

Risk Management of Weather-Related Events
Nuclear Utility Meteorological Data Users Group

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It is a pleasure to be invited to speak here this morning. The use of meteorological data by nuclear utilities represents an important part of our regulatory process and can be instrumental in guiding our response to operational events. Meetings such as this where utilities can share knowledge and insight on important safety techniques provide an excellent means of maintaining technical excellence. More importantly they serve to promote the skills and interest of the people who will be counted on in the event of an accident.

The Operations Center of the Nuclear Regulatory Commission shares many of the methods and procedures that you maintain in your emergency response capabilities. In an operational event of "alert" status or higher, we immediately access your Emergency Response Data System (ERDS) data link, and begin to enter your site meteorological data into the RASCAL program for projection of offsite doses. We have the ability to make these projections in a timely manner to guide us in our independent assessment of licensee protective action recommendations (PAR).

In addition we access data under contract from ACCU-WEATHER Inc. to give us readings on precipitation in the region around the plant and to track the progress of hurricanes.

During events and emergency exercises, we have participants from NOAA who come into our center and run their regional weather codes. This gives us the capability to track plume dispersion to some distance from the site.

Those of you who have emergency response roles with your respective utilities know that we use our dose projection capabilities primarily for the purpose of developing an independent assessment of what protective actions might be appropriate. We expect that our assessment will generally be compatible with the protective action recommendations (PAR) that you are giving to the state, and our experience in full scale emergency exercises generally supports this level of confidence.

In cases where substantive disagreements develop, we will discuss them with you through the health physics network (HPN) telephone link. If we are still unable to reach consensus, we will ask our executive team to discuss the issue with your emergency manager. It is our goal to work out any disagreements with you so that the state can receive a recommendation that all parties are satisfied with.

These capabilities continue to be upgraded and improved. I notice there is a paper at this conference reviewing the RASCAL code upgrades. Nevertheless, these methods have limitations. We recognize the approximations which are used

in these calculations. Moreover, there are limitations in the data input. We know that wind directions and speeds can vary from point to point, and can change with time, especially for low wind speeds.

Decisionmakers must be aware of these limitations, and recognize that these projections cannot be taken literally as predictions. At the NRC we use the dose projections as an important benchmark to our protective action decisionmaking; but we also use rules of thumb regarding the relationship of plant conditions to offsite protective actions. For instance, if the core is believed to be damaged or in imminent danger of being damaged, we believe an evacuation out to two miles should be recommended, regardless of the state of containment, and without reference to any dose projections.

In summary, we regard this capability as very important, and I encourage you to continue maintaining and improving these techniques, as will the NRC.

I would like to spend some time this morning discussing another aspect of weather as it relates to nuclear safety; namely, the role of weather as an initiator of significant nuclear reactor events.

If you examine the reactor events that have risen to the alert level in recent years, you find an interesting pattern. A large fraction of the events are related to common-cause initiators. These are initiating events which simultaneously threaten multiple trains of safety systems. Examples include loss of instrumentation and control systems, fires in key safety areas, releases of toxic fumes and losses of support systems, such as offsite power or service water. I see the same pattern when I look at events which lead to activation of the NRC Operations Center.

One group of such events is the weather related initiators, such as hurricanes and other storms, lightning, floods, high winds and ice. Last year we activated in anticipation of two hurricanes, Opal and Erin, and this year we activated for the Wolf Creek frazil ice event. One might ask if this level of concern over such events is reasonable. I believe there is good reason for paying a high level of attention to these events.

Probabilistic risk assessments (PRA) indicate that station blackout sequences initiated by storms and hurricanes are a significant contributor to overall plant risk. This conclusion is supported in some measure by the results of the NRC's accident sequence precursor (ASP) program, which analyzes the risk significance of actual occurrences. Of the 446 precursors that have been identified since 1969, I could identify about 40 that were explicitly attributed to weather, although the most significant of these ranked only 39th on the list in risk significance.

I have come to the conclusion that our high level of interest in such events is justified. First, while the risk from such events is comparable to other contributors, weather related risk tends to be peaked at certain times at certain plants. When adverse weather conditions threaten a plant, its conditional risk hits a peak. It may be the riskiest 12 hour period that plant experiences all year.

Secondly, and a bit more obviously, weather related accidents are among the few types of hazards in which we have sufficient warning to take prior compensatory measures. For example, in anticipation of hurricane Andrew's landfall, Turkey point shut down both reactors and started their emergency diesel generators.

Finally, if a radiological release were to result from a severe weather condition, the effectiveness of offsite protective actions could be hampered by those same weather conditions.

We saw this type of situation during hurricane Andrew at the Turkey Point plant. The storm not only damaged the plant, but also severely damaged communications and transportation facilities in the area. Other examples need not be so dramatic, and may include situations involving high winds and extreme temperatures. Just two months ago we saw a problem develop at Wolf Creek in which extreme temperature conditions in the cooling lake jeopardized the emergency service water system.

A little bit of attention from the NRC at those times can help to lower that peak risk; or get the plant over the hump. More importantly, some attention from the licensee at such times can have a much greater impact in getting safely past these humps in risk. At times like this a licensee can take steps to maximize the availability of equipment, postpone maintenance and surveillance work, put the operational staff on alert and review contingency plans.

This kind of effort falls under the general heading of risk management, and it is a concept that NRC is working with several licensees to implement. An example of this type of thinking is the shutdown risk planning that all utilities now do to mitigate the potential for high risk situations during the many plant iterations that occur during shutdown. It is a generally accepted fact that risk during outages can be significantly reduced by eliminating situations in which multiple safety trains are out of service simultaneously.

NRC is also working on pilot projects to examine risk based technical specifications. These are intended to give the licensees the tools to manage plant maintenance and other activities in a way that minimizes the chance for creating periods of high conditional risk.

In summary, the NRC will continue to place emphasis on the potential threat of weather initiated events. We also believe it is prudent for operating utilities to continue to take the type of precautionary measures that we have seen implemented in past instances of approaching weather. This is just one of many strategies that we can use to minimize the risk of radiological releases due to reactor accidents.

I would like to take this opportunity to invite you to tour our Operations Center the next time you visit our headquarters offices in Rockville Maryland. I would also suggest that you encourage your managers to visit us when they come through for meetings with NRR. We feel that your familiarity with our staff and facilities will help us to interact more efficiently in future drills and events.

Again I want to thank you for inviting me this morning. I hope you have a very successful and enlightening meeting.