

Rulemaking Comments

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From: George Vayssier [glvayssier@cs.com]
Sent: Monday, June 18, 2012 7:27 PM
To: Rulemaking Comments
Cc: Lutz, Robert J.
Subject: Comments on post-Fukushima proposed rule
Attachments: Fed Register EOPs-SAMG-EDMG.NSC Netherlands.doc

June 18, 2012 (2:45 pm)

OFFICE OF SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

Dear sir / madame,

I herewith submit my comments on the proposed rule on 'post-Fukushima', as published in the Federal Register, Vol. 77, nr. 75, dated 18 April 2012.

The comments have been made on my experience with both European and US types of SAMG (severe accident management guidelines), as my work for the IAEA in drafting and revising their guideline on severe accident management.

I send a copy to mr. Robert J. Lutz jr. of Westinghouse, who made me aware of the possibility to send my comments on this issue and with whom I had many inspiring discussions on this topic. The comments and insights attached are, however, solely my responsibility.

Respectfully submitted,
George Vayssier,
NSC Netherlands, director.

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Template = SECY-067

USNRC Federal Register/Vol 77, nr. 75, 18 April 2012, Proposed Rules

Commented: George Vayssier, NSC Netherlands
Date: 18 June 2012

IV. Discussion and Request for Public Comment

A. ANPR Purpose

In SECY-11-0124, the NRC staff recommended that the agency engage stakeholders during rulemaking activities “so that the regulatory action and licensee actions taken effectively resolve the identified issues and implementation challenges are identified in advance.” The NRC staff proposed interaction with stakeholders to support development of the regulatory basis, a proposed rule, and implementing guidance for strengthening and integrating the onsite emergency response capabilities.

In the SRM¹ for SECY-11-0124, the Commission directed the NRC staff to issue an ANPR² prior to developing the regulatory basis for a proposed rule. Accordingly, the NRC’s objective in this ANPR is to solicit external stakeholder feedback to inform the NRC staff’s efforts to evaluate regulatory approaches for strengthening the current onsite emergency response capability requirements. In the SRM for SECY-11-0124, the Commission also encouraged NRC staff to develop recommendations that continue to realize the strengths of a performance-based system as a guiding principle. The Commission indicated that, to be effective, approaches should be flexible and able to accommodate a diverse range of circumstances and conditions. The Commission stated that for “consideration of events beyond the design basis, a regulatory approach founded on performance-based requirements will foster development of the most effective and efficient, site-specific mitigation strategies, similar to how the agency approached the approval of licensee response strategies for the ‘loss of large area’ event” addressed in 10 CFR 50.54(hh)(2).

Consistent with the Commission’s direction in the SRM for SECY-11-0124, the NRC is open to flexible, performance-based strategies to address onsite emergency response capability requirements. This ANPR is structured around questions intended to solicit information that (1) supports development of such a framework and (2) supports assembling a complete and adequate regulatory basis that enables rulemaking to be successful. In this context, commenters should feel free to provide feedback on any aspects of onsite emergency response capability that would support this ANPR’s regulatory objective, whether or not in response to a stated ANPR question.

B. Rulemaking Objectives/Success Criteria

The NRC is considering development of a proposed rule that would amend the current onsite emergency response capability requirements. Currently, the regulatory and industry approaches to onsite emergency response capability are fragmented into the separate strategies that were discussed in Section III of this document. By promulgation of an onsite

¹ Staff Requirements Memorandum

² Advanced Notice of Proposed Rulemaking

emergency response capability rule, the NRC would be able to establish regulations that, when implemented by licensees, would strengthen and integrate the various onsite emergency response strategies. Specifically, the proposed requirements for onsite emergency response capability would strive to accomplish the following goals:

