A VIEW ON CONSISTENCY
OF NRC RISK POLICY

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ABSTRACT

The occurrence of the Three Mile Island (TMI) accident greatly accelerated the older, more conservative practice of imposing new safety requirements to such a massive rate of change in safety requirements that the safety of plant operations was threatened by the frantic pace of keeping up with constantly changing requirements. The TMI accident also accelerated development and use of probabilistic risk analysis (PRA), a comprehensive, more balanced basis for evaluating safety requirements.

Four initiatives at the Nuclear Regulatory commission (NRC) define a consistent risk policy for the NRC. They are the development of a safety goal, the backfit policy, the Indian Point risk decision, and the Severe Accident Policy Statement.

KEY WORDS: Risk, Risk Assessment, Safety, Safety Goal, Severe Accident, NRC, Regulation, Backfit, Indian point

Ever since the beginning of nuclear power it has been recognized that the central element of public risk is the severe accident, the accident in which the reactor core is severely damaged or melted. This concern is the origin of many of the fundamental safety requirements for nuclear power plants, defense-in-depth, multiple barriers around the fuel, a substantial containment structure, redundant systems for core cooling, etc. The conception and application of safety requirements in the first two decades of power plant development was without the benefit of a comprehensive method of risk analysis which could be used to weigh the relative value of specific requirements. Nevertheless, the conservatism born of the underlying concern for public safety led to the imposition of many safety requirements resulting in a relatively high degree of safety with, if anything, a substantial number of superfluous requirements. The occurrence of the Three Mile Island (TMI) accident greatly accelerated the older, more conservative practice of imposing new safety requirements leading beyond superfluous requirements to such a massive rate of change in safety requirements that the safety of plant operations was threatened by the frantic pace of keeping up with constantly changing requirements (NRC-75).

A comprehensive, more balanced basis for evaluating safety requirements, probabilistic risk analysis (PRA), came on the scene with
the Reactor Safety Study (NRC-81) just a few years before the TMI accident. It is ironic that the TMI accident also accelerated the development of risk analysis techniques. Thus, in the early 1980s we found the safety regulation of nuclear power in the U.S. greatly in need of a new discipline, at the same time that the means for that discipline fell to hand. I would like to offer my personal observations on four initiatives at the Nuclear Regulatory Commission (NRC) in these last few years which appear to be independent but which, I believe, constitute a coherent set defining a consistent risk policy for the NRC. These initiatives are the development of a safety goal, the backfit policy, the Indian Point risk decision, and the Severe Accident Policy Statement.

These closely related NRC actions will chart the general regulatory course for years to come. These four constitute a logical set, that should be mutually consistent in philosophy and approach even though the realities of administrative practice make it virtually impossible to deal with them together in a single combined action. Difficulties that may be apparent in one or the other, may be better understood in the broader context of the four actions. The development of the safety goal is the articulation of the clearly established principle that there is a level of sufficient safety for nuclear reactors where society's resources are better spent if they are left to other purposes. Certainly there are legitimate questions regarding just where that level of sufficient safety lies, and whether it is possible or useful to measure safety with available risk analysis techniques. Nevertheless, it is acceptable in principle that a threshold of concern does exist and the NRC, the responsible regulatory authority can seek to define it, or ways to determine whether a safety issue crosses it. For some years now the NRC has explored alternative formulations of safety goals and evaluation criteria. We are now just completing a two-year evaluation of a specific safety goal formulation (NRC-84) armed with a wealth of experience in the forms and methods of analysis that are needed to examine the potential utility of such a goal.

The essential basis of the safety goal under evaluation is that the risk of nuclear power plant operation should have a negligible effect on the risk of any person living near such a plant. As a measure of negligibility, the NRC is considering a risk increment of only 0.1%. This is certainly not a threshold of tolerance but rather a description of a clearly acceptable or timely negligible increment of risk for those closest to a plant. Taking such a strict standard as a goal comes somewhat easily because early conservative approaches to nuclear reactor safety achieved such a low level of risk. Taking such a strict standard also affords great advantage since it carries within it substantial margin for error. Undue risk to a member of the public is certainly not found at 0.1%, or at 1%, or at 10%, or perhaps even at 100%, although I certainly don't propose to argue that a factor of two change in background risk is acceptable for a regulatory goal. The point is that the goal, at 0.1%, holds orders of magnitude of margin against undue risk.

The NRC has not chosen a safety goal yet, nor even chosen to implement one. However, we must recognize now a formidable record that indicates that there is a general compatibility between most formulations of nuclear plant safety goals and most available quantitative estimates of risk or safety. In other words, it appears that our present estimates of risk all seem to indicate that the present generation of light water reactors are safe enough - if it is useful to consider a PRA-type formulation of safety goals and PRAs to compare to them.