Doris Mendiola - Attn: Dr. Farouk Eltawila/ Reg. Guide 1.200- rev.1

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From: "The Specters" <mhspecter@ns.sympatico.ca>
To: <FXE@nrc.gov>
Date: 09/11/2006 1:34 PM
Subject: Attn: Dr. Farouk Eltawila/ Reg. Guide 1.200- rev.1

Dear Dr. Eltawila,
I offer a number of comments on Rev.1 of Reg. Guide 1.200, all confined to page 7 of the document out for comment.

GENERAL COMMENTS
It is stated that CDF and LERF are surrogates for latent and early fatality risks, respectively. This actually is not the case. There are core damage events, like the accident at TMI, which do not have any substantial release, and therefore do not relate to the latent fatality risk. More appropriate metrics would be the frequency of containment failure or, better, the frequency at which substantial amounts of the reactor's inventory of radioactive cesium is released to the environment. In general, BWRs have CDFs that are about an order of magnitude smaller than a typical PWR, but their contribution to the latent fatality risk is about the same. Therefore CDFs alone do not correlate with latent risks.

The situation with LERFs in some ways is even more out of place. The LERF criteria are likely two orders of magnitude smaller than the LERF that would challenge the early fatality safety goal. The delta LERFs that are part of Reg Guide 1.174 are perhaps three orders of magnitude smaller than what which would challenge the early fatality safety goal. It would be instructive if the NRC did an uncertainty analysis of PRA calculated LERFs and then compared the width of the uncertainty band to the acceptable delta LERFs in Reg. Guide 1.174. Calculated LERFs are subject to uncertainties stemming from operator actions, initiating event frquencies, equipment performance data, numerous assumptions, phenomenological data uncetainties, etc. If the basis for a regulatory decision, such as to accept or reject a proposed change to the licensding basis of an operating power plant, is based on a certain sized delta LERF, yet this delta LERF itself is considerably smaller than the uncertainty in the base LERF value from which it is a departure, then ,I believe, the whole regulatory decision making process is in need for a review.

The whole regulatory process might be better served if the staff just said that it wants to use two deterministic metrics as part of its overall sense of defense- in- depth: CDF and cesium release to the environment frequency and just set aside any reference to safety goals or LERF(see below).

SPECIFIC COMMENTS ON LERF
If the staff insists on retaining the term LERF, then:

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E-RIDS = ADM-03
Add = M. Drouin (MXD)

1) To be consistent with the definition of core damage frequency on page 7, the LERF definition should start with " Large early release frequency is defined as the sum of the frequencies of those accidents....."

2.) The LERF concept traces back to the Early Fatality Safety Goal. If so, the use of the term "early health effects" is too broad because it includes both early fatalities and early injuries. There is no NRC early injury safety goal and any plant that met the early fatality safety goal would easily meet a similar early injury safety goal, if one existed. For Reg, Guide 1.200 purposes it is important not to use the words early health effects as this would be inconsistent with the history of LERF and other regulatory policies.

There are many potential early injury consequences, some of which might require hospitalization and many which do not. For example, there are whole body doses that exceed 50 rem, the threshold for early injuries, that might require some form of medical treatment within a year of exposure. There are also other lesser potential early health effects, such a skin erythema, transepidermal skin effects, hypothyroidism from 200 rems or more of thyroid- H doses,thyroiditis, prodromal vomiting,diarrhea, and pneumontis from a 500 rem or more lung dose. Not only are there many potential lesser early health effects, they have different thresholds...some of which are controversial..., different geographic ranges over which they might exist... are a function of the emergency response that one assumes is taken, as well as the medical treatment assumed. A further source of potential complexity is whether or not one takes the mean, 90%, 99% or peak consequence numbers in determining if a particular health effect has a non-zero value. Opening the door to evaluations of early injuries as part of the determination of the LERF could invite endless debate.

So for both historical reasons and for practical implementation reasons the words in the draft rev.1 should be narrowed to read "early fatality effects".

3.) A much larger concern is the difficulties with connecting large early releases to offsite responses. If this is done then there is the possibility that much of the calculation of LERFs will shift away from using PRA to determine plant characteristics to offsite consequence analyses. If this occurs then the value of PRA in the regulatory decision making process would be greatly diminished. For example, ongoing emergency planning studies at the Indian Point site show that size and speed of the evacuating population depends on whether or not the release of radioactive material starts at night or during the weekend versus mid-day, mid- week. The night time and weekend population is approximately two thirds of the mid- week population. Not only are fewer people at risk at night or during the weekend, they would evacuate at higher speeds and their early health consequences would be lower. There are also more night time and weekend hours than weekday hours and this should be accounted for. Does the NRC want calculations of LERF to be affected by assumptions of when a release occurs?