1. Ensure that effective transitions are developed between the various accident mitigating procedures (EOPs, SAMGs, and EDMGs) so that overall strategies are coherent and comprehensive.
2. Ensure that command and control strategies for large scale events are based on the best understanding of severe accident progression and effective mitigation strategies, and well defined in order to promote effective decision-making at all levels and develop organizational flexibility to respond to unforeseen events.
3. Ensure that the key personnel relied upon to implement these procedures and strategies are trained, qualified, and evaluated in their accident mitigation roles.
4. Ensure that accident mitigating procedures, training, and exercises are appropriately standardized throughout the industry and are adequately documented and maintained. The NRC is seeking stakeholders' views on the following specific regulatory objectives:

1. What is the preferred regulatory approach to addressing NTTF Recommendation 8?

For example:

- a. Should the NRC develop a new rule, or could the requirements that would provide for a more strengthened and integrated response capability be accomplished by a method other than a rulemaking? Provide a discussion that supports your position.
- b. If a new rule is developed, what type of supporting document would be most effective for providing guidance on the new requirements?
Provide a discussion that supports your position.

Response to 1a and 1b:

The present position is that EOPs are required by regulation but not submitted for NRC's approval, SAMGs are not required by regulation, neither are they approved by the NRC, and EDMGs are required by regulation but not approved either. A number of EOPs deal with beyond design basis accidents (BDBA) and, hence, are neither required nor approved. The consequences are a large scatter in EOPs for DBA, EOPs for BDBA, SAMG and EDMG between plants, although all of them principally try to achieve the same objectives.

There are two root causes for this highly unsatisfactory situation:

1. The NRC regulation focuses on the traditional DBA, with limited regulation for BDBA.
2. The NRC regulation does not cover approval of emergency measures at plants to mitigate accidents, both DBA and BDBA

After the TMI and Chernobyl accidents a need was felt to develop accident management guidelines for severe accidents, but industry convinced NRC that they could handle this without rulemaking, and provided a fairly weak document to cover severe accidents, the NEI 91-04, rev. 1. This was not an industry standard and, hence, a large scatter of guidelines was developed, on different working principles, with different detail, with different transition criteria, and with different setting of priorities. The inspection after Fukushima also showed many gaps in maintaining an appropriate level of the guidelines: e.g., some plants still worked with the rev. 0 version, where the rev.1 version has already been released many years ago. The SAMG approaches had one assumption in common: all assumed that all major equipment was still there and functional - nobody seemed to realise that if all equipment is

available and functional, there is - generally speaking - no severe accident. Due to the advanced EOPs that had been developed after TMI, the chance of missing insights in a plant behaviour had become extremely small. E.g. the WOG SAMG says in SAG-1 that operators must fill the SG, to prevent SG tube creep rupture. But what if there is no power and/or no water? If there is power, cooling water and operating pumps, you have no severe accident. A severe accident occurs if there is gross failure of major components and high stress in the control room. For such a situation, all SAMG developed so far has only limited value.. The conclusion is that industry failed to develop appropriate SAMG: it was technically incorrect and not maintained - and no NRC was capable of correcting these failures, as it was outside their regulation.

Potential remedies are the following:

1. Revise the concept of DBA being LBLOCA, etc., as we have learned that real accidents are quite different. Extend the DBA to include accidents that are clear precursors to severe accidents or include even the core melt accident itself. Radiation acceptance criteria for such accidents can still be different, as we probably are still far away from being able to control a severe accident as we do a present DBA. Another option is to use the IAEA concept of '**design extension conditions**', which describes regulatory treatment of BDBA, including severe accidents: **IAEA SSR 2/1, Safety of Nuclear Power Plants: Design, IAEA, Vienna, 2012** (available from the IAEA website: www.iaea.org).
2. Develop regulation, so that a mechanism is created to approve and inspect what licensees are doing in this area. Make sure there is enough detail in the regulation so that a wide scatter of approaches is avoided. This can best be done in two steps: first, requirements on CFR-level, then guidance on how to meet these requirements in a Regulatory Guide. In the IAEA-approach this is done by the **Safety Guide NS-G-2.15: Severe Accident Management Programs for Nuclear Power Plants, IAEA, Vienna, 2009** (at present under revision).
3. Invite industry to develop an industry standard on actual SAMG-measures. Once completed, incorporate this standard in the regulation. Please include European industry (e.g. Areva, EdF, utilities).

