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Risk-Informed and Performance-Based Oversight of Radiological Emergency Response Programs

Office of Nuclear Security and Incident Response

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ABSTRACT

This report provides a concept for performance-based oversight of offsite radiological emergency response preparedness in jurisdictions surrounding commercial nuclear power plants. That is, it provides the framework for development of an alternative oversight regimen in which regulators consider inputs and enablers of performance (such as plans and training) only when jurisdictions cannot demonstrate adequate performance. The report proposes an initial set of objective performance indicators for demonstration in drills and exercises. It further proposes differential levels of oversight intervention based on the degree to which the jurisdictions meet or fail to meet performance targets. The report considers whether this performance-based oversight regimen would enable better integration of offsite radiological emergency response preparedness with all-hazards preparedness. Finally, the report briefly considers aspects of implementing the concept, such as potentially required regulatory changes. While the ingestion pathway is important to public health and safety, it is not considered for regulation in the scope of this report. The report concludes that a performance-based oversight system is feasible and could enhance all-hazards integration along with reasonable assurance. However, implementation of a performance-based oversight regimen likely would require more resources than are currently applied in order to ensure a high level of emergency preparedness.

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ABBREVIATIONS

µCi/cc	Microcuries per Cubic Centimeter
AAR	After-Action Report
ALC	Annual Letter of Certification
ARCA	Area Requiring Corrective Action
ARPAT	All-hazards Response and Preparedness Assessment Tool
CI	Capability Indicator
CPG	Comprehensive Preparedness Guide
DHS	Department of Homeland Security
DQI	Deductive Quantification Index
EAS	Emergency Alert System
EMPG	Emergency Management Performance Grant
EMT	Emergency Medical Technician
EOC	Emergency Operations Center
EOP	Emergency Operations Plan
EP	Emergency Preparedness
EPA	Environmental Protection Agency
EPZ	Emergency Planning Zone
ETE	Evacuation Time Estimate
FEMA	Federal Emergency Management Agency
HAZUS	Hazards United States
HSEEP	Homeland Security Exercise and Evaluation Program
HSPD	Homeland Security Presidential Directive
ICS	Incident Command System
IP	Improvement Plan
JIC	Joint Information Center
KI	Potassium Iodide
NEI	Nuclear Energy Institute
NEP	National Exercise Program
NIMS	National Incident Management System
NPP	Nuclear Power Plant
NPR	National Preparedness Report
NPRM	Notice of Proposed Rulemaking
NRC	Nuclear Regulatory Commission
ORO	Offsite Response Organization
PAD	Protective Action Decision
PAG	Protective Action Guidelines
PKEMRA	Post-Katrina Emergency Management Reform Act
PM	Performance Measure

PPD	Presidential Preparedness Directive
REP	Radiological Emergency Preparedness
RERP	Radiological Emergency Response Program
RIPB	Risk-informed, performance-based
ROP	Reactor Oversight Process
SAV	Staff Assistance Visit
SNPRM	Supplemental Notice of Proposed Rulemaking
SNRA	Strategic National Risk Assessment
SPR	State Preparedness Report
TEP	Training and Exercise Plan
THIRA	Threat and Hazard Identification and Risk Assessment

1. INTRODUCTION

The Nuclear Regulatory Commission (NRC) relies upon a defense-in-depth approach to ensure adequate protection of public health and safety against risks from licensed nuclear power plant (NPP) operations. The 2011 incident in Fukushima, Japan, is a reminder that while the likelihood that high-quality designed components, safety systems, highly trained operators, and containment systems all will fail is low, it is not zero. The ability of both licensees and State and local offsite response organizations (OROs) to respond to an emergency is the critical final link in the defense-in-depth concept.

The NRC must find there is "reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency," or it can take enforcement action to include shutting down a reactor (see 10 CFR 50.54(s)(2)(ii)). Inputs to that determination come from the NRC's own assessment of licensee emergency preparedness and the Federal Emergency Management Agency's (FEMA) assessments regarding whether State and local emergency plans are adequate and capable of being implemented.

The NRC's reasonable assurance determinations and FEMA's Radiological Emergency Preparedness (REP) Program rely on 16 planning standards in regulation (at 10 CFR 50.47(b) and 44 CFR 350.5), as well as criteria in NUREG-0654/FEMA-REP-1, Revision 1, *Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants*. While there has been additional guidance, including a 2013 update to FEMA's REP Program Manual, these foundational standards and criteria date from 1980. They focus on review of emergency plans for adequacy and on demonstrating the ability to implement plans, mainly through exercises.

However, in the voting record for SECY-06-0200, the NRC's Commissioners endorsed exploration of a more "risk-informed, performance-based" (RIPB) regulatory approach for reasonable assurance determinations regarding emergency preparedness, including offsite preparedness. As used in this report, "risk-informed" oversight involves focusing on the elements most significant to protecting public health and safety. "Performance-based" oversight involves demonstrating achievement of successful outcomes rather than compliance with procedural requirements.[1]

This report offers an initial proposal for the development of an RIPB oversight regimen for offsite Radiological Emergency Response Programs (RERP). While the ingestion pathway is important to ensuring public health and safety, it is not considered for regulation in the scope of this report. The remaining report chapters address the topics shown in **Figure 1** on the next page.

[1] See NRC 2012. The term "risk-informed" as used for onsite emergency preparedness (EP) has traditionally meant to incorporate risk insights into the program and supporting guidance where they can be identified. Risk-informing EP does not rely on quantitative analysis of core damage frequency but assesses qualitatively the risk to the public should an NPP accident occur. This practice was formalized for regulatory purposes in the EP Cornerstone of the reactor oversight process. (For example, see IMC 0308, Attachment 3, Appendix B: "the EP [significance determination process] is risk-informed, rather than risk-based, and does not involve numerical estimates of risk metrics such as core damage frequency (CDF) or large early release fraction (LERF).") The EP significance determination process assumes that the EP program is needed for protection of public health and safety in order to assess the significance of degraded program elements. This regulatory structure recognizes EP as a defense-in-depth measure. Another way of viewing this use of risk information is that for oversight purposes core damage is assumed to be progressing and program elements that reduce consequences are risk-significant.

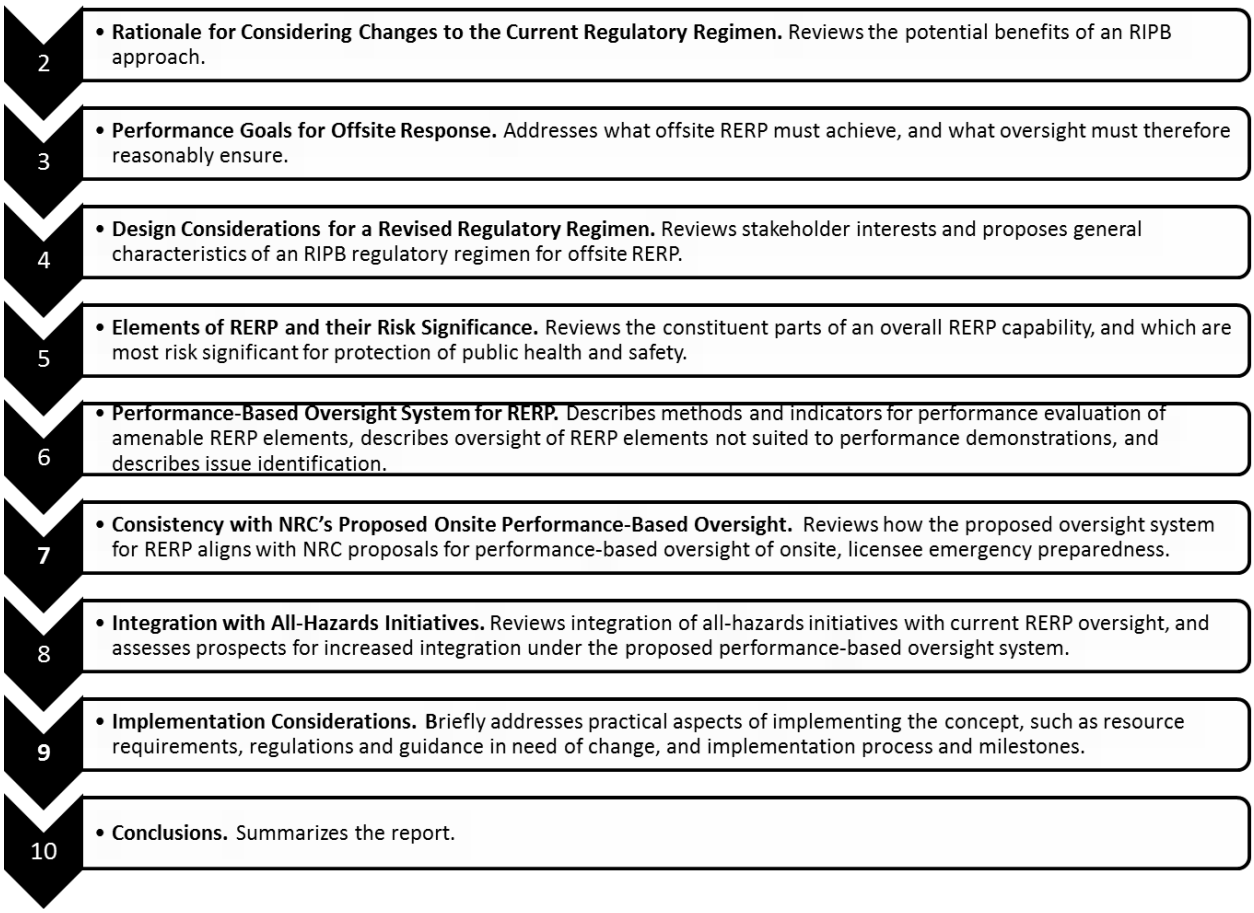

Figure 1. Organization of This Report

2. RATIONALE FOR CONSIDERING CHANGES TO THE CURRENT REGULATORY REGIMEN

The current system for providing "reasonable assurance" of offsite radiological preparedness has served for over 30 years. However, a shift to outcome-oriented performance measures, linked to an overarching health and safety goal for assessing offsite radiological emergency response preparedness, could include the following benefits:

(1) More efficient use of personnel and equipment for response, demonstration, and oversight,

(2) Enhanced oversight focus on the most risk-significant aspects of RERP,

(3) Potential alignment with other elements of nuclear reactor safety oversight as well as all-hazards preparedness initiatives,

(4) Improved public understanding of how "reasonable assurance" relates to safety, and

(5) Enhanced flexibility in response options.

2.1 MORE EFFICIENT USE OF PERSONNEL AND EQUIPMENT FOR RESPONSE, DEMONSTRATION, AND OVERSIGHT

One hope for a performance-based system is that it could require fewer resources to achieve substantially the same outcome: it could be more efficient.

An oversight system focused on compliance requires an assignment of response resources to comply with the requirement, an assignment of resources to demonstrate compliance with the requirement, and an assignment of oversight resources to ensure compliance with the requirement—whether or not the requirement has been proven to contribute even marginally to better health and safety outcomes. If the requirement does not contribute to ensuring an adequate health and safety outcome, then the investment of resources in meeting that requirement is wasted. Even if the requirement contributes only marginally to health and safety, an alternative use of resources may contribute more. Tying up resources in a compliance requirement when better uses are available also constitutes waste. A shift to performance-based oversight has the potential to reduce or eliminate such waste.

2.2 ENHANCED OVERSIGHT FOCUS ON THE MOST RISK-SIGNIFICANT ASPECTS OF RADIOLOGICAL EMERGENCY RESPONSE PROGRAMS

To achieve efficiencies, a performance-based oversight regimen must be risk-informed (i.e., focused on those aspects of radiological emergency response that contribute most to reducing the risk that the public would receive an unsafe dose of radiation in the event of a radiological emergency). Consideration of a shift to performance-based oversight offers a chance to reconsider which elements of RERP are most risk-significant and should therefore receive greater relative attention and resources.

2.3 POTENTIAL ALIGNMENT WITH OTHER ELEMENTS OF NUCLEAR REACTOR SAFETY OVERSIGHT AND ALL-HAZARDS PREPAREDNESS INITIATIVES

FEMA's adoption of more outcome-based metrics supporting a defined health and safety outcome could improve the linkage between FEMA's offsite preparedness determinations and the NRC's overall "reasonable assurance" determinations.

First, the NRC could judge the contributions of onsite emergency preparedness to meeting the same health and safety outcome. For example, if the overarching metric involved timeliness for completing protective actions from awareness of an event to evacuation (if appropriate) of the emergency planning zone (EPZ), the time taken by licensees to complete their sequence of actions could reduce time available for OROs to complete their actions. The NRC and FEMA would be able to coordinate holistically any needed emergency preparedness improvements for both onsite and offsite response in order to achieve the target outcome.

Second, more frequent collection of performance demonstration results and the development of rules for aggregating results from these individual performance demonstrations over time could allow for greater comparability of presentation between FEMA's offsite RERP determinations and the NRC's current Reactor Oversight Process (ROP). If all parties were willing, an offsite RERP "cornerstone" rating could be given for each site.

Third, the NRC could more easily incorporate outcome-oriented, quantitative FEMA findings into an RIPB scheme for oversight of all elements of its defense-in-depth approach (see **Figure 2** on the next page) if the Commission chose to move further in this direction. While the NRC has had quantitative objectives to inform regulation since its Safety Policy Goal of 1986, the NRC's Fukushima Near-Term Task Force has recommended establishing a "logical, systematic, and coherent regulatory framework for adequate protection that appropriately balances defense in depth and risk considerations."[1] To the extent the NRC can estimate probability of success or failure for each defense-in-depth element (including emergency preparedness), along with the range of potential consequences from accident sequences, the NRC may be able to offer a more transparent basis for its overall "reasonable assurance" determinations in the future.

More importantly for FEMA, a shift to a more performance-based oversight regimen could offer opportunities to enhance integration of RERP and all-hazards initiatives. If oversight focuses on achievement of outcomes rather than compliance of inputs, OROs may be able to increase linkages between all-hazards and RERP-specific efforts. For example, jurisdictions that maintain a stand-alone RERP plan primarily to satisfy separate RERP oversight requirements, regardless of the likely use of the plan in an actual incident, could base their decision strictly on whether a stand-alone RERP plan enhances RERP response. Over time such jurisdictions likely would integrate all but the truly RERP-specific content with the all-hazards plan.

[1] The 1986 Safety Policy Goals statement included the quantitative health objective that "the risk to the population in the area near an NPP of cancer fatalities that might result from nuclear power plant operation should not exceed one-tenth of one percent (0.1 percent) of the sum of cancer fatality risks resulting from all other causes." Targets also exist for core damage frequency (reflecting effectiveness in controlling and mitigating initiating events) and "large early release frequency" (reflecting effectiveness of containment barriers). See SECY-00-007. Apostolakis (2012) reviews the NRC's history of increasingly incorporating risk considerations into its work.

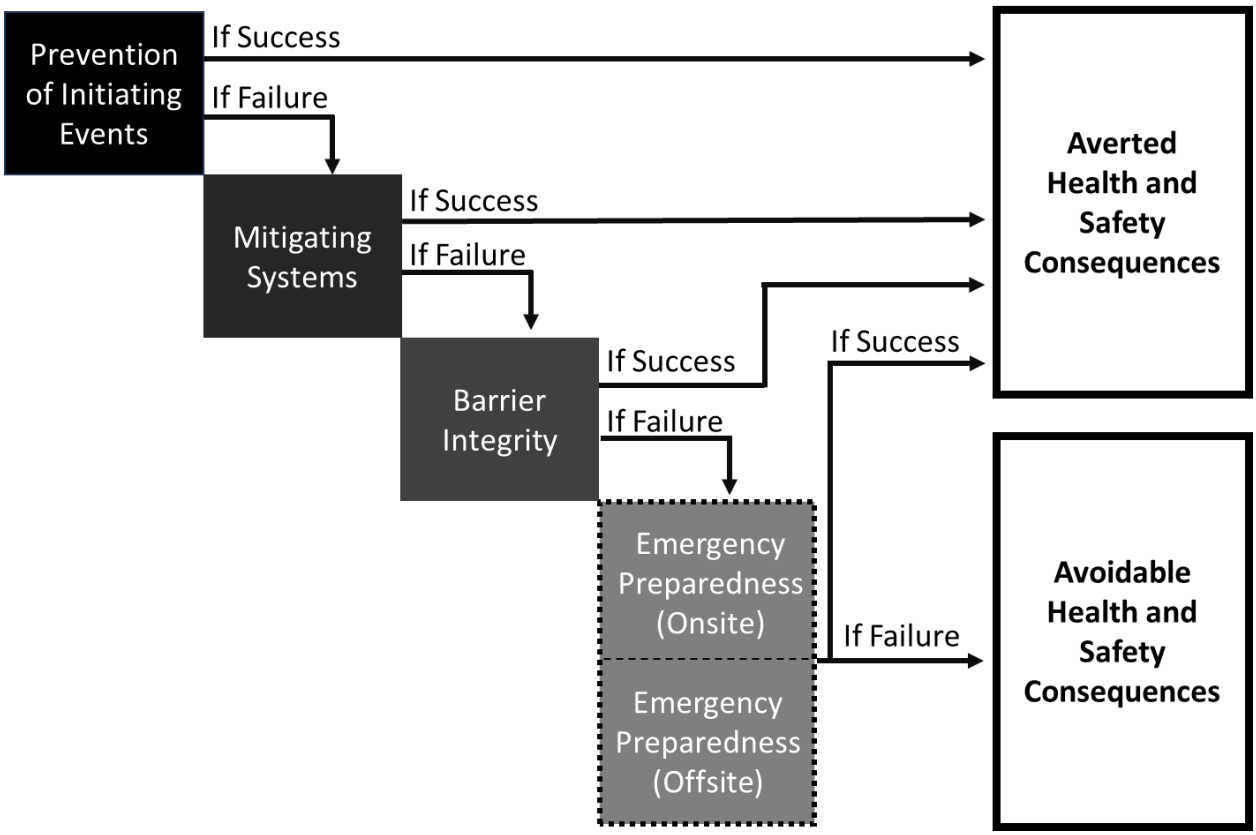

Figure 2. The NRC's Overall "Reasonable Assurance" of Public Health and Safety

2.4 IMPROVED PUBLIC UNDERSTANDING

It is possible that a more objective and performance-based oversight system for offsite RERP could make reasonable assurance determinations easier for the public to grasp. The current system of oversight involves a combination of plan reviews, exercises, and certifications to determine "adequacy of the plans and capabilities of State and local governments to effectively implement the plans" (44 CFR 350.1). The system of oversight typically involves the following process:

- *States submit plans for review.* For each site within the State, a State submits its radiological emergency plan and the plans of local jurisdictions in the 10-mile plume exposure pathway EPZ and 50-mile ingestion pathway EPZ. The State must give its opinion that the plans are adequate to protect the public health and safety of its citizens in the EPZs and that the State and local governments can, and intend to take, appropriate protective actions in the event of a radiological emergency.
- *FEMA regions review each plan in detail.* FEMA publishes a Federal Register notice that the plans are available for review, provides copies to an interagency Regional Assistance Council for review and input, and completes an assessment of the adequacy of the State and local governments' capability to implement the plans. Reviews are keyed to the planning standards in regulation, NUREG-0654 and its supplements, and the REP Program Manual.
- *FEMA evaluates an exercise of each plan.* The licensee conducts an exercise with the State and local governments, allowing FEMA to evaluate the ORO plans and their

implementation. After the initial qualifying exercise for plan approval, the State and local governments within the 10-mile EPZ participate in such a joint exercise at least once every two years. (States with multiple sites may rotate their full participation among sites.)

- *A public meeting is held regarding the plan and the exercise.* At or near the licensee facility, a public meeting must be held to describe the plan and the exercise, answer questions about the FEMA review, and receive suggestions for improvements. (After the initial qualifying exercise, subsequent public meetings regarding exercises focus on explaining the exercise process.)
- *The FEMA Regional Administrator forwards an evaluation of the plan to the FEMA Deputy Administrator.* Once an exercise and public meeting have been held, the FEMA Regional Administrator will forward to the Deputy Administrator an evaluation of the plan, results of the exercise (including deficiencies noted and corrections made), a summary of deficiencies identified during the public meeting, recommendations made to the State, and the State's commitments and actions to address the deficiencies and recommendations.
- *The FEMA Deputy Administrator approves the plan or indicates that it is inadequate.* The FEMA Deputy Administrator determines whether the plans are adequate and capable of being implemented. Approval is subject to appeal within 30 days by any interested person, but only on the grounds that the decision was unsupported by substantial evidence. After initial approval, FEMA continues to review the adequacy of plans and preparedness over time, and may withdraw approval at any time (e.g., on the basis of biennial exercise findings, a disaster-initiated review, or other evidence).
- *Determination that the plan is inadequate initiates a 120-day window to take action on deficiencies to FEMA's satisfaction or face withdrawal of approval.* If notified that the plan is not adequate, the State has 120 days to correct deficiencies or provide a plan and timeline for correcting the deficiencies. If after 120 days (or the agreed timeline) the deficiencies are not corrected, FEMA may notify the Governor, the NRC, other agencies, and the public that approval (i.e., that FEMA has "reasonable assurance" that plans are adequate and capable of being implemented) is withdrawn.
- *FEMA's withdrawal of approval escalates to the NRC, and the NRC decides on an appropriate response.* If the NRC determines that reasonable assurance is compromised, the NRC may give the licensee 120 days to correct the problem or face possible enforcement action (although the Commission is not constrained to a 120-day timeline). The Commission will determine whether the reactor should be shut down until the deficiencies are corrected or whether other enforcement action is appropriate. The Commission takes into account whether the licensee can demonstrate that the deficiencies are not significant, or whether there are compensatory actions the licensee can take.

FEMA supplements the plan reviews and exercises with Staff Assistance Visits (SAVs) and an Annual Letter of Certification (ALC) from each REP Program State.[2]

This approach is well institutionalized among licensees, State and local governments, FEMA, and the NRC. The 16 planning standards defined in regulation (10 CFR 50.47(b) and 44 CFR 350.5) have served as a stable foundation for plan reviews and exercise evaluation for more than 30 years.

[2] The process description is drawn from the summary of 44 CFR 350 given in FEMA 2013f, pp. IV-2 to IV-9. See also pp. IV-36 to IV-37 and IV-49 to IV-57 regarding SAVs and ALCs, respectively.

The planning standards also rely on two additional layers of interpretation. (See **Figure 3**, below.) NUREG-0654/FEMA-REP-1, Revision 1, offers more than 190 criteria for review of plans. FEMA's April 2013 REP Program Manual additionally offers six "assessment areas" with 25 sub-elements and 32 demonstration criteria, mapped to the NUREG-0654 plan review criteria.

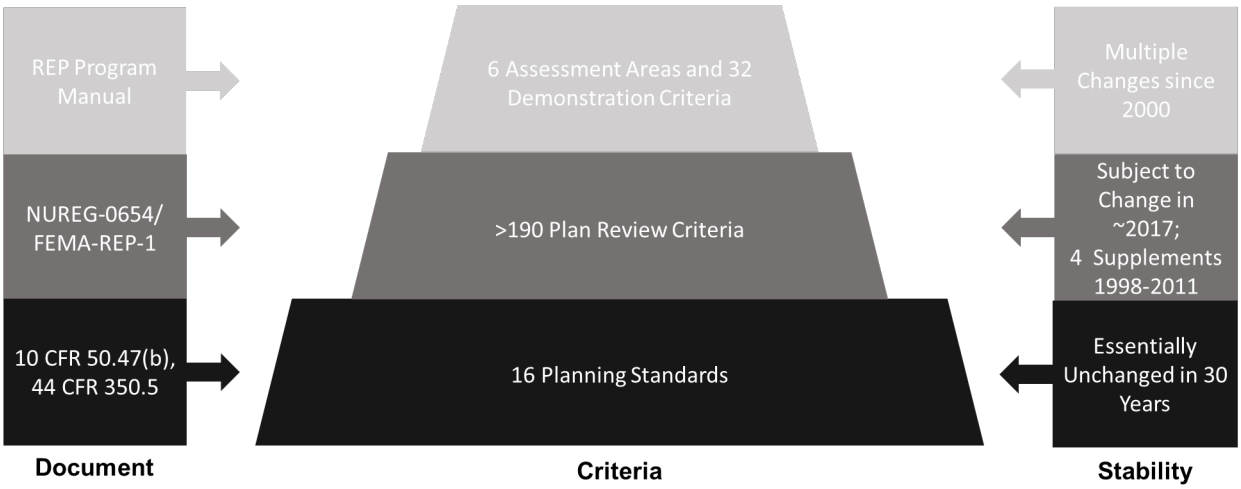

Figure 3. Layers of Interpretation for "Reasonable Assurance" of Offsite Preparedness

The benefit of this structure is that it allows the flexibility to make incremental changes without the time-consuming effort of revising the underlying regulations. For example, FEMA and the NRC have jointly issued four supplements to NUREG-0654. In 2012 FEMA and the NRC announced plans to begin revising NUREG-0654, with the new document to be issued in 2017 (see 77 FR 65700). Also, in response to a multi-year REP Program strategic review, FEMA streamlined and reorganized exercise evaluation criteria for interim use in 2001 (see 66 FR 31342). Two of those criteria were dropped by the time a consolidated REP Program Manual was published in October 2011 and revised in April 2012 and June 2013.

The drawback of the existing layered approach is that it is not transparent. While all of the documents are made publicly available, identifying how compliance or non-compliance with hundreds of separate criteria translates to a single FEMA "reasonable assurance" determination is difficult to communicate. Further, it is unclear what degree of safety the public can expect based on a FEMA determination that a plan and its supporting capability are "adequate."

A potential improvement for oversight of offsite radiological emergency preparedness would be to define objective performance measures and describe their contribution to an overall safety outcome or consequence metric. That metric could involve target values for an averted dose of radiation, a maximum dose and the probability of exceeding it, or (as developed further in this report) a maximum amount of time available to implement a protective action, among other possibilities. While there could be debate on whether or not the target values provide the degree of safety desired, refocusing that debate on health and safety outcomes rather than inputs could enhance public understanding of what is meant by "reasonable assurance."

2.5 ENHANCED FLEXIBILITY IN RESPONSE OPTIONS

Finally, a performance-based oversight system could offer the benefit of greater flexibility. As already noted, not being constrained to comply with requirements that do not directly support public health and safety outcomes may help both OROs and oversight agencies reduce waste

by reallocating resources to more risk-significant activities. For oversight, this may require developing a range of response options dependent on the risk significance of any less-than-target performance, rather than a single menu of options applicable to each and every instance of non-compliance or failure to perform as prescribed.

Also as noted, the flexibility could allow for greater integration and alignment with all-hazards activities.

Yet more important for public health and safety may be that flexibility for OROs in how to respond (i.e., how to achieve a public health and safety performance outcome) could enable greater innovation and learning. Improvements and best practices are more likely to emerge for the RERP community where there is room for OROs to experiment and apply judgment to unique circumstances. A performance-based oversight system focused on outcomes could create even more freedom to foster innovation and improvement in ensuring public health and safety.

3. PERFORMANCE GOALS FOR OFFSITE RESPONSE

The goals for offsite radiological emergency response remain the same regardless of the oversight mechanisms involved. An RIPB oversight regimen should seek to ensure that:

- State and local officials can immediately receive licensee notification of emergency conditions, understand the potential hazard, and alert or activate necessary response capabilities;
- State and local officials can independently assess radiological conditions in support of protective action decision-making (e.g., dose projections, field monitoring);
- State and local officials can make timely protective action decisions (PADs) appropriate to the emergency conditions;
- State and local officials can rapidly alert and inform the public regarding emergency conditions and appropriate protective measures in a way that supports State and local implementation of those measures;
- State and local officials can implement PADs in a timely manner to eliminate or substantially reduce public radiation exposure; and
- All persons in the EPZ are accounted for in PADs, including emergency workers, the non-English speaking populations, persons with access and functional needs, and persons under the care of others in facilities (e.g., schools, prisons, health care facilities, etc.).

4. DESIGN CONSIDERATIONS FOR A REVISED REGULATORY REGIMEN

4.1 STAKEHOLDER ANALYSIS

Successfully implementing any change will require satisfying the needs of the community of stakeholders and giving the stakeholders the opportunity to participate in the development of the change. The NRC's interests in exploring change are reflected in Chapter 2, above. The discussion below reviews some potential interests of the community of stakeholders beyond the NRC (e.g., NRC licensees, State and local governments, the general public, and FEMA) in the current system, along with how those interests may translate to design considerations. All stakeholders are assumed to share an interest in safety.

4.1.1 Nuclear Regulatory Commission Licensees

NRC licensees' stake in ORO oversight is: (a) to maintain their operating license, and (b) to maintain the confidence of surrounding communities in the ability of the licensee and the ORO together to ensure safety in the event of an accident. Licensees also pay fees to fund Federal and, typically, State and local efforts to maintain offsite radiological emergency response preparedness. For NRC licensees, design considerations may be:

- *Stability of Requirements.* The nuclear industry prefers stable requirements. The Nuclear Energy Institute's (NEI) initial 2008 reaction to developing a performance-based oversight regimen was that the current approach had been "successfully implemented for many years." NEI noted that other regulatory changes were underway, and asked that a new approach be considered only after those changes had been implemented (see Nelson 2008).
- *Stability of Results*. NEI also noted that for onsite emergency preparedness programs there were "relatively few issues noted" and these could be addressed in a timely manner (Nelson 2008). Similarly, few offsite deficiencies identified by FEMA lead to enforcement actions by the NRC against licensees. While the nuclear industry has a strong interest in demonstrating the safety of its operations, industry has no direct control over offsite response. Industry likely will not want outcome-oriented performance standards that prove overly stringent, leading to an increase in deficiencies. While transparency is a benefit of objective performance metrics, it also poses a risk.
- *Avoidance of Cost Increases.* The nuclear industry faces strong competition from other power generation sources and faces pressure to contain costs. Industry is unlikely to embrace a new oversight regimen for offsite radiological emergency preparedness if additional costs are required to implement and support it. Providing reasonable assurance based solely on performance demonstrations could require an increase in the number of such demonstrations, and it is as yet undetermined whether the reduction in costs for compliance monitoring (plan reviews, etc.) would offset any increase in demonstration costs.
- *Flexibility and Performance Focus.* Related to stability of requirements, industry has suggested that the requirements be made less prescriptive and more results-focused. "The NUREG [NUREG-0654] is prescriptive in that it defines elements—and in some cases exact methods—for implementation of the Planning Standards. … In order to safeguard document longevity, the [revised] NUREG guidance should be flexible and not overly prescriptive. This flexibility should allow for alternative approaches to achieve the same result and enable the use of evolving technology" (Perkins-Grew 2013).