Similarly, the present definition of LERF makes reference to the ability of having an effective evacuation in a particular time frame. However, under severe weather conditions, such as snow storms,

it might be advisable to shelter until the roads are cleared and then evacuate. Sheltering, particularly accompanied by actions to reduce inhalation doses, can be very effective. One can easily envision a shelter first, evacuate later response that took longer but was more effective than a prompt evacuation into a snow storm that was slower. There is no numerical or verbal definition of what constitutes an effective evacuation. The choice of just an evacuation response in the Reg. guide draft is too narrow and is inconsistent with ongoing emergency planning analyses.

Consider also the situation where there are two identical plants, except that one sits on a site that has essentially no one within one mile of the plant and the other plant has people in this nearby area. As things stand now, one plant would have a different LERF than another, even though they would be otherwise identical. Perhaps this is appropriate, but it means that, in the extreme, low nearby population sites have near zero LERFs independent of plant characteristics or their PRA results. Is this the direction that Reg. Guide 1.200 should lead us to?

Even containment bypass events and loss of containment isolation events have issues that are likely to surface if one goes forward with the present definition of LERF. For example, some source term analyses of particular bypass events that have a pathway through the auxiliary building give a factor of ten credit for source term (assumedly radioactive iodine) reduction in that structure. I assume that this factor of ten is just due to plateout phenomena. Since bypass events themselves, as well as containment isolation events are, in general, quite rare, an additional factor of ten reduction in the iodine would almost certainly make them risk insignificant. Some bypass and loss of isolation sequences might trigger fire protection spray systems as the escaping steam heats up confined areas. If the fire protection sprays are operating then the source terms would be greatly reduced. Are such systems to be credited in a LERF calculation and, if so, are these spray systems to be now considered safety systems,assuming that they were not so labeled already? Does the NRC staff really want to get into such discussions with the nuclear industry? Personally, I would encourage such discussions.

Some of the issues that I have raised are not new to the regulatory process. In the past extremely artificial offsite responses were assumed to overcome site -to- site differences, such as assuming that someone stays at a prescribed location for a specific period of time before taking a specific protective measure. Such artificial offsite prescriptions can create more problems than they solve.

One of the more important observations to emerge from the ongoing Indian Point emergency planning studies is that, even assuming a conditional large release probability of 1.0, the early fatality risk is near zero for the country's most highly populated site. This is because the consequences, i.e., the number of early fatalities, are near zero. This very small value is principally due to the size and timing of the source term and to offsite emergency actions. Clearly, if the early fatality consequences at this most challenging site are near zero, then its LERF value would be extremely small, likely too small to be an important regulatory tool.

Significant new analyses on emergency planning are now fairly mature and are expected to be under

discussion at the NRC over the next several months, including the new emergency planning effort at the Indian Point site, NRC/Sandia emergency planning studies and possibly other studies underway at NEI and EPRI. I suggest that those staff members involved in the further development of Reg. Guide 1.200 track these efforts closely so that the implications of advanced level three analyses on their work are fully understood and well coordinated with the development of Reg. Guide 1.200.

4.) Another approach to defining LERF, also prescriptive but based on observations made in the Indian Point emergency planning analysis, may be somewhat better in that it avoids the potential debates on offsite responses and consequences. One might consider all sequences that might release 5% or more of the core's radioactive iodine into the environment within three hours after the initiation of events that might lead to a core melt. The sum of all such sequences would be the LERF. This is not perfect either, but it would restore the importance of PRA in the regulatory process in terms of calculating the frequency of large early releases. It is also quite conservative in that near zero early fatalities are being calculated at Indian Point for releases of 11% of the reactor's inventory of iodine into the environment within two hours of the start of a core melt sequence.

If this revised definition were accepted, then the definition might read as " The large early release frequency is defined as the sum of the frequencies of those accidents that result in the release of 5 percent or more of the reactor's inventory of iodine into the environment within three hours of the initiation of a core melt sequence"

I hope you find this helpful.

Sincerely,
Herschel Specter, President
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