Hence, the resolution of this issue is straightforward - if some hard decisions are made.

2. The NTF recommendation for emergency response procedures stressed that the EOP guidelines should be revised to establish effective transitions between EOPs, SAMGs, and EDMGs in an effort to promote a more integrated approach to onsite emergency response. The NRC is interested in stakeholder opinions on the best course of action for revising and maintaining these procedures to accomplish this objective.

For example:

2a. Should the SAMGs be standardized throughout the industry? If so, describe how the procedures should be developed, and discuss what level of regulatory review would be appropriate. Should there be two sets of standard SAMGs, one applicable to pressurized water reactors (PWRs) and one applicable to boiling water reactors (BWRs), or should SAMGs be developed for the various plant designs in a manner similar to EOPs? Provide a discussion that supports your position.

Response to 2a:

The difference in approaches is a consequence from a lack of guidance. E.g., some SAMG approaches use single parameters to decide on actions (WOG SAMG), others use groups of parameters (CEOG and B&WOG, some European) to do so, so-called plant damage states. Some set a priority on the sequence of expected failures of fission product boundaries (e.g. WOG SAMG), other always start with the core. Some believe there should be a clear priority between actions (WOG SAMG), others believe they can be executed more or less in parallel (BWROG SAMG). Some believe you cannot identify vessel failure (WOG SAMG), all others believe they can. Some have a logic diagram to walk through during the accident to establish priorities, other believe they do not need. Some are very detailed, look almost like EOPs, other (notably in Europe) are more manual-like, i.e. w/o clear description of what to do. Some have extensive Rules of Usage, other believe they can do without.

The present approach in SAMG is, therefore, highly scattered and probably far from optimal. A possible solution is to use the IAEA NS-G-2.15 (see above), which treats most of these aspects and gives guidance how to proceed. Still this guide leaves spaces for individual approaches, but demands a critical attitude to the SAMG development process.

For US, I would recommend that people develop a harmonised approach as far as is practicable. The IAEA guidance may help to achieve this. The BWROG approach may be different from PWROG, yet should be based on 'common ground'.

2b. What is the best approach to ensure that procedural guidance for beyond design basis events is based on sound science, coherent, and integrated? What is the most effective strategy for linking the EOPs with the SAMGs and EDMGs? Should the transition from EOPs to SAMGs be based on key safety functions, or should the SAMGs be developed in a manner that addresses a series of events that are beyond a plant's design basis? Provide a discussion that supports your position.

Response to 2b:

A further integration between EOPs, SAMG and EDMG/FLEX can be obtained as follows:
- provide ample additional equipment to execute EOPs; this includes portable on-site equipment and, through appropriate and well-defined off-site emergency organisation, off-site equipment support, for those cases where plant equipment or on-site portable additional equipment is not available.

- make SAMG functions also available to EOP-space, e.g. containment venting is in SAMG-space, but may also be needed in EOP-space, or using unborated water, dirty water, sea water to cool / fill important components. Make TSC suitable for the additional tasks which they will have here.
- make all EDMG/FLEX strategies also available in SAMG-space (where their focus is now on the preventive domain).

The transition EOP-SAMG now is often quite hard: it is made upon certain parameters exceed a pre-defined value. E.g., for WOG SAMG (generic plant) 650 gr C, plus last EOP-strategies fail. But what if an operator understands he is in no way able to control the evolution of an accident? In the WOG SAMG he still should wait until this one parameter exceeds the assigned value. In such cases, flexibility should be made, and probably the best way to proceed is to let the TSC assess the situation and then the site emergency director make the decision. Advocating plant parameters for transition has also the disadvantage that these are not available. But there should never be a gap in decision making.