4.1.2 State and Local Governments

State and local governments influence safety oversight by: (a) providing input into planning and design and (b) complying with the requirements using available resources.[1] Given budget pressures on State and local governments, States have an interest in ensuring the level of funding provided by licensees for radiological emergency preparedness is not reduced due to any savings from efficiency, where needs still remain. State and local governments also must balance requirements for radiological emergency preparedness with preparedness requirements for other hazards. For State and local governments, design considerations may include:

- *Continuity.* Most State and local commenters on possible revision of NUREG-0654 did not call for wholesale change. One commenter, echoed by two others, noted that the "16 planning standards as they currently exist in NUREG-0654 are still applicable" (Mulligan 2013).
- *Streamlined, Rationalized Requirements.* Some comments noted duplicative requirements (e.g., providing information or demonstrations for plan reviews, exercises, and ALCs) or lack of clarity on requirements (e.g., having to provide lists of trainings conducted without an approved training curriculum to evaluate against). See for example Engelhart (2013).
- *Cost Concern.* A new oversight regimen should attempt not to place significantly more burdens (financial, time, or opportunity cost) on State and local government responders, nor reduce the resources available to maintain radiological safety. "The States must prioritize their limited resources to ensure adequate focus on the required items" (Klinger 2013). It is unclear whether cost increases from conducting exercises and drills more frequently would be fully offset by a reduction in compliance costs and in the scope of the exercises (e.g., from large-scale exercises to task-focused drills and demonstrations, emphasizing the most risk-significant tasks).
- *Flexibility.* In commenting on possible revision of NUREG-0654, one State requested "an evaluation and approval process that is flexible enough to apply to future technologies, so that regulatory documents do not have to be revised to allow [their] usage." This State also noted that each site has unique circumstances (Engelhart 2013). Another State pointed out that FEMA's REP Program Manual mentions "alternate forms of demonstration" to meet requirements and requested that a revised NUREG-0654 provide for and discuss these acceptable alternatives (Bear 2013).
- *Input*. Many State commenters on possible revisions to NUREG-0654 stressed the importance of State involvement in defining the oversight requirements. An extension of this may be to expand State input into the determination of oversight assessments, such as allowing States themselves to highlight where potential deficiencies exist and propose corrective actions.

4.1.3 General Public

The general public has mixed views on the safety of nuclear power.[2] To the extent the public equates radiological emergency preparedness with being able to evacuate quickly, growing

[1] States are preempted from regulating radiological safety aspects of NPPs (as opposed to need, reliability, or cost of nuclear power). See Congressional Research Service (2011). Also, State and local governments cannot preclude "reasonable assurance" determinations by opting not to participate in the oversight process per 10 CFR 50.47(c)(1).

[2] See NEI (2012) and Yale (2012) for contrasting poll results on the U.S. public's safety perceptions. NEI reports a September 2012 poll showing 17 percent find plants "unsafe" to some degree. Yale reports a

populations in EPZs and increased traffic congestion on road networks sow doubt. Advocacy groups and public commenters in the environmental impact study process for NPP license renewals often express these doubts in performance terms. They question whether the plan reviews and exercise demonstrations used for "reasonable assurance" determinations actually mean the licensee, ORO, and community could implement an evacuation in time for the EPZ population to be "safe." What the NRC and FEMA mean by "reasonable assurance" may not equate to "safe" in the public's mind and may need to be defined more explicitly. How determinations are made should also be understood, to aid in gaining trust and confidence in the process. Resulting considerations are:

- *No Loss of Useful Information.* Changes to the offsite regulatory regimen should not eliminate the ability to gain information on capability enablers (i.e., plans, organization, equipment, and training) in addition to performance, where performance does not create confidence. Such information may be useful for interpreting performance and developing corrective actions.
- *Transparency.* Any changes made should enhance transparency and the ability to understand the "reasonable assurance" determination.

4.1.4 Federal Emergency Management Agency

FEMA retains responsibility for oversight of State and local OROs' radiological emergency preparedness, in coordination with the NRC. FEMA has explored changes (e.g., the Strategic Review in the late 1990s) and adapted elements of the regimen to address all-hazards imperatives (e.g., adoption of elements of the Homeland Security Exercise and Evaluation Program, or HSEEP). FEMA has an interest in ensuring it can maintain effective RERP-specific oversight within other all-hazards requirements and in seeing the results of its oversight efforts aligned with the NRC's overall oversight process. Considerations include:

- *Balance and Linkage between Onsite and Offsite Emergency Preparedness Oversight.* FEMA has an interest in ensuring the oversight approaches and requirements for onsite and offsite emergency preparedness support are consistent with, and do not undermine, one another.
- *Integration with All-Hazards Policy.* FEMA's RERP oversight must focus on the elements necessary to ensure preparedness specific to the radiological hazard to public health and safety from commercial NPPs. However, FEMA as a whole needs to understand and report to Congress whether the Nation is prepared for all hazards under terms of Presidential Policy Directive 8 and its National Preparedness Goal (DHS 2011a). Where consistency is impractical, quantitative and objective results may be easier to translate from one construct to the other.
- *Stability.* Implementation of changes should not undermine confidence in current "reasonable assurance" determinations.
- *Cost Concern.* In a tight budget environment, FEMA shares an interest with State and local governments in not facing a significantly greater burden (financial, time, or opportunity cost) under a new oversight regimen or a reduction in resources available to maintain radiological safety.

May 2011 poll (shortly following the Fukushima incident) in which 53 percent think of nuclear power as a "disaster" or "bad," compared to 34 percent in 2005.

4.2 PROPOSED CHARACTERISTICS OF A REVISED REGULATORY REGIMEN

Design considerations following from an examination of potential stakeholder interests are provided below.

4.2.1 Transparency in Methodology for Determining Reasonable Assurance

- *Objective Measures of Performance.* To the extent feasible, assessment of offsite radiological emergency preparedness will involve objective measures of performance (and capability as necessary), to include both binary and quantitative measures of reliability and timeliness.
- *Overarching Safety Goal.* Measures ideally would help gauge contribution to an overarching safety goal or goals. The primary goal presented in this document is to ensure that an offsite radiological emergency response is able to ensure public health and safety during a radiological emergency. Although that goal could be expressed in terms of dose averted or received, this paper focuses on accomplishing a sequence of actions in time to avoid or minimize exposure.

4.2.2 Flexibility

- *Focus on Performance.* Oversight will focus on performance demonstrated during drills and exercises, with specificity in the competencies to be demonstrated and standards to judge success.
- *Flexibility of Data Inputs: Use of Non-REP Responses or Exercises as Proxies.* Credit for demonstrated performance in a non-REP context may be given if it can be documented or otherwise validated that performance met or exceeded the relevant performance standard.

4.2.3 Streamlining and Rationalization

- *Focus on Risk-Significant Elements.* Oversight will focus on elements most critical to ensuring adequate protection of public health and safety during the plume release phase of a radiological event.
- *Differential Levels of Scrutiny Based on Performance.* Performance demonstrations may be supplemented with self-certified information including capability indicators (see 6.3.2, 6.5, and Appendix B). However, reviews of the adequacy of capability elements (plans/procedures, organization/staffing, training, facilities/equipment) will occur only if adequate performance cannot be demonstrated.

4.2.4 Resource Neutrality

- *No Significant Net Change*. Where resource information is available, the oversight program will be designed to involve approximately the same level of effort as is currently required. The focus and allocation of that effort will shift from compliance reviews of plans and training to demonstrations of task performance, and from all elements of overall RERP capability to those most critical to public health and safety. This will require more frequent demonstration of capabilities within a performance cycle through tightly scoped functional exercises and drills, rather than reliance on a large-scale biennial exercise.

4.2.5 Adequacy of Available Information

- *Alternative, Proxy Indicators of Performance*. While focus of oversight may shift to demonstrations of performance (i.e., what capabilities can actually *do*), it may not be feasible to perform some tasks in an exercise or perform them fully. For example, the scope of an exercise will not allow for actually monitoring 20 percent of the plume exposure EPZ population over 12 hours. Where necessary, proxy quantitative indicators of capability may be substituted for performance indicators. Indicators of potential challenges, such as 511 information on number of days on which major evacuation routes experienced delays, may also be considered if obtaining the information can be streamlined.

4.2.6 Other Considerations

- *Diversity of Scenarios*. Performance demonstrations would continue to occur under a variety of scenarios, to avoid rote response and the possibility of "gaming" the oversight system. Performance demonstrations may include additional scenarios or variety in exercise design, including, but not limited to, exercising real weather conditions, exercising at different times of day, or reacting to a sudden radiological release without a gradual escalation of events.
- *Transition*. The new regimen would replace the existing regimen and its requirements.[3] Some transitional testing or pilot phase with selected licensees and State and local OROs likely would be required before adoption of the new regimen. Such a pilot could be conducted under the "alternative approaches and methods" provisions described in FEMA's REP Program Manual.
- *State Input*. Following HSEEP principles, the new regimen will encourage inclusion of State ORO self-critiques for after-action reports (AARs). Depending on the level of performance in a given demonstration, analysis and corrective action may remain internal to the ORO, an input from the ORO for FEMA review, or a FEMA-led corrective action plan with State ORO input. States already perform some self-assessment for FEMA in ALCs and, in the all-hazards context, State Preparedness Reports (SPRs). Additionally, OROs that identify a weakness in performance during the demonstration of a capability may be able to re-start the performance demonstration without penalty.

[3] This would be in contrast to the initially proposed approach for onsite oversight in the NRC's "Elements of a Performance Based Emergency Preparedness Regulatory Regimen" (ADAMS Accession Number ML080440163), p. 3. The initial thought was that a new performance-based approach for onsite oversight could be made voluntary. However, maintaining two regimens in parallel permanently could be burdensome for FEMA to implement. It could be confusing for OROs seeking to comply. It could also undermine public confidence in "reasonable assurance" determinations under at least one if not both of the regimens.

5. ELEMENTS OF RERP AND THEIR RISK SIGNIFICANCE

5.1 RADIOLOGICAL EMERGENCY RESPONSE LOGIC

Defining a performance-based oversight system for RERP requires an understanding of what tasks the ORO must perform to protect public health and safety. This section describes a simplified, high-level logic for radiological emergency response to frame RERP oversight.

Radiological emergency response relies on recognition of an emergency by the licensee. Under Appendix E to 10 CFR 50, "nuclear power reactor licensees shall establish and maintain the capability to assess, classify, and declare an emergency condition within 15 minutes after the availability of indications to plant operators that an emergency action level has been exceeded and shall promptly declare the emergency condition as soon as possible following identification of the appropriate emergency classification level." There are four emergency classification levels per NRC Bulletin 2005-02:

- *Notification of Unusual Event*. Events are in process or have occurred that indicate a potential degradation of the level of safety of the plant or indicate a security threat to facility protection. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs.
- *Alert.* Events are in process or have occurred that involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable life-threatening risk to site personnel or damage to site equipment because of intentional malicious dedicated efforts of a hostile act. Any releases are expected to be limited to small fractions of the Environmental Protection Agency's (EPA) Protective Action Guideline (PAG) exposure levels.
- *Site Area Emergency*. Events are in process or have occurred that involve an actual or likely major failure of plant functions needed for protection of the public, or involve security events that result in intentional damage or malicious acts that could lead to the likely failure of, or prevent effective access to, equipment needed for the protection of the public. Any releases are not expected to result in exposure levels that exceed EPA PAG exposure levels beyond the site boundary.
- *General Emergency.* Events are in process or have occurred that involve actual or imminent substantial core degradation or melting with potential for loss of containment integrity or an actual loss of physical control of the facility due to compromised security. Releases can be reasonably expected to exceed EPA PAG exposure levels offsite for more than the immediate site area.

Under Appendix E to 10 CFR 50, at IV.D.3, licensees also must have the capability to notify responsible State and local governmental agencies (i.e., the ORO) within 15 minutes after declaring an emergency. If the EPA PAG is expected to be exceeded, the notification must be accompanied by a protective action recommendation to the ORO.

The ORO must be able to receive the licensee notification and understand the nature of the emergency declared by the licensee. This is the beginning of offsite radiological emergency response, which proceeds in conceptual phases as shown in **Table 1** on the next page.

Exposure concerns and appropriate protective actions evolve over the course of the response, as shown in **Table 2** on the next page. However, radiological response is *initially* focused on avoiding the population's exposure to external radiation from any plume, and from inhalation of material in that plume.

Table 1. Phases of a Radiological Release
(EPA 1992: 1-2)

Early Phase (During Event to a Few Days After Event)	**Intermediate Phase** (Follows Early Phase, After Incident Brought Under Control)	**Late Phase** (Ends When Remediation Is Complete)
• PADs will be made with only preliminary situational understanding and data • Actions should be taken quickly and modified as additional data become available • Considerations: Plume exposure, short-term exposure to deposited materials, inhalation exposure	• Typically overlaps with early and late phases • Considerations: Additional relocation or removal of public vs. allowing to return home, food and drinking water	• No longer "emergency response" • Considerations: cleanup and recovery, decontamination, return and reentry

Table 2. Protective Actions and Exposure Pathways of Concern, by Phase
(EPA 1992: 1-4)

Phase	**Potential Exposure Pathways**	**Possible Protective Actions***
Early	External Radiation from Facility	Sheltering, Evacuation, Access Control
Early	External Radiation from Plume	Sheltering, Evacuation, Access Control
Early	Inhalation of Material in Plume	Sheltering, Administration of Potassium Iodide (KI),[+] Evacuation, Access Control
Early/Intermediate	Contamination of Skin and Clothes	Sheltering, Evacuation, Decontamination of Persons
Early/Intermediate/Late	External Radiation and Ground Deposition of Activity	Evacuation, Relocation, Decontamination of Land and Property
Intermediate/Late	Ingestion of Contaminated Food and Water	Food and Water Controls
Intermediate/Late	Inhalation of Re-Suspended Activity	Relocation, Decontamination of Land and Property

* While these are logically possible protective actions to reduce exposure via a given pathway, some are more relevant in practice. For example, access control would be the primary means to protect against external radiation from the facility. Decontamination of persons would be the primary means to address contamination of skin and clothes. Evacuation may serve to avoid exposure through ground deposition of activity, but generally relocation and decontamination are most relevant once ground deposition has been assessed.
[+] Note that 50 CFR 10.47(b)(10) requires "consideration" of KI as a "supplement" to protective actions involving sheltering and evacuation, "as appropriate." The NRC does not require or recommend KI, but recognizes the prerogative of States to decide this question.

Whatever the licensee's recommendation, responsibility for making the protective action *decision*—PAD—rests with the ORO. Because the ORO has this responsibility, the ORO must be able to independently assess the situation in order to decide what measures are most appropriate to protect the public health and safety from excessive radiation exposure. The two primary options in the early phase are evacuation or shelter-in-place, although States may supplement these with KI to protect against uptake of radioactive iodine in the thyroid.[1] Major considerations include:

- *Incident Progression and Plant Conditions*. An emergency's classification may evolve. The Notice of Unusual Event can become an Alert if "further degradation of safety systems occurs," and that degradation could progress to failure, and then loss of

[1] Evacuation and shelter-in-place are not mutually exclusive. In some scenarios, it may be appropriate for some segments of the population to shelter in place first and then evacuate. For example, a plume may travel too quickly for evacuation to be accomplished in advance of arrival. People may shelter in place, then evacuate to reduce exposure to deposited materials.

containment integrity. If notified of a condition other than General Emergency, OROs are faced with deciding whether any precautionary actions should be implemented and communicated for any part of the potentially affected population.[2] OROs rely on information from licensees regarding current and expected plant conditions, and the likely rate of change in those conditions.

- *Time until Arrival of Plume vs. Evacuation Time Estimate (ETE).* Evacuation will protect the public from receiving a significant dose from any airborne release if it can be completed before arrival of the plume. If evacuation of an area cannot be completed in time to avoid an unsafe dose, shelter-in-place may be preferable initially.
- *Duration of Release vs. Shelter Protective Factors.* Sheltering will reduce the gamma exposure rate from deposited materials, but it is not a suitable protective action for this pathway for a long-duration exposure. Sheltering will eventually be followed by evacuation out of the EPZ for the affected population in the plume exposure pathway.

Any PAD must be supported by instructions to the population segments expected to implement the PAD, as well as by the mobilization of responders who assist in its implementation (e.g., to support traffic management, access control, etc.).

Once people are in a place safe from external radiation from the plume or inhalation of material in the plume, radiological emergency response focuses on attending to their needs and managing their risks of additional exposure and contamination, to stabilize the situation. Areas of safety—and restricted areas—may be better defined over time as radiological monitoring information becomes available. Over time, radiological emergency response efforts focus on reclaiming more of the impacted area for unrestricted use, where achievable, and shift to community recovery.

5.2 RADIOLOGICAL EMERGENCY RESPONSE TASKS AND RISK SIGNIFICANCE

Figure 4, on the next page, shows the high-level tasks described in the foregoing section and an assessment of their risk significance for public health and safety.

The most risk-significant tasks for offsite radiological emergency response focus on avoiding the population's exposure to the plume and the material it contains. Collectively, these tasks can be highly time-sensitive, depending on the scenario. Successful performance of these tasks reduces the challenge of managing subsequent risks of exposure and contamination, such as through access control or decontamination of individuals.

Managing those subsequent risks, along with reception and screening of the evacuated population, have medium risk significance. They address marginal exposure risks after the population is safe from the danger posed by the plume and material deposited on the ground.

Late phase actions focused on cleanup and recovery have low risk significance because immediate health and safety needs of the population have been addressed at this stage. Return

[2] NUREG/CR-6953 concluded that "precautionary efforts during Site Area Emergency are prudent." See pp. ix-x, 25, 64. The study noted that some instances could warrant early closure of schools, parks, government facilities, etc., at the Site Area Emergency, and early notification of the general population within the 10-mile EPZ to prepare for evacuation.

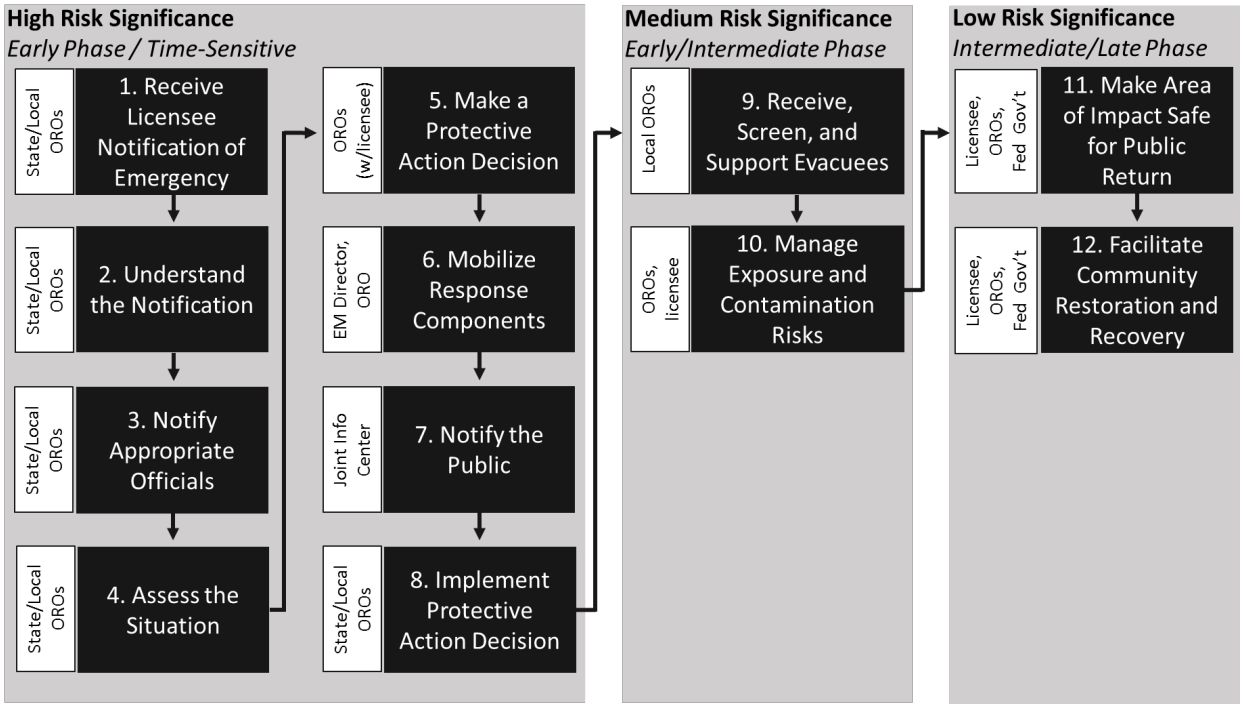

Figure 4. Radiological Emergency Response Tasks and Risk Significance

to the impacted area is not a requirement for individual physical health and safety, nor is broader community recovery, although both may be important psychologically.

This tiering of tasks by risk significance for public health and safety informs which tasks receive more focused and frequent oversight under a revised oversight system, as will be discussed in the next chapter. The remainder of this chapter provides more description of these high-level tasks, grouped by their risk significance.

5.3 HIGH RISK SIGNIFICANCE TASKS

- *Receive Licensee Notification of Emergency.* This response task requires OROs to have sufficient communications systems in place to receive messages from the NPP in the event of an emergency. OROs must also have sufficient staffing at all times to be able to receive and process information through those communications channels. The ORO should have a notification and warning point that receives the information. The notification and warning point may be a 911 Center, a duty officer, a designated communications center, or any other officially designated channel that can receive and disseminate information.
- *Understand the Notification.* ORO decision-makers, as well as the ORO notification and warning point, should be sufficiently trained in REP to understand the current emergency classification system (Notification of Unusual Event, Alert, Site Area Emergency, General Emergency), and the potential implications of an emergency notification. Based upon existing plans and procedures, OROs must also be able to take the appropriate next steps to notify other responders and begin incident response.
- *Notify the Appropriate Officials.* The notification and warning point begins incident response by contacting previously identified decision-makers from State and local OROS. The decision-makers involved may vary depending upon existing plans and

procedures. In the event that a primary contact cannot be reached, secondary or tertiary contacts should be established to enable incident response to proceed in a timely manner.

- *Assess the Situation.* Once necessary decision-makers and OROs have been activated, an identified technical advisor or public health expert (who is trained to interpret the information being provided from the facility) will take the lead in processing information received from the plant, as well as information observed by the OROs, and synthesize it into an accurate assessment of the situation given the current information. OROs must be able to produce a projection of the plume based upon wind and weather conditions, and use this plume projection to identify the at-risk population. OROs should also demonstrate an established capability to monitor the environment outside the facility boundary for any radiation that may have been released above ground. The technical advisor must demonstrate the ability to develop a protective action recommendation based on an understanding of information available.
- *Make a Protective Action Decision.* OROs must decide the best way to protect the public given the nature of the incident and the resources available to them. The licensee provides protective action recommendations to the ORO, which may then be accepted or revised by the ORO. Protective action decision-making typically centers on identifying which zones within the 10-mile EPZ to evacuate and which to shelter-in-place. Plant conditions, weather and wind direction, and ETEs for the potentially affected area all factor into the decision. Use of KI is another consideration for protective action decision-making, when applicable.
- *Mobilize Response Components.* In assessing the situation and determining required protective actions, OROs should gain a better understanding of the response components that will need to be involved in implementing the PAD and follow-on activities. OROs will need to mobilize firefighters, police, emergency medical technicians (EMTs), and other response elements. Sufficient response personnel should be available to fulfill requirements of the PAD. Responders may be called to a variety of subtasks, including traffic control points and activation of reception facilities and decontamination stations. Mobilization may be concurrent with or following protective action decision-making.
- *Notify the Public.* Once a PAD has been determined, the public must be informed of the steps that they should take in order to ensure their own safety. Notification of the public is a responsibility of the State and local OROs. OROs must be able to alert and disseminate a prompt message to the EPZ population that there is an emergency (e.g., with sirens and Emergency Alert System (EAS) messages). The method of dissemination is less important than achieving coverage of the population. Any such prompt message must be followed quickly by a clear, coherent, and complete message providing instructions for implementing the PAD. A Joint Information Center should be established so that the licensee and ORO may collaborate and deliver a unified message.
- *Implement Protective Action Decision.* State and local OROs should implement the PAD in an efficient and timely manner. ORO primary responsibilities for facilitating evacuation include traffic management and ensuring transportation for persons requiring assistance. The ORO may seek to confirm implementation of the PAD. PAD implementation should account for all persons in the 10-mile EPZ, including emergency workers, non-English-speaking population, persons with access and functional needs, and persons under the care of others in facilities (e.g., schools, prisons, health care facilities, etc.).

5.4 MEDIUM RISK SIGNIFICANCE TASKS

- *Receive, Screen, and Support Evacuees.* Once evacuation has been initiated, local OROs must ensure that evacuees' basic needs are met. A first need is screening individuals to determine if decontamination is necessary; contaminated individuals are not allowed into public shelters. Counties should have sufficient access to shelters to be able to accommodate displaced individuals from the plume zone in the short term. Local OROs should also have sufficient stockpiles of food and water to feed evacuees in the short term. Where an ORO cannot meet these functions on its own, it should have resource sharing agreements in place with other jurisdictions.
- *Manage Exposure and Contamination Risks.* Local OROs must be prepared to decontaminate individuals and their belongings as they evacuate the EPZ. Local OROs must also be able to decontaminate response vehicles and equipment that exit a radiation control zone. State and local OROs must also restrict access to evacuated areas until they are deemed safe for reentry. Finally, OROs may seek to mitigate the potential for ingestion of contamination by having livestock placed on stored feeds and uncontaminated water, and restricting movement of animals and agricultural products.

5.5 LOW RISK SIGNIFICANCE TASKS

- *Make Area of Impact Safe for Return.* This function calls for OROs to be able to determine, for specific sites and their intended uses, that an acceptable level of radioactivity has been achieved before the sites can be reopened for return. This may require site decontamination including the removal of topsoil. *This response task will not be evaluated in the oversight regimen.*
- *Facilitate Community Restoration and Recovery.* Once the goal of ensuring public health and safety has been met, the OROs must facilitate the return and recovery of displaced individuals and businesses. This may include financial assistance, construction assistance, or other assistance as needed to return a displaced population to normal functionality. The Federal Government may provide technical and other assistance during this time. *This response task will not be evaluated in the oversight regimen.*

A risk-informed oversight regimen allocates resources and attention on tasks that bear most directly on ensuring public health and safety. Return and restoration are important, but presuppose an already healthy and safe population that must make choices about long-term and less acute risks. Therefore, this framework does not provide for performance-based oversight of these tasks, beyond requiring their periodic consideration and discussion by OROs. OROs evaluate these tasks internally and may address them more frequently than required.

6. PERFORMANCE-BASED OVERSIGHT SYSTEM FOR RADIOLOGICAL EMERGENCY RESPONSE PROGRAM

If a risk-informed oversight system focuses on the RERP elements most critical to the protection of public health and safety, a performance-based oversight system focuses most on whether those elements *do* what is needed to protect public health and safety. This is different from whether there are plans to perform tasks, an adequate quantity and/or quality of personnel and equipment to perform tasks to the extent and level required, or an organization of those resources. These are elements of *capability*—being able to do. The question of interest for performance-based oversight is whether the capability performs.

This chapter outlines a system for developing "reasonable assurance" that ORO RERP capabilities perform both reliably and timely, as appropriate. It addresses:

- *Decomposition of High-Level Tasks.* Tasks presented in Chapter 5 above are divided into subtasks to facilitate observation, analysis, and measurement.
- *Methods, Frequency, and Conditions for Performance Demonstration.* Methods for OROs to demonstrate subtask performance are described, where possible and appropriate. Given risk significance of the parent tasks, frequency of required demonstration is also defined preliminarily. Final determination of specific frequencies and methods should be subject to a more detailed risk assessment in the future, to flesh out the conceptual framework provided here.
- *Performance Indicators and Acceptable Performance*. Preliminary measures are defined for acceptable or target performance of subtasks. Reliance on existing measures is discussed.
- *Aggregate Timeliness of Performance*. The report provides a tentative construct for rating overall performance on timeliness for protective actions. This is critical for an intelligible reasonable assurance determination.[1]
- *Alternative, Proxy Indicators for Performance*. For subtasks not amenable to performance demonstration, alternative metrics are proposed.
- *Issue Handling and Differential Levels of Oversight*. The report proposes how to identify and manage issues of less-than-acceptable performance, and how the proposal may enhance consistency of issue identification. The proposed system provides for gradations of unacceptable performance.
- *Enhancement of Risk Focus*. The report describes how focus on risk-significant elements should increase under a revised oversight process.

6.1 DECOMPOSITION OF TASKS INTO SUBTASKS

Each task identified in Chapter 5 of this paper consists of multiple subtasks. However, to streamline oversight, only subtasks necessary and critical for preservation of public health and safety are included in task "checklists." The complete subtasks and checklists, including proposed performance indicators for the subtasks, are in Appendix A. Each subtask is organized in a similar manner to NEI 99-02, which discusses onsite facility preparation and response. Each subtask has a name, a definition, measurement criteria (including data reporting elements and clarifying notes), and an initial effort at calculating the measurement.

[1] Projected dose could also be the basis for an overall assessment of performance, but that option is not developed in this paper.

Tasks and subtasks that occur in the early steps of the emergency response process tend to be simpler in scope. The focus of activity shifts from inward and management-focused to outward and community-focused as an incident progresses. As a result, emergency response performance becomes more complicated and difficult to measure.

6.2 METHODS AND FREQUENCY OF PERFORMANCE DEMONSTRATION

Performance is best tested in exercises and drills (and real-world response), using objective, measurable standards of performance where feasible. Scheduled exercises will continue to operate in eight-year cycles, incorporating a number of scenarios and conditions to test OROs' performance of tasks.

A key consideration for a performance-based oversight regimen is how often and under what conditions performance must be demonstrated in order to provide reasonable assurance that the ORO can be relied upon to perform the task adequately in a variety of emergency situations. Success in a single demonstration may not be an adequate basis to judge. For example, such a demonstration may have involved the one person on one shift who is highly skilled in a task, rather than a less adept individual on another shift who may require training or review of a procedure. There will need to be multiple communications tests, drills, and exercises, at different times of day, and sometimes with limited or no notice, in order to provide a more accurate assessment of an ORO's RERP performance. Emphasis would shift from large-scale exercises with long lead times and broad scope, to more limited functional exercises, task-focused drills, and communications tests.

To determine the ideal minimum frequency for these performance demonstrations may require more detailed analysis. In the interim, this paper proposes that a biannual (i.e., twice-yearly) functional exercise requirement focused on PADs and public messaging will generate an adequate number of observations for reasonable assurance in these task areas, with additional communications tests and drills for field teams.

Generally, tasks with high risk significance would be tested more frequently than tasks with lower risk significance. For oversight purposes, this generates more observations on the tasks most critical to ensuring public health and safety. Yet as an additional benefit, it requires OROs to spend relatively more time testing and maintaining proficiency in the most risk-significant tasks, as well. This should increase the reliability of the ORO and thereby reduce risk.

Practically, the desired frequency of demonstration must be balanced with the cost of demonstrating a specific subtask. For example, a large registration or decontamination drill that requires significant resources and volunteer participation should occur less frequently than a simple communications drill of equal risk significance that might require only a phone call. This is of particular importance if one goal for implementation of any new oversight regimen is not to unduly increase the existing resource burden of oversight.

Table 3 on the next page shows a preliminary, qualitative approach for the determination of frequencies of subtasks, based on risk significance and resource requirements. **Table 4** (on the following pages) shows the proposed methods of and frequency for demonstrating performance of the subtasks. Methods include communications and notifications tests in addition to drills (performance of tasks regardless of scenario) and exercises (performance of tasks within the context of a given scenario). Frequencies proposed in this table are preliminary and may merit more detailed study. A final determination should require capabilities to be exercised frequently enough to generate confidence that the ORO would be able to perform a subtask during a real-world emergency, and retain the skill between demonstrations.

