

POLICY ISSUE NOTATION VOTE

December 29, 2007

SECY-07-0225

FOR: The Commissioners

FROM: Luis A. Reyes
Executive Director for Operations

SUBJECT: REVISION OF NUREG-0654, SUPPLEMENT 3, "CRITERIA FOR PROTECTIVE ACTION RECOMMENDATIONS FOR SEVERE ACCIDENTS"

PURPOSE:

The purpose of this paper is to seek Commission approval to revise Nuclear Regulatory Commission (NRC) protective action recommendation (PAR) guidance contained in NUREG-0654, Supplement 3 to reflect the results of NUREG/CR-6953, Vol. 1, "Review of NUREG-0654, Supplement 3, Criteria for Protective Action Recommendations for Severe Accidents". This paper does not address any new commitments.

BACKGROUND:

In late 2004, the staff initiated a project with Sandia National Laboratories entitled, "A Review of NUREG-0654, Supplement 3, Criteria for Protective Action Recommendations for Severe Accidents," or informally, the PAR Study. The PAR Study effort is documented in NUREG/CR-6953, Vol. 1, which is being readied for publication and is enclosed. The staff believes that results from analysis of alternative protective action regimens provide a technical basis for improving NRC PAR guidance. A draft of NUREG/CR-6953 was provided to the Advisory Committee on Reactor Safeguards (ACRS) for review. ACRS provided the results of their review to the Commission in a July 27, 2007, letter (ADAMS Accession No. ML071980087)

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that concluded the PAR Study results should be published, NUREG-0654 Supplement 3 should be revised, and that PAR Study model uncertainties should be considered. ACRS also recommended that PAR strategies should not become overly complicated such that they slow down decision making during emergencies. The staff agrees with the ACRS recommendations.

The PAR Study analyzed the relative efficacy of alternative PAR strategies for the protection of public health and safety in severe accidents. The PAR Study staff selected a series of source terms and evaluated the potential consequences to the public under the various strategies. Three General Emergency accident conditions were analyzed:

- Rapidly progressing severe accident;
- Progressive severe accident; and
- Severe accident without loss of containment.

It should be noted that rapidly progressing severe accidents are very unlikely to occur but are currently required to be addressed as an important element of the emergency preparedness planning basis. The staff plans to revisit this requirement when additional analyses are completed in the State of the Art Reactor Consequence Analysis project.

The PAR Study staff examined various PAR strategies for each of the three General Emergency accident conditions:

1. Immediate radial evacuation (current strategy);
2. Lateral evacuation (perpendicular to the plume);
3. Staged evacuation (close-in population leaves first, others shelter);
4. Shelter-in-place followed by radial evacuation;
5. Shelter-in-place followed by lateral evacuation;
6. Preferential sheltering (in large public structures) followed by radial evacuation; and
7. Preferential sheltering followed by lateral evacuation.

The PAR Study staff modeled a hypothetical site with generic weather and a population of about 80,000 based on 100 residents per km² in the 10-mile emergency planning zone (EPZ). The relative benefit of alternative PAR strategies was compared to the current strategy and reported qualitatively.

DISCUSSION:

Many of the PAR Study results suggest that the NRC should consider improvement of its PAR guidance. A synopsis of results follows:

- Radial evacuation (away from the plant) should remain the major element of protective action strategies.
- Sheltering-in-place should receive more emphasis in protective action strategies. For sites with long evacuation times under rapidly progressing severe accident conditions, sheltering-in-place provides more protection than immediate evacuation. According to the PAR Study, sites with evacuation times longer than about 4 hours should implement initial sheltering followed by evacuation for rapidly progressing

- severe accident scenarios. However, a site-specific analysis should be performed to determine the appropriate strategy.
- Staged evacuation, wherein the public close to the plant is evacuated first while those further out shelter, should be considered because it is more protective than immediate radial evacuation, although in some scenarios the difference is not large.
 - Precautionary protective actions such as evacuating schools and parks during a Site Area Emergency (SAE) are prudent. Additionally, under certain SAE scenarios it may be appropriate to consider evacuation of the nearby public.
 - Strategies that reduce evacuation time reduce consequences. The staff will consider whether rulemaking is possible to improve regulatory oversight of licensee assessment of issues that increase evacuation times.
 - Evacuation time estimates (ETE) are important in preplanning PAR strategies. Enhanced regulatory oversight of ETEs to improve their quality is appropriate and the staff is pursuing this in the current emergency preparedness rulemaking.
 - Advance planning for the evacuation of special needs populations that do not reside in special facilities may not be consistently addressed within all nuclear plant EPZs. This issue warrants additional review to determine extent. The staff will discuss this issue with the Federal Emergency Management Agency.

These results would guide revision of NUREG-0654 Supplement 3, which was first published in July 1996, as a draft report for interim use and comment. Additional insights from the PAR Study, as well as input from State and local government emergency response professionals, stakeholders, and industry, would be considered in the development of revised guidance. The staff intends to utilize professional conferences and other scheduled meetings to seek input from these groups on the revision of NUREG-0654 Supplement 3. It is expected that the revision would be completed by the end of Fiscal Year (FY) 2009.

In addition to the technical analyses documented in NUREG/CR-6953 Vol. 1, the staff plans to conduct a public telephone survey of EPZ populations after approval of the survey instrument is obtained from the Office of Management and Budget. The purpose of the public survey is to provide insights into how to improve the implementation of protective actions and how best to convey information to the public during emergencies. The staff expects to conduct the survey and publish the results as NUREG/CR-6953 Vol. 2 in late FY 2008.

RECOMMENDATION:

Based upon the results of the PAR Study, the staff recommends that NUREG-0654, Supplement 3, be revised after receiving input from State and local government emergency response professionals, stakeholders, and industry.

RESOURCE:

Completion and publication of PAR Study Volumes 1 and 2 were anticipated by management and the resources needed to support this effort are budgeted.

Revision of NUREG-0654, Supplement 3, was anticipated by management and the resources needed to support this effort are budgeted. In FY 2008 and FY 2009, a 0.2 full-time equivalent employee has been budgeted, and in FY 2009 \$120,000 has been budgeted for continued

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support from Sandia National Laboratory. The telephone survey of EPZ populations was obligated in 2006 and no further funds are necessary.

COORDINATION:

The Office of the General Counsel has reviewed this paper and has no legal objection. The Office of the Chief Financial Officer has reviewed this paper for resource implications and concurs.

/RA Martin J. Virgilio for/

Luis A. Reyes
Executive Director
for Operations

Enclosure:
NUREG/CR-6953, "Review of NUREG-0654,
Supplement 3, Criteria for Protective Action
Recommendations for Severe Accidents"

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