Ultimately, in striving for a more homogeneous solution (now there are as many transition criteria as there are SAMG-approaches) re SAMG, this issue should be discussed in-depth, and a consensus approach reached.

2c. The NTF Recommendation 8 strongly advised that the plant owners' groups should undertake revision of the accident mitigating procedures to avoid having each licensee develop its own approach. Is this the best course of action? What additional scenarios or accident plans should be considered for addition to SAMG technical guidelines as a result of the lessons learned in Japan? Provide a discussion that supports your position.

Response to 2c:

No doubt, once the Owners' Groups sit together to harmonise their approaches, this issue will be addressed and hopefully resolved. It is highly advisable to include some European views here as well.

Some elements from the EOP-domain now usually are lost in SAMG-space, e.g. to keep a path open to remove decay heat, even to make sure that the core is subcritical. This is already considered in one European approach. The function to retain a residual heat removal path is high on the priority list.

Additional lessons are from Japan: where do we leave the highly contaminated cooling water that is used to cool the core / the debris? Should there be additional tanks capable to receive masses of such water on site?

We should also consider that most plants today have no adequate protection against basement meltthrough. Although such meltthrough may not be risk-relevant, spoiling large masses of groundwater can be detrimental for populated areas. The main cause of lack of regulatory interest here is the present regulations focuses on protecting 'public health and safety'. A major lesson from Japan is that such regulation is insufficient. **Severe accidents may not cause many casualties, but they cause wide-spread fear and disruption of society**, in terms of social, economic and environmental damage. It is strongly recommended to add these aspects to the present criteria for 'public health and safety' and adapt regulations accordingly. Note: this item is also taken up in the ongoing revision of IAEA NS-G-2.15 and may also be considered in the update of IAEA SSR 2/1.

2d. In the SRM for SECY-11-0137, the Commission directed the NRC staff to consider the November 2011 INPO report, INPO-11-005, in the development of the technical bases for Recommendation 8. How should this document be used by industry in developing SAMGs and the NRC in developing any proposed regulatory changes? Provide a discussion that supports your position.

Response to 2d:

No comment, as INPO-11-005 is not available to me.

2e. Should there be a requirement for the SAMGs and EDMGs to be maintained as controlled procedures in accordance with licensee quality assurance programs? Provide a discussion that supports your position.

Response to 2e:

It is quite useless to have important procedures/guidelines and do not control them in a quality assurance program. E.g., what is the use of a procedure that calls on equipment that has been removed in an outage? As I would favour a complete regulatory control over such procedures, they should also be part of the utility's QA program.

2f. Should the SAMGs and EDMGs be added to the "Administrative Controls" section of licensee technical specifications? Provide a discussion that supports your position.

Response to 2f:

If equipment needed in SAMG/EDMG/FLEX is not available for a predefined time, plant operation should be altered (e.g. from full power operation to hot shutdown). There is no reason to grade these procedures lower than the EOPs. The reason that they are right now at lower grade is that the BDBAs which they mitigate have still a lower status in the regulatory domain than the (present) DBA. As discussed before, this historical position has become obsolete - but it requires some regulatory and industry courage to walk away from it.

2g. In a letter dated October 13, 2011 (ML11284A136), the Advisory Committee on Reactor Safeguards (ACRS) recommended that Recommendation 8 be expanded to include fire response procedures. In their letter, ACRS stated that some plant-specific fire response procedures can direct operators to perform actions that may be inconsistent with the EOPs, and that experience has shown that parallel execution of fire response procedures, abnormal operating procedures, and EOPs can be difficult and complex. Should efforts to integrate the EOPs, SAMGs, and EDMGs include fire response procedures? Are there other procedures that should be included in the scope of this work? Provide a discussion that supports your position.

Response to 2g:

I am not a fire risk expert. However, fire can go with severe accidents, probably mostly if they arise from seismic events. If there is a risk that fire extinguishing procedures are inconsistent with EOPs-SAMG-EDMG/FLEX, this item should be high on the agenda in reviewing the overall procedures. Otherwise it may land on the table of the TSC in an accident. Do not place such problems on the responsibility of plant staff during an accident, if it could have been studied in advance by an engineer (free to Edward Frederick, operator of TMI-2).