Table 3. Proposed Frequency of Subtask Demonstrations Based on Resource Requirements and Risk Significance			
Resource Requirements for Single Demonstration of Subtask	**Risk Significance**		
	High	**Medium**	**Low**
High	Quadrennially	Cycle	Internally evaluated by ORO at ORO's discretion
Medium	Biannually	Annually	Internally evaluated by ORO at ORO's discretion
Low	Quarterly/Monthly	Biannually/Quarterly	Internally evaluated by ORO once per cycle

Table 4. Methods for and Frequency of Subtask Demonstrations			
Task	**Subtask**	**Demonstration Type**	**Recommended Minimum Frequency**
Receive Licensee Notification of Emergency	Primary Communications	Comms Test	Monthly
	Secondary Communications	Comms Test	Monthly
	24-Hour Warning Point	Comms Test	Monthly
	Alternate Communications Center	Exercise	Quadrennially
Understand the Notification	Message Comprehension	Drill (may be combined with comms test)	Monthly
	Secondary Official Message Comprehension	Drill (may be combined with comms test)	Monthly
Notify the Appropriate Officials	Timely Notification	Comms Test/Within Exercise	Monthly
	Functional Communications	Comms Test	Monthly
Assess the Situation	Radiological Expertise	Within Exercise	Biannually
	Contact Licensee	Within Exercise	Biannually
	Monitor Radioactivity	Drill	Quarterly
	Weather Evaluation	Within Exercise	Biannually
	Plume Mapping	Within Exercise	Biannually
	Risk Mapping (Dose Projection)	Within Exercise	Biannually
Make a Protective Action Decision	Consult with Experts	Within Exercise	Biannually
	Make Protective Action Decision	Exercise	Biannually
	Road Mapping	Within Exercise	Biannually
	Evacuation Mapping	Within Exercise	Biannually
	Shelter-in-Place Mapping	Within Exercise	Biannually
	KI Mapping	Within Exercise	Biannually
Mobilize Response Components	Contact Emergency Responders	Comms/Notification Test	Quarterly
	Activate Responders	Mobilization Drill	Quadrennially
	Response Support	Drill or Within Exercise	Quadrennially
Notify the Public	Mass Notification	Exercise	Biannually
	Develop Follow-On Instruction Message	Exercise	Biannually
	Notification of Non-English-Speaking Population	Exercise	Biannually
	Establish Joint Information Center	Exercise	Biannually
	Special Needs Populations	Exercise	Biannually
Implement Protective Action Decision	Evacuation	N/A	N/A
	Shelter-in-Place	N/A	N/A
	KI Distribution	N/A	N/A
	Emergency Worker Protection	Exercise	Biannually

Receive, Screen, and Support Evacuees	Reception Center Operation	Drill	Annually
	Radiological Monitoring	Drill	Annually
	Register Evacuees	Drill	Annually
	Congregate Care	Drill	Cycle
Manage Exposure and Contamination Risks	General Decontamination	Drill	Annually
	Emergency Worker Decontamination	Drill	Annually
	Evacuation Zone Access Control	Drill	Annually
	Secure Contaminated/Restricted Zones	Drill	Cycle
	Nuclear Facility Access Control Support	Drill	Cycle
	Identify Agricultural Contamination	Within Exercise	Annually
	Stored Feed Advisories	Within Exercise	Annually
Make Area of Impact Safe for Public Return	N/A	Exploratory/Ungraded Tabletop Exercise (internally evaluated by ORO)	Cycle
Facilitate Community Restoration and Recovery	N/A	Exploratory/Ungraded Tabletop Exercise (internally evaluated by ORO)	Cycle

6.3 PERFORMANCE INDICATORS AND ACCEPTABLE PERFORMANCE

6.3.1 Concepts for Performance Indicators

Following the determination of subtasks, objective performance measures were developed where possible for each subtask. These are available in Appendix A. Three types of measures were used:

- *Activity or Process Measures.* Process measures assess the performance of a process or activity (i.e., whether the ORO was able to perform a given task). For example, did the ORO's communications center answer when contacted?
- *Output Measures.* Output measures are assessments of the results of an activity or process that can be measured quantitatively. Quantitative output measures may be framed to give pass-fail determinations by asking if the ORO produced the expected output *x* for a given subtask. For example, did the ORO contact over x percent of farmers in the ingestion pathway EPZ with a stored feed advisory?
- *Efficiency or Time-Based Measures.* These measures assess how quickly an ORO was able to perform a subtask, or how much output the ORO was able to achieve in a unit of time. For example, did the ORO generate a message for delivery to the public within 15 minutes of notification of an emergency? Or, was the ORO's evacuee screening throughput in one hour adequate to screen x percent of the EPZ population in 12 hours?

Because the focus is on performance, the measures do not reference compliance with plan provisions. Measures focus solely on achieving a defined output or outcome. To address reliability, several of the measures are extended by requiring frequent measurement over time (e.g., monthly communications tests are successful over x percent of the time). Proposed thresholds are not included for all indicators, and in many cases the development of appropriate threshold levels will require additional study.

6.3.2 Modification of Existing Radiological Emergency Preparedness Program Criteria

FEMA's REP Program Manual (FEMA 2013f) offers multiple measures and criteria to test compliance with the 16 existing planning standards. Most are not quantitative and rely on qualifiers such as "timely" or "appropriate." Exceptions to this include:

- *Assessment Subelement 1.d.1.* At least two communications systems are available and at least one operates properly.
- *Assessment Subelement 4.b.1.* ORO can field at least two field monitoring teams.
- *Assessment Subelement 5.a.1.* Primary alert and notification covers essentially 100 percent of the EPZ.
- *Criterion 5.a.4.* FEMA and the NRC recommend that OROs and operators establish means that will reach those in approved exception areas within 45 minutes once the initial decision is made by authorized offsite emergency officials to notify the public of an incident.
- *Criterion 6.a.1.* Staff responsible for the radiological monitoring of evacuees must demonstrate the capability to attain and sustain, within about 12 hours, a monitoring productivity rate per hour needed to monitor the 20 percent EPZ population planning base. The monitoring sequences for the first six simulated evacuees per monitoring team will be timed by the evaluators to determine whether the 12-hour requirement can be met.
- *NUREG-0654 Criterion I.9.* Each organization shall have a capability to detect and measure radioiodine concentrations in air in the plume exposure EPZ as low as 10^{-7} microcuries per cubic centimeter (µCi/cc) under field conditions.

Criteria from the REP Program Manual were adapted in two ways.

First, some REP Program Manual criteria required only minor changes in wording and recombination to support a subtask. For example, a number of criteria address the ability to identify contamination in the environment. These include requirements for evaluators to review calibration logs, review use of approved equipment, ensure the correct amount of equipment, ensure the correct number of responders, and conduct tests suitable to measure radioiodine concentrations in the environment. While all of these indicators may be important, proposed measures focus on final performance. The adapted measure reads:

> ORO must be able to activate and provide field monitoring teams at random times over a given period of time. To measure this, a series of unannounced tests must be performed, in which the ORO is required to provide at least two offsite monitoring teams with capability, equipment, and knowledge to accomplish a reading. During demonstration, the ORO should be required to detect elevated levels of radioiodine concentrations in the air to an amount as low as 10^{-7} µCi/cc within one hour of notification, even with interference from noble gases and background radiation.

Secondly, and more commonly, quantitative measures were proposed for areas FEMA currently assesses qualitatively. These measures were also framed in terms of performance rather than compliance with plan provisions. These include many measures related to activities conducted in the Emergency Operations Center (EOC), such as mapping, procuring expert advice, or implementing resource agreements.

An initial review of the REP Program Manual seeking ideas for both potential performance measures and capability indicators is in Appendix B. The proposed measures in Appendix A are a later evolution of this initial review; Appendix B documents consideration of the existing criteria.

6.4 AGGREGATE TIMELINESS OF PERFORMANCE

The tasks, subtasks, and performance indicators proposed would simplify the existing oversight process while refocusing it on performance. To the extent the tasks and subtasks represent the most necessary and critical actions to be performed for protecting public health and safety, failure to perform any task at a target level should trigger action, up to and including reconsideration of "reasonable assurance." Section 6.6, below, describes how the proposed RERP oversight system would define and handle issues of less than acceptable performance on task areas.

However, subtask performance is measured in different ways (timeliness, reliability on multiple trials, binary yes/no output measures). Those measurements can be combined qualitatively to produce a bottom-line judgment of reasonable assurance. Yet without a single unifying metric, that bottom line may remain difficult to communicate effectively to the public and other stakeholders, including OROs and licensees seeking to enhance performance.

The bottom line for public health and safety in RERP is whether, and to what extent, RERP efforts can ensure members of the public avoid receiving *any* dose of radiation as a result of a radiological emergency or, failing that, any dose in excess of accepted PAGs regarding what would constitute an unhealthy dose. However, as suggested in **Table 4** above and discussed more fully in Section 6.5 below, performance on the most important element of RERP—implementation of the PAD—is the most difficult to measure.

6.4.1 Construct of Problem

As discussed in Section 5.1, PADs depend on consideration of time. **Figure 5** illustrates that for protective actions to be successful in avoiding exposure, the sequence from licensee notification of emergency, through making a PAD, notifying the public of the PAD, and implementing that PAD, must take less time than estimated for arrival of the plume at the zone for which protective actions are being considered.

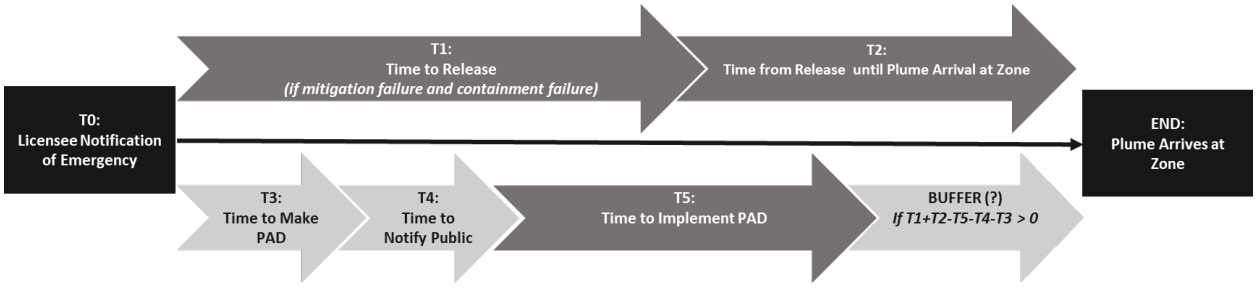

Figure 5. Time for Protective Action Decision-Making and Notification of the Public

As shown in **Figure 6**, below, zones for development of protective actions within the EPZ are defined by rings of two, five, and ten miles from the plant, which are then segmented.

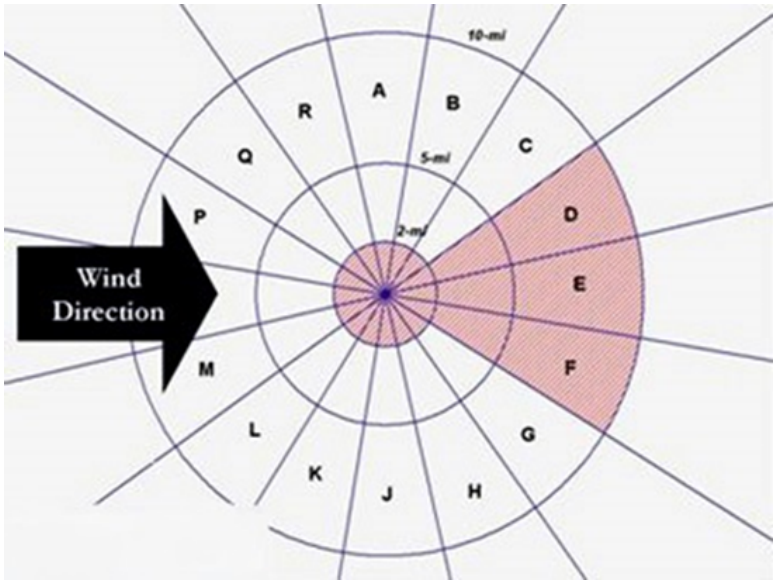

Figure 6. Emergency Response Planning Areas in EPZ

Source: Sorenson and Vogt (2006)

Although **Figure 6** gives the "ideal" zone arrangement, real-world zones are defined by streets, landmarks, and other easy-to-communicate features.[2] Usually in a General Emergency, the appropriate PAD is to evacuate the two-mile ring and people living in the five-mile zone(s) downwind and slightly to either side of the projected path of the release. The need to evacuate portions of the EPZ beyond five miles is assessed as the incident progresses. This is called "keyhole" evacuation. However, NUREG-0654/FEMA-REP-1, Rev. 1, Supplement 3 indicates that in a rapidly progressing incident, shelter-in-place could be the appropriate initial strategy for the two-mile ring and five-mile zones where the ETE exceeds a predetermined duration.

6.4.2 Assessing Timeliness of Protective Action Decision-Making and Public Notification

Assessing OROs' aggregate timeliness would occur in exercises. Focus of observation would be on the time to make a PAD and the time to notify the public of the PAD *for each zone of the EPZ potentially affected by the scenario*.

In order for this not to be rote and automatic, scenarios must be varied and not known to players beforehand. In an eight-year cycle, scenarios would include at least one hostile-action-based incident, one scenario not progressing to a release (but potentially requiring a PAD), and one rapidly progressing emergency. The other scenarios would involve varied source terms. Additionally, real weather would be used. Extent of play would involve only EOC personnel, not field elements, given the flexibility required. The focus would be on decision-making and crafting appropriate messages. Extent of play would need to encompass multiple hours (at least four) to account for possible changes in wind direction.

ORO players would have control over the light-shaded elements in **Figure 5**: their decision time and notification time to the public. OROs would make decisions for the two-mile, five-mile, and

[2] For an example, see Coates and Hines (2012).

ten-mile rings. Decisions and messages would need to be appropriate. (Other subtask indicators and requirements would be addressed in the exercise, although the focus here is on timeliness.)

The scenarios would determine time to release (although the exact time would not be known to players initially). Weather conditions would determine time from release to arrival of the plume. Existing ETEs would be used for the potentially affected zones.

6.4.3 Options for Assessing Results

Timeliness of the PAD process would be assessed against the specific scenario conditions. Success would involve having appropriate decision-making and notification occur with enough time to leave a buffer in all scenario conditions. Ability to do this consistently would add to "reasonable assurance" regarding RERP; results could be combined with assessment of the licensee's ability to meet its requirements for notification and protective action recommendations in a timely manner, to aid in overall "reasonable assurance" regarding preparedness to protect public health and safety.

A RIPB RERP oversight system could also include an overall timeliness metric for the critical path in ensuring public health and safety: the sequence of activities from receiving licensee notification to implementing the PAD.

Although a standard "design basis" decision and public notification time for all sites and scenarios may be desirable, it is likely infeasible, particularly if it is to ensure decision-making and public notification can address the worst case. Currently NUREG-0654/REP-1, Rev. 1, recommends that planning not address a single accident sequence. Consider that such a design basis might consist of:

- *Time to Release.* This could be one hour, as given for rapidly progressing emergencies in current guidance (see NUREG-0654/FEMA-REP-1, Rev. 1, Supplement 3, p. 9).[3]
- *Time to Arrival.* Per the National Renewable Energy Laboratory's Wind Maps, average annual wind speeds in the U.S. at 30 and 80 meters do not exceed 10 mph. Time to arrival at the two-to-five-mile ring would then be 15 minutes, and at the five-to-ten-mile ring would be 30 minutes.
- *Worst-Case ETE.* From a set of ETEs available in 1981, NUREG/CR-1856 gives a maximum permanent population evacuation time to evacuate the 10-mile EPZ under adverse conditions of approximately 16 hours (the 75th percentile case was six hours). The 2007 NUREG/CR-6953 said these ETE ranges were still applicable.[4]

If this were the design basis, protective action decision-making and notification of the public could occur instantaneously—and initial guidance would still be to shelter-in-place, even for ETEs as low as 90 minutes. It may be possible to develop a 90th-percentile or 80th-percentile case for scenarios and ETEs rather than a worst case (i.e., completion of decision-making and

[3] Lower times are possible if not considered likely; NUREG/CR-6953 used a source term with 40 minutes until release from the time a General Emergency was declared. These values are much lower than in the State of the Art Reactor Consequence Analyses for Peach Bottom and Surry, which had containment failure in an earthquake scenario beginning at about the eight-hour mark (NRC 2013a).

[4] Review of just four randomly-selected ETEs submitted to the NRC in 2013 found a worst case of approximately six hours. This was for 100 percent clearance of the zone, rather than 90 percent, and in adverse winter conditions. In no case was an ETE given under 80 minutes for any zone, even for clearing only 90 percent of the zone population.

public notification in X time would meet requirements for 90 percent of release scenarios and ETEs), but that is beyond the scope of this effort.[5]

6.4.4 Limitations

The aggregate timeliness metric would need to supplement, not supplant, the other measures. FEMA and the NRC would still need to consider quality of the PADs, ability to mobilize supporting resources (assumed away in this metric), and other factors, potentially including projected dose.[6] However, timeliness is a key data point to be captured and communicated for reasonable assurance.

6.5 ALTERNATIVE, PROXY INDICATORS FOR PERFORMANCE

As indicated in **Table 4** and Appendix A, useful performance-based metrics for assessing protective action implementation—evacuation, shelter-in-place, and KI—in an exercise or drill environment are not available. It is not feasible to obtain large-scale public participation to test performance in these areas. Obtaining reasonable assurance on protective action implementation will require other indicators. Potential proxy indicators for performance are discussed below.

6.5.1 Evacuation

Some jurisdictions will have real-world evacuation experience, whether for hurricanes in the Southeast, wildfires in the West, or hazardous materials incidents throughout the United States. These jurisdictions may claim credit for the real-world implementation of evacuation. Evaluation should address whether the evacuation was of a scale to approximate a RERP-related evacuation, and whether it was completed within a reasonable timeframe for a RERP-related evacuation (e.g., was it accomplished in the same or less time as the ETE for an equivalent area of the EPZ?). The NRC has studied the applicability of non-RERP evacuations to RERP in NUREG/CR-6864.

However, not all ORO jurisdictions will have relevant real-world evacuation experience in the course of a RERP evaluation cycle. An indicator is necessary to track, if not the ability to implement an evacuation, then whether there can be confidence in the approved ETE and its

[5] This also suggests an alternative metric: the ORO's response time would allow for successful protection against X percent of the risk. But for setting a threshold timeliness target, research on evacuation times for other types of incidents may help scope what is feasible. One example is Mills et al. (1995). This research was initially focused on cases comparable to radiological transportation accidents, but broadened in scope to capture sufficient data points. Only three of the 66 cases examined had an evacuation radius of two miles or more. The maximum evacuation time for the 66 incidents was 10 hours.

[6] Although this paper emphasizes an overall timeliness metric, the NRC's Deductive Quantification Index (DQI) method effectively captures many of the necessary measurements that would need to be made for a dose-based assessment system. The DQI method was developed and used in a proof of concept application for two sites with several accident sequences at each site. The analyses performed compare the potential consequences of accident scenarios when a radiological emergency response plan is fully and effectively implemented, and quantify the value of emergency preparedness in terms of dose that the public avoids as a direct result of the emergency preparedness program. The tool is able to quantify, given a basic accident scenario, the dose effects of a lack of PAD, untimely PAD, or incorrect PAD in terms of the population dose. The DQI method could be incorporated into RIPB RERP oversight to help evaluate and determine the significance, in terms of dose, of different levels of performance in making PADs. See NUREG/CR-7160.

underlying assumptions.[7] Under Appendix E to 10 CFR 50, the NRC already requires licensees to track Census annual population estimates and to advise if estimated population increase between decennial censuses would affect the longest ETE value for any zone in the two- or five-mile rings or for the overall 10-mile EPZ to increase by 25 percent or 30 minutes, whichever is less.

It may be possible to construct an evacuation feasibility index to monitor trends affecting the ability to evacuate. Such an index could address not only population, but also availability of transportation, conditions of the road network, and congestion (capacity relative to normal demand) of the road network, and theoretical capacity. The American Highway Users Alliance (2006) developed an evacuation capacity index, but it examined 37 urban areas. Indices not specific to evacuation have also been constructed for urban areas. There is a travel time index (Texas A&M Mobility Institute 2012), and the Federal Highway Administration has developed travel time reliability measures within its monthly congestion reporting—but again, for urban areas. Data availability and frequency of updates could be issues for such an index.

Surveys regarding evacuation behavior are possible, but surveys are recommended for developing ETEs, which are to be updated at least every 10 years.

6.5.2 Shelter-in-Place

Shelter-in-place is the least burdensome protective action to implement. The issues of interest are whether the need to shelter in place is communicated, whether it is received, and whether there is compliance. Communication of a shelter-in-place PAD (where appropriate) is tested under a Notify the Public subtask for Mass Notification, which proposes a survey to test whether notification is received. Such a survey could be expanded to ask whether the recipient of the notification would shelter in place or contribute to a shadow evacuation.

6.5.3 Potassium Iodide Distribution

For KI, the main available indicator would be an inventory. The current oversight system has provided that

> quantities of KI available and storage locations(s) will be confirmed by physical inspection at the storage location(s) or through documentation of current inventory submitted during the exercise, provided in the ALC submission, and/or verified during an SAV. Available supplies of KI must be within the expiration date indicated on KI bottles or blister packs. As an alternative, the ORO may produce a letter from a certified private or state laboratory indicating that the KI supply remains potent, in accordance with U.S. Pharmacopoeia standards.[8]

This does not address performance of distribution, but only availability of KI for distribution.

6.6 ISSUE HANDLING AND DIFFERENTIAL LEVELS OF OVERSIGHT

Performance-based oversight requires clear, objective performance measures. “Objective” does not always mean “quantitative.” Some subtasks involve demonstration of multiple elements, but these can be addressed with a question tree using simple binary (“yes/no”) questions.

[7] See NUREG/CR-7002 for the ETE development process.

[8] FEMA (2013f), demonstration guidance subelement 1.e., p. III-34. Note that this criterion applies to emergency workers, institutionalized individuals, and, only where stipulated by the jurisdiction’s plans and procedures, the public (including transients).

Using objective performance measures for RERP oversight enables consistent evaluations across all OROs. Many indicators in the current oversight regimen allow for subjective determinations. While subjective judgment cannot be eliminated, the current oversight system may magnify its potential effects by offering only a small range of potential outcomes when issues are identified. Those are areas requiring corrective action (ARCAs) and deficiencies.

ARCAs are relatively moderate assessments that do not indicate a significant reduction to public safety. ARCAs require some corrective action to be made, and require a subsequent re-demonstration of a capability, either during the exercise, or at a future scheduled date.

Deficiencies are assessments such that there would be a significant degradation in public safety should an emergency at an NPP. As noted in Section 2.4, FEMA's determination that the radiological emergency plan (or the ability to implement it) is inadequate initiates a 120-day window to take action on deficiencies to FEMA's satisfaction. Within that time the State must either correct the deficiency or provide a timeline for doing so. If after 120 days (or the agreed upon timeline) the deficiencies are not corrected, FEMA notifies the Governor, the NRC, other agencies, and the public that FEMA has withdrawn its finding that offsite plans and preparedness provide "reasonable assurance" that appropriate protective measures can be taken in the event of a radiological emergency. This escalates the issue to the NRC. Upon receipt of FEMA's withdrawal notification, the NRC considers a response under 10 CFR 50.54(s)(2)(ii). If the NRC finds that the state of emergency preparedness does not provide reasonable assurance that adequate protective measures can and will be taken in a radiological emergency, and if after 120 days of this finding the deficiencies have not been remedied, the Commission will determine whether the reactor should be shut down until the deficiencies are corrected or whether other enforcement action is appropriate. The Commission shall take into account whether the licensee can demonstrate that the deficiencies are not significant, or that there are compensatory actions. Per 10 CFR 50.54(s)(3), the Commission is not constrained in taking "action under any other regulation or authority of the Commission or at any time other than that specified in this paragraph," so the 120-day period does not necessarily apply.

If exercise assessments escalate to the level at which the NRC considers a plant shutdown, the basis must be clear and defensible. Because the current system lacks objective measures, there is room for substantial variations in judgment of how significant the assessment may be. **Table 5**, on the next page, shows by FEMA Region the average number of ARCAs and deficiencies given per exercise, from a review of 288 AARs from 1999 to 2012. While it is possible the OROs' performance varied by region, the results suggest that some FEMA regional personnel may be more likely to issue ARCAs and deficiencies than colleagues in other regions.[9]

Among the deficiencies cited, one involved a school that evacuated children upon declaration of an Alert rather than a Site Area Emergency as required in approved plans. Several deficiencies involved issuing alerts and notifications to the public just a few minutes after the 15-minute deadline (one of the few hard, quantitative measures in current oversight). In the former case, significance was unclear. In the latter case, while it constitutes unacceptable performance on a highly risk-significant task, it is not clear that entering a process involving the possibility of shutting down the plant is preferable to a lesser penalty.

[9] GAO (2013) has also noted, and the NRC has acknowledged, regional variation in NRC oversight findings.

Table 5. Mean Number of ARCAs and Deficiencies by FEMA Region, 1999-2012		
FEMA Region	**Mean Number of ARCAs per Exercise**	**Mean Number of Deficiencies per Exercise**
I	**11.20**	**0.69**
II	6.70	0.15
III	8.30	0.49
IV	**1.03**	**0.06**
V	2.04	0.07
VI	1.54	0.28
VII	2.20	0.40
VIII	N/A	N/A
IX	5.82	0.09
X	5.20	0.00
Mean	3.81	0.21

The NRC's significance determination process for onsite issues provides for a greater range of options. It uses four color-coded levels for individual assessments, each indicating a stronger degradation in plant safety, and pertains to the seven cornerstones of the ROP, including onsite emergency preparedness:

- *Green.* Performance is within an expected performance level in which the related cornerstone (i.e., important areas of assessment such as emergency preparedness, mitigation systems, etc.) objectives are met, though minor reductions in safety margin may occur.
- *White.* Related cornerstone objectives are still being met with a minimal reduction in safety margin.
- *Yellow.* Related cornerstone objectives are being met but with a moderate reduction in safety margin.
- *Red.* There is a significant reduction in safety margin in the area measured by the performance indicator.

The NRC has a response (action) matrix for combining individual findings to determine an appropriate level of oversight response:

- *Column I.* All findings are green, and baseline oversight continues.
- *Column II.* There are no more than two white findings in different cornerstones. Staff members hold a public meeting with utility management, corrective actions are required, and baseline inspections follow up on the corrective actions.
- *Column III.* There are three white findings or a yellow finding; the safety margin for the cornerstone is considered minimally reduced. The senior regional leadership team holds a public meeting with senior utility management; the utility conducts a self-assessment under NRC oversight, and the NRC conducts additional inspections focused on the cause of degraded performance.
- *Column IV.* There have been repetitive evaluations at Level III (three white findings or a yellow), there are multiple yellow findings, or there is one red finding; there are longstanding unresolved issues or significant reduction in the safety margin. NRC headquarters' Executive Director for Operations holds a public meeting with senior utility management; the utility develops a performance improvement plan under NRC oversight; there is an NRC team inspection; there is a Demand for Information, Confirmatory Action Letter, or Order.

- *Unacceptable Performance.* There is an unacceptable reduction in the margin of safety. The plant is not permitted to operate; the Commission meets with senior utility management; there is an order to modify, suspend, or revoke the operating license.[10]

A performance-based oversight regimen for offsite response should also incorporate multiple levels of evaluative oversight for each subtask and task. **Tables 6, 7, and 8**, two pages below, give a proposed evaluation and oversight scheme. This is *not* intended to be a direct translation of the NRC's Emergency Preparedness Significance Determination Process (IMC 0609, Appendix B) for onsite emergency preparedness.[11]

Portions of the NRC's color scheme are used for consistency. While the green, white, and yellow assessment levels have been preserved, they have been devised to fit actions and consequences appropriate to offsite RERP and FEMA oversight. Instead of a "green" assessment being defined as a minor negative assessment, this framework proposes that "green" is equivalent to performing a subtask with no anticipated consequences for public health and safety. The "white" assessment level is retained as a level indicating a minor reduction in public health or safety, while the "yellow" assessment indicates a moderate reduction to public health or safety. The "red" assessment level has been dropped from consideration to avoid confusion, since in the emergency preparedness cornerstone, a "red" may only be given in the event of a real-world emergency response failure. Instead, an "orange" assessment level has been introduced for problems in performing high-risk tasks and subtasks of such degree that they do not allow for unqualified reasonable assurance that the ORO's RERP capabilities would adequately protect public health and safety if needed. Each subtask in Appendix A has a target or "green" level of performance. Gradations of unacceptable performance remain to be defined.

Risk significance of a task determines what ratings may apply to the subtasks. Only subtasks for highly risk-significant tasks are subject to the "orange" assessment level, as these are the subtasks projected to have the most consequences for public health and safety. For medium-risk tasks, the most severe assessment that can be given is a "yellow," as even a complete failure to perform a task is not expected to lead to severe consequences for public health and safety.

Tables 6, 7, and 8 on the following pages explain the proposed evaluation schema in greater detail. Evaluation builds from an individual demonstration of subtask performance, to subtask performance over time (e.g., two years), to task performance over time, to an overall "cornerstone" evaluation of offsite RERP.

As noted in **Table 6** on the next page, OROs are allowed the opportunity to identify and rectify their mistakes or less-than-target performance in a timely manner, depending on level of performance. There are several ways this may be accomplished:

- *First*, if OROs are able to self-identify a mistake in their demonstration of a task or subtask while the task is being demonstrated or immediately following a failed demonstration, they may be given the opportunity to restart the activity being performed, without penalty by evaluators.

[10] See NRC (2013). Although the term "column" is not used there, it is used for the action matrix included in the IMC 0305 at p. F-1-1.
[11] NRC, "Emergency Preparedness Significance Determination Process." Available at: http://pbadupws.nrc.gov/docs/ML1200/ML120090270.pdf (accessed October 27, 2013). See also NRC, "Technical Basis for Emergency Preparedness Significance Determination Process." Available at: http://pbadupws.nrc.gov/docs/ML1228/ML12284A512.pdf (accessed October 27, 2013).

Table 6. Proposed Evaluative Schema for Performance-Based RERP Oversight, Single Demonstration of Subtask				
Scope of Evaluation	**Green**	**White**	**Yellow**	**Orange**
Single Demonstration of Subtask[+]	Subtask has generally been performed in a satisfactory manner. Where issues have arisen in an exercise or drill, they were identified first by the ORO and re-demonstrated immediately to meet the green performance measure.	Subtask performance has fallen tolerably short of the target demonstration criteria. Marginal decreases to public health and safety may be expected in the event of a radiological emergency. How performance will be corrected and improved is an internal matter for the ORO.	Subtask performance has fallen short of the demonstration criteria to a degree that would likely result in degradation of public health and safety in the event of a radiological emergency. The State ORO is required to provide FEMA with a root cause analysis and proposed corrective action prior to the next scheduled subtask demonstration (or in a specially scheduled demonstration before the end of the two-year period if no scheduled opportunities remain).	The orange assessment level is reserved only for subtasks of tasks with high risk significance. Orange is assessed when subtask performance is at a level likely to result in significant degradation of public health and safety in the event of a radiological emergency. If a subtask is assessed as orange, FEMA will lead a root cause analysis (requiring meetings, interviews, and potentially the review of capability elements such as plans, training records, equipment status, etc.), and develop a corrective action plan for the ORO to follow. The ORO will re-demonstrate the subtask within a specified period of time.
[+] Some notification-related subtasks are not assessed in a single demonstration, but only in terms of cumulative performance.				

