

WILL THE RADIATION EMERGENCY PLAN WORK?

By

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The answer to the question somewhat depends upon who is answering the question, when are they answering the question and what level of response is expected. The State and local governments have been conducting annual or bi-annual exercises of Nuclear Power Plant off-site radiation emergency response plans since the late 1970's. NRC evaluates these exercises at the plant, on-site and by FEMA evaluates the off-site activities. In addition, and often forgotten by the public, these same agencies conduct real emergency response to a variety of hazards each year. Further, every jurisdiction conducts at least one, non-radiation exercise each year.

The emergency response agencies have an opportunity to be proficient in taking the necessary protective actions. Yet reports of response actions related to Hurricane Katrina raise concerns by both the public and government officials causing a major loss of confidence. While this report is not discussing the situation related to Katrina, it will point out opportunities for the responses to appear to have failed, yet they will have protected the public to the extent expected in the planning. We should recognize that several circumstances might arise which will negatively affect the public's confidence and still be considered an response is adequate. A few examples follow.

A. Slow opening of the Reception Centers. Each state and local plans directs the public to a reception center when an evacuation is ordered. At this center, the public will be registered into the care system, provided shelter if needed, and checked for contamination if appropriate. In most cases, the centers will not be able to open for 2 to 6 hours after the request is made to open the centers. Notification, response time and facility set up all contribute to the total activation time for a center. These time constraints are consistent with every evacuation and are why the centers are activated before the evacuation order is given. This problem occurs for any situation involving evacuation. Fortunately, the most likely scenarios for a nuclear power plant will give ample time for the activation of the staff to the centers. Yet, we should be prepared for the fast developing event, which may have the public arriving before the centers are open.

The situation where the public arrives first is really not of much consequence, in that, the total dose will not dramatically increase as a result. Yet, it will be of significant concern to the public if they have not been told to expect the possibility of an unmanned reception center. Delays in the activation of the reception centers may cause personal comfort problems, such as thirst, heat, cold, sunburn, etc. The reason it is not of concern is the planning basis to survey for contamination is over a 12 hour period as described in NUREG 0654 items J.9., J.10.h., and J12. For most emergency planning zones, this can be accomplished despite delays in staffing the centers and therefore not of significant concern to emergency planners. Also the levels that most Nuclear Power Plant plans decontaminate to is around 300 counts per minute on a GM probe. Compare this value to what is being considered as contamination from a weapon of mass destruction which is around 12,000 counts per minute, National Council on Radiation Protection and Measurements, Commentary #19.

B. Detection of radioactive material after individual has been monitored. All states have individual monitoring procedures, which are designed to detect the presence of radioactive materials

at levels well below those which could represent a health and safety problem to the public or an individual. This should not be confused with detecting all radioactive material on an individual. As a result it is quite likely that some individual will be monitored by a team at a reception and care center, declared clean, then subsequently monitored at another location only to find some radioactive material present. This may occur for a number of valid reasons including: a more efficient instrument that is able to detect the radioactive material better, the use of a slower, more effective monitoring technique or any number of other reasons. The bottom line is the individual in all likelihood does **not** have sufficient radioactive material on their person to represent a risk to their health. In fact it may well be less than the amount of radioactive material found on some wrist watches.

C. Sheltering is an admission plan does not work. We as emergency planners have not effectively explained to the public that there are several good reasons to use sheltering as a means of protective action. For example, if the release is known to be of short duration and the public cannot be fully evacuated prior to the release, then sheltering will be the protective action of choice and would result in a dose reduction to the public when compared to having the public in the radioactive cloud during an evacuation. In this circumstance the evacuation is likely to place the public in the plume as they evacuate, thus extending their time of exposure. Another condition for which sheltering is preferred occurs when roads are in a condition that the evacuation travel times are significantly increased, and a smaller exposure to the public would result if they remain within shelter.

Will the emergency plan work?

Radiation emergency planning remains a mystery to the public. While strides have been made toward informing the public that emergency plans do exist and what actions they may be asked to take for protection, the public is woefully unaware of why such actions are taken or how the decisions are made. Most decision-makers work very hard to understand the engineering and radiological conditions at the nuclear power plant site during an emergency. This is not to second guess the operator's assessment, but rather to be prepared to implement a decision at the earliest possible time to protect the public from protective action guide exposure. They do not understand that the Protective Action Guideline (PAG) value are the exposure prevented doses. The goal of decision-makers is to prevent the public from being exposed. This supports the concept that a prompt evacuation prior to the arrival of the plume is the best method of public protection. This is unlike the way the Russians implemented their emergency plan at Chernobyl, in which they waited until the public was exposed to the 25 rem then they tried to take action. I believe none of the other states will wait until the public has received a "minimum" exposure if they believe the exposure might exceed the PAG. To express this more clearly, I believe that decision-makers in this country will take a protective action as soon as it becomes clear that conditions at the site may result in radioactive material being released that may exceed the EPA PAGs whether a release has actually started or not. Lacking the understanding of how decisions are made makes the public uneasy. Most people are insecure if they do not feel they have a full knowledge of what is happening. Members of the public are likely to declare the plan a failure based only on their feelings of insecurity.

Additionally, every incident is uniquely different and poses different problems to be solved to make the emergency plan work. It is impossible for any single emergency plan to account for every

possible outcome or challenge that will arise during an event. That is why it is imperative that emergency plans be flexible enough to allow emergency response managers to react and respond according to the actual event. The plan and the accident do not read nor follow the emergency plan. The emergency plan must assemble sufficient government officials with appropriate authority who can and will follow the events of the incident and not blindly follow a plan. The key point of the emergency plan is to assure that these knowledgeable, trained and experienced officials are in place to make the necessary decisions.

Still the question is, “Will the emergency plan work?” The answer depends on what you expect in defining “work”. If your definition is that each and every procedure in the emergency plan was followed exactly with no deviations, in most cases, very few or no emergency plans will “work” to that expectation. On the other hand, if the definition is protective actions taken in a timely manner, then I expect virtually all emergency plans will “work”. Confusing the issue will be the items described in A., B., and C. above. The public does not understand that these are known and expected variations on the emergency plan operations. They can and will occur for any emergency response event whether radiological or otherwise. A critical evaluation of the exercises presently conducted to assure that a viable emergency plan exists for each nuclear power plant site, will reveal that in each case they are capable of implementing public protective measures in a timely manner to reduce or prevent exposure of the public.

I believe this conclusion is supported by the fact that Agencies respond to emergencies at HAZMAT facilities everyday utilizing the same emergency plans that are utilized for radiation emergencies. These responses have generally protected the public health and safety quite well. There is no reason to think the radiation portion of the plan will not work equally as well. In addition, the International Atomic Energy Agency through its Safety Standards Series Number GS-R-2, indicates the following goals for emergency response to a nuclear or radiological emergency.

- To regain control of the situation;
- To prevent or mitigate consequences at the scene;
- To prevent the occurrence of deterministic health effects in workers and the public;
- To render first aid and to manage the treatment of radiation injuries;
- To prevent, to the extent practicable, the occurrence of stochastic health effects on individuals and among the population;
- To protect, to the extent practicable, property and the environment; and
- To prepare, to the extent practicable, for the resumption of normal social and economic activity.

I believe that the current radiation emergency response plans, when activated, will achieve most, if not all of these goals.