2h. What level of effort, in terms of time and financial commitment, will be required by the industry to upgrade the accident mitigating procedures? If possible, please include estimated milestones and PWR/BWR cost estimates.

Response to 2h:

The cost problem always arises if upgrade in safety is discussed. I would say to those that hesitate due to costs: 'Are you afraid of costs of safety upgrades? Then try an accident!' There is probably one consideration we (i.e., the nuclear community) should not forget: *we cannot afford another Fukushima!*

3. The NNTF established the identification of clear command and control strategies as an essential aspect of Recommendation 8. What methodology would be best for ensuring that command and control for beyond design basis events is well defined?

For example:

3a. Should separate procedures be developed that clearly establish the command and control structures for large-scale events? Should defined roles and responsibilities be included in technical specifications along with associated training and qualification requirements?

Provide a discussion that supports your position.

Response to 3a:

I consider regaining command and control as an integral part of the whole set of procedures: EOPs-SAMG-EDMG/FLEX. Hence, they should be in the TechSpecs and training programs. Example: if a terrorist (from outside or an intruder from inside) shoots the control room staff, this should have no consequences for safe shutdown of the plant (protection available at some European plants).

3b. Should the command and control approach be standardized throughout the industry or left for individual licensees to define? Provide a discussion that supports your position.

Response to 3b:

Harmonise on principles, detail on plant specific aspects - as all other procedures/guidelines.

3c. What level of effort, in terms of time and financial commitment, will be required by the industry to develop these command and control strategies? If possible, please include estimated milestones and PWR/BWR cost estimates.

Response to 3c:

See response to 2h.

4. As the guidelines for accident mitigating procedures are revised and the command and control strategies are developed, personnel who will be implementing these procedures must be adequately trained, qualified, and evaluated. What would be the best approach for ensuring that the personnel relied upon to implement the revised procedures are proficient in the use of the procedures, maintain adequate knowledge of

the systems referenced in these procedures, and can effectively make decisions, establish priorities, and direct actions in an emergency situation?

For example:

4a. Should a systems approach to training be developed to identify key tasks that would be performed by the various roles identified in the new strategies? Provide a discussion that supports your position.

Response to 4a:

Training for SAMG is described in IAEA NS-G-2.15, and is well applicable to other sets of guidelines, such as EDMGs/FLEX. A major shortcoming is today's training programs in many plants is that the training for SAMG has large time gaps, and does not consider severe accident phenomena in-depth.

4b. Should the current emergency drill and exercise requirements be revised to ensure that the strategies developed as a result of this ANPR will be evaluated in greater depth? Provide a discussion that supports your position.

Response to 4b:

See response to 4a. The answer is 'yes'.

4c. Should the revised accident mitigating procedures, specifically SAMGs and EDMGs, be added to the knowledge and abilities catalogs for initial reactor operator licenses? Provide a discussion that supports your position.

Response to 4c:

I would add to this licence knowledge about these procedures up to the level people understand their need, the way they are decided upon and executed. As much of the FLEX equipment may be addressed in EOP-space, operators should be capable of handling the associated procedures. Operators should also know what their role is in regaining command and control.

4d. What level of plant expertise should be demonstrated by the personnel assigned to key positions outlined by the accident mitigation guidelines and command and control strategy? Should these personnel be required to be licensed or certified on the plant design? Provide a discussion that supports your position.

Response to 4d:

These persons need adequate training, including drills and exercises. I see no benefit in creating an additional layer of examinations.

4e. What training requirements should be developed to ensure emergency directors and other key decision-makers have the command and control skills needed to effectively implement an accident mitigation strategy? Provide a discussion that supports your position.

Response to 4e:

The training of these people is adequately described in IAEA NS-G-2.15.