- *Second*, if OROs are given a marginally less-than-target yet tolerable (white) assessment, how they correct performance is their concern.
- *Third*, if OROs are given a moderately negative (yellow) assessment, they may develop a corrective action plan allowing the OROs to work to fix any problems, and re-demonstrate them, without long-term ramifications for the licensee. The corrective action plan must, however, be documented and shared with FEMA.

However, as shown in **Tables 6-8**, an orange assessment of a subtask potentially may lead to serious consequences, up to and including FEMA's withdrawal of its reasonable assurance determination. The ORO faces more comprehensive oversight, as orange represents significant concerns that an ORO will not be able to provide for public health and safety in the event of a radiological emergency. Federal staff develop and monitor implementation of a performance improvement plan, to ensure that OROs take specific steps to enable improved performance and then demonstrated that improved performance. If performance does not improve, FEMA refers the matter to the NRC. As is currently the case, the NRC has discretion in what it elects to do in response, up to suspending plant operations. However, this more systematic escalation process should ensure serious attention.

Table 7. Proposed Evaluative Schema for Performance-Based Oversight, Cumulative Biennial Subtask and Task Performance				
Scope of Evaluation	**Green**	**White**	**Yellow**	**Orange**
Cumulative Biennial Subtask Performance	At least 75% of subtask demonstrations were assessed green.* There were no yellow or orange subtask assessments.	At least 75% of subtask demonstrations were assessed white or green. Fewer than 25% of subtask demonstrations were assessed yellow. Any yellow assessment was cleared.^ There was no orange subtask assessment.	At least 25% of subtask demonstrations were assessed yellow or orange. There was no more than one orange assessment, and it was cleared. ^	Subtask performance was assessed orange, and the orange assessment was not cleared. ^ Or subtask performance was assessed orange more than once, cleared or not.
Cumulative Biennial Task Performance	For a given task, no biennial subtask assessment was yellow or orange. One quarter or fewer of biennial subtask assessments were white.	For a given task, no biennial subtask assessment was yellow or orange. More than one quarter but fewer than half of biennial subtask assessments were white.	For a given task, at least one biennial subtask assessment was yellow, or more than half of biennial subtask assessments were white.	For a given task, at least one biennial subtask assessment was orange, or more than half of biennial subtask assessments were yellow.
* For subtasks assessed only in terms of cumulative performance, green may be higher (e.g., 90% successful attempts at notification). ^ A yellow or orange subtask assessment in a single demonstration is "cleared" if all subsequent demonstrations of the subtask are assessed white or green.				

The overall assessment criteria in **Table 8** (next page) could incorporate a timeliness evaluation as discussed in Section 6.4. For example, green may also require meeting a timeliness threshold in 90 percent of demonstrations, or demonstrating timeliness such that greater than 90 percent of risk is addressed.

The proposed evaluation scheme addresses both issues mentioned previously. By introducing an expanded range of determinations and response options along with a systematic means for combining the individual assessments, each task and the overall ORO program may be evaluated systematically and appropriately, with a focus on resolving performance issues.

Additionally, by tying evaluations to metrics that have a definite quantification or threshold that must be met, potential subjectivity should be reduced. Introducing performance-based, quantifiable metrics and tying these to a graduated evaluation system offers promise for improving the overall consistency of RERP oversight, while providing a reasonable assurance that public health and safety needs are being met.

Software could support and enhance a systematic evaluation process. Appendix C examines potential applicability of an existing software tool to the proposed evaluation process.

Table 8. Proposed Evaluative Schema for Performance-Based Oversight, Cumulative Biennial ORO RERP "Cornerstone" Performance				
Scope of Evaluation	**Green**	**White**	**Yellow**	**Orange**
Cumulative Biennial ORO RERP "Cornerstone" Performance	No task was assessed yellow or orange, and there was no more than one white high-risk task.	No task was assessed orange. No high-risk task was assessed yellow, and there was no more than one yellow task assessment. There were no more than two white high-risk tasks, and no more than four white tasks overall.	No task was assessed orange. At least one high-risk task was assessed yellow, but no more than three tasks were yellow overall.	At least one task was assessed orange, or at least four tasks were assessed yellow. FEMA notifies the NRC and initiates a comprehensive review of ORO plans, organization, equipment, training, and exercises to develop a performance improvement plan for the ORO's RERP, delivered within a specified period of time (e.g., 120 days). The ORO will have a specified period of time to implement all requirements of the performance improvement plan, monitored by FEMA. The ORO must demonstrate at least white-level performance in all subtasks of tasks that led to the performance improvement plan in that time. If not, FEMA withdraws "reasonable assurance" and refers the matter to the NRC.

6.7 ENHANCEMENT OF RISK FOCUS

The RERP oversight scheme proposed herein has several features to ensure a focus on risk-significant elements:

- *Performance Focus.* The oversight system is designed to focus on actual performance. Task performance contributes more directly to reducing risk than do enablers of task performance, whose contribution to risk reduction is more difficult to gauge.
- *Task Stratification by Risk Significance.* Tasks have been identified as high, medium, and low risk. The basis for this determination is the tasks' contribution to a defined public health and safety goal of dose avoidance. The determination of risk significance has implications for oversight. For example, yellow ratings on three high-risk tasks will receive a higher level of follow-on oversight than yellow ratings on medium- or low-risk tasks. As previously mentioned, *only* high risk tasks can be subject to an orange assessment.

Further, low risk tasks are not formally evaluated; they have no defined subtasks (meaning they can never be rated even yellow under the proposed scheme). Oversight and evaluation resources are then allocated away from low risk tasks.

- *Subtask Selection.* Only subtasks deemed necessary and critical are included for evaluation. Oversight and evaluation resources are not spread over an extensive set of subtasks and criteria that may not be critical to performance of risk-significant tasks.
- *Gradation of Assessments against Objective Measures.* There is or will be a scale for unacceptable performance of all subtasks that have performance measures. The scale allows for more middle ground in addressing unacceptable performance before escalating the involvement of oversight resources to high levels that may not be warranted by the risks posed.

Whether the proposed oversight system will necessarily enhance focus on risk-significant elements compared to the current system is difficult to prove absent additional resource information for both.

As noted above in Section 6.6, a review of FEMA-identified deficiencies from 1999 to 2012 showed some deficiencies that were not necessarily risk-significant, or at least not to the point of considering the shutdown of a reactor. However, this was anecdotal. For fuller consideration, **Table 9** on the next page groups all deficiencies given from 1999 to 2012 into several broad categories, gives examples for each grouping, and offers a preliminary determination on the risk significance of these deficiencies within the proposed performance-based oversight system, based on the risk significance of the analogous task.

Table 9 shows that in most instances the current oversight system has identified deficiencies for areas that are significant to protecting public health and safety in radiological emergency. Problems with alert and notification of the public were most common, followed by a failure to provide or transmit PADs. These deficiencies, should they occur in a real- world incident, would all result in members of the public being unaware of an emergency or actions they should take to protect themselves.

However, deficiencies were assigned for deviations from plans where the demonstrable impact on public health and safety was not clear. For example, as noted previously, a school chose to evacuate children when an Alert was declared, contrary to plans. In another, a surveillance helicopter claimed it would not fly into the EPZ given the release, contrary to plans. It is unclear why these were deficiencies rather than ARCAs. Thus there is a potential to focus resources on issues of uncertain, and potentially low, risk significance.

Also as noted previously, deficiencies were assigned for alert and notification delays of a few minutes. While this could be significant, particularly in a rapidly progressing emergency, it may not warrant raising the possibility of shutting down the reactor. Again, there is potential for misallocating resources relative to risk.

Given its performance focus, stratification of tasks by risk, selection of only necessary and critical subtasks, and gradation of assessments, the proposed RERP oversight process should serve to enhance the focus of ORO and oversight resources on risk-significant elements.

Table 9. Number of Deficiencies by Type, 1999-2012			
Type of Deficiency	**Number Given**	**Example(s)**	**Significance Determination**
Alert and Notification Problems – Responder Error	17	Sending faxes instead of notification to start sirens, taking more than 15 minutes to start sirens	High Significance
PADs for Responders Not Transmitted	7	Responders not directed to take KI, responders do not receive notification to take KI	High Significance
PADs for Public Not Transmitted	7	Public not advised of evacuation routes, public not advised to take KI	High Significance
Communication Errors	6	Incorrect messaging released, inability to contact and activate necessary personnel, not reaching out to confirm receipt of EAS messages	High Significance
Deviation From Plans	5	Releasing children from school in violation of plans, helicopter refusing to fly given release in violation of plans	Indeterminate
Alert and Notification Problems – Mechanical Error	4	Digi-Cart system did not work, lack of backup power source	High Significance
Failure to Develop PADs to Adequately Protect Public	3	Failure to identify special needs individuals requiring transportation, evacuation orders sending evacuees into plume path	High Significance
Access Control Problems	1	Failure to establish access control in evacuation zone in timely manner	Moderate Significance

7. CONSISTENCY WITH PROPOSED ONSITE PERFORMANCE-BASED OVERSIGHT

The NRC's 2008 "Elements of a Performance-Based Emergency Preparedness Regulatory Regimen" (ADAMS Accession Number ML080440163) offers a preliminary proposal for a voluntary performance-based emergency preparedness regulatory regimen for licensees. The offsite RERP oversight regimen proposed here follows the spirit of that proposal and is largely consistent with it. Areas of similarity include:

- *Focus on Performance in Lieu of Compliance.* The NRC seeks to "focus oversight and licensee efforts on actual performance competencies [demonstrated] during drills and exercises, rather [than] compliance issues." Variations in plans, training attendance, and response organization "would not matter so long as performance was acceptable." Reasonable assurance determinations would focus on demonstration of competencies rather than compliance. The same focus on performance underlies the proposal for offsite RERP oversight.
- *Goals.* Stated goals for the NRC's performance-based regimen are similar to the ones identified in Chapter 3 of this paper. (However, the NRC's proposal includes goals for State and local officials, whereas this paper is silent on goals for licensees.) For example, both regimens are concerned with ensuring immediate notification of emergency conditions from licensee to ORO and rapidly alerting and informing the public of PADs.
- *Scenario Variation and Secrecy.* The NRC's proposal specifies that licensees must not use the same scenario in sequential evaluated exercises, and that emergency teams should not know scenario specifics in advance of an exercise. Section 6.4 of this paper calls for scenarios to "be varied and not known to players beforehand" in testing the ability to make timely PADs and communicate them to the public.
- *De-emphasis of Large Biennial Exercises*. The NRC's proposal acknowledges that some competencies are not amenable to testing in large biennial exercises. Section 4.2 of this paper calls for testing critical tasks through frequent functional exercises (such as for testing PAD development and communications as described in section 6.4) and drills, moving away from a focus on large-scale biennial exercises.
- *Performance Standards.* Both documents call for performance standards (objective measures) for each element to be demonstrated. This paper has proposed measures for subtasks (see Appendix A).
- *Differential Levels of Oversight*. Both documents note that increased oversight should only result from crossing clear thresholds of performance or failures in significant corrective actions.
- *Concern for Communicating Reasonable Assurance*. Both papers posit that use of objective performance standards or measures will improve understanding of reasonable assurance.

There is a difference in what is to be evaluated. The NRC offers multiple proposed metrics focused on activating centers and making them operational. This report generally treats facilities as an enabler of performance, not a focus of evaluation in themselves. The exception is a proposed subtask on activating an alternate communications center, given the importance of ensuring reliability for this function.

Overall, however, the performance-based oversight systems proposed by the NRC and in this report are consistent and potentially complementary.

8. INTEGRATION WITH ALL-HAZARDS INITIATIVES

The Nation's laws and policies for emergency preparedness have evolved piecemeal, generally in response to specific incidents. Some incidents led to hazard-specific policy. For example, the 1979 Three Mile Island emergency led to current regulations for radiological emergency preparedness both at and around NPPs.

Yet, after other incidents, Congress concluded there are unacceptable risks to focusing resources and attention on a single, preeminent hazard. After Hurricane Andrew in 1992, Congress eliminated the Federal Civil Defense Act requirement that FEMA-funded State and local preparedness efforts be "consistent with, contribute to, and not detract from" nuclear attack preparedness; policy became simply to prepare for "hazards." After Hurricane Katrina in 2005, Congress corrected a perceived focus on terrorism-specific preparedness through the Post-Katrina Emergency Management Reform Act (PKEMRA). PKEMRA required the President to develop a national preparedness system "to prepare the Nation for all hazards, including natural disasters, acts of terrorism, and other man-made disasters." Presidential Policy Directive 8 (PPD-8) of 2011 assigns responsibilities to Executive Branch agencies for implementing these all-hazards national preparedness system requirements. PPD-8 also reaffirms the all-hazards National Incident Management System (NIMS) required by Homeland Security Presidential Directive 5 (HSPD-5) of 2003.

While details may change over time, any new RIPB construct for oversight of offsite RERP will need to operate within a broader, all-hazards preparedness policy framework. State and local OROs will be responsible for satisfying both RIPB RERP requirements and all-hazards requirements.

This chapter describes how the RIPB oversight concept for offsite RERP can integrate with key all-hazards preparedness policy initiatives. Elements of the proposed RIPB RERP framework are or could be consistent with all-hazards initiatives. However, RERP would not meet its hazard-specific intent through such generic preparedness requirements as currently exist. Further, the proposed RIPB RERP framework will not help ensure significantly greater consistency of onsite NPP emergency preparedness (EP) with all-hazards initiatives than do current arrangements.

This chapter will:

- Discuss what integration of RERP and all-hazards initiatives means and what it should achieve,
- Describe key Federal all-hazards initiatives and how the Federal Government influences compliance,
- Examine how the proposed RIPB RERP oversight construct could work within the all-hazards policy context, and
- Assess whether onsite NPP EP compliance with all-hazards initiatives is likely to improve in the proposed RIPB RERP oversight construct.

8.1 OBJECTIVES FOR INTEGRATION

This section addresses what integration of RIPB RERP and all-hazards initiatives should achieve. Providing reasonable assurance of public health and safety in the event of a radiological emergency at an NPP is foremost. Integration is valuable, but secondary.

8.1.1 Meaning of "Integration"

To integrate is either to combine two or more elements into a functioning, unified whole or to incorporate one or more elements into a larger unit. If all-hazards preparedness is the "larger unit," then there are two basic options for integrating RIPB RERP and all-hazards preparedness initiatives:

(1) Develop crosswalks and linkages between RIPB RERP and all-hazards preparedness initiatives so that each supports the other. RIPB RERP and all-hazards preparedness initiatives would be consistent with and supportive of one another, but not lose their identity within the whole of preparedness efforts.

(2) Subsume the RIPB RERP construct within all-hazards preparedness initiatives. Specific RIPB RERP requirements would be eliminated in favor of all-hazards preparedness requirements. All-hazards preparedness requirements would have to provide reasonable assurance of OROs' ability to protect public health and safety from a radiological release beyond the boundaries of an NPP.

As will be discussed in Sections 8.2 and 8.3, the first option applies for most all-hazards initiatives.

8.1.2 Rationale for Integration

There are two main arguments for integration of all-hazards initiatives with offsite RERP: compliance and efficiency.

The compliance argument involves respect for law, regulation, and policy. Where there is no conflicting legal requirement, law, regulation, and policy should be followed. Ignoring the requirements of any one law, regulation, or policy—picking and choosing—undermines compliance with law, regulation, and policy generally.

The efficiency argument is that it takes fewer resources or less effort to do something one way rather than two ways. Working with one set of concepts, terms, procedures, and standards for RERP and another for other hazards is inherently inefficient, if the same concept, term, procedure, or standard could adequately address both RERP and all-hazards concerns.

8.1.3 Dimensions of Integration

Integration of RIPB RERP and all-hazards initiatives could take place in multiple areas:

- *Categorization and Reporting of Results*, or consistency in how performance outputs are organized and presented.

- *Performance*, or consistent definition of how or what performance occurs through standards and targets.

- *Inputs to Performance*, with consistent approaches and terminology in the plans, organizational constructs, equipment, training, and exercises that enable performance.

In a strict performance-based oversight construct, these are irrelevant to oversight until and unless performance is judged inadequate.

- *Funding Inputs*, allowing all-hazards funding streams to be used for RERP needs or meeting an all-hazards (including RERP) need through any RERP funding stream.

- *Risk Prioritization*, ensuring that RERP hazards factor into all-hazards risk assessment and management, and even that other hazards (e.g., as initiating events or complications to response) factor into RERP.

FEMA and the States have already made efforts in several of these areas, as will be discussed in Section 8.3.

8.1.4 Objectives for Integration

Integration of all-hazards preparedness initiatives in the RIPB constructs for offsite RERP and onsite NPP EP must satisfy the following objectives:

- Integration will not reduce the NRC's ability to provide reasonable assurance of public health and safety in the event of a radiological emergency at an NPP.

- No RIPB RERP or NPP EP performance target will be made less stringent for the sake of all-hazards integration.

- Integration of any all-hazards requirements into RIPB RERP requirements will not increase the scope of RIPB RERP oversight, or industry contributions for that oversight, beyond RERP-specific concerns.

- Integration of any all-hazards requirements into RIPB RERP requirements will not increase total costs for OROs.

- Where there is no performance or efficiency reason not to be consistent with all-hazards initiatives, such consistency will be encouraged through the oversight process.

- Both licensees and OROs will be free to incorporate all-hazards requirements, concepts, and/or terminology as long as they can meet their performance targets under RIPB RERP or NPP EP oversight constructs.

- Where a licensee or ORO exhibits a performance deficiency, any remedies required by Federal entities will incorporate applicable all-hazards requirements, concepts, and/or terminology.

8.2 INTEGRATION CONTEXT: ALL-HAZARDS INITIATIVES, PROCESSES, AND SYSTEMS

This section defines all-hazards initiatives and identifies the key ones, describes means available to influence compliance, and summarizes the key initiatives.

8.2.1 Scope of All-Hazards Initiatives

For this report, "all-hazards initiatives" are policies from the President, the Department of Homeland Security (DHS), or FEMA about preparing to manage incidents resulting from

hazards of any type: natural, accidental, or deliberate.[1,2] The term excludes policies focused on a single hazard, such as FEMA's REP Program Manual or Executive Order 13636 of February 12, 2013, "Improving Critical Infrastructure Cybersecurity."

There are two Presidential directives that best fit this definition:[3]

- HSPD-5, "Management of Domestic Incidents," which establishes the requirement for NIMS to provide for interoperability and compatibility among Federal, State, and local capabilities. NIMS includes a core set of concepts, principles, terminology, and technologies covering the incident command system (ICS); multi-agency coordination systems; unified command; training, qualifications, and certification; identification and management of resources (including systems for classifying types of resources); and the collection, tracking, and reporting of incident information and incident resources.

- PPD-8, "National Preparedness," which requires a National Preparedness Goal defining core capabilities needed to prepare for the greatest risks facing the Nation. PPD-8 also requires a National Preparedness System of guidance, programs, and processes to help the Nation meet the National Preparedness Goal through planning, organization, equipment, training, and exercises that build core capabilities, as well as regular assessment of national capabilities.

Congress requires in PKEMRA that FEMA lead implementation of both of these initiatives:

- "The [FEMA] Administrator … shall ensure ongoing management and maintenance of the National Incident Management System" (paragraph 509(b)(1)).

- "The President, acting through the [FEMA] Administrator, shall develop a national preparedness system to enable the Nation to meet the national preparedness goal" (subsection 643(a)).

8.2.2 Means to Influence Compliance

FEMA does not have authority to direct State, local, or private sector entities.[4] However, FEMA does have various tools at its disposal to influence State and local OROs to adopt or comply with its policies. These include:

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[1] NRC (2012), paragraph 4.3.1, refers to "integration of White House and DHS/FEMA initiatives into the RERP and NPP EP programs" and "DHS/FEMA initiatives, processes, and systems that affect State, local and NPP EP programs."

[2] Paragraph 602(a)(1) of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, as amended (42 USC 5195a) defines "hazard" as "an emergency or disaster resulting from– (A) a natural disaster; or (B) an accidental or man-caused event."

[3] Other directives were considered. PPD-21, Critical Infrastructure Security and Resilience, does refer to "all hazards." However, it focuses on Federal responsibilities. HSPD-8, National Preparedness, was superseded by PPD-8. Executive Order 13603, National Defense Resources Preparedness, addresses resource claimancy for the "full spectrum of emergencies." Authorities from this Executive Order and the Defense Production Act have been delegated to FEMA to help States and private sector entities place "rated" (priority) orders for contracts, but the Executive Order contains no State, local, or private sector preparedness requirement. Sources for review of Presidential directives include compilations listed under References.

[4] FEMA (2011) describes even the current Radiological Emergency Preparedness (REP) Program as a "voluntary program." As noted in 44 CFR 352, States may "decline or fail" to prepare or exercise offsite radiological emergency plans. FEMA could make a determination based on plans available to FEMA under 44 CFR 350.3(f), not necessarily a radiological emergency response plan submitted under the 44

- *Financial Stimulus – Preparedness Assistance.* In Fiscal Year 2013 FEMA will provide more than $354 million in State Homeland Security Program grants, almost $559 million in Urban Area Security Initiative grants, and more than $332 million in Emergency Management Performance Grant (EMPG) funding. States and localities are not obligated to take these funds, but if they do they become subject to the conditions of the grants. All three of these programs require that grantees "ensure and maintain adoption and implementation of NIMS" in compliance with HSPD-5 (see FEMA 2013a, p. 12, and FEMA 2013b, p. 17). Further, Urban Areas and States must maintain and update a Threat and Hazard Identification and Risk Assessment (THIRA) annually, and their emergency operations plan (EOP) every two years as conditions of grant funding. They must also develop and submit a multi-year training and exercise plan (TEP) annually, following HSEEP guidance. State grantees must submit an annual SPR. Finally, the grants must build and sustain the core capabilities described in the National Preparedness Goal.

- *Financial Stimulus – Disaster Assistance.* Where required by law, FEMA has made completion of a preparedness activity a condition for receiving an additional amount of disaster assistance. The Disaster Mitigation Act of 2000 amended the Stafford Act so that States and local jurisdictions could receive additional post-disaster mitigation funding if they had approved hazard mitigation plans.

- *Direct Technical Assistance.* FEMA may conduct workshops and facilitate a grantee's efforts to develop plans or undertake other homeland security and emergency management efforts. FEMA's National Preparedness Directorate publishes a catalog of available technical assistance (FEMA 2013c).

- *Tools.* FEMA provides free software tools to accomplish some homeland security and emergency management tasks. This helps standardize processes and products as users opt for the free tools over alternative approaches. One widely used tool is HAZUS (Hazards U.S.), software for estimating potential losses from earthquakes, floods, and hurricanes. (See FEMA 2013j.)

- *Templates.* Another way to standardize State and local work products without a direct requirement is to offer templates. State and local users save time by using the templates, and FEMA sees consistent products as more users opt for the template approach. FEMA's HSEEP offers templates for exercise documents, exercise planning meeting presentations, and more. (See DHS 2013, DHS 2013a, and DHS 2013b.)

- *Guidance*. FEMA provides doctrine and guidance on a range of subjects, offering advice and best practice for accomplishing emergency management tasks. Examples include Comprehensive Preparedness Guide (CPG) 101, version 2.0, *Developing and Maintaining Emergency Operations Plans* (FEMA 2010a).

- *Reports and Research Findings.* FEMA can influence actions simply by providing information. Under PKEMRA, FEMA provides annual reports to Congress on the Nation's preparedness. FEMA does not identify individual States, but as **Figure 7** on the next page shows, States can compare their individual SPR ratings to aggregates

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CFR 350 approval process. As noted in 44 CFR 350.3(c)(1), the NRC can also issue a license without a FEMA-approved plan if "there exists a State, local or utility plan which provides assurance that public health and safety is not endangered by the operation of the facility." However, FEMA notes that participation in the 44 CFR 350 plan approval process "demonstrates to the public that a site has met specific planning and preparedness criteria." See FEMA (2011), pp. 54, 682.

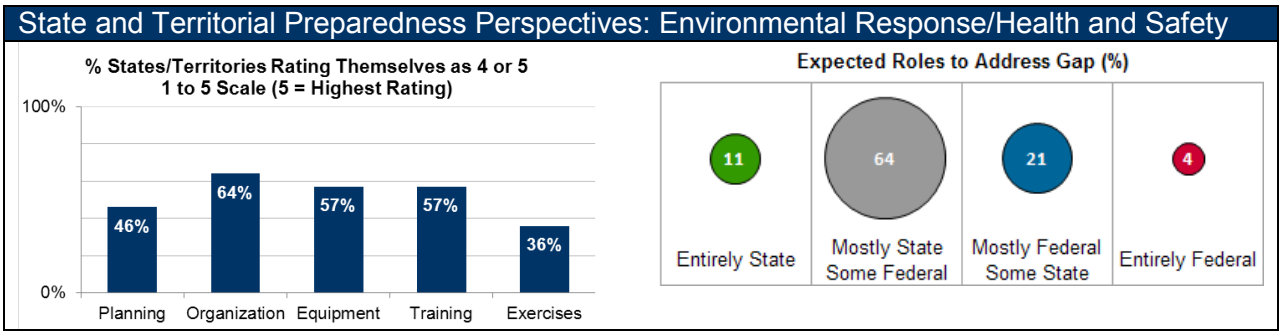

Figure 7. Example of State Preparedness Data in National Preparedness Report
Source: FEMA (2013d)

presented in the National Preparedness Report (NPR) (FEMA 2013d). Subsection 611(e) of the Stafford Act also authorizes the FEMA Administrator to "study and develop emergency preparedness measures designed to afford adequate protection of life and property, including research and studies as to the best methods of treating the effects of hazards." This can include both technical reports and dissemination of lessons learned.

Of these tools, grants are FEMA's primary lever. **Table 10** on the next page shows the relative contribution of Federal (primarily FEMA) grants and nuclear industry fees to selected State emergency management agency budgets. Preparedness grants, even if some funding passes through to local government, are a significant portion of the budget.[5] State and local OROs must be sensitive to all-hazards requirements attached to the funding.

FEMA has limited ability to influence licensees. Each year, FEMA sets the fee it will charge licensees for RERP oversight under authority of 44 CFR 354. However, the fee has been for FEMA services "to facilitate offsite radiological emergency planning and preparedness," which is understood as distinct from all-hazards preparedness.[6,7] FEMA's other major initiative with the private sector, PS-PREP, has been to endorse preparedness standards for private sector business continuity and emergency preparedness programs, and to recognize companies that meet them. The program is voluntary. (See FEMA 2012b.)

[5] Examples are from a review of recent State emergency management agency budgets for 31 States with NPPs. Budget presentations vary by State. In some cases the emergency management budget is subsumed within a larger Department of Public Safety or Department of Military Affairs budget. In some cases both preparedness and disaster assistance are combined in a single Federal Aid line item. In some States radiological emergency preparedness funding goes to a Department of the Environment or a Department of Health responsible for radiation control activities in the State. The budget figures shown here taken from: http://www2.illinois.gov/gov/budget/Documents/Budget%20Book/FY%202014/FY14EnactedTotalBudgetbyLineItem.xls, http://admin.state.nh.us/budget/Budget2014-2015/GovernorsBudgetBill.pdf#02-23, http://media.obm.ohio.gov/OBM/Budget/Documents/operating/fy-14-15/bluebook/budget/Section-D_DPS.pdf, http://www.portal.state.pa.us/portal/server.pt/document/1320332/2013-14_governors_executive_budget_cd_pdf, and http://finance.vermont.gov/sites/finance/files/pdf/Vantage/FY%202014%20Executive%20Budget%20Recommendations.pdf (accessed October 27, 2013).

[6] 44 CFR 353, *Fee for Services in Support, Review and Approval of State and Local Government or Licensee Radiological Emergency Plans and Preparedness.* Available at: http://www.gpo.gov/fdsys/pkg/CFR-2011-title44-vol1/pdf/CFR-2011-title44-vol1-part353.pdf (accessed October 27, 2013).

[7] 44 CFR 354, *Fee for Services to Support FEMA's Offsite Radiological Emergency Preparedness Program.* Available at: http://www.gpo.gov/fdsys/pkg/CFR-2011-title44-vol1/pdf/CFR-2011-title44-vol1-part354.pdf (accessed October 27, 2013).

Table 10. Relative Contribution of Grants and Nuclear Industry Fees to Selected State Emergency Management Agency Budgets
(Multiple sources*)

	Illinois	New Hampshire	Ohio	Pennsylvania	Vermont
Budget Year	2014 enacted	2012 actuals	2013 estimated	2012-2013 available	2013 as passed
Total Budget	$502,148,400 (100%)	$11,062,395 (100%)	$131,786,175 (100%)	$645,844,000 (100%)	$18,591,123 (100%)
Preparedness Grants	$300,351,100 (59.81%)	$4,856,462 (43.90%)	$77,966,477 (59.16%)	$204,937,000 (31.73%)	$15,842,606 (85.22%)
Disaster Grants	$127,000,000 (25.29%)	$2,427,923 (21.95%)	$27,707,636 (21.02%)	$191,100,000 (29.59%)	$0 (0%)
Radiological Emergency Preparedness Fees/ Assessments	$23,677,600 (4.72%) [6 sites]	$1,334,672 (12.06%) [1 site]	$1,415,945 (1.07%) [2 sites]	$2,050,000 (0.32%) [5 sites]	$2,321,510 (12.49%) [1 site]

* Sources include: Illinois Office of Management and Budget (2013), New Hampshire Department of Administrative Services (2013), Ohio Office of Management and Budget (2013), Pennsylvania Office of the Budget (2013), and Vermont Department of Finance and Management (2013).

8.2.3 Key All-Hazards Initiatives for Integration

To assess potential integration of the proposed RERP RIPB construct with all-hazards initiatives, the rest of this chapter will center on two broad initiatives: the National Preparedness System and NIMS. These are the key initiatives as based on the White House and legislative interest described in Section 8.2.1, and FEMA's grant focus as discussed briefly in Section 8.2.2. Summaries follow.

National Preparedness System. Capabilities are "the means to accomplish a mission, function, or objective based on the performance of related tasks, under specified conditions, to target levels of performance." PPD-8 required a National Preparedness Goal to define the core capabilities necessary to prepare for the incidents that pose the greatest risk to the security of the Nation. It required a National Preparedness System to guide building and maintaining those core capabilities.

The National Preparedness Goal (DHS 2011a) identified 31 core capabilities across five mission areas: prevention, protection, mitigation, response, and recovery. (Section 8.3.9 will discuss the response-related core capabilities in more detail.)

The National Preparedness System (FEMA 2011b) identified six components for achieving preparedness:

(1) *Identifying and Assessing Risk.* Preparedness requires identifying threats and hazards, including projected consequences. A Strategic National Risk Assessment (SNRA) informs the National Preparedness Goal (see DHS 2011b). State and local FEMA grantees must perform a THIRA, as noted in Section 3.2. So must FEMA Regions, working with Federal partners.

(2) *Estimating Capability Requirements*. In their THIRAs, State and local grantees must also develop requirements for delivering each of the 31 core capabilities. FEMA guidance is

to combine the largest relevant impact (e.g., 50 fatalities) with either a timeliness or effectiveness standard (e.g., within 72 hours, or with 100 percent completion) to define a target requirement (FEMA 2013h).

