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Memo to the File. ATWS Rule.

Tomorrow the ACRS subcommittee will meet to consider the options available to the NRC for the establishment of an ATWS Rule. The four proposals under consideration and the preferences expressed by public comment are:

No rule	18
Utility proposal	11
Hendrie proposal	6
NRC rule	1

We have learned that the Hendrie proposal is considered by the NRC to be a non-option due to the lack of time for obtaining data. In view of the almost universal opposition to the NRC rule, in particular the automated poison injection for BWRs, we must give consideration to the utility proposal. Adoption of the utility proposal would be consistent with the objective of increasing utility capability so that they might "get their destiny into their own hands"

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The NRC and the Utility Group agree that the problem is largely a BWR concern with core melt probabilities respectively 2×10^{-4} and 1.3×10^{-4} per reactor year. Inasmuch as the goal is now 10^{-4} , a small reduction in probability would be useful.

The NRC has maintained that, with the limited number of units in operation, ATWS does not constitute an unacceptable risk, and the issue has dragged on for fourteen years. We now have 75 units in operation and another 75 in prospect. In consideration of the existing hiatus and the prospect of no new orders for ten years, we can expect to see, as older units are retired, an actual reduction of the 150 units to be considered, with an upturn in number occurring at about the year 2010. Further, only the BWR ATWS is serious, and with the adoption of Recirc. Trip, time remains to develop and adopt an acceptable solution for the Second Nuclear Era.

The utility proposed rule, running a close second behind No Rule, is however entirely unacceptable.

With Recirc Trip, the ATWS probability is now 1.3×10^{-4} per reactor year and would be reduced by a factor of 3 by ARI. Alternate Rod Insertion would

result in a gain of no more than a factor of 3 on the basis that the ratio of electrical to mechanical failures is 2 to 1. A further reduction would result from about $\frac{1}{3}$ of the events occurring at low power. Thus the probability of unacceptable consequences becomes about 3×10^{-5} per reactor year.

As a result of Recirc Trip the power level would be reduced to 35 to 40% which, if allowed to continue, would cause overheating of the suppression pool. On basis of the 280°F limit (200°F according to NRC) the operator would be allowed 12 minutes to wrestle with the problem.

Essential to the utility proposal is the emergency operating procedure whereby the water level in the reactor vessel would be reduced to enhance boiling and accelerate the shutdown effect of the boiling voids.

This is unacceptable. We saw at TMI the importance of keeping the core covered. We also have learned that the misuse of the HPSI for PWR cooling rather than its intended purpose of keeping the core covered, can cause dangerous repressurization of the cold reactor vessel. Reducing the level during the stress of an emergency is clearly hazardous.

It seems not to be recognized that every safety device, especially if misused, can become dangerous. The Golden Rule is "Good as the Bottom of the Pile". This says that with no bottom, a scram would cause all rods to fall out of the core and into the basement with disastrous results. In the ATWS instance the need to dump steam into the torus would result from the inability of the main condenser to handle the 35 to 40% power level. In order to avoid overheating the torus and to buy time for operator action, the flow of coolant to the reactor vessel would be interrupted by the operator in order to reduce the level and enhance the formation of boiling voids. This is clearly a misuse of systems essential to residual head removal!

Considering the consequences of core uncover and the record of operator error, the proposed procedure must be considered an invitation to disaster. In 5000 reactor years 33,000 Anticipated Transients requiring scram will occur and one failure is expected. Should an ATWS occur there would be about one chance in ten that, during his career as an operator at that plant, an individual would, at that time be on shift, and be in the control room. We can not expect any individual operator to take the problem seriously, i.e., to participate in an event that he would expect to see with a probability of one in 330,000 demands for scram.

The fallacy of the utility proposal is that correct operator response can be expected and verified in preventing or limiting transients under normal conditions but can not be expected when under stress and with the plant in an unknown condition after the failure of high quality protection systems has occurred.

The utility proposal is disappointing in that it demonstrates that they are not yet ready to assume a leading role in maintaining an acceptable level of risk, and that we must continue to accept NRC demands for prescriptive fixes. It is now obvious that, being unable to find an acceptable ATWS remedy in fourteen years of effort, we are not yet ready to enter the Second Nuclear Era.