4f. What should the qualification process entail for key personnel identified in the new strategies? How would this qualification process ensure proficiency? Provide a discussion that supports your position.

Response to 4f:

The physics of severe accidents is quite complex. Key personnel should have an education level commensurate with the level of knowledge required for their functions. For me, as an outsider to the US education process, I would not easily make a recommendation. For key personnel, I would expect they have a university education or similar background.

4g. What level of effort, in terms of time and financial commitment, will be required by the industry to develop and implement these training, qualification, and evaluation requirements? If possible, please include estimated milestones and PWR/BWR cost estimates.

Response to 4g:

I feel not competent to make a clear recommendation. I would expect that, if proper attention and effort is invested, a program could be available in one year after procedures/guidelines are complete.

C. Applicability to NRC Licenses and Approvals

The NRC would apply the new onsite emergency response capability requirements to power reactors, both currently operating and new reactors, and would like stakeholder feedback.

Accordingly, the NRC envisions that the requirements would apply to the following:

- \$ Nuclear power plants currently licensed under 10 CFR part 50;
- \$ Nuclear power plants currently being constructed under construction permits issued under 10 CFR part 50, or whose construction permits may be reinstated;
- \$ Future nuclear power plants whose construction permits and operating licenses are issued under 10 CFR part 50; and
- \$ Current and future nuclear power plants licensed under 10 CFR part 52.

D. Relationship Between Recommendation 8 and Other Near- Term Task Force Recommendations

The NRC notes that there is a close relationship between the onsite emergency response capability requirements under consideration in this ANPR effort and several other

nearerterm actions stemming from the NTTF report (and identified in SECY-11-0124 and SECY-11-0137). Regulatory actions taken in response to these other activities might impact efforts to amend onsite accident mitigating procedures and training.

In this regard:

1. What is the best regulatory structure for integrating the onsite emergency response capability requirements with other post-Fukushima regulatory actions, such that there is a full, coherent integration of the requirements?
2. Recommendations 4.1 and 4.2 address SBO regulatory actions and mitigation strategies for beyond design basis external events, respectively. The implementation strategies developed in response to Recommendations 4.1 and 4.2 will require corresponding procedures. The NRC recognizes the need for coordinating efforts under Recommendations 4.1, 4.2, and 8. What is the best way to integrate these three regulatory efforts to ensure that they account for the others' requirements, yet do not unduly overlap or inadvertently introduce redundancy, inconsistency, or incoherency?
3. Recommendation 9.3 addresses staffing during a multiunit event with an SBO. Should staffing levels change as a result of a revised onsite emergency response capability or should these duties be assigned to existing staff?
4. Recommendation 10.2 addresses command and control structure and qualifications for the licensee's decision-makers for beyond design basis events. Should this recommendation be addressed concurrently with Recommendation 8?

Response to D:

Re events such as SBO, ATWS and other BDBA-procedures, I believe they should be fully integrated in the EOPs and treated as such, i.e. also be part of the operator's licence. I feel not competent to make other recommendations on such detailed level. These aspects should be covered under the more general statements which I made.

E. Interim Regulatory Actions

The NRC recognizes that implementation of multiple post-Fukushima requirements could be a challenge for licensees and requests feedback on how best to implement multiple requirements, specifically onsite emergency response capability requirements, without adversely impacting licensees' effectiveness and efficiency. It will take several years to issue a final rule. Should the NRC use other regulatory vehicles (such as commitment letters or confirmatory action letters) to put in place interim coping strategies for onsite emergency response capabilities while rulemaking proceeds?

Response to E:

I hesitate to comment: this is primarily an internal US affair. However, the public may want to see action on a fairly short time. The regulatory tasks here seem to me very big, as also fundamental issues are treated (such as DBA-BDBA). Please remind that what the NRC is doing, influences large parts of the world, as many countries follow US regulations. I doubt whether nuclear safety is served by various types of interim solutions - a comprehensive approach is needed.