(3) *Building and Sustaining Capabilities.* Defining target requirements allows grantees to identify gaps and the means to address them. The means include funding, organizing (both internally and through mutual aid), equipping, and training.

(4) *Planning to Deliver Capabilities.* The National Preparedness System calls for plans to document how capabilities will be delivered. Each mission area has a framework to assign responsibilities across the "whole community" (Federal, State, territorial, tribal, local, private sector, and public) for delivering capabilities. An example is the National Response Framework, formerly the National Response Plan. There are Federal Interagency Operational Plans detailing how the Federal Government implements its responsibilities under each framework, as well as department- and agency-level plans as needed. Grantees are encouraged to use the planning approach outlined in CPG 101 to guide their planning.

(5) *Validating Capabilities.* Exercises and assessments are used to test whether targets are being met. The National Exercise Program (NEP) is the "principal exercise mechanism for examining national preparedness and measuring readiness" (FEMA 2013e). HSEEP offers doctrine and templates for design, development, conduct, and evaluation of exercises. Finally, a Comprehensive Assessment System (CAS) that includes the NPR collects and analyzes data about capabilities to report progress on building and sustaining required levels of capability.

(6) *Reviewing and Updating.* The National Preparedness System includes periodic reviews of risk conditions, capability development, and exercise and assessment results to adjust priorities, goals, and objectives if needed.

Section 8.3 will discuss potential integration of these all-hazards preparedness elements with the proposed RIPB RERP construct.

NIMS. PPD-8 and National Preparedness System documents stress the importance of NIMS, which was required by HSPD-5. NIMS provides standardized, scalable organizational structures for incident management (see **Figure 8** on the next page).[8] This helps collaboration—across the public and private sectors, among different levels of government, and across disciplines. NIMS also focuses on common terminology to underpin communications and collaboration. Common terminology extends to resource management, where NIMS relies on "resource typing" (definitions and standards for certain resources or combinations of resources) as well as evolving training and qualifications standards for people to hold positions within standard NIMS organizational structures for an incident. As shown in **Table 11** on the next page, NIMS also relies on standard forms for communications required to support NIMS processes, such as development and issuance of incident action plans.

[8] Not every position is required depending on the incident. See DHS (2008) for more on NIMS principles such as reliance on incident action plans, standard forms, and common terminology.

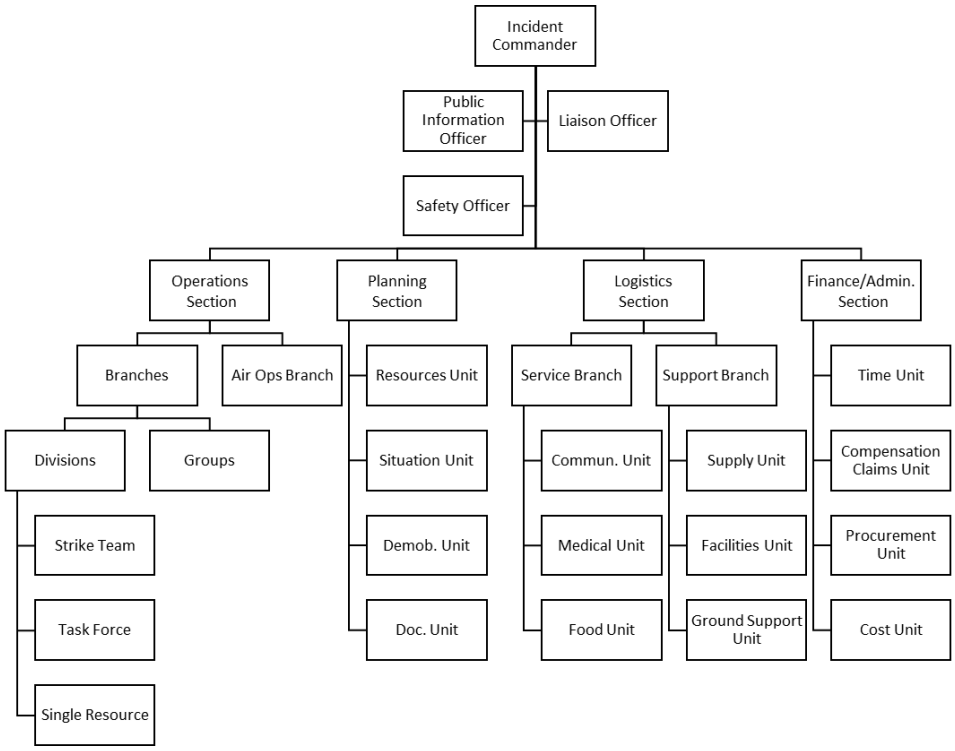

Figure 8. NIMS ICS Generic Incident Organizational Structure
Source: FEMA IS-200.b (undated)

Table 11. Selected Standardized Forms under NIMS ICS
(DHS 2008: 128)

Number	Purpose
ICS 201 (p. 1)	Incident Briefing Map
ICS 201 (p. 2)	Summary of Current Actions
ICS 201 (p. 3)	Current Organization
ICS 201 (p. 4)	Resources Summary
ICS 202	Incident Objectives
ICS 203	Organization Assignment List
ICS 204	Assignment List
ICS 205	Incident Radio Communications Plan
ICS 206	Medical Plan
ICS 207	Incident Organization Chart (wall mounted)
ICS 209	Incident Status Summary
ICS 210	Status Change
ICS 211	Incident Check-In List
ICS 213	General Message
ICS 215	Operational Planning Worksheet
ICS 215A	Hazard Risk Analysis

Section 8.3 will discuss potential integration of NIMS organizational, resource typing, and position qualification requirements with the proposed RIPB RERP construct.

8.3 ALL-HAZARDS INTEGRATION POTENTIAL: OFFSITE

This section reviews potential for integrating elements of the National Preparedness System and NIMS into a RIPB RERP oversight construct. Key factors assessed are whether and how the current RERP oversight system integrates all-hazards elements, the degree to which all-hazards elements support RERP (and vice versa), how well all-hazards elements support performance-based oversight, and whether all-hazards elements would conflict with performance-based oversight of offsite RERP efforts.

Generally, the all-hazards elements are inputs to performance rather than standards of performance. They therefore neither support nor conflict with performance-based oversight, which focuses on whether State and local OROs meet objective performance outcomes.

8.3.1 Risk Prioritization: Threat and Hazard Identification and Risk Assessment

Radiological emergencies involving commercial NPPs have factored into risk assessments supporting all-hazards preparedness. The SNRA included a scenario in which an accident led to reactor core damage and release of radiation. Both the 2012 and 2013 editions of FEMA's CPG 201 THIRA guidance mentioned "radiological release" as one hazard to consider. Of four States with NPPs and 2012 THIRA documents online, two specifically mentioned the hazard.

The THIRA process differs from the probabilistic risk assessments favored by the NRC. The THIRA is consequence-focused. FEMA's THIRA guidance encourages development of a "meta-scenario" that combines the most stressing aspects of each hazard in order to set capability targets for addressing the worst impacts.

However, as a risk assessment the THIRA process is not directly germane to RERP or performance-based oversight. The main offsite RERP interest in other hazards is whether State and local OROs can perform adequately if confronted with both a radiological emergency and another incident at the same time. This goes to setting performance and capability targets, discussed next.

In summary, there is currently a moderate level of integration between RERP and all-hazards risk prioritization efforts such as THIRA. However, it is one-way: RERP considerations inform some THIRAs, but THIRAs do not inform RERP.

8.3.2 Performance Targets (National Preparedness Goal, Threat and Hazard Identification and Risk Assessment)

State and local jurisdictions are using the THIRA process to set capability targets because the National Preparedness Goal does not—at least not specific and measurable targets. **Table 12** on the next page provides an example for one core capability. The numbered targets further specify tasks, but do not define any standards of performance.[9]

The National Preparedness Goal acknowledges this. It notes that the targets will serve as the basis for development of performance measures to track progress. It also states that the "capability targets serve as strategic targets and will be vetted and refined, taking into

[9] The National Academy of Public Administration (2011) has leveled this criticism: "The Panel finds that the Goal document does not meet the need for clearly defined, measurable outcomes for preparedness capabilities. … Without additional clarification by DHS/FEMA, the states and urban areas will need to continue to establish capability levels for themselves which may or may not satisfy the national interest. The Panel strongly recommends that [DHS/FEMA] develop more specific or additional capability targets …" (p. viii).

Table 12. Example of Capability Targets in the National Preparedness Goal (DHS 2011a)	
Mass Care Services:	Provide life-sustaining services to the affected population with a focus on hydration, feeding, and sheltering to those who have the most need, as well as support for reunifying families.
1. Move and deliver resources and capabilities to meet the needs of disaster survivors, including individuals with access and functional needs and others who may be considered at-risk. 2. Establish, staff, and equip emergency shelters and other temporary housing options (including accessible housing) for the affected population. 3. Move from congregate care to non-congregate care alternatives and provide relocation assistance or interim housing solutions for families unable to return to their pre-disaster homes.	

consideration risk information and resource requirements, during the planning process established through PPD-8." The THIRA process is one element of this planning.

From the few examples available online, States have used the THIRA process to develop measurable targets, often focusing on initiating or completing an activity within a certain amount of time. However, the targets are not necessarily compatible or standardized. **Table 13** on this and the following page gives example targets from three States for three different capabilities potentially applicable to RERP. Over time, FEMA could begin compiling and deconflicting the targets to develop and apply national performance measures, but this has not occurred.

None of the States with THIRAs online specifically cited RERP considerations as the basis for a performance target. For full integration with RIPB RERP, ideally the THIRA process will come to involve mandatory inclusion of a RERP-relevant scenario by States with RERP planning responsibilities. These would be used to help set capability targets. Targets for a given capability could be stricter than those required for RERP, depending on characteristics of other hazards. As long as the capabilities and capability targets addressed all RIPB RERP requirements, and the all-hazards THIRA capability targets were equal to or more stringent than any accepted RIPB RERP performance target, RIPB RERP could rely on meeting all-hazards performance targets to give reasonable assurance of preparedness for RERP requirements. However, this is not currently the case. The examples given do not reflect expectations for response to a significant release. The THIRA focus on States and selected urban areas also means its targets may not scale to RERP implementation requirements for local, non-urban OROs around NPPs.

Table 13. Selected Capability Targets from Three States' 2012 THIRAs (Multiple sources*)
Mass Care Services: *Provide life-sustaining services to the affected population with a focus on hydration, feeding, and sheltering to those who have the most need, as well as support for reunifying families.*
• Mobilize resources within 72 hours of an incident to provide life-sustaining services to the affected human and animal populations consisting of an estimated 650,000 people and 96,300 animals in need of shelter, potable water, sanitation disposal, secure medical treatment facilities, mental health treatment, functional needs assistance, veterinary services, and support to reunify families. • Inspect 2,600 potential temporary shelter structures within the first 72 hours after an incident prior to placing them into operation.
• Provide assistance to communities with shelter, food, water, health care, and functional and behavioral needs within 24 hours of an event or incident.

• Within 72 hours, move and deliver resources and capabilities to meet the needs of disaster survivors, including individuals with access and functional needs and others who may be considered to be at risk. • Within 72 hours, establish, staff, and equip emergency shelters and other temporary housing options (including accessible housing), feeding operations, bulk distribution centers, and volunteer reception and donations centers for the affected population. • Within 30 days, move from congregate care to non-congregate care alternatives and provide relocation assistance or interim housing solutions for families unable to return to their pre-disaster homes.
Critical Transportation: *Provide transportation (including infrastructure access and accessible transportation services) for response priority objectives, including the evacuation of people and animals, and the delivery of vital response personnel, equipment, and services into the affected areas.*
• Identify, within 24 hours of an incident, staging areas and other support locations for use by federal, state, local, and private partners. • Establish lines of supply into the impacted zone within 72 hours using seaports, airports, railroads, and roads in order to establish emergency power and fuel lines of supply. • Inspect, reestablish, and maintain land, sea, pipeline, and air routes within the first 72 hours after an incident in order to move first responders into the area affected by the incident and to safely sustain 650,000 persons in the vicinity of the incident or evacuate them out of the impacted zone, including up to 12,500 persons seriously injured and 43,000 persons with injuries not requiring hospitalization.
• Within 12 hours of the incidents, establish physical access through appropriate transportation corridors and within six hours of receiving a request deliver required resources to save lives and to meet the needs of disaster survivors for an event impacting 13,209 sq. miles and damaging or destroying 1,659 transportation lifelines.
• Type, stage, and provide transportation resources to responders/evacuees within one hour of request.
Public Information and Warning: *Deliver coordinated, prompt, reliable, and actionable information to the whole community through the use of clear, consistent, accessible, and culturally and linguistically appropriate methods to effectively relay information regarding any threat or hazard and, as appropriate, the actions being taken and the assistance being made available.*
• Provide warning of the expected impacts during an unfolding event (such as a flood) for 800,000 people, including messaging on how to take appropriate actions. • Coordinate local, state, and federal public information strategy within 12 hours after an incident to communicate information such as location and activation schedule of shelters and Family Assistance Centers as well as information related to missing persons and fatalities. • Establish communications within 24 hours after an incident to update the populace at regular intervals in all counties, tribal areas, and surrounding states, as well as federal partners, on response efforts and other information (e.g., details of public/individual assistance programs) relevant to the incident. • Employ multiple information dissemination platforms to include private media outlets, public address systems, and social media to distribute guidelines for additional assistance available to the public after the close of the immediate operational response.
• Within two hours of an incident and at the end of every operational period afterwards, inform all affected segments of society by all means necessary, including accessible tools, of critical lifesaving and life-sustaining information to expedite the delivery of emergency services and aid the public to take protective actions. • Within two hours of an incident and at the end of every operational period afterwards, deliver credible messages to inform ongoing emergency services and the public about protective measures and other life-sustaining actions and facilitate the transition to recovery.
• Provide unified, timely, and consistent warning and guidance to public and responders within one hour for urgent situations and four hours for all others.
* Sources: California Governor's Office of Emergency Services (undated), Missouri Office of Homeland Security (2012), and New Hampshire Homeland Security and Emergency Management (2012)

8.3.3 Funding (Grants)

Federal funds must be used for the purposes for which they were appropriated, and grants must be used for eligible costs. All-hazards grants have a broader purpose than RERP, but a purpose that could include RERP uses.

However, many States have funding specifically for RERP from fees levied on NPP licensees. For example, Pennsylvania charges each of its five sites annual fees of $200,000 for a Radiological Emergency Planning and Preparedness Fund account and $150,000 for a Radiological Emergency Response Fund account within the General Fund. These funds are managed by the Pennsylvania Emergency Management Agency.[10]

States must maintain a foundational all-hazards capability and address other hazard-specific needs. Some of these hazards may not have dedicated sources of funding. Since most States with NPPs can cover RERP-specific needs with assessments on the licensees, States will generally use all-hazards grant funding for non-RERP purposes.

The dividing line between RERP and non-RERP all-hazards purposes may not always be clear. For example, Pennsylvania law for its Radiation Emergency Response Program funding requires "development and maintenance of a current list of handicapped persons requiring assistance" (Pennsylvania Code 116.5(a)(2)(v)). This has benefits beyond RERP-related incidents. Similarly, RERP benefits from a foundation of all-hazards preparedness, including ensuring there is a professional emergency management staff to coordinate response if needed, as EMPG program funds help do. Yet RERP-specific funding at least covers RERP minimum requirements; all-hazards grants are then unlikely to replace or supplant that funding.

From a performance-based oversight perspective, the funding source is immaterial. However, to the extent licensees are the beneficiaries of ensuring adequate State and local ORO RERP performance, licensees will continue supporting the costs of RERP. The nuclear industry has expressed concern about including all-hazards matters in current RERP-related requirements in part because of this funding support.[11]

Funding considerations may be the most significant obstacle to integration. Currently funding is largely "siloed." Efforts funded from either all-hazards or RERP-specific funds can have crossover benefits. However, funding is generally focused on compliant inputs and activities, not achieving a target level of performance. Under a purely performance-based RERP oversight system, there may be disagreement over whether licensees should fund an all-hazards activity as a corrective action, even if it could help jurisdictions meet related RERP-specific performance targets. Specifically, there may be disagreement over whether the expected impact on performance can be attributed to the proposed input/activity, and over the scope needed to achieve that impact.

[10] This is in addition to an annual fee of $550,000 per site for the Radiation Protection Fund managed by the Pennsylvania Department of Environmental Protection (see Pennsylvania Department of Environmental Protection 2010). Note also that an additional $300,000 is appropriated to the Radiological Emergency Planning and Preparedness Fund, beyond the $200,000 per site contribution.

[11] Regarding proposed changes to FEMA's REP Program Manual, one NEI reviewer wrote: "Many changes or additions to this program manual are imposing new requirements and expectations that reach far beyond planning and responding to the unique aspects of a radiological event at a NPP (i.e., a "REP event") … subjecting OROs to evaluation against these generic emergency response elements" (FEMA 2011a, p. 92).

8.3.4 Performance Input: Plans (CPG 101)

All-hazards emergency operations plans must still account for requirements specific to single hazards. For example, a generic function of providing public information and warning may rely on some of the same organizations and resources to deliver messages regardless of hazard. However, the timeline, specific target audience, and pre-scripted messages for hurricane evacuation would be different from those for a radiological release at an NPP.

The National Response Framework accounts for this through "incident annexes." The annexes describe specific requirements and arrangements for given hazards, yet can reference the all-hazards elements of the framework rather than duplicate them as in a separate plan. CPG 101, FEMA's guidance on planning (FEMA 2010a), features this hazard-specific incident annex approach but does not require it. In fact, CPG 101 notes that local communities "may find it appropriate to address specific hazards or threats in completely separate and stand-alone plans. In this case, the EOP must specifically reference those plans and provide a brief summary of how the EOP is to be coordinated with the stand-alone plans."

FEMA also recognizes in CPG 101 that there are legal and regulatory requirements associated with some hazards. However, one State commenter on proposed REP Program Manual changes said: "CPG 101 the document contradicts the planning needs and evaluation criteria for NPP and is unsuitable for use in NPP planning." FEMA responded that offsite RERP requirements are more specific, but that CPG 101 has useful information (see FEMA 2011a, p. 53).

From the all-hazards standpoint, FEMA leaves States and locals free to address RERP-specific requirements in any format they choose. **Table 14**, below, shows that over half the 31 States with NPPs use stand-alone plans to meet RERP requirements, although there may be summaries or other "bridging documents" in the all-hazards plans. Although many States have moved from stand-alone plans to hazard-specific annexes in all-hazards plans, planning integration is relatively limited.[12] None of the 31 States relies solely on "generic" all-hazards planning provisions to address RERP requirements.

Table 14. State Approaches to RERP Requirements in All-Hazards Planning

Separate RERP Plan (referenced)	Separate RERP Plan and Bridging Document(s) in All-Hazards Plan	RERP Annex or Annexes in All-Hazards Plan
12	6	13
California, Connecticut, Georgia, Iowa, Illinois, Massachusetts, Mississippi, Missouri, Nebraska, New Jersey, Pennsylvania, Tennessee	Alabama, Arizona, Florida, Kansas, Louisiana, New York	Arkansas, Maryland, Michigan, Minnesota, New Hampshire, North Carolina, Ohio, South Carolina, Texas, Virginia, Vermont, Washington, Wisconsin

From a performance-based oversight perspective, plans would be immaterial as long as performance is acceptable. However, objective RERP performance measures would allow FEMA to correlate planning approaches and specific planning provisions to successful RERP performance. This could help justify any FEMA-driven corrective actions for adopting all-hazards guidance to support RERP efforts, where State and local ORO performance requires FEMA-determined corrective action under the proposed RIPB RERP framework.

[12] For example, Minnesota consolidated its formerly separate plan into its all-hazards plan in 1995, according to the 2001 Minnesota Emergency Operations Plan.

8.3.5 Performance Input: Organization (National Incident Management System Incident Command System)

Supplement 4 to NUREG-0654 reiterates that NIMS ICS is not required for OROs who do not receive Federal preparedness assistance (p. 3). While FEMA has said it will not evaluate OROs on NIMS ICS compliance during REP exercises (FEMA 2011a, pp. 54-55, 91-93, 96-98, 419, 520-521, 693, and 703), the 2013 REP Program Manual does seek consistency with NIMS ICS in plans "for those OROs that have adopted NIMS." Specifically, their concepts of operations must be consistent with NIMS core doctrine, their organizational charts must use the five main organizational elements of NIMS ICS (Command, Planning, Operations, Logistics, and Finance and Administration), and they must identify who will carry out the five NIMS ICS functions (FEMA 2013f, pp. II-6, II-7, and II-9). States have cautioned against requiring RERP plans to include more NIMS ICS content than was required for their Governors to certify local plans as NIMS compliant (FEMA 2011a, p. 54).

Not all State-level RERP stakeholders consider that NIMS ICS benefits RERP. One commenter on NUREG-0654 Supplement 4 opposed how the State's NIMS implementation added organizational layers between the State Radiation Control Officer and the State's Emergency Management decision makers, rather than enabling them to speak directly (FEMA 2011, p. 242). It may be possible to develop a suggested NIMS ICS-compliant organization for NPP radiological emergencies that resolves this issue. In any case, FEMA describes the benefit of NIMS ICS to RERP as aiding mutual aid and interoperability: "The integration of NIMS/ICS into ORO emergency plans/procedures for NPPs will provide greater consistency across response jurisdictions and facilitate integration of response elements during an incident that affects a NPP" (FEMA 2013f, pp. II-5 to II-6).

Despite current efforts to integrate NIMS ICS into offsite RERP oversight, for purely performance-based oversight purposes NIMS ICS remains an input to performance. Personnel and resources are organized under NIMS ICS to accomplish something. Performance-based oversight is focused on whether the accomplishment occurs, not how it was organized. NIMS ICS organization is therefore not material to performance-based oversight.

8.3.6 Performance Input: Equipment (National Incident Management System Resource Typing)

Current RERP-related policy does not specifically address NIMS resource typing efforts, which address equipment or teams of personnel and their associated equipment. FEMA's National Integration Center has developed several typed resource definitions, but few elements are specific to radiological incidents (FEMA 2013i). **Table 15** on the next page shows radiological detection requirements for Hazardous Materials Entry Teams. There are no current definitions for teams of technical specialists and advisors on radiological issues.

Typing resources most likely to be needed for response to a radiological emergency surrounding an NPP could be useful for mutual aid and eventually in defining any performance targets related to mobilization (i.e., the ability to deploy some quantity of a typed capability by a given time). However, it is not necessary for specifying performance standards. Resources are organized to be able to accomplish something. Performance-based oversight is focused on whether the accomplishment occurs, not the specific resources used in accomplishing it. NIMS ICS resource typing is therefore not directly material to performance-based oversight.

Table 15. NIMS Typed Resource Definition with Radiological Detection Capability (FEMA 508-4, 2005)						
Resource:		**Hazmat Entry Team**				
Category:	Hazardous Materials Response (ESF #10)				**Kind:**	Team
Minimum Capabilities:		**Type I**	**Type II**	**Type III**	**Type IV**	**Other**
Component	**Metric**					
Team	Sampling: Capturing, Labeling, Evidence Collection	Same as Type III plus: (WMD Chem Bio) Special resources may be required for air sample collection.	Same as Type III plus: (Unknown Industrial Chemicals) Known and unknown industrial chemicals standard evidence collection protocols. Ability to sample liquids and solids.	(Known Industrial Chemicals) Known industrial chemicals standard evidence collection protocols for each include: capturing and collection, containerizing and proper labeling, and preparation for transportation and distribution, including standard environmental sampling procedures for lab analysis. Consistent with established chain of custody protocols.		
	Radiation Monitoring/ Detection	Identify and establish the exclusion zones after contamination spread (this does include identification of some, but not all, radionuclides). Ability to conduct environmental and personnel survey. Ensure all members of survey teams are equipped with accumulative self-reading instruments (dosimeters).	Same as Type III plus: (Alpha detection) Basic criteria include detection and survey capabilities for alpha, beta, and gamma.	(Beta detection, Gamma detection) The ability to accurately interpret readings from the radiation detection devices and conduct geographical survey search of suspected radiological source or contamination spread. Basic criteria include detection and survey capabilities for beta and gamma.		

8.3.7 Performance Input: Training (National Incident Management System Qualification Systems)

NIMS relies on ensuring that a term means the same thing across jurisdictions and disciplines. This extends to NIMS position titles. For the titles to mean the same thing means that anyone occupying a NIMS position must be "qualified" in that position. Qualification means both completing formal training and gaining related experience, including experience in progressively more complex incidents. Usually a "position task book" defines the training and experience requirements for a position.

The NIMS Training Program provides NIMS training expectations surrounding a core curriculum and different levels of incident complexity. FEMA states that its guidance is not absolute; most of the guidance uses "should" rather than "must" (DHS 2011, p. 16). None of the NIMS core curriculum specifically addresses RERP, although it would be possible to tailor NIMS training to RERP concerns through use of RERP-related examples.

Likewise, current RERP policy does not specifically address NIMS training. FEMA's 2013 REP Program Manual addresses requirements for "radiological emergency response training" for different elements of the ORO. The requirements are for plans and procedures to "discuss" training these different ORO groups; no content is specified beyond notifications and radiation protection (FEMA 2013f, p. II-138). One State commenter has noted that "there is no established training curriculum, no requirement regarding the organizations that must be trained, and no requirement about how many personnel must be trained" (Engelhart 2013).

NIMS training supports NIMS organization, and the potential benefit to RERP is to facilitate mutual aid and augmentation for OROs. However, like the NIMS organizational construct and NIMS resource typing, NIMS training is an input to performance and neither directly supports nor conflicts with a performance-based oversight construct for RERP. ORO personnel required to use NIMS will be required to have some level of NIMS training regardless of the RERP oversight construct.

8.3.8 Performance Input: Exercise Doctrine (Homeland Security Exercise and Evaluation Program)

Similar to NIMS, HSEEP doctrine describes a common approach—terminology, processes, and document templates—for managing exercise programs and designing, developing, conducting, and evaluating individual exercises. HSEEP is not about compliance. HSEEP doctrine is "flexible, scalable, [and] adaptable … . Exercise practitioners are encouraged to apply and adapt HSEEP doctrine to meet their specific needs" (DHS 2013, p. Intro-2). Per NUREG 0654/FEMA-REP-1, Rev. 1, Supplement 4 (pp. 3-4), HSEEP's key features are the following:

(1) Exercise scheduling through Training and Exercise Program Workshops documented in multi-year TEPs,
(2) Use of certain documents for exercise conduct, developed according to certain planning meeting milestones,
(3) An AAR and appended improvement plan (IP) in a certain format (organized by core capabilities, etc.), and
(4) Tracking of corrective actions identified in the AAR/IP.

As noted in Section 8.2.2, FEMA grantees must develop TEPs and "the use of HSEEP is strongly encouraged" when developing AAR/IPs (FEMA 2013b, p. 61). FEMA Directive 123-15 of January 16, 2009 also required all FEMA programs, including REP, to use HSEEP (Spence 2013). Accordingly, FEMA and its grantees that are OROs have made significant progress in

integrating HSEEP doctrine in the current RERP oversight framework. For example, of 12 States with NPPs whose TEPs are online, all but one mentions the REP program and REP exercises.[13] FEMA directed its regional REP staff to begin using HSEEP and conducted three integration exercises to test application of HSEEP processes to REP. FEMA concluded that there "was no need to modify" how REP exercises were conducted in order to integrate HSEEP doctrine. There were, in fact, some benefits to following HSEEP guidelines on exercise documents, such as the exercise plan and controller/evaluator handbook (FEMA 2010). The REP program has continued using HSEEP doctrine since 2009, including the revised and simplified HSEEP doctrine of 2013.

For performance-based oversight, HSEEP guidance may help develop consistent performance demonstrations. It is not necessary—as FEMA noted, using HSEEP doctrine did not alter how exercises were conducted—but it does not conflict with performance-based oversight. (Section 8.3.10 below addresses HSEEP evaluation processes.)

8.3.9 Categorization and Reporting: Core Capabilities

Oversight of response preparedness requires categories of response activities to align direction, guidance, and reporting. The National Preparedness Goal defines 14 categories—of a total of 31 core capabilities—as applicable specifically to the response mission and "necessary to save lives, protect property and the environment, and meet basic human needs after an incident has occurred" (see **Table 16**, next page). FEMA and its grantees use the core capabilities to set performance targets, devise plans, evaluate exercise performance, and assess the status of preparedness.

FEMA has mapped assessment areas from its current RERP oversight system to the 31 core capabilities—and had mapped them to the core capabilities' predecessor, the target capabilities list (TCL), with its 37 capabilities. This was part of FEMA's effort to incorporate HSEEP evaluation procedures into RERP oversight. That FEMA was able to redefine preparedness categories from 37 to 31, and that RERP oversight was able to adapt to the change, shows that categorization does not affect the underlying substance of homeland security and emergency management. Similarly, a crosswalk between task areas for the proposed RIPB RERP construct and the core capabilities is feasible. **Table 17** (following **Table 16** on the next page) gives a crosswalk between the 14 response core capabilities and both the current RERP assessment areas and the task areas in the proposed RIPB RERP construct. The only response-related core capabilities not addressed are Fatality Management and Mass Search and Rescue Operations, given the nature of the hazard, and Planning, given that both the assessment areas and the RIPB RERP task areas focus on performance demonstrations.[14]

Since mapping one construct to another is feasible, the proposed RIPB RERP construct could simply have used the core capabilities. It did not do so in order to preserve some specificity. The all-hazards core capability definitions are broad; they require another layer of RERP-specific content (i.e., a set of RERP-specific performance targets) to be meaningful. For example, the Critical Transportation core capability combines evacuation and movement of response resources. Further, the all-hazards categorization may change in the future. By working instead from the specific requirements for protecting public health and safety in a radiological emergency at an NPP, the proposed RIPB RERP construct preserves those terms and requirements for integration with any all-hazards categorization.

[13] Vermont's 2012 TEP does not, but the document seems to be a draft though marked "final." Vermont's 2010 TEP did mention REP exercises. The other 11 States are: Arkansas, Florida, Louisiana, Michigan, Minnesota, Missouri, Nebraska, Pennsylvania, South Carolina, Washington, and Wisconsin.
[14] Table 17 draws from the crosswalk at FEMA (2013f), pp. IV-19 to IV-20.

