

Project Milestones

The initial list of project milestones is provided below. The milestones are separated into five categories: pre-planning activities; initial (preparatory) work; aspects of the full-scope site Level 3 PRA study that are within the scope of the ASME PRA standard (i.e., the Level 1 and LERF portions of the PRA for the reactor at full power); aspects of the study that are beyond the scope of the ASME PRA standard; and the development of the NUREG report documenting the study, including external peer review.

Pre-planning Activities

a) Initiate commercial contract actions (in progress)

b) Develop site selection criteria (completed)

c) Hold public meeting on site selection criteria (completed)

d) Develop estimate of impact on licensee to support study (completed)

e) Interact with nuclear industry on site selection (completed)

f) Develop TAG charter and establish TAG (completed)

g) Develop communications plan (completed)

h) Develop initial project plan (completed)

<u>Preparatory Work</u>

i) Official project start date (April 2012)

j) Investigate treatment of multi-unit risk issues

k) Investigate improved PRA documentation processes

l) Document gap analysis based on licensee and NRC PRA information

m) Complete detailed task schedule, including estimated level of effort

<u>Scope of Study Covered by ASME Standard for Level 1/LERF PRA</u>

n) Complete update of Level 1 internal events SPAR model based on licensee information and other advances in PRA technology

o) Complete expansion of Level 1 SPAR model to include internal floods and fires

p) Complete expansion of Level 1 SPAR model to include seismic and other external hazards

q) Complete expansion of SPAR model to include Level 2 PRA

r) Complete ASME-standard-based peer review of Level 1/LERF portions of Level 3 PRA (Spring 2014)

<u>Scope of Study Beyond ASME Standard for Level 1/LERF PRA</u>

s) Complete expansion of SPAR model to include Level 3 PRA

t) Complete expansion of SPAR model to include low power and shutdown plant operating states

u) Complete expansion of SPAR model to include spent fuel pool

v) Complete expansion of SPAR model to include dry cask storage

w) Complete expansion of SPAR model to address multi-unit risk

<u>Documentation of the Complete Study (NUREG Report)</u>

x) Complete fully integrated draft NUREG report

y) Submit draft NUREG report for external peer review (Fall 2014)

z) Submit revised version of NUREG report to licensee for technical and proprietary information review

aa) Release revised version of NUREG report for public comment

bb) Complete final NUREG report

A more detailed list of milestones that addresses the dependencies between milestones and other major aspects of the Level 3 PRA study will be prepared after completion of gap analyses of the requisite licensee and NRC PRA information and state-of-practice PRA technology. It is currently envisioned that the initial tasks of investigating the modeling of multi-unit risk issues and advanced PRA documentation processes, as well as performing the gap analyses, will generally occur in parallel. These activities will be followed by development of the Level 1 internal events PRA model for full power operation. This base model will then be expanded to address internal and external hazards (e.g., fire, flood, seismic).

Work on severe accident progression and source term analysis (i.e., the Level 2 PRA) will generally proceed in parallel with the work on internal and external hazards. This work will also coincide with work being performed on low power and shutdown modes of plant operation and the risk analysis of spent fuel pool(s) and dry cask storage. The analysis of accident consequences (Level 3 PRA) will be initiated near the end of the previous tasks.

It is currently anticipated that an ASME-PRA-standard-based peer review will be performed as soon as the requisite parts of the study (Level 1/LERF) are completed (preliminarily estimated to be in April 2014). The staff will request industry participation in the ASME/ANS PRA standard peer review, as well as in an external peer review of the full study (i.e., including those items outside the scope of the ASME/ANS PRA standard). The external peer review will be initiated after completing the draft NUREG report documenting the entire study. Based on insights from the SOARCA study, it is prudent to allow at least 18 months for performing and responding to the external peer review of the Level 3 PRA study. Therefore, the preliminary target date for completing the draft NUREG report is October 2014.

Communications

This section addresses the two primary forms of communication that will occur throughout the Level 3 PRA study: (1) technical information exchanged between the licensee and the NRC and (2) communication of study status and results with internal and external stakeholders.

Performance of the full-scope site Level 3 PRA study will require significant amounts of technical information to be provided by the volunteer licensee (e.g., systems descriptions and diagrams, plant procedures, training manuals, and T-H calculations). A significant portion of this information may be of a proprietary nature. Correspondingly, some of the documentation prepared by the NRC for the Level 3 PRA study may use licensee proprietary information. Initial interactions with the volunteer licensee will need to address the process for exchanging technical information with the licensee and availability to the public.

Due to the perceived interest in the full-scope site Level 3 PRA study, a formal communications plan has been developed to facilitate communication of project status and results to all interested stakeholders. Use of a communications plan will ensure that consistent messages are conveyed to stakeholders. The plan will be updated as needed to ensure broad stakeholder interaction.

At the outset of the project, groups of internal stakeholders will be identified. Project staff will then interact with these groups to determine their preferred level of engagement, and the communications plan will be updated, as necessary. One of the first priorities of communications with internal stakeholders will be to obtain their feedback and approval of the proposed methods for the study.

Study Documentation

The documentation of the full-scope site Level 3 PRA study will include briefing packages, letter reports and a final NUREG report. Letter reports will be prepared documenting each major milestone of the study. Draft versions of these reports will be provided to the volunteer licensee to ensure factual accuracy and identify proprietary information. Draft versions will also be provided to the TAG for review and comment.

Since the Level 3 study does not involve licensing action, non-proprietary versions of interim deliverables generally will not be prepared (this will allow resources to be focused on technical, rather than administrative, work). As such, interim deliverables will not be released for public review and comment unless they contain no (or limited[28]) proprietary information. External stakeholder interaction on interim deliverables will generally be addressed through conductance of public meetings. Proposed public meeting information will be provided to the licensee in advance of the meeting to confirm that it contains no proprietary information.

In addition to the traditional formats for documenting the information and results of the full-scope site Level 3 PRA study, improved documentation methods will be explored. As stated in SECY-11-0089, it is envisioned that the use of modern information technology to document the relevant assumptions, decisions, methods, models, tools, and data of the study will make this information much more readily accessible to support potential future needs. This improved documentation can be used to enhance external risk communication by facilitating external stakeholder understanding of not only the relative importance of various risk contributors to public risk, but also the underlying assumptions and limitations affecting the results and risk insights.

One of the initial tasks in the Level 3 PRA project will be to develop a documentation process for the study. It is envisioned that this process will be multi-tiered, wherein the top tier information would be publically available and the second tier information would not be publicly available. The developed documentation process will take advantage of modern information technology, as appropriate, for the purpose of improving the overall risk communication of the study results and insights, including making the PRA information more accessible, retrievable, and understandable. As part of this task, NRC staff members who are potential users of the information produced from the full-scope site Level 3 PRA project will be interviewed so as to identify and incorporate the most beneficial documentation capabilities. Interim study deliverables will be used to pilot the improved documentation process, prior to public release of the final NUREG report.

An additional consideration for the Level 3 PRA study documentation involves the potential inclusion of sensitive unclassified non-safeguards information (SUNSI). Since one of the principal objectives of the study is to identify new insights, it is expected that many of the identified insights will not have been previously provided in the open literature, and may be classified as SUNSI per SECY-04-0191. It is anticipated that other portions of the documentation will also need to be evaluated for SUNSI. Consideration will be given to having a dedicated SUNSI reviewer to review documents and maintain a record of classification decisions.

[28] If a report contains limited proprietary information, a decision will be made at that time as to whether a non-proprietary version will be prepared and released to the public.