

<b>As of:</b> 6/26/17 4:31 PM <b>Received:</b> June 25, 2017 <b>Status:</b> Pending_Post <b>Tracking No.</b> 1k1-8x5y-qk3v <b>Comments Due:</b> June 27, 2017 <b>Submission Type:</b> Web
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# PUBLIC SUBMISSION

**Docket:** NRC-2015-0225  
Emergency Preparedness Requirements for Small Modular Reactors

**Comment On:** NRC-2015-0225-0002  
Emergency Preparedness for Small Modular Reactors and Other New Technologies: Draft Regulatory Basis for Comment

**Document:** NRC-2015-0225-DRAFT-0034  
Comment on FR Doc # 2017-07502

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## General Comment

I strongly encourage the re-assessment of the emergency planning zone (EPZ) for innovative nuclear power plants, and indeed for existing plants. The current EPZ requirements were set decades ago. We are more knowledgeable about source terms now, about the hazards of implementing emergency actions, and about the hazards of beyond design basis events from US plants.

Why listen to me? I have 57 peer-reviewed technical journal articles, mostly in safety of fission and fusion. During my doctoral research at MIT, I found an error in what was then NRC's premier computer code for calculating offsite doses and health effects - CRAC (Consequences of Reactor Accident Consequences). Indeed, I earned bachelors, masters, and doctorate in nuclear engineering from MIT.

The EPZ should be a function of  
Source term for the power plant in question  
Beyond design basis protection levels  
Hazards of potential emergency actions  
Newest research about the miniscule effects of low levels of radiation

At the limit of pathological wind conditions, the highest exposure to a member of the public almost scales as  $Q/r$  where  $Q$  is the source term and  $r$  is the radius. As reactors are larger or smaller, their source terms

increase or decrease and that should be taken into account. And, of course, we know more about source terms than the overly pessimistic values that EPZs were established decades ago. This warrants reduction for all current plants and all future plants.

Current plants have superior beyond design basis protection. All new plant designs that I've seen are even better. Not only are possible consequences reduced, but the time scale for hypothetical releases to the public is lengthened. This warrants reduction for all current plants and all future plants.

Implementing emergency actions carries risk. Emergency actions should only be suggested if the nuclear risk exceeds the emergency action risk. That must be considered when deciding what EPZ to establish. With increasing traffic problems, the worst thing that could happen in most hypothetical cases is to send thousands or millions of people into a panic, fleeing onto crowded highways. A crazy, panic-driven driver is an unsafe driver. When comparing nuclear risk to evacuation risk, use elevated driver risk values according to panic situations. Consider stress and heart attacks. Panic kills. Unfortunately, even if the recommended emergency action is shelter in place or stop eating local food, a sizable number of people will panic anyway and flee in their vehicles. Consider the unnecessary panic induced at Three Mile Island compared to the extremely low doses to any member of the public. This warrants reduction for all current plants and all future plants.

Finally, there is the question of radiation hazard. It is past time to acknowledge that low doses of radiation are harmless or even beneficial. This warrants reduction for all current plants and all future plants. Even the stodgy radiation protection organizations are moving away from using collective dose, i.e., simply multiplying large numbers of people times tiny doses. Collective risk makes sense when estimating driving and other panic-driven risks; it does not make sense with regard to small ( $\ll$  background) radiation dose. Given what we know today, it would be criminal to induce panic over small radiation doses - all harm from emergency actions (or planning thereof) versus no benefit from radiation dose reduction.

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