Table 16. Response Core Capabilities from the National Preparedness Goal (DHS 2011a)

Core Capability	Objective
Planning	Conduct a systematic process engaging the whole community in development of executable strategic, operational, and/or community based approaches to meet defined objectives
Public Information and Warning	Deliver coordinated, prompt, reliable, and actionable information to the whole community through the use of clear, consistent, accessible, and linguistically appropriate methods to effectively relay information regarding any threat or hazard and actions being taken/assistance being made available
Operational Coordination	Establish and maintain a unified and coordinated operational structure and process that appropriately integrates all critical stakeholders and supports the execution of core capabilities
Critical Transportation	Provide transportation for response priority objectives, including the evacuation of people and animals, and the delivery of vital response personnel, equipment, and services to the affected areas
Environmental Response/Health and Safety	Ensure the availability of guidance and resources to address all hazards, including hazardous materials, acts of terrorism, and natural disasters, in support of responder operations and the affected communities
Fatality Management Services	Provide fatality management services, including body recovery and victim identification, working with state and local authorities to provide temporary mortuary solutions, sharing information with Mass Care Services for the purpose of reunifying family members and caregivers with missing persons/remains
Infrastructure Systems	Stabilize critical infrastructure functions, minimize health and safety threats, and restore and revitalize systems and services
Mass Care Services	Provide life-sustaining services to the affected population with a focus on hydration, feeding, and sheltering to those with the most need, as well as support for reunifying families
Mass Search and Rescue Operations	Deliver traditional and atypical search and rescue capabilities, including personnel, services, animals, and assets to individuals in need, with the goal of saving the greatest number of lives in the shortest time possible
On-Scene Security and Protection	Ensure a safe and secure environment through law enforcement and related security and protection operations for people and communities located within affected areas in the impact area and all response forces
Operational Communications	Ensure the capacity for timely communications in support of security, situational awareness, and operations by any and all means available, among and between affected communities in the impact area and all response forces.
Public and Private Services and Resources	Provide essential public and private services and resources to the affected population and surrounding communities, to include emergency power to critical facilities, fuel support for emergency responders, and access to community staples (grocery stores, pharmacies, and banks) and fire and other first response services
Public Health and Medical Services	Provide lifesaving medical treatment via emergency medical services and related operations, and avoid additional disease and injury by providing targeted public health and medical support and products to all people in need within the affected area
Situational Assessment	Provide all decision makers with decision relevant information regarding the nature and extent of the hazard, any cascading effects, and the status of the response

Table 17. Crosswalk of Response Core Capabilities, Current REP Program Manual Assessment Areas, and Tasks in the Proposed RIPB RERP Oversight Construct

		Common			Response										
		Planning	Public Information and Warning	Operational Coordination	Critical Transportation	Environmental Response/ Health and Safety	Fatality Management Services	Infrastructure Systems	Mass Care Services	Mass Search and Rescue Operations	On-Scene Security and Protection	Operational Communications	Public and Private Services and Resources	Public Health and Medical Services	Situational Assessment
FEMA REP Program Manual Assessment Areas	Emergency Operations Management			X		X			X			X	X	X	X
	Protective Action Decision-Making		X	X		X						X			X
	Protective Action Implementation			X	X	X					X		X		
	Field Measurement and Analysis			X		X		X							X
	Emergency Notification and Public Information		X	X								X			
	Support Operations/ Facilities			X		X			X					X	
Tasks in Proposed RIPB RERP Construct	Receive Licensee Notification of Emergency											X			
	Understand the Notification			X											
	Notify Appropriate Officials			X								X			
	Assess the Situation														X
	Make a Protective Action Decision			X											
	Mobilize Response Components			X								X			
	Notify the Public		X									X			
	Implement Protective Action Decision			X	X						X	X	X	X	
	Receive, Screen, and Support Evacuees					X			X				X	X	
	Manage Exposure and Contamination Risks					X					X			X	
	Make Area of Impact Safe for Public Return							X							
	Facilitate Community Restoration and Recovery							X							

In sum, integration of the core capabilities as categories for organizing and reporting results of performance demonstrations occurs in the current RERP oversight system, and could be accommodated in the proposed RIPB RERP construct. Results generated under the current assessment areas or under the proposed RIPB RERP task areas can be categorized in terms of core capabilities. This is an overlay that neither supports nor conflicts with RERP content and performance-based oversight.

8.3.10 Categorization and Reporting: Exercise Evaluation (Homeland Security Exercise and Evaluation Program)

HSEEP structures exercise evaluation around exercise evaluation guides, or EEGs. For each core capability to be assessed under a given exercise's objectives, the EEG lists one or more "organizational capability targets" for the core capability, and one or more "critical tasks" for each organizational capability target. The critical tasks give evaluators points of review for assessing whether organizational capability targets are met. **Figure 9** on the next page provides a sample EEG.

FEMA has developed a set of HSEEP EEGs for RERP oversight. FEMA used its assessment areas as the organizational capability targets, and its specific demonstration criteria as the critical tasks. The proposed RIPB RERP oversight construct could use the same procedure, with task areas (or subtask areas) as the organizational capability targets, and specific performance targets as the critical task descriptions.

Under HSEEP, evaluators grade organizational capability targets and the overall core capability on a four-step rating scale. As shown in **Table 18** (on the page following **Figure 9**), this four-step scale is compatible with, if not exactly equivalent to, four-step evaluation scales under both current RERP oversight and proposed RIPB RERP oversight. Results under one system's rating scale could be translated to the other system's rating scale for reporting and comparison purposes.

Some RERP stakeholders have noted that HSEEP has a "no-fault" evaluation approach that is incompatible with RERP's requirements, and that HSEEP calls for more self-evaluation and self-driven corrective action than RERP currently does. The idea in HSEEP is to focus on potential corrective actions, not blame individuals and organizations for inadequate performance.[15]

[15] Current HSEEP doctrine (DHS 2013) uses the term "no-fault" only once, in describing evaluation of tabletop exercises. It also uses the term "non-attribution environment" once. The terms are not defined or discussed. See pp. 2-5 and 5-4.

EXERCISE EVALUATION GUIDE

Exercise Name: [Insert exercise name] *Exercise Date:* [Insert exercise date]	*Organization/Jurisdiction:* [Insert organization or jurisdiction]	*Venue:* [Insert venue name]

Response

Exercise Objective: [Insert exercise objective]

Core Capability: **Operational Communications**

Ensure the capacity for timely communications in support of security, situational awareness, and operations by any and all means available, among and between affected communities in the impact area and all response forces.

Organizational Capability Target 1: [Insert customized target based on plans and assessments]

Critical Task: [Insert task from frameworks, plans, or SOPs]
Critical Task: [Insert task from frameworks, plans, or SOPs]
Critical Task: [Insert task from frameworks, plans, or SOPs]
Critical Task: [Insert task from frameworks, plans, or SOPs]

Source(s): [Insert name of plan, policy, procedure, or reference]

Organizational Capability Target 2: [Insert customized target based on plans and assessments]

Critical Task: [Insert task from frameworks, plans, or SOPs]
Critical Task: [Insert task from frameworks, plans, or SOPs]
Critical Task: [Insert task from frameworks, plans, or SOPs]
Critical Task: [Insert task from frameworks, plans, or SOPs]

Source(s): [Insert name of plan, policy, procedure, or reference]

Organizational Capability Target 3: [Insert customized target based on plans and assessments]

Critical Task: [Insert task from frameworks, plans, or SOPs]
Critical Task: [Insert task from frameworks, plans, or SOPs]
Critical Task: [Insert task from frameworks, plans, or SOPs]
Critical Task: [Insert task from frameworks, plans, or SOPs]

Source(s): [Insert name of plan, policy, procedure, or reference]

Organizational Capability Target	Associated Critical Tasks	Observation Notes and Explanation of Rating	Target Rating
[Insert Organizational Capability Target 1 from page 1]	• [Insert Organizational Capability Target 1 Critical Tasks from page 1]		
[Insert Organizational Capability Target 2 from page 1]	• [Insert Organizational Capability Target 2 Critical Tasks from page 1]		
[Insert Organizational Capability Target 3 from page 1]	• [Insert Organizational Capability Target 3 Critical Tasks from page 1]		
		Final Core Capability Rating	

Evaluator Name _____
Evaluator E-mail _____
Phone _____

Ratings Key
P – Performed without Challenges
S – Performed with Some Challenges
M – Performed with Major Challenges
U – Unable to be Performed

Figure 9. Example of an HSEEP EEG
Source: DHS (2013a)

Table 18. Rating Scales for HSEEP and RERP Exercise Evaluations		
System	**Rating**	**Rating Definition**
HSEEP	P – PERFORMED WITHOUT CHALLENGES	Targets and tasks were completed in a manner that achieved the objective(s) and did not negatively impact the performance of other activities. Performance of this activity did not contribute to additional health and/or safety risks for the public or for emergency workers, and it was conducted in accordance with applicable plans, policies, procedures, regulations, and laws.
	S – SOME CHALLENGES	Targets and tasks were completed in a manner that achieved the objective(s) and did not negatively impact the performance of other activities. Performance of this activity did not contribute to additional health and/or safety risks for the public or for emergency workers, and it was conducted in accordance with applicable plans, policies, procedures, regulations, and laws. However, opportunities to enhance effectiveness and/or efficiency were identified.
	M – MAJOR CHALLENGES	Targets and tasks were completed in a manner that achieved the objective(s), but some or all of the following were observed: demonstrated performance had a negative impact on the performance of other activities; contributed to additional health and/or safety risks for the public or for emergency workers; and/or was not conducted in accordance with applicable plans, policies, procedures, regulations, and laws.
	U – UNABLE TO PERFORM	Targets and tasks were not performed in a manner that achieved the objective(s).
REP (Current RERP Oversight)	MET	The participating ORO performed all activities for the criterion to the level required in the Extent-of-Play Agreement, with no Deficiencies or Areas Requiring Corrective Action assessed in the current exercise for that criterion and no unresolved prior Areas Requiring Corrective Action.
	PLAN ISSUE	This refers to an identified inadequacy in the organization's emergency plan/ procedures, rather than in the organization's performance.
	AREA REQUIRING CORRECTIVE ACTION (ARCA)	This refers to an observed or identified inadequacy of organizational performance in an exercise that is not considered, by itself, to adversely impact public health and safety.
	DEFICIENCY	This refers to an observed or identified inadequacy of organizational performance in an exercise that could cause a finding that offsite emergency preparedness is not adequate to provide reasonable assurance that appropriate protective measures can be taken in the event of a radiological emergency to protect the health and safety of the public living in the vicinity of an NPP.
Proposed RIPB RERP Oversight Construct	GREEN	Performance was at a level with no anticipated negative consequences for public health and safety. (Generally a quantitative target.)
	WHITE	Performance was at a level that could result in a minor reduction to public health or safety. (Generally a quantitative target.)
	YELLOW	Performance was at a level that could result in a moderate reduction to public health or safety. (Generally a quantitative target.)
	ORANGE	Performance was at a level not allowing reasonable assurance that the ORO's RERP capabilities would adequately protect public health and safety if needed. (Generally a quantitative target.)

8.3.11 Categorization and Reporting: Exercise Evaluation (National Exercise Program)

The NEP is the primary exercise program for measuring national preparedness. With the revised NEP Base Plan and NEP Implementation Plan, FEMA redesigned the NEP to capture information about Federal senior leaders' priorities from a cross-section of exercises around the Nation, rather than rely on one large national-level exercise and a handful of tabletop exercises to identify key preparedness issues for senior leaders. In the new NEP, FEMA develops a quarterly Rolling Summary Report identifying trends from exercises accepted into the NEP. FEMA maps this information to the core capabilities.

FEMA has not publicly released a NEP Rolling Summary Report or even a listing of exercises included within the NEP. At least one REP exercise was selected for the NEP; many more could be to help the NEP have a large sample size for trend analysis. Yet in any case, the NEP uses findings from the individual exercises to assess trends. Results of any individual RERP-related exercise would already be available within the RIPB RERP oversight process; thus the NEP and its macro-level trend reporting would not add to RIPB RERP oversight.

8.3.12 Categorization and Reporting: Assessments (National Preparedness Report, State Preparedness Report)

States receiving FEMA all-hazards grants must provide an annual SPR. The SPR requires an assessment of planning, organization, equipment, training, and exercise effectiveness in each of the 31 core capabilities. FEMA uses the SPR results in the NPR, showing the Nation's progress towards meeting the National Preparedness Goal.

The 2013 NPR is silent on RERP. Nuclear and radiological matters are mentioned only in connection with Department of Defense capabilities for response to terrorism involving chemical, biological, radiological, nuclear, and explosive elements. There is no comparison of RERP States to non-RERP States in the aggregate, for example. With an RIPB RERP oversight construct, FEMA would have a source of objective, quantitative metrics that could be mapped to the core capabilities, offering additional data points on the Nation's preparedness for the NPR.

However, reporting of all-hazards assessment results—particularly aggregate results not focused on a given State or site—will neither contribute to nor detract from performance-based oversight of RERP. Like RERP planning requirements, reporting of RIPB RERP results must be addressed, but whether that reporting is separate or is integrated within an all-hazards document (e.g., as an appendix) will not affect RIPB RERP results.

8.4 ALL-HAZARDS INTEGRATION POTENTIAL: ONSITE

Current integration of all-hazards initiatives with onsite emergency preparedness is extremely limited. Adoption of a new RIPB RERP oversight construct offsite is unlikely to change that.

None of the all-hazards initiatives discussed above is a requirement for private sector licensees. The legal authorities underpinning the initiatives focus on what Federal agencies must do, including requiring compliance as a condition of receiving Federal preparedness assistance. FEMA, in implementing the initiatives, exercises no authority over the private sector.

The all-hazards initiative most relevant to licensee NPP EP efforts is NIMS, because licensees will interact with OROs in emergencies and OROs will use NIMS organization and terminology. HSPD-5, the source of the NIMS requirement, creates no private sector requirement. HSPD-5 says NIMS is meant to "provide a consistent nationwide approach for Federal, State, and local governments to work effectively and efficiently together" (emphasis added). HSPD-5 requires the NRC to use NIMS/ICS in its own response plans, but not to make NIMS a regulatory requirement for licensees.

The NRC's guidance (NSIR/DPR-ISG-01) acknowledges NIMS without requiring it:

> Because ORO responders to an NPP event will conduct and coordinate their response efforts in accordance with NIMS/ICS concepts, licensee plans and procedures should establish the protocols and interfaces that will allow OROs to effectively support onsite activities, consistent with incident command concepts established in State and local emergency response plans. … Personnel in ERO [emergency response organization]

positions with ORO interface responsibilities should be familiar with incident command concepts, position titles, and terminology consistent with State and local emergency response plans and procedures. These ERO personnel should have a listing of ORO incident command terms and definitions to ensure that these terms are clearly understood during communications with ORO personnel.

In its Federal Register Notice revising emergency preparedness rules, the NRC explained why it did not require licensees to adopt NIMS/ICS (76 FR 72574-72575). The NRC cited specific performance outcomes to be achieved, such as "prompt communications" with the ORO, and said its regulation was adequate to ensure that outcome. Further, the NRC raised the possibility that NIMS/ICS requirements could change, requiring the NRC to issue new rules for licensee compliance. By focusing on the performance outcome, the NRC has given licensees freedom to adopt NIMS/ICS (or not), and the ability to adapt.

For its part, NEI (2010) has encouraged licensees to be familiar with NIMS/ICS: "Lead ERO facility managers, and liaisons to the ICP [incident command post], should be broadly familiar with the concepts and principles of [NIMS] and [ICS], as practiced by their State and local authorities. … This is not to suggest that NIMS/ICS training be required for any ERO member." As the NRC considers new post-Fukushima rulemaking on onsite emergency capabilities for severe accidents, the NEI has maintained that "essential attributes of command and control should be defined at the guidance level. Licensees should retain the flexibility to address these attributes within the context of their existing emergency preparedness and response capabilities and applicable Owners Group guidance." This suggests the industry is not eager to adopt NIMS/ICS and associated training requirements. In this climate, it seems equally unlikely that the industry would pursue NIMS resource typing for its FLEX mutual aid resources.

Adoption of an RIPB RERP oversight construct will not lead directly to greater all-hazards compliance and integration in NPP EP efforts. The RIPB RERP construct focuses on offsite, State and local preparedness to achieve defined outcomes, as gauged in performance demonstrations. It creates no new authority over licensee NPP EP efforts and no new requirement for licensee NPP EP efforts.

Indirectly, the use of objective, quantifiable performance metrics in RIPB RERP may help develop evidence to support regulation, guidance, or voluntary industry standards. It may become possible to show, for example, a correlation between higher ORO performance and licensee adoption of NIMS ICS, should a number of licensees choose to adopt NIMS ICS.

8.5 ALL-HAZARDS INTEGRATION PROSPECTS: SUMMARY

Table 19 on the next page summarizes the review of integration potential in Section 8.3.

The proposed RIPB RERP oversight construct could most easily and usefully integrate HSEEP, refining FEMA's already substantial integration of HSEEP in RERP oversight. Otherwise, prospects are not promising. As long as RERP has more specific, stand-alone requirements supported by separate funding, there is little driving the part (RERP) to assimilate the whole (all-hazards). As noted in this chapter, all-hazards performance targets could become at least as stringent as RERP performance targets if a more comprehensive—and therefore burdensome—THIRA process required their inclusion for any State with an NPP (or with a portion of a 10-mile EPZ): RERP requirements would become the default unless another hazard imposed more difficult requirements. Yet even then, RERP-specific oversight would be needed to ensure at least the RERP-specific mandates and requirements were met.

Table 19. Factors for Assessing Integration Prospects of All-Hazards Initiatives with RIPB RERP						
All-Hazards Initiative or Element		**Current Level of Integration (+)**	**Potential RERP Utility to All-Hazards Initiative (+)**	**All-Hazards Initiative's Potential Utility to RERP (+)**	**Supports Performance-Based Oversight (+)**	**Conflicts with Performance-Based Oversight (-)**
Risk Prioritization (THIRA)		Medium	Medium	Low	Low	Low
Performance Targets		Low	Medium	Medium	Medium	Low
Funding (Grants)		Low	Medium	Medium	Low	Low
Performance Input	Plans (CPG 101)	Low	Medium	Low	Low	Low
	Organization (NIMS ICS)	Medium	Low	Medium	Low	Low
	Equipment (NIMS Resource Typing)	Low	Low	Medium	Low	Low
	Training (NIMS Qualification Systems)	Low	Low	Medium	Low	Low
	Exercise Doctrine (HSEEP)	High	Low	Medium	Medium	Low
Categorization and Reporting	Core Capabilities	Medium	Low	Low	Low	Low
	Exercise Evaluation (HSEEP)	High	Low	Low	Medium	Low
	Exercise Evaluation (NEP)	Medium	Medium	Low	Low	Low
	Assessments (NPR/SPR)	Low	Medium	Low	Low	Low

Most striking in **Table 19** is that nothing in the all-hazards initiatives conflicts with performance-based oversight, even if an initiative is not directly supportive of performance-based oversight. All-hazards initiatives have tended to focus on performance inputs and processes, not on defined performance outcomes. Because a performance-based approach is focused on assessing outcomes rather than prescribing how to achieve outcomes, it increases freedom to integrate all-hazards requirements, concepts, and terminology. Leaving such input and process concerns in the ORO (or licensee) "band" of discretion may actually lead to increased integration as State and local OROs pursue overall efficiencies.

Where the ORO loses discretion because of performance deficiencies, FEMA may still be motivated to promote adoption of all-hazards concepts. Use of consistent, objective, quantitative performance metrics in an RIPB RERP construct could help FEMA develop evidence for which all-hazards concepts may best aid RERP performance. Such evidence becomes critical in a truly performance-based system. If requirements are defined in terms of performance outcomes, all inputs to performance are moot unless they are shown to improve performance outcomes. Research to marshal such evidence and mechanisms to disseminate evidence may be an important adjunct to RIPB oversight.

FEMA (and State and local OROs) may need that evidence as long as licensees separately fund RERP oversight. Licensees will want the funds they provide applied to a RERP purpose. At the Federal level, Congress authorizes the collection for RERP purposes. Satisfying a RERP

purpose may have all-hazards benefits, but licensees will ask that satisfying an all-hazards purpose with licensee funding satisfy a RERP purpose.

Even with evidence, FEMA should temper making adoption of any all-hazards practice a requirement in corrective actions with the recognition that all-hazards concepts, terms, and practices are not stable. The switch from the Target Capabilities List (TCL) to Core Capabilities is one example. CPG 101 guidance on planning, CPG 201 guidance on THIRAs, and the NEP all were revised between one and four years after issuance.

By the time the NRC and FEMA are ready to consider adopting an RIPB RERP oversight construct for OROs, all-hazards concepts and requirements may have become stable. Defined targets for all-hazards performance outcomes may exist that meet or exceed the requirements of radiological emergencies. Use of all-hazards concepts, terminology, and processes may be shown to have a direct bearing on meeting the performance targets. And oversight of State and local all-hazards preparedness may somehow become quasi-regulatory in its own right. If that happens, integration may mean replacing the RIPB RERP construct with an all-hazards one. Yet until then, integration will mean much the same as it does now: looking for improved interfaces between RERP and all-hazards preparedness.

9. IMPLEMENTATION CONSIDERATIONS

Earlier chapters have outlined a rationale for considering an RIPB RERP oversight regimen, provided a conceptual framework for that regimen, and examined how this RIPB RERP oversight framework might coexist with all-hazards preparedness initiatives. This chapter briefly addresses practical aspects of making the concept a reality, should the NRC and FEMA ever choose to do so.

9.1 POTENTIALLY INCREASED RESOURCE BURDENS FOR FEDERAL OVERSIGHT

A purely performance-based oversight system will require more frequent demonstrations of performance, to provide reasonable assurance that OROs can reliably meet performance targets. Although State requirements for non-Federally-evaluated RERP exercises vary, the required minimum demonstration frequencies proposed in Section 6.2 exceed some States' requirements for exercises and drills.

The Federal Government—FEMA—may choose not to evaluate all of these exercises directly. However, to offset the loss of information from regular reviews of plans and other inputs, FEMA will need to observe and evaluate more demonstrations directly than with the current biennial exercise focus. Whether this increased evaluation workload for demonstrations is met through FEMA staff, FEMA contractors, or through a FEMA-coordinated network of peer evaluators, this element of FEMA's oversight burden will increase.[1]

It is likely the increase in Federal oversight burden for demonstrations will offset any savings from reduced compliance monitoring of plans.

It is also possible that routine non-site-specific activities could increase, should FEMA pursue a program of research to develop evidence and "lessons learned" to support corrective action recommendations.

Qualitatively, then, the level of resources required for routine oversight would likely be more than under the current system.

Without firm data, how much more can only be a rough order of magnitude estimate. Consider the following *unverified, illustrative assumptions* as the basis of a rough order of magnitude estimate:

(1) Half (50 percent) of FEMA's FY2013 $37.3 million REP program budget, or $18.7 million, was for site-specific biennial exercise activity;
(2) Half of the remaining budget (i.e., $9.3M) is saved from reduced compliance activities (plan reviews, determining adequacy of plans);
(3) No additional savings accrue as former guidance and technical assistance activities transition to research on lessons learned for corrective action purposes; and

[1] In its fiscal year 2013 Congressional justification for the REP program budget, FEMA planned to evaluate approximately 30 biennial exercises and requested budget authority of $37.3 million for collections from licensees. A portion of this funding supports 170 full-time equivalent personnel. Flat fee and exercise-specific costs or labor hour breakdowns are not provided in the document (or in annual Federal Register notices setting the hourly rate to be charged to licensees for site-specific biennial exercise activities). See FEMA (2012).

(4) The site-specific exercise activity will double (i.e., require another $18.7 million) under the proposed oversight regimen.[2]

Under these illustrative assumptions, FEMA's oversight budget would need to increase by one quarter, or more than $9 million.

9.2 IMPACT OF IMPLEMENTATION ON OROS

With increased demonstration requirements, the resource burden would increase for at least some OROs if the proposed RIPB RERP oversight construct were implemented.

OROs may over time seek to include relevant RERP performance targets in THIRAs, as a basis for enhancing all-hazards capabilities to better support RERP.

However, OROs will face transition costs of their own before any new RIPB RERP oversight regimen can be implemented. State laws and regulations on fee collections from licensees and their appropriate uses may need to change to harmonize with Federal requirements. (States may elect to maintain requirements for performance "inputs" such as plans, training, procurement of specialized equipment, etc., in the service of meeting Federal performance targets.)

Further, depending on implementation, States and their publics may face a period of uncertainty for "reasonable assurance" in offsite RERP. Performance-based oversight is retrospective. It relies on past performance for reasonable assurance regarding future performance. Initially there may be no past performance in terms of the new performance targets that provide the new basis for reasonable assurance. Also, plan compliance will have been defined as an insufficient (or at least, outmoded) basis for reasonable assurance going forward. Messaging the transition carefully will be important. The message must be that the new regimen is intended to achieve a greater degree of and more objective assurance regarding RERP; this does not invalidate previous reasonable assurance determinations.

9.3 REQUIRED CHANGES IN EXISTING REGULATIONS AND GUIDANCE

Shifting from a plans-based to a purely performance-based oversight approach for RERP would be a radical change. Putting a new regulatory framework in place would be a significant undertaking after more than 30 years of incremental change and institutionalization of the current framework. This section discusses some elements needing change, without proposing specific regulatory language.

9.3.1 10 CFR 50.47, Emergency Plans, and 10 CFR 50 Appendix E

These NRC regulations define emergency preparedness on the basis of plans and planning standards, which apply both to licensees and to OROs. FEMA's role is defined as making determinations on "whether State and local emergency plans are adequate and whether there is

[2] Note that under the current regimen the focus is on a biennial exercise, and under the proposed regimen the focus is on a biannual functional exercise: a quadrupling, not doubling, of major demonstrations. The assumption here is that State and local OROs may be able to evaluate some exercise and demonstration activity already conducted separately under State auspices, and count it towards the required frequency of demonstrations. FEMA would send smaller-than-usual FEMA observer presence to at least a sample of these, to monitor the ORO evaluation and corrective action process.

reasonable assurance that they can be implemented." 10 CFR 50, Appendix E, IV.F.2.c requires that licensees conduct exercises biennially with OROs.

To support the proposed RIPB RERP construct, new language must emphasize that the NRC's "reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency" will, at least where OROs are concerned, be derived from FEMA findings on reliably meeting standards of performance in key aspects of radiological emergency response. Regulation may refer to consensus standards for ORO performance endorsed by the NRC and FEMA, rather than define the performance targets themselves in regulation. This will provide some flexibility.

New regulatory language must also modify the biennial full participation exercise requirement to promote more frequent ORO demonstrations. The NRC and FEMA should synchronize licensee and ORO required demonstrations to the extent possible.

9.3.2 44 CFR 350, Review and Approval of State and Local Emergency Response Plans and Preparedness

To implement the proposed RIPB RERP construct, FEMA's regulation on RERP plan reviews must change. As with 10 CFR 50.47, language must put the focus on "reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency." States would not request review and approval of plans, but rather a review of ORO performance against standards referenced in the revised 10 CFR 50.47. References to NUREG-0654 such as at 44 CFR 350.5(a) would be unnecessary.

Current language on the plan review and approval process would need to reflect the performance review process described in Section 6.2. Language may also clarify the scope of corrective actions FEMA would propose to improve significantly deficient performance.

9.3.3 44 CFR 351, Radiological Emergency Planning and Preparedness

This regulation defines Federal department and agency roles in assisting State and local governments with RERP. Language would require minor modifications to deemphasize support for plan reviews and emphasize technical assistance to improve RERP performance.

9.3.4 44 CFR 352, Commercial Nuclear Power Plants: Emergency Preparedness Planning

This regulation addresses how reasonable assurance will be given if OROs decline or fail to participate in RERP planning and exercises. FEMA may arrange for Federal support to the licensee in preparing offsite plans, and may then review the Federal commitments to see if a finding of reasonable assurance for the NRC is warranted.

Since this regulation makes an explicit assumption that OROs will implement at least their all-hazards plans in an actual incident, it is not necessarily a high priority under the current oversight regimen.

However, for consistency FEMA should explore adopting a performance focus in this regulation. Determinations would be based on whether Federal departments and agencies could, in lieu of State and local OROs, meet the identified performance standards.

9.3.5 44 CFR 354, Fee for Services

This regulation defines how FEMA assesses fees to NRC licensees. The current biennial exercise requirement figures prominently. Evaluation of plans is also mentioned.

New language would need to reflect requirements of the proposed RIPB RERP oversight construct. This would include additional exercise requirements. It could include additional language on lessons learned and corrective action development, although "technical assistance" is already cited as a use of the fees.

9.3.6 NUREG-0654/FEMA-REP-1, Rev. 1 and Guidance Generally

NUREG-0654 provides criteria for plan reviews. Plan reviews may be necessary under the proposed oversight regimen, but only if performance is significantly deficient or technical assistance is requested (on the assumption that a revised plan would improve performance).

Under the proposed construct, NUREG-0654 and its supplements would not be a more detailed set of "input" requirements to meet. As noted above, references to NUREG-0654 in regulations like 44 CFR 350 would be removed. Under the proposed performance-based oversight construct, very little guidance would be prescriptive. Most publications would instead focus on research and lessons learned about what practices and activities (plan provisions, training, etc.) have led to improved performance, based on meeting or exceeding objective performance targets.

Publications would also include the consensus standards, with performance targets and thresholds for different levels of degraded performance.

Beyond the requirements given by the standards, prescriptive guidance would be limited to defining valid conditions for demonstrations and associated evaluations, as well as reporting requirements. A successor publication to the FEMA Rep Manual could consolidate these requirements.

9.4 NOTIONAL IMPLEMENTATION PROCESS AND MILESTONES

Careful, deliberative rulemaking takes time. Revising its emergency preparedness regulations took the NRC more than five years, from presenting a proposed rule to the Commissioners in 2006 to issuing the final rule in 2011. The NRC and FEMA are collaborating on revisions to NUREG-0654 that likely will not be issued until 2017. In the case of the proposed RIPB RERP construct, the NRC and FEMA would need to work together to coordinate a package of changes to rules and guidance, only some of which were touched upon in Section 9.3.

Further, these are not incremental changes. Stakeholders discussed in Section 4.1 will need ample opportunity to comment. All parties wish to avoid unintended negative consequences or unreasonable burdens. Given the complexities, the NRC and FEMA will need to pilot the concept during rule development to test for issues. Stakeholders will also need ample transition time between the issuance and effective date of a final rule (or rules).

Finally, as the concept hinges on definition of performance standards, stakeholder input on the concept will require draft or strawman performance standards early in the process.

Table 20 on the following pages provides milestones for a notional implementation process based on these considerations. The sequence is more important than the notional timeframes.

The notional timeframes may be optimistic depending on the level of stakeholder concern. One draft and round of comments could be eliminated to accelerate the process, if needed.

Table 20. Notional Implementation Process and Milestones for the RIPB RERP Oversight Construct

Milestone	Purpose	Notional Timeframe for Completion
Provide SECY Paper / Decision Memorandum (and staff briefing)	Obtain NRC/FEMA leadership consent to proceed and form joint project team	2015q1
Issue Notice of Inquiry in Federal Register	Outline concept and obtain initial stakeholder views (in writing) on issues raised in this paper: • Clarity of reasonable assurance • Benefit vs. cost of performance-based approach • Elements of RERP and their risk significance • Proposed performance indicators and target values • Frequency of demonstration • Alternative, proxy indicators for RERP elements not amenable to demonstration • Differential oversight and intervention	2015q2
Adjudicate Comments	Refine concept and prepare for gateway decision	2015q3
Hold Public Meeting Regarding Notice of Inquiry and Comments Received	Refine concept and prepare for gateway decision	2015q3
Revise Concept at Staff Level into Proposed Rule(s) [draft Notice(s) of Proposed Rulemaking (NPRM)]	Refine concept and prepare for gateway decision	2016q1
Research and Draft Initial Strawman Performance Standards (NUREG)	Engage experts (labs or relevant standards-making bodies) to develop proposed performance targets, threshold levels for less-than-target performance, and proposed demonstration guidance Obtain key information needed to judge cost/benefit of proposed construct Develop clarifications based on interactions with drafters of strawman "exposure draft" standards	2016q3
Draft NPRM	Refine rule language	2016q4
Gateway: Submit NPRM to Leadership for Approval to Release	Obtain NRC/FEMA leadership commitment to proceed	2016q4
Issue NPRM for 60-Day Comment Period	Obtain public comment to refine rule language	2017q1
Conduct Supplemental Public Meetings	Obtain public comment to refine rule language	2017q1
Draft Pilot Implementation Materials, Recruit ~3 Sites/OROs for Pilot, and Conduct Training	Prepare to pilot the RIPB RERP oversight process as an "alternative approach" for OROs at selected sites	2017q2
Conduct Pilot	Obtain practical lessons learned from concept implementation	2018q2
Evaluate Pilot and Present Findings/Lessons at Stakeholder Conferences	Present lessons learned as part of outreach on concept Obtain additional feedback on concept	2018q3
Draft Supplemental Notice of Proposed Rulemaking (SNPRM)	Refine rule language	2018q4

Publish SNPRM for 75-Day Comment Period	Obtain public comment to refine rule language	2018q4
Conduct Supplemental Public Meetings	Obtain public comment to refine rule language	2019q1
Draft Interim Final Rule	Refine rule language based on comments Inform finalization of performance standards	2019q2
Gateway: Submit Interim Final Rule to Leadership for Approval to Release	Afford leadership opportunity to address any final concerns	2019q2
Finalize Standards	Prepare for final rule	2019q3
Issue Final Rule	Finalize rule language	2019q4
Develop Implementation Guidance and Training	Endorse final standards for program Complete guidance (e.g., revised REP Program Manual)	2020q3
Develop Website(s) for Public Reporting of Results and Portal for Analysis of Lessons Learned	Develop ability to associate RERP oversight results with other site information at Reactor Oversight Project site Develop (or leverage existing) portal to compile AARs, analyses of AARs, and research into evidence supporting corrective actions for performance	2020q4
Complete Initial Post-Rule Training and Outreach	Complete cycle of outreach to stakeholder groups and OROs Complete training of exercise planners and evaluators	2021q4
Make Final Rule Effective	Provide an ample transition period for States/OROs to adjust	2022q1

10. CONCLUSIONS

Since the Three Mile Island accident, oversight of offsite radiological emergency preparedness has evolved into a complex oversight regime, with the original 16 planning standards supplemented by more than 190 assessment criteria. While these planning standards and the oversight system built upon them have served to provide defense-in-depth protection to the American public from a radiological disaster for more than 30 years, there is room to reduce the oversight burden on OROs by refocusing on what OROs must *do*, not what they must say in their plans.

This paper has outlined an oversight system for offsite RERP that would be more risk-informed and performance-based. The system is based not on a list of things to include in plans, but on a conceptual model of the basic tasks that must be performed to ensure public health and safety in a radiological emergency. Subtasks have objective and outcome-based metrics for gauging performance, with clear thresholds for acceptability. Levels of less-than-target performance are associated with different levels of oversight, corrective action, and re-demonstration in order to allocate resources appropriately against risks.

The proposed offsite RERP oversight system is consistent with proposals for performance-based oversight of licensees. In both, the focus on objective measures of performance rather than subjective determinations of compliance should offer more meaningful reasonable assurance determinations to the public, and more flexibility for emergency preparedness efforts to licensees and OROs.

Further, by focusing on performance outcomes rather than performance inputs, the proposed RIPB RERP oversight construct would enable greater integration of RERP and all-hazards initiatives for OROs. Nothing in the oversight construct itself would impede adopting an all-hazards format or approach, such as for plans, because oversight would focus on achieving outcomes. Also, use of objective performance measures could enable research and studies to find correlations between specific all-hazards requirements or approaches and RERP performance outcomes.

There are issues. A performance-based oversight system could require more resources than under the current system in order to fully reap its benefits.

There are also gaps. How to demonstrate the implementation of protective actions, especially evacuation, remains unclear. The minimum frequency of demonstration needed to provide reasonable assurance on subtask performance remains more relative than precisely specified. Degrees of unacceptable performance have not been defined or validated for all subtasks. Resource costs and savings of the proposed approach are not quantified. Additional work needs to be done in all these areas.

However, a conceptual framework now exists in sufficient detail to guide further development of an RIPB RERP oversight concept. Ideally, this report has provided enough detail to suggest the additional work is worth doing.

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APPENDIX A: SUBTASK CHECKLISTS

Each subtask on the following pages is organized in a similar manner to NEI 99-02 (Nuclear Energy Institute 2009), which discusses onsite facility preparation and response. For each indicator, an attempt is made to provide an indicator name, a definition of the indicator, measurement criteria for each subtask (including data reporting elements and clarifying notes), and an initial effort at calculating the subtask.

Also included is a proposed method and frequency of demonstration.

Unlike NEI 99-02, each measure (except for binary process measures) has values linked to evaluation categories. For example, in a time-based indicator, the ideal or target time would be labeled “green,” an unacceptable time that is expected to have small impact on public health and safety would be labeled “white,” an unacceptable time that is expected to have a moderate to major impact on public health and safety would be labeled “yellow.”

Determining thresholds for assessments for each subtask requires more literature review, expert consultation, and analysis. Sample threshold levels are provided for some indicators. For some time-based metrics, the target value is given only as a letter value (e.g., “x”) indicating the need for additional analysis to determine a threshold value. However, the level of detail in this framework should serve to guide fuller development.

Task 1: Receive Licensee Notification of Emergency

Subtask: Primary communications

Description: The primary means of communication from licensee to ORO is functional.

Measurement: Primary communications system should be tested multiple times throughout the period of performance, to test that the system is functional. “Functional” means that a connection is made. Must demonstrate positive performance at least 90% (tentative) of the time to yield a positive finding. Tests should be conducted at least monthly to yield accurate findings.

Calculation:

Green: (# of successful tests)/(total # of tests) >/= 0.90

White: (# of successful tests)/(total # of tests) >/= w

Yellow: (# of successful tests)/(total # of tests) >/= y

Orange: (# of successful tests)/(total # of tests) < y

Demonstration Type: Communications test

Demonstration Frequency: Monthly

Subtask: Secondary communications

Description: Licensee and ORO have a functional, secondary means of communication.

Measurement: Secondary communications system should be tested multiple times throughout the period of performance, to test that system is functional. “Functional” means that a connection is made. Must demonstrate positive performance at least 90% (tentative) of the time to yield a positive assessment. Tests should be conducted at least monthly to yield accurate assessments.

Calculation:

Green: (# of successful tests)/(total # of tests) >/= 0.90

White: (# of successful tests)/(total # of tests) >/= w

Yellow: (# of successful tests)/(total # of tests) >/= y

Orange: (# of successful tests)/(total # of tests) < y

Demonstration Type: Communications test

Demonstration Frequency: Monthly

Subtask: 24-Hour Warning Point

Description: ORO’s primary communications center is staffed at all times to receive a message.

Measurement: Call or otherwise contact ORO's primary communications center at random times throughout the period of performance, to test that someone is available to answer the phone or secondary means of communication. Call must include notification that this is a test or drill. Must answer phone/device at least 90% (tentative) of the time to yield a positive finding. Calls should be conducted on a monthly (or more frequent) basis, at all times of day and night. Test may be combined with tests of primary and secondary means of communication.

Calculation:

Green: (# successfully answered calls)/(total # of calls) >/= 0.90

White: (# successfully answered calls)/(total # of calls) >/= w

Yellow: (# successfully answered calls)/(total # of calls) >/= y

Orange: (# successfully answered calls)/(total # of calls) < y

Demonstration Type: Communications test

Demonstration Frequency: Monthly

Subtask: Alternate Communications Center

Description: ORO can continue to receive notifications in the event of a primary facility being rendered unusable.

Measurement: At least quadrennially, as a condition of play, render ORO primary communications/watch center unusable. ORO must be able to identify and set up an alternate location for continuity of operations, and maintain required communications from this secondary facility.

Calculation: This indicator requires two capability demonstrations.

Green: Is ORO able to identify an alternate facility? Y or N. Is ORO able to establish operations at alternate facility? Y or N. Must achieve yes to both.

White: Is ORO able to identify an alternate facility? Y or N. Is ORO able to establish operations at alternate facility? Y or N. Must achieve yes to both, but may have trouble with one.

Yellow: Is ORO able to identify an alternate facility? Y or N. Is ORO able to establish operations at alternate facility? Y or N. Only achieves 1 demonstration of capability.

Orange: ORO cannot demonstrate either capability.

Demonstration Type: Exercise

Demonstration Frequency: Quadrennially

Task 2: Understand the Notification (Emergency Classification Levels)

Subtask: Message comprehension

Description: Staff members at communications/watch center who receive a message are able to comprehend emergency classification levels/severity of emergency.

Measurement: Done in conjunction with ability to receive a notification. Various levels of emergency are presented to the respondent. Respondent is then queried about the meaning of the classification level, and the actions that would be necessary on his or her part. Should demonstrate understanding of emergency response levels at least 90% (tentative) of the time.

Calculation:

Green: (# of times able to explain response levels)/(total # of queries about response levels) >/= 0.90

White: (# of times able to explain response levels)/(total # of queries about response levels) >/= w

Yellow: (# of times able to explain response levels)/(total # of queries about response levels) >/= y

Orange: (# of times able to explain response levels)/(total # of queries about response levels)< y

Demonstration Type: Drill (may be combined with communications test)

Demonstration Frequency: Monthly

Subtask: Secondary official message comprehension

Description: Other appropriate officials who receive the message from original offsite message recipient are able to comprehend emergency classification levels/severity of emergency.

Measurement: On at least a quarterly basis, secondary staff members at communications/watch center are questioned about the meaning of the classification levels, and the response actions that would be necessary on their part. Should demonstrate understanding of emergency response levels at least 75% (tentative) of the time.

Calculation:

Green: (# of times able to explain response levels)/(total # of queries about response levels) >/= 0.75

White: (# of times able to explain response levels)/(total # of queries about response levels) >/= w

Yellow: (# of times able to explain response levels)/(total # of queries about response levels) >/= y

Orange: (# of times able to explain response levels)/(total # of queries about response levels) < y

Demonstration Type: Drill (may be combined with communications test)

Demonstration Frequency: Monthly

Task 3: Notify the Appropriate Officials

Subtask: Timely notification

Description: Offsite message recipient at communications center is able to contact appropriate officials/decision makers within reasonable amount of time following receipt of notification of emergency.

Measurement: During exercise play, communications center is able to contact appropriate officials in the chain of command within 15 minutes (tentative) of notification of an emergency.

Calculation:

Green: (recorded time that message recipient successfully contacts officials)/(recorded time that message was received) </= 15 minutes

White: (recorded time that message recipient successfully contacts officials)/(recorded time that message was received) </= w

Yellow: (recorded time that message recipient successfully contacts officials)/(recorded time that message was received) </= y

Orange: (recorded time that message recipient successfully contacts officials)/(recorded time that message was received) > y

Demonstration Type: Exercise

Demonstration Frequency: Monthly

Subtask: Functional communications

Description: Functional primary and backup systems are in place to disseminate message to ORO primary personnel and other response organizations.

Measurement: On at least a quarterly basis, both primary and functional communications systems must be tested for ability to connect with officials/decision makers at least 75% (tentative) of the time. This could serve as both a test of systems, as well as a test of ability to actually reach decision-makers, or their backups in chains of command.

Calculation:

Green: (# of successfully answered communications transmissions)/(total number of attempted communications) >/= 0.75

White: (# of successfully answered communications transmissions)/(total number of attempted communications) >/= w

Yellow: (# of successfully answered communications transmissions)/(total number of attempted communications) >/= y

Orange: (# of successfully answered communications transmissions)/(total number of attempted communications) < y

Demonstration Type: Communications test

Demonstration Frequency: Monthly

Task 4: Assess the Situation

Subtask: Radiological expertise

Description: A team of decision-makers and radiological technical advisors successfully interprets information related to a radiological event or release.

Measurement: State or local EOC personnel responsible for producing assessments accurately interpret information provided regarding the emergency at least 90% of the time (tentative). Information may include figures about the severity of an emergency, radioactive dosage and PAGs in the event of a release, plume projections given weather conditions, and other information related to the preservation of public safety in a radiological emergency. To ensure that the interpretation is accurate, playing a pre-developed scenario will ensure that "correct" answers are available to grade the technical advisor's performance against.

Calculation:

Green: (# of times radiological technical advisor/decision-maker is able to correctly interpret information)/(# of times radiological technical advisor receives information) >/= 0.90

White: (# of times radiological technical advisor/decision-maker is able to correctly interpret information)/(# of times radiological technical advisor receives information) >/= w

Yellow: (# of times radiological technical advisor/decision-maker is able to correctly interpret information)/(# of times radiological technical advisor receives information) >/= y

Orange: (# of times radiological technical advisor/decision-maker is able to correctly interpret information)/(# of times radiological technical advisor receives information) < y

Demonstration Type: Exercise

Demonstration Frequency: Biannually (but multiple demonstration points within each exercise)

Subtask: Contact licensee

Description: ORO can demonstrate ability to contact nuclear plant for questions pertaining to a developing situation.

Measurement: ORO can demonstrate use of communication systems to communicate with nuclear plant in real time to gain information within 15 minutes of requiring information about a situation x% of the time.

Calculation:

Green: (# of times ORO is able to successfully communicate with nuclear plant within 15 minutes)/(# of times ORO attempts to communicate with nuclear plant) >/= g

White: (# of times ORO is able to successfully communicate with nuclear plant within 15 minutes)/(# of times ORO attempts to communicate with nuclear plant) >/= w

Yellow: (# of times ORO is able to successfully communicate with nuclear plant within 15 minutes)/(# of times ORO attempts to communicate with nuclear plant) >/= y

Orange: (# of times ORO is able to successfully communicate with nuclear plant within 15 minutes)/(# of times ORO attempts to communicate with nuclear plant < y

Demonstration Type: Exercise

Demonstration Frequency: Biannually

Subtask: Monitor radioactivity

Description: ORO can demonstrate capability to monitor the environment outside the facility boundary for increased levels of radioactivity.

Measurement: ORO must be able to activate and provide field monitoring teams at random times over a given period of time. To measure this, a series of unannounced tests must be performed, in which the ORO is required to provide at least 2 offsite monitoring teams with capability, equipment, and knowledge to accomplish a reading. During exercise, the ORO should also be required to detect elevated levels of radioiodine concentrations in the air to an amount as low as 10^-7 µCi/cc within x hours of notification, even with interference from noble gases and background radiation.

Calculation: Two calculations must be performed for this measure.

Green: First: (# of unannounced tests in which ORO is able to successfully perform an offsite monitoring test within *g* hour of notification)/(total # of unannounced offsite monitoring tests) >/= 0.90. Second: ORO is able to detect elevated levels of radioiodine concentration as low as 10^-7 µCi/cc in a test within *g* hour of notification. ORO meets both elements.

White: First: (# of unannounced tests in which ORO is able to successfully perform an offsite monitoring test within *g* hours of notification)/(total # of unannounced offsite monitoring tests) >/= 0.90. Second: ORO is able to detect elevated levels of radioiodine concentration as low as 10^-7 µCi/cc in a test within *g* hour of notification. ORO meets both elements, but may have difficulties.

Yellow: First: (# of unannounced tests in which ORO is able to successfully perform an offsite monitoring test within *g* hours of notification)/(total # of unannounced offsite monitoring tests) >/= 0.90. Second: ORO is able to detect elevated levels of radioiodine concentration as low as 10^-7 µCi/cc in a test within *g* hour of notification. ORO meets only one element.

Orange: ORO is unable to meet either element.

Demonstration Type: Drill

Demonstration Frequency: Quarterly

Subtask: Weather evaluation

Description: ORO can demonstrate ability to evaluate current and future real-world weather conditions that may have a direct impact on the protective actions necessary to protect the public.

Measurement: ORO has direct access to a weather authority (such as the National Weather Service) or meteorologist who is able to provide guidance on real-world weather and its effect on a nuclear emergency. Random tests should be performed over a given period of time, and should assess whether the ORO can contact the weather service in a timely manner, and

whether the meteorologist can produce accurate implications of forecast weather in a timely manner.

Calculation: 2 calculations must be made to capture this subtask.

Green: First: (# of times ORO successfully contacts weather evaluator within x minutes)/(total # of times ORO attempts to contact weather authority) >/= g. Second: Time it takes for weather service to produce accurate implications of forecast weather </= G minutes.

White: First: (# of times ORO successfully contacts weather evaluator within x minutes)/(total # of times ORO attempts to contact weather authority) >/= w. Second: Time it takes for weather service to produce accurate implications of forecast weather </= W minutes.

Yellow: First: (# of times ORO successfully contacts weather evaluator within x minutes)/(total # of times ORO attempts to contact weather authority) >/= y. Second: Time it takes for weather service to produce accurate implications of forecast weather </= Y minutes.

Orange: First: (# of times ORO successfully contacts weather evaluator within x minutes)/(total # of times ORO attempts to contact weather authority) < y. Second: Time it takes for weather service to produce accurate implications of forecast weather > Y minutes.

Demonstration Type: Exercise

Demonstration Frequency: Biannually

Subtask: Plume mapping

Description: ORO can demonstrate the ability to develop detailed plume maps of the area of likely impact.

Measurement: ORO uses available resources, samples, and information to produce an accurate map of projected plume, given current or provided release and wind conditions, x% of the time.

Calculation:

Green: (# of times ORO produces accurate plume map from current or provided weather conditions)/(# of times ORO is asked to produce plume map) >/= g

White: (# of times ORO produces accurate plume map from current or provided weather conditions)/(# of times ORO is asked to produce plume map) >/= w

Yellow: (# of times ORO produces accurate plume map from current or provided weather conditions)/(# of times ORO is asked to produce plume map) >/= y

Orange: (# of times ORO produces accurate plume map from current or provided weather conditions)/(# of times ORO is asked to produce plume map) < y

Demonstration Type: Exercise

Demonstration Frequency: Biannually

Subtask: Risk mapping (dose projection)

Description: ORO can demonstrate the ability to identify people at risk in a radiological event.

Measurement: ORO develops accurate projections of integrated dose, including gross radioactivity measurements from contamination data (water and air) and produces assessments for population in 10-mile EPZ within x hours of notification of protective action recommendation, y% of the time.

Calculation:

Green: (# of times ORO accurately produces an integrated dose assessment within x hours of protective action recommendation from plant)/(# of times ORO attempts to produce an integrated dose assessment) >/= g

White: (# of times ORO accurately produces an integrated dose assessment within x hours of protective action recommendation from plant)/(# of times ORO attempts to produce an integrated dose assessment) >/= w

Yellow: (# of times ORO accurately produces an integrated dose assessment within x hours of protective action recommendation from plant)/(# of times ORO attempts to produce an integrated dose assessment) >/= y

Orange: (# of times ORO accurately produces an integrated dose assessment within x hours of protective action recommendation from plant)/(# of times ORO attempts to produce an integrated dose assessment) < y

Demonstration Type: Exercise

Demonstration Frequency: Biannually

Task 5: Make Protective Action Decision

Subtask: Consult with experts

Description: ORO can demonstrate ability to consult with technical advisors for advice on maximum protection of public health and safety.

Measurement: ORO consults with technical advisor to review protective action recommendations provided by licensee, and determine if recommendations are adequate. When deemed necessary, the technical advisor provides additional recommendations for protective action.

Calculation:

Green: Does ORO consult with technical advisor? Y or N. Does technical advisor review recommendations? Y or N. Does technical advisor provide additional recommendation for protective action if he/she deems necessary? Y or N. Must answer Y to 3/3 questions.

White: Does ORO consult with technical advisor? Y or N. Does technical advisor review recommendations? Y or N. Does technical advisor provide additional recommendation for protective action if he/she deems necessary? Y or N. Must answer Y to 2/3 questions.

Yellow: Does ORO consult with technical advisor? Y or N. Does technical advisor review recommendations? Y or N. Does technical advisor provide additional recommendation for protective action if he/she deems necessary? Y or N. Answers Y to 1/3 or 0/3 questions.

Demonstration Type: Exercise

Demonstration Frequency: Biannually

Subtask: Make protective action decision

Description: ORO leaders review recommendations from technical advisor and licensee and make a PAD for public health and safety.

Measurement: Do decision-makers in the ORO reach a PAD in exercise play within x minutes of receiving protective action recommendation from nuclear licensee?

Calculation:

Green: Decision-makers in the ORO reach a PAD within g minutes of receiving protective action recommendation from nuclear licensee?

White: Decision-makers in the ORO reach a PAD within w minutes of receiving protective action recommendation from nuclear licensee?

Yellow: Decision-makers in the ORO reach a PAD within y minutes of receiving protective action recommendation from nuclear licensee?

Orange: ORO is unable to provide within y minutes.

Demonstration Type: Exercise

Demonstration Frequency: Biannually

Subtask: Evacuation mapping

Description: ORO can identify on a map or mapping system zones for evacuation.

Measurement: ORO must develop or provide a map identifying evacuation zones in the 10-mile EPZ.

Calculation:

Green: Can ORO provide an accurate map of evacuation zones in the 10-mile EPZ within g hours of receiving protective action recommendations from licensee?

White: Can ORO provide an accurate map of evacuation zones in the 10-mile EPZ within w hours of receiving protective action recommendations from licensee?

Yellow: Can ORO provide an accurate map of evacuation zones in the 10-mile EPZ within y hours of receiving protective action recommendations from licensee?

Orange: ORO is unable to provide within y hours.

Demonstration Type: Exercise

Demonstration Frequency: Biannually

Subtask: Shelter-in-place mapping

Description: ORO is able to identify on a map or mapping system zones for shelter-in-place.

Measurement: ORO must develop or provide a map identifying zones for shelter-in-place in the 10-mile EPZ.

Calculation:

Green: Can ORO provide an accurate map of zones for shelter-in-place in the 10-mile EPZ within g hours of receiving protective action recommendations from licensee?

White: Can ORO provide an accurate map of zones for shelter-in-place in the 10-mile EPZ within w hours of receiving protective action recommendations from licensee?

Yellow: Can ORO provide an accurate map of zones for shelter-in-place in the 10-mile EPZ within y hours of receiving protective action recommendations from licensee?

Orange: ORO is unable to provide within y hours.

Demonstration Type: Exercise

Demonstration Frequency: Biannually

Subtask: KI mapping

Description: ORO is able to identify on a map or mapping system zones for administration of KI.

Measurement: ORO must develop or provide a map identifying zones for administration of KI within the 10-mile EPZ, and within the 50-mile EPZ as needed.

Calculation:

Green: Can ORO provide an accurate map of zones for administration of KI in the 10-mile EPZ/50-mile EPZ within g hours of receiving protective action recommendations from licensee?

White: Can ORO provide an accurate map of zones for administration of KI in the 10-mile EPZ/50-mile EPZ within w hours of receiving protective action recommendations from licensee?

Yellow: Can ORO provide an accurate map of zones for administration of KI in the 10-mile EPZ/50-mile EPZ within y hours of receiving protective action recommendations from licensee?

Orange: ORO is unable to provide within y hours.

Demonstration Type: Exercise

Demonstration Frequency: Biannually

Task 6: Mobilize Response Components

Subtask: Contact emergency responders

Description: ORO is able to establish contact with emergency responders working in or near the 10-mile EPZ (police, EMTs, firefighters) in a timely manner.

Measurement: ORO is able to contact police, EMTs, firefighters, and other first responders working in or near the 10-mile EPZ within 15 minutes (tentative) of making a PAD.

Calculation: Requires three demonstrations of capability.

Green: ORO able to contact police within 15 minutes of making a PAD? Y or N. ORO able to contact EMTs within 15 minutes of making a PAD? Y or N. ORO able to contact firefighters within 15 minutes of making a PAD? Y or N. ORO able to contact other (if needed) within 15 minutes of making a PAD? Y or N. Must demonstrate all.

White: ORO able to contact police within 15 minutes of making a PAD? Y or N. ORO able to contact EMTs within 15 minutes of making a PAD? Y or N. ORO able to contact firefighters within 15 minutes of making a PAD? Y or N. ORO able to contact other (if needed) within 15 minutes of making a PAD? Y or N. Must demonstrate at least 2/3.

Yellow: ORO able to contact police within 15 minutes of making a PAD? Y or N. ORO able to contact EMTs within 15 minutes of making a PAD? Y or N. ORO able to contact firefighters within 15 minutes of making a PAD? Y or N. ORO able to contact other (if needed) within 15 minutes of making a PAD? Y or N. Must demonstrate 1/3.

Orange: ORO able to contact police within 15 minutes of making a PAD? Y or N. ORO able to contact EMTs within 15 minutes of making a PAD? Y or N. ORO able to contact firefighters within 15 minutes of making a PAD? Y or N. ORO able to contact other (if needed) within 15 minutes of making a PAD? Y or N. ORO unable to demonstrate any element.

Demonstration Type: Communications/notification test

Demonstration Frequency: Quarterly

Subtask: Activate responders

Description: ORO is able to demonstrate the ability to notify and activate necessary off-duty personnel.

Measurement: ORO can contact and activate off-duty personnel within x hour of notification of event. Off-duty personnel should be contacted via telephone or other method. In an ideal test, off-duty personnel would be required to report for duty in a designated location (e.g., for training), but due to overtime staffing concerns this may not be possible for many jurisdictions. Instead, ORO can use the ability to contact responders as a proxy measure, OR can attempt to use demonstration of successful mobilization of response components either in a series of drills, or in a massive mobilization exercise, tied to a time requirement. This test may occur in an unannounced environment in order to be a true demonstration of capability.

Calculation: Two calculations are possible to test responder activation. Both are not necessary, though in a mobilization drill, a response activation call drill should also occur.

Green: First: (# of off-duty responders who respond to activation call drill)/(total # off duty responders contacted) >/= G. Second: (# of off-duty responders who report to a designated location following an activation call within x hours)/(total # off duty responders who receive activation call) >/= g

White: First: (# of off-duty responders who respond to activation call drill)/(total # off duty responders contacted) >/= W. Second: (# of off-duty responders who report to a designated location following an activation call within x hours)/(total # off duty responders who receive activation call) >/= w

Yellow: First: (# of off-duty responders who respond to activation call drill)/(total # off duty responders contacted) >/= Y. Second: (# of off-duty responders who report to a designated location following an activation call within x hours)/(total # off duty responders who receive activation call) >/= y

Orange: First: (# of off-duty responders who respond to activation call drill)/(total # off duty responders contacted) </= Z. Second: (# of off-duty responders who report to a designated location following an activation call within x hours)/(total # off duty responders who receive activation call) < y

Demonstration Type: Drill

Demonstration Frequency: Quadrennially (if massive mobilization drill)

Subtask: Response support

Description: ORO is able to demonstrate the ability to bring in additional emergency service personnel through existing mutual aid agreements, contract services, or contact with other agencies/levels of government.

Measurement: Some portion of needs could likely be taken care of through mobilizing response components. However, to the extent that needs remain, measurements must capture whether the ORO is able to successfully contact resource support providers listed in existing plans or agreements, whether ORO can obtain a [notional] commitment for asset(s) relied upon in the plan, and whether ORO can obtain an estimated delivery time for asset(s) relied upon in plan (with a recording of the time). This would not need to be demonstrated frequently, but since it supports a task with high risk significance it should be tested at least quadrennially.

Calculation: Measuring this subtask requires three demonstrations of capability.

Green: First: (# of resource support providers ORO is able to contact)/(total # resource support providers) >/= g. Second: (# of resources ORO obtains notional commitment for)/(total # of resources ORO requests) >/= G. Third: Average estimated delivery time for committed assets </= 24 hours. Must demonstrate 3/3.

White: First: (# of resource support providers ORO is able to contact)/(total # resource support providers) >/= g. Second: (# of resources ORO obtains notional commitment for)/(total # of resources ORO requests) >/= G. Third: Average estimated delivery time for committed assets </= 24 hours. Must demonstrate at least 2/3.

Yellow: First: (# of resource support providers ORO is able to contact)/(total # resource support providers) >/= g. Second: (# of resources ORO obtains notional commitment for)/(total # of resources ORO requests) >/= G. Third: Average estimated delivery time for committed assets </= 24 hours. Must demonstrate 1/3.

Orange: ORO cannot demonstrate any of the three elements.

Demonstration Type: Exercise/Drill

Demonstration Frequency: Quadrennially

Task 7: Notify the Public

Subtask: Delivery of mass notification

Description: ORO is able to use a range of communications devices to reach x% of the EPZ population within 15 minutes.

Measurement: Primary alert and notification methods cover x% of the 10-mile EPZ population, and can reach them within 15 minutes. The range of communications devices may include emergency messaging over television or radio, cellular EAS, sirens, or other methods as deemed appropriate. It is beyond the scope of an exercise to monitor the entire population during an exercise. Instead, this should serve as a proxy measure that the communications systems extend over a wide enough range and in a diverse enough manner to reach an estimated 100% of the population. For example, a combination of cellular EAS and sirens might be projected to reach x% of the population through the vast majority of the population having cellular phones (and a secondary method operating to reach those who do not).

Notification tests can serve to meet requirements within a number of tasks, as public information and notification are critical throughout all phases of a radiological emergency. For example, though not explicitly listed as subtasks here, it is important for the ORO to notify the public of the protective action plan, including any evacuation routes, registration stations, decontamination stations, shelters, special needs facilities, or other relevant information to assist in the implementation of the protective action plan.

Calculation: Test of EAS(s) able to disseminate emergency notification to an estimated x% of population. Estimation may come from executing a drill utilizing available communications systems, and following this with a random survey of the population in the 10-mile EPZ to determine if they received a test alert. This sample may be extrapolated to determine how much of the population could be reached in an emergency.

Demonstration Type: Exercise

Demonstration Frequency: Biannually

Subtask: Develop follow-on emergency instruction message

Description: ORO develops an accurate and correct instructional message to the public for implementing the PAD.

Measurement: Within 15 minutes (tentative) following initial PAD, ORO develops an appropriate warning/instructional message that includes protective actions to be taken by the general public, evacuation routes by affected areas, methods to maximize shelter-in-place protection, a public inquiry number, and what evacuees should or should not take with them.

Calculation:

Green: ORO is able to develop or provide instructional messaging within 15 minutes following initial PAD.

White: ORO is able to develop or provide instructional messaging within w minutes following initial PAD.

Yellow: ORO is able to develop or provide instructional messaging within y minutes following initial PAD.

Orange: ORO is unable to develop or provide instructional messaging within y minutes following initial PAD.

Demonstration Type: Exercise

Demonstration Frequency: Biannually

Subtask: Notification of non-English-speaking population

Description: ORO develops messages in languages other than English for delivery to non-English speakers comprising a significant percentage of the population.

Measurement: Within 15 minutes following delivery of follow-on message, ORO develops an appropriate warning/instructional message equivalent to its English-language message in each language other than English spoken by more than 10,000 people within a given county or 5% of the voting-age population within a given county.

Calculation:

Green: ORO is able to develop or provide instructional messaging in non-English languages spoken by 10,000 people or more than 5% of the population in counties within the EPZ within 15 minutes following the initial follow-on message.

White: ORO is able to develop or provide instructional messaging in non-English languages spoken by 10,000 people or more than 5% of the population in counties within the EPZ within w minutes following the initial follow-on message.

Yellow: ORO is able to develop or provide instructional messaging in non-English languages spoken by 10,000 people or more than 5% of the population in counties within the EPZ within y minutes following the initial follow-on message.

Orange: ORO is unable to develop or provide instructional messaging in non-English languages spoken by 10,000 people or more than 5% of the population in counties within the EPZ within y minutes following the initial follow-on message.

Demonstration Type: Exercise

Demonstration Frequency: Biannually

Subtask: Establish Joint Information Center (JIC)

Description: The ORO must establish a JIC with the licensee in order to yield unified responses to questions from public and media.

Measurement: The ORO and licensee must work together to establish a JIC functional within x minutes of a Site Area Emergency.

Calculation:

Green: (time JIC is established) – (time Site Area Emergency is declared) </= g minutes

White: (time JIC is established) – (time Site Area Emergency is declared) </= w minutes

Yellow: (time JIC is established) – (time Site Area Emergency is declared) </= y minutes

Orange: (time JIC is established) – (time Site Area Emergency is declared) > y minutes

Demonstration Type: Exercise

Demonstration Frequency: Biannually

Subtask: Special needs populations

Description: ORO is able to alert and notify schools, licensed care facilities, correctional facilities, and persons with specific evacuation support requirements within the 10-mile EPZ.

Measurement: Demonstrate the capability to alert and notify *all* public school districts, correctional facilities and special care facilities that are expected or may necessitate protective actions for students. Demonstration requires that OROs actually contact public school systems/etc. during exercise.

Calculation:

Green: (# of facilities successfully alerted and notified within 15 minutes)/(total # of facilities) >/= g

White: (# of facilities successfully alerted and notified within 15 minutes)/(total # of facilities) >/= w

Yellow: (# of facilities successfully alerted and notified within 15 minutes)/(total # of facilities) >/= y

Orange: (# of facilities successfully alerted and notified within 15 minutes)/(total # of facilities) < y

Demonstration Type: Exercise

Demonstration Frequency: Biannually

Task 8: Implement Protective Action Decision

Subtask: Evacuation

Description: ORO is able to evacuate population in evacuation zones within required time, whether through lateral evacuation, radial evacuation, staged evacuation, or shelter-before-evacuation.

Measurement: N/A (impractical). *May involve real-world demonstration, constructed index, etc.*

Calculation: N/A

Demonstration Type: N/A

Demonstration Frequency: N/A

Subtask: Shelter-in-place

Description: ORO is able to have population appropriate zones seek shelter within required time, whether through shelter-in-place, shelter in enhanced facilities, or shelter-before-evacuation.

Measurement: N/A (impractical). *May rely on survey data.*

Calculation: N/A

Demonstration Type: N/A

Demonstration Frequency: N/A

Subtask: KI distribution

Description: ORO has distributed or has the ability to distribute KI to the public, responders, special needs populations, and transients.

Measurement: N/A. *May use inventory as proxy, rather than a performance measure.*

Calculation: This is a proposed proxy measure.

Green: (total # of doses disseminated to emergency workers) + (total # of doses available to emergency workers) = total emergency worker population? Y or N. (total # of doses disseminated to correctional facilities) + (total # of doses available to institutionalized individuals) = total incarcerated population? Y or N. (total # of doses disseminated to the public) + (total # of doses available to the public) = total population in 10-mile EPZ, including incarcerated population. Y or N. Demonstrate 3/3

White: (total # of doses disseminated to emergency workers) + (total # of doses available to emergency workers) = total emergency worker population? Y or N. (total # of doses disseminated to correctional facilities) + (total # of doses available to institutionalized individuals) = total incarcerated population? Y or N. (total # of doses disseminated to the public) + (total # of doses available to the public) = total population in 10-mile EPZ. Y or N. Demonstrate 2/3

Yellow: (total # of doses disseminated to emergency workers) + (total # of doses available to emergency workers) = total emergency worker population? Y or N. (total # of doses disseminated to correctional facilities) + (total # of doses available to institutionalized individuals) = total incarcerated population? Y or N. (total # of doses disseminated to the public) + (total # of doses available to the public) = total population in 10-mile EPZ, including incarcerated population. Y or N. Demonstrate 1/3

Orange: ORO is unable to perform any of the required subtasks

Demonstration Type: N/A

Demonstration Frequency: N/A

Subtask: Emergency Worker Protection

Description: ORO is able to develop protective actions for responders in the 10-mile EPZ and effectively implement them for affected responders.

Measurement: Demonstrate the capability to alert and notify responders of PADs affecting them (including administration of KI or shelter-in-place). In place of actually requiring demonstration of KI ingestion, can determine that have stockpile of KI available, and are able to comprehend the order to ingest when directed to do so.

Calculation: Requires two calculations

Green: First: (# of responders alerted to PADs for responders)/(total # responders) >/= g.
Second: (# of responders who have KI available)/(total # of responders) >/= G

White: First: (# of responders alerted to PADs for responders)/(total # responders) >/= w.
Second: (# of responders who have KI available)/(total # of responders) >/= W

Yellow: First: (# of responders alerted to PADs for responders)/(total # responders) >/= y.
Second: (# of responders who have KI available)/(total # of responders) >/= Y

Orange: First: (# of responders alerted to PADs for responders)/(total # responders) < y.
Second: (# of responders who have KI available)/(total # of responders) < Y

Demonstration Type: Exercise

Demonstration Frequency: Biannually

Task 9: Receive, Screen, and Support Evacuees

Subtask: Reception center operation

Description: ORO must be able to demonstrate the ability to establish and operate an appropriate number of reception centers for citizens evacuating the 10-mile EPZ.

Measurement: Demonstration will process simulated evacuees, to process evacuees at the reception center. Ideally, these "evacuees" will be actual residents of the 10-mile EPZ. Registration centers should be able to handle at least 20% of the total population of the EPZ within 12 hours. However, this figure is infeasible to conduct in a drill setting. Instead, a one-hour drill should be conducted, if possible including "evacuees" totaling a threshold amount of the population for a one-hour time period (possibly 1.66%, 1/12 of 20%). "Evacuees" should include special needs populations, and non-English speakers.

Calculation:

Green: (# of evacuees processed in 1 hour drill)/(total population of 10-mile EPZ) >/= g

White: (# of evacuees processed in 1 hour drill)/(total population of 10-mile EPZ) >/= w

Yellow: (# of evacuees processed in 1 hour drill)/(total population of 10-mile EPZ) < w

Demonstration Type: Drill

Demonstration Frequency: Annually

Subtask: Radiological monitoring

Description: ORO must demonstrate the ability to monitor residents of EPZ for contamination.

Measurement: ORO may use hand-held instruments, portal monitors, or other equipment as necessary, and should have sufficient number of trained staff to operate monitoring equipment. ORO should demonstrate the ability to monitor 20% of the EPZ in a 12-hour period. In a drill setting, this may involve calculating the hourly rate of monitoring necessary to meet the 20% threshold (possibly 1.66% per hour), and conducting a one-hour drill, using a pool of volunteer "evacuees," who may be recycled through to avoid undue burden on the local population.

Calculation:

Green: (# of evacuees monitored per hour)/(total number of residents in 10-mile EPZ) >g

White: (# of evacuees monitored per hour)/(total number of residents in 10-mile EPZ) >/= w

Yellow: (# of evacuees monitored per hour)/(total number of residents in 10-mile EPZ) < w

Demonstration Type: Drill

Demonstration Frequency: Annually

Subtask: Register evacuees

Description: ORO must be able to register and address the needs of evacuees—either online or through registration stations.

Measurement: Conduct a drill/reception center demonstration as part of a full-scale exercise. Could require demonstration for each affected county. Registration stations as a whole must be able to account for x% of total population in EPZ. This should be a throughput measure that can extrapolate from a small sample of volunteer "evacuees" to give an estimate of an ORO's ability to deal with the entire population. To better approximate the need to rapidly process registration of evacuees, evaluators could monitor ability to achieve a certain rate of registration (# of registrants/hr). Ideally, bring in "evacuees" from local 10-mile EPZ so that this can serve as a learning experience for them, as well.

Calculation:

Green: (# evacuees registered)/(allotted time) >/= (required # evacuees registered)/(allotted time)

White: (# evacuees registered)/(allotted time) >/= w

Yellow: (# evacuees registered)/(allotted time) < w

Demonstration Type: Drill

Demonstration Frequency: Annually

Subtask: Congregate care

Description: ORO must be able to provide sufficient public shelter for evacuees from the 10-mile EPZ.

Measurement: Demonstrate the ability to set up shelters adequate to accommodate 20% (tentative) of the EPZ population, *including addressing access and functional needs*. Because of the volume of this test, does not need "evacuees" to participate, but should test availability of beds, staff, and supplies. Because this is a massive sheltering exercise, congregate care should only be tested once every eight years. However, it is also important to note that this does have all-hazards value outside of radiological emergencies, and a congregate care test may be supplemented by demonstration of capacity during an actual emergency requiring a significant evacuation (e.g., hurricane or earthquake).

Calculation: Requires two calculations

Green: First: (# of persons congregate care facilities in host or support jurisdictions can accommodate)/(total population in 10-mile EPZ) >/= 0.20. Second: (# congregate care facilities meeting ADA requirements without modification)/(# congregate care facilities) >/= G

White: First: (# of persons congregate care facilities in host or support jurisdictions can accommodate)/(total population in 10-mile EPZ) >/= w. Second: (# congregate care facilities meeting ADA requirements without modification)/(# congregate care facilities) >/= W

Yellow: First: (# of persons congregate care facilities in host or support jurisdictions can accommodate)/(total population in 10-mile EPZ) < w. Second: (# congregate care facilities meeting ADA requirements without modification)/(# congregate care facilities) < W

Demonstration Type: Drill

Demonstration Frequency: Once per cycle

Task 10: Manage Exposure and Contamination Risks

Subtask: General decontamination

Description: ORO must demonstrate the ability to decontaminate people and vehicles.

Measurement: ORO must be able to decontaminate victims, vehicles attempting to evacuate the EPZ, and pets or animals. Effective decontamination involves contamination control measures, such as safety requirements and decontamination protocol to be in place. Decontamination should occur in a timely and efficient manner. While the ORO should have the capacity to decontaminate 20% (tentative) of the EPZ population in a 12-hour period, conducting such a drill would be massive and infeasible. Instead, the ORO should be required to decontaminate a certain number of victims and vehicles, with a maximum time allowed for each decontamination. The mean time for all decontamination demonstrations should not exceed the maximum allowed time.

Calculation: Calculation of this subtask requires two demonstrations.

Green: First: (total time for all demonstrations of human decontamination)/(total # of human decontaminations) </= g minutes. Second: (total time for all demonstrations of vehicle decontamination)/(total # of vehicle decontaminations) </= G

White: First: (total time for all demonstrations of human decontamination)/(total # of human decontaminations) </= w minutes. Second: (total time for all demonstrations of vehicle decontamination)/(total # of vehicle decontaminations) </= W

Yellow: First: (total time for all demonstrations of human decontamination)/(total # of human decontaminations) > w minutes. Second: (total time for all demonstrations of vehicle decontamination)/(total # of vehicle decontaminations) > W

Demonstration Type: Drill

Demonstration Frequency: Annually

Subtask: Emergency worker decontamination

Description: ORO has the ability to monitor and decontaminate emergency workers and emergency service vehicles.

Measurement: The ORO should have the ability to decontaminate all emergency workers and emergency service vehicles operating in the 10-mile EPZ. Again, because such a drill would be massive, it would be infeasible. A decontamination drill for emergency workers and vehicles could be conducted in coordination with a general decontamination drill, using similar time maximum time allowed.

Calculation: Calculation of this subtask requires two demonstrations.

Green: First: (total time for all demonstrations of responder decontamination)/(total # of responder decontaminations) </= g minutes. Second: (total time for all demonstrations of emergency vehicle decontamination)/(total # of emergency vehicle decontaminations) </=G

White: First: (total time for all demonstrations of responder decontamination)/(total # of responder decontaminations) </= w minutes. Second: (total time for all demonstrations of emergency vehicle decontamination)/(total # of emergency vehicle decontaminations) </= W

Yellow: First: (total time for all demonstrations of responder decontamination)/(total # of responder decontaminations) >/= > w minutes. Second: (total time for all demonstrations of emergency vehicle decontamination)/(total # of emergency vehicle decontaminations) > W

Demonstration Type: Drill

Demonstration Frequency: Annually

Subtask: Evacuation Zone Access Control

Description: ORO is able to establish access control for evacuation zones and other non-plant restricted zones.

Measurement: Required demonstration of implementing access control for evacuation zone through a drill. May involve limited number of roads or complete functional test establishing access control to all roads in 10-mile EPZ. Response time needed to establish access control into evacuation zone should not exceed x hours from the notification of PAD.

Calculation:

Green: (X time recorded) – (Z maximum time allowed) </= g

White: (X time recorded) – (Z maximum time allowed) </= w

Yellow: (X time recorded) – (Z maximum time allowed) > w

Demonstration Type: Drill

Demonstration Frequency: Annually

Subtask: Secure contaminated/restricted zones

Description: ORO has the ability to secure potentially contaminated areas.

Measurement: This subtask may be a shared responsibility of the facility operator, the ORO, NRC, and FEMA, especially during the intermediate to late phases of a radiological event. During the early phase (as a release is occurring or just after occurring), the ORO would likely be responsible for providing physical security to contaminated areas, which is the primary concern for this subtask. Ability to rapidly establish physical security perimeters around a designated area during a drill setting could serve as an effective proxy for securing multiple zones in the EPZ. The time allowed to establish a physical security perimeter will vary by plant depending upon the size, population, road access, and geographic features in the 10-mile EPZ.

Calculation: (Time required to establish physical security perimeter in drill)/(time allowed to establish physical security perimeter in drill) </= x

Green: (Time required to establish physical security perimeter in drill)/(time allowed to establish physical security perimeter in drill) </= g

White: (Time required to establish physical security perimeter in drill)/(time allowed to establish physical security perimeter in drill) </= w

Yellow: (Time required to establish physical security perimeter in drill)/(time allowed to establish physical security perimeter in drill) > w

Demonstration Type: Drills

Demonstration Frequency: Once per cycle

Subtask: Nuclear facility access control support

Description: ORO is able to effectively assist nuclear facility with controlling and restricting access to the facility when needed.

Measurement: Required demonstration of implementing access control for nuclear facility through a drill. May involve limited restriction of access, or test of complete access control. Response time needed to establish access control into evacuation zone should not exceed x hours from the notification of the PAD. This may not need to be tested every performance period, but could be tested in conjunction with hostile action drills.

Calculation:

Green: (X time recorded) – (Z maximum time allowed) </= g

White: (X time recorded) – (Z maximum time allowed) </= w

Yellow: (X time recorded) – (Z maximum time allowed) > w

Demonstration Type: Drill

Demonstration Frequency: Once per cycle

Subtask: Identify agricultural contamination

Description: ORO is able to identify farms/livestock/agriculture that have potential to become contaminated in the event of a release.

Measurement: ORO must develop or provide a map identifying locations of farms possessing livestock or agriculture with potential to become contaminated in the event of a release. Map must account for 50-mile ingestion pathway, or beyond if plume projections exceed 50 miles.

Calculation:

Green: ORO provides an accurate map of potentially affected farms in the 50-mile ingestion pathway within g minutes.

White: ORO provides an accurate map of potentially affected farms in the 50-mile ingestion pathway within w minutes.

Yellow: ORO cannot provide an accurate map of potentially affected farms in the 50-mile ingestion pathway within w minutes.

Demonstration Type: Exercise

Demonstration Frequency: Annually

Subtask: Stored feed advisories

Description: ORO is able to advise farmers to shelter and place at-risk livestock on stored feed.

Measurement: ORO is able to use a variety of communications methods to advise x% of farmers in plume pathway within 50 miles to place livestock on stored feed, or take other preemptive actions. Should be tested in a drill setting, with OROs having to contact farmers, notifying them that this is just a drill.

Calculation:

Green: (# of farmers contacted)/(population of farmers in ingestion pathway zone) >/= g

White: (# of farmers contacted)/(population of farmers in ingestion pathway zone) >/= w

Yellow: (# of farmers contacted)/(population of farmers in ingestion pathway zone) < w

Demonstration Type: Exercise

Demonstration Frequency: Annually

APPENDIX B: INITIAL REVIEW OF EXISTING CRITERIA

Extract from Deliverable 4.2a:

For some RERP elements, performance may be difficult to demonstrate directly. In those instances, indicators of capability may be useful to suggest that adequate performance is possible or likely.

To support initial consideration of which RERP elements are most suitable for performance-based oversight, the project team has reviewed existing documentation—principally the FEMA REP Program Manual—to find objective performance criteria or capability indicators that have already been developed. All-hazards National Preparedness Goal core capability metrics also have been considered.

Table B-1 below and on the following pages lists, for each standard, performance measures (PM) and capability indicators (CI). Those not drawn from existing REP Program documentation are indicated with an asterisk (*). For existing REP Program criteria, citations are given for either the demonstration criteria or the planning criteria. Some of these are followed by italicized suggestions for a more quantitative and objective measure that could be adapted from the existing REP Program criteria. Existing RERP elements most suitable for performance-based oversight will be those with existing quantitative PMs.

Table B-1. Review of Existing Criteria for Actual or Implied Quantitative Measures and Indicators

NRC/FEMA Planning Standard	Performance Measure (PM)/ Capability Indicator (CI)	Existing PM?	Comments
A – Assignment of Responsibility	• **CI: Number of activations of ORO (State and each locality) EOC over previous year for real-world incidents and exercises. Portion of such activations involving 24-hour (multi-shift) operations.*	NO	Generally involves planning input for performance, not performance itself. Suggested CI may also be indicator for "training" (job proficiency) for general emergency response.
C – Emergency Response Support and Resources		NO	Generally involves identification of outside resources available to assist. See comment under H regarding resource typing.
D – Emergency Classification System		NO	Involves yes/no determination of whether ORO is using same classification and emergency action levels as licensee.

E – Notification Methods and Procedures	• **PM:** Activities associated with primary alerting and notification of the public are completed in a timely manner following the initial decision by authorized offsite emergency officials to notify the public of an emergency situation. The initial instructional message to the public must include as a minimum the elements required by current REP guidance. (Criterion 5.a.1) *Initial instructional message to population is ready for transmission in x minutes.* • **PM:** Backup alert and notification of the public is completed within a reasonable time following the detection by the ORO of a failure of the primary alert and notification system. (Criterion 5.a.3) *Message is ready for delivery by backup system within the recommended 45 minutes following identification of need for backup notification.* • CI: Primary alert and notification method covers 100% of the 10-mile EPZ population. • CI: Computation of siren operability (percentage of sirens operable) for the immediately preceding calendar year is at least 90%, based on simple average of all regularly conducted tests employed as part of testing program. (FEMA-REP-10)	YES	Existing criteria may be made more explicit and quantitative.
F – Emergency Communications	• **PM:** Periodic test results of primary and backup communications systems (to demonstrate 24/7 availability of a primary and at least one backup system). (Criterion 1.d.1) *Percentage successful test results.*	YES	
G – Public Education and Information	• **CI: Results of survey indicating whether 10-mile EPZ population understands alert signals, knows by what means to receive information, knows evacuation concept, knows evacuation routes and host site, and has prepared an evacuation or shelter-in-place kit.*	NO	

H – Emergency Facilities and Equipment	• CI: Quantities of monitoring instruments required, based on the number of field monitoring teams and reception center requirements, and quantities available by model. (H.10) *Percentage of requirement available. Portable monitoring units per emergency worker. Portal monitoring units per EPZ population.* [Availability] • CI: Periodic operational checks and calibration of monitoring instruments. *Percentage successful test results.* [Reliability] • CI: Number and contents of emergency kits, and number of items in each emergency kit. (H.11)	NO	Generally involves input for performance, not performance itself. Determinations on adequate equipment may require a resource typing effort for RERP under the auspices of NIMS and Emergency Management Assistance Compact. This would define, for example, field monitoring teams of different capacities, and the equipment requirements for each. Such definitions would enable: (1) monitoring of team status (number of teams operationally ready vs. reconstituting vs. assigned), (2) better gauging outside resources available under mutual aid.
I – Accident Assessment	• **PM:** Two or more FMTs must demonstrate the capability to make and report measurements of ambient radiation to the field team coordinator, dose assessment team, or other appropriate authority. (Criterion 4.a.3) *Percentage of accurate readings (from simulation source) delivered within x time.* • **PM: Number of timely and accurate (given available source term and meteorological data) independent plume projections developed during drills and exercises over previous eight quarters, given "opportunities" to do so.*	YES	Criteria may need to be made more explicit and quantitative. Suggested PM criterion is based on a licensee performance indicator.

J – Protective Response	• **PM:** Demonstrate the capability to alert and notify *all* public school systems/districts of emergency conditions that are expected to or may necessitate protective actions for students. Demonstration requires that the OROs actually contact public school systems/districts during the exercise. *Percentage of districts successfully contacted within x time*. • **PM:** Demonstrate capability to mobilize one third of the resources necessary to monitor 20% of the 10-mile EPZ population within a 12-hour period. (Criterion 6.a.1) • **PM:** Staff responsible for the radiological monitoring of evacuees must demonstrate the capability to attain and sustain, within 12 hours, a monitoring productivity rate per hour needed to monitor the 20% EPZ population planning base. The monitoring productivity rate per hour is the number of evacuees that can be monitored, per hour, by the total complement of monitors using an appropriate procedure. (Criterion 6.a.1) • CI: Availability of [blankets, cots, food supplies for congregate care centers] must be verified by providing the evaluator a list of sources with locations and estimates of quantities. (Criterion 6.c.1) • CI: OROs must plan for a sufficient number of congregate care centers in host/support jurisdictions to accommodate a minimum of 20% of the EPZ population. (Criterion 6.c.1) • CI: Inventories of KI sufficient for use by: (1) emergency workers; (2) institutionalized individuals, as indicated in capacity lists for facilities; and (3) where stipulated by the plans/procedures, members of the general public (including transients) within the plume pathway EPZ. (Criterion 1.e.1) *Percentage of estimated requirement available in inventory.* • CI: Number of persons without private transportation [personally owned vehicles] in 10-mile EPZ. (J.10.g) *Number of such persons as percentage of EPZ population; number of such persons as percentage of identified non-private transportation capacity.*	YES	

K – Radiological Exposure Control	• CI: Sufficient quantities of appropriate direct-reading and permanent record dosimetry and dosimeter chargers must be available for issuance to all emergency workers who will be dispatched to perform an ORO mission. (Criterion 1.e.1) *Dosimeters divided by emergency personnel*. [Availability] • CI: Dosimeters must be inspected periodically for electrical leakage (Criterion 1.e.1) *Percentage of dosimeters tested, and percentage of successful test results.* [Reliability]	NO	
L – Medical and Public Health Support	• **PM:** Approximate response time needed to establish controlled areas and fully prepare necessary medical/radiological staff. (L.1) *Specify a maximum time from notification; specify ability to demonstrate throughput of some percentage of requirement, similar to demonstrating monitoring for congregate care.* • CI: There is at least one primary and one backup medical facility for treatment of contaminated injured, and each has at least one trained physician and one trained nurse to perform and supervise treatment of contaminated injured individuals. (L.1; REP Program Manual, p. III-63) CI: Maximum number of contaminated injured or exposed patients who could be treated at one time. (L.1) *This maximum divided by 10-mile EPZ population.*	YES	Criteria may need to be made more explicit and quantitative.
M – Recovery and Reentry Planning and Post-Accident Operations		NO	
N – Exercises and Drills	• CI: *Number and frequency of drills and exercises conducted for different purposes (e.g., ingestion pathway, medical drills).*	NO	Generally involves planning input for performance, not performance itself.
O – Radiological Emergency Response Training	• *CI: Percentage of ORO members who have participated in a radiological emergency preparedness exercise over previous eight quarters.*	NO	Generally involves planning input for performance, not performance itself. CI given is based on a licensee indicator. It is listed for training rather than exercises as a matter of maintaining proficiency.

P – Responsibility for the Planning Effort		NO	Generally involves planning input for performance, not performance itself.

APPENDIX C: ONE SOFTWARE TOOL FOR EVALUATION

The All-hazards Response and Preparedness Assessment Tool (ARPAT), developed by Science Applications International Corporation (SAIC), aids in organizing information for assessments and presenting it in a more visually appealing manner. This functionality could be especially useful under the current RERP oversight system, given the large amount of documentation it collects for determinations on the adequacy of plans and supporting documentation. It is not clear whether it would be useful for the performance-based RERP oversight system proposed in this paper.

ARPAT is designed to support assessments for FEMA REP Program, among other constructs. ARPAT presents a visual map of the 16 planning standards, linked to a central "Overall Evaluation" category, as shown in **Figure C-1**, below.

Figure C-1. ARPAT Summary Screen
Source: FEMA 2011

Each of the 16 current planning standards exists as a separate folder, within which each assessment criterion affiliated with a task is listed in a separate line, to be coded according to whether performance was “Adequate,” “Adequate with Consequences,” “Inadequate,” or “Not Applicable” (as shown in **Figure C-2**, below). These evaluations are color coded green-yellow-red, and when entered for all of the criteria, produce a visual depiction of the planning standard, shaded green, yellow, red, or some mix thereof depending on how well the ORO met the mix of criteria for the planning standard. When all planning standards have been entered, a complete evaluation map is produced, with visualization of the areas of greatest strength and weakness.

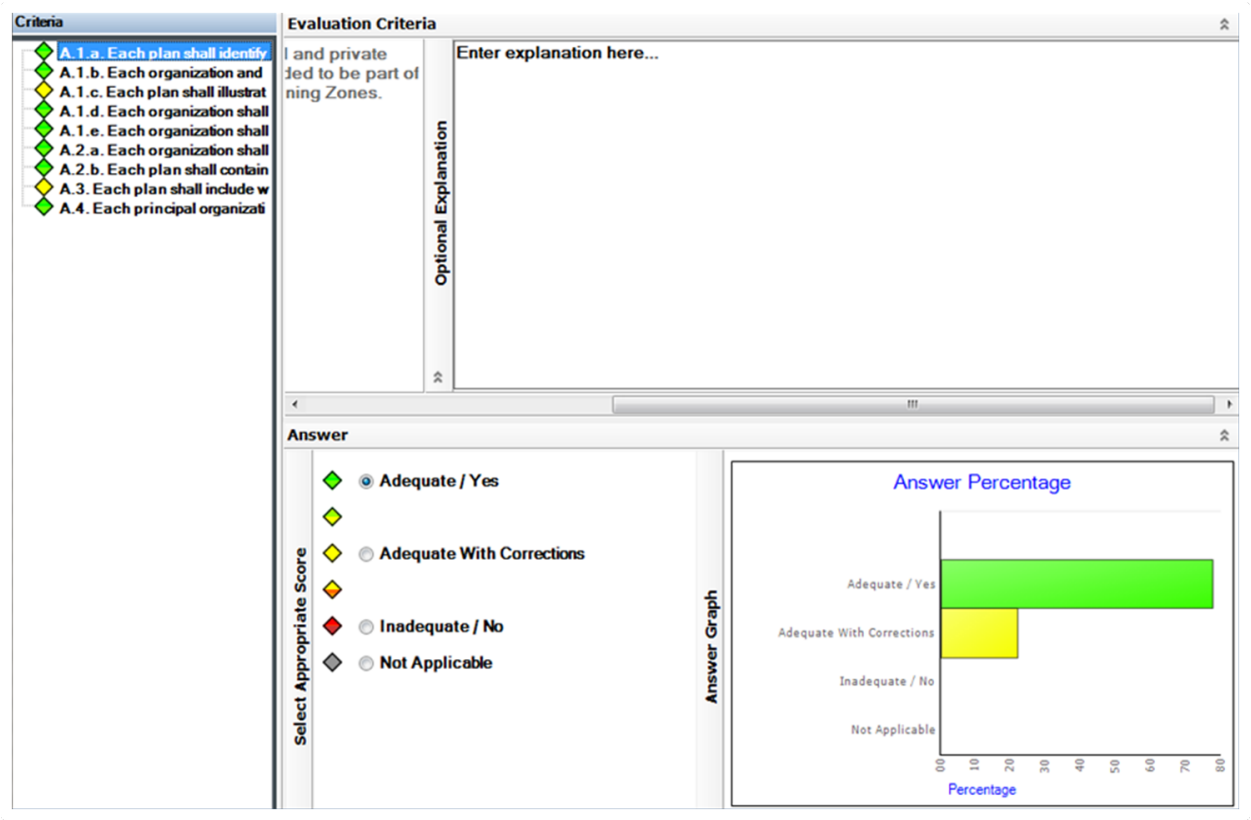

Figure C-2. ARPAT Data Entry
Source: FEMA 2011

ARPAT also allows explanations to be attached to each score, allowing an easy means of organizing a plan review or an AAR. Additionally, users may attach documents to the relevant planning standard folder, which can serve as a repository for additional information about mutual aid agreements, capability improvement projects, or other important documents.

ARPAT could have some utility for concisely presenting performance-based oversight results. However, ARPAT would require several changes to fit the framework proposed in this paper. First, the planning standards would need to be changed to reflect the new critical tasks. The folders attached to each critical task would also need to be changed to reflect the subtasks for each. When it was developed, ARPAT also allowed for assessments against the target capabilities (now core capabilities) of the all-hazards National Preparedness Goal, so ARPAT is able to accommodate different criteria.

Scoring within ARPAT also would need to change. For subtasks, the green-yellow-red scoring would need to be altered to include “white” categories, and to replace the “red” assessment level with an “orange” assessment level.

Additionally, ARPAT would need to incorporate the overall task scoring rules described in Section 6.6 of this paper, to generate rollup scores. ARPAT currently allows for weighting criteria within the calculation of a mathematical score; the revised approach would require if/then rules for rollup scores.

ARPAT's document repository features—the ability to associate maps, mutual aid agreements, and capability improvement plans with a given planning standard or criterion—seem less important for a performance-based system, except when less-than-target performance occurs. ARPAT could allow for compiling information relevant to capabilities that underlie performance, and for tracking corrective actions and their resolution. The folder organization for compiling associated documents would need to be reworked to serve this purpose.

In summary, ARPAT software does not directly support performance-based evaluation in its current form. Yet a modified version of ARPAT could support compilation of well-organized and visually appealing summaries of findings and follow-on actions from single exercises and/or an exercise cycle for the ORO associated with a particular NPP site.

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11. ABSTRACT (200 words or less)

This report provides a concept for performance-based oversight of offsite radiological emergency response preparedness in jurisdictions surrounding commercial nuclear power plants. That is, it provides the framework for development of an alternative oversight regimen in which regulators consider inputs and enablers of performance (such as plans and training) only when jurisdictions cannot demonstrate adequate performance. The report proposes an initial set of objective performance indicators for demonstration in drills and exercises. It further proposes differential levels of oversight intervention based on the degree to which the jurisdictions meet or fail to meet performance targets. The report considers whether this performance-based oversight regimen would enable better integration of offsite radiological emergency response preparedness with all-hazards preparedness. Finally, the report briefly considers aspects of implementing the concept, such as potentially required regulatory changes. While the ingestion pathway is important to public health and safety, it is not considered for regulation in the scope of this report. The report concludes that a performance-based oversight system is feasible and could enhance all-hazards integration along with reasonable assurance. However, implementation of a performance-based oversight regimen likely would require more resources than are currently applied in order to ensure a high level of emergency preparedness.

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