

NRC STATEMENT ON THE SAFETY OF NUCLEAR
POWER PLANTS

The NRC recognizes that nuclear power plants present some potential for accidents that can have large public consequences. Because of this, it also recognizes the need for a comprehensive regulatory process to help ensure that no undue risk to the health and safety of the public will arise from their operation.

This process involves a well developed safety design approach, the specification of safety design requirements to implement that approach, and an extensive safety review and licensing process to ensure that plants meet established safety requirements. A key element behind these requirements and procedures is a recognition of the need for redundancy not only in the elements of plant design but also in the review process. The need for redundancy derives from the knowledge that, in spite of man's best efforts to achieve high quality in design, construction and operation of nuclear power plants, these goals cannot be completely achieved.

The safety record so far achieved in the operation of nuclear power plants attests to the validity of NRC's approach. There have been approximately 440 reactor years of operation of large commercial nuclear plants in the U.S. without an accident of significant effect on the health and safety of the public. The worldwide

total of operating experience with large nuclear power plants (which follow essentially the same safety design approach as that in the U.S.) brings the total to about ^{600?}~~800~~ reactor years. While this experience is much less than that needed to confirm our belief that large reactor accidents have a low probability of occurrence, not even the precursors (such as large pipe breaks or fuel overheating) to potentially large accidents have occurred within this period of operating experience.

NRC's regulatory process has relied and will continue to rely on the judgment of highly skilled engineers and scientists as the principal basis for its safety decisions. While extensive strides have been made in the development of quantitative risk assessment techniques, and the careful use of such techniques can provide added engineering insights about the safety of nuclear power plants, they are not yet sufficiently precise to be relied on except to supplement the other methods and procedures now used by the NRC to form its safety judgments.

The safety design approach used by the NRC emphasizes defense in depth. In nuclear power plants, a series of physical barriers is constructed between the large amounts of radioactivity contained in the nuclear fuel and the environment. The fuel is contained in a sealed metal cladding; the clad fuel is contained in a sealed, steel

primary coolant system; and the primary coolant system is enclosed in a sealable containment building. Since it is known that some types of failures in one of these barriers can also cause failure of the other barriers, there are two other important factors involved in the implementation of the defense in depth approach. These are, first, the specification of requirements to achieve high quality in the design, construction and operation of nuclear power plants to reduce the likelihood of failures that could potentially cause accidents; and, second, the use of engineered safety systems, with redundancy when needed, to prevent failures from progressing into accidents. These requirements are outlined in NRC regulations, standards and safety guides which are based on sound engineering practices established over the past twenty years, and which are undergoing continuing improvement. The NRC also sponsors a comprehensive research program to provide the technical bases for the confirmation of NRC's safety decisions and for needed improvements.

The NRC's regulatory process for nuclear power plants consists of safety reviews by the staff of the Office of Nuclear Reactor Regulation and by the statutorily independent Advisory Committee on Reactor Safeguards. Public hearings of the results of the staff and ACRS reviews are held by an NRC Atomic Safety and Licensing Board. The results of these hearings can be appealed to an NRC Appeals Board and the Commission. Beyond this, appeals can also be made to the courts. These

reviews are conducted twice--once before the construction of a plant is allowed to commence and again before operation of the plant is permitted. The reviews include environmental as well as health and safety considerations.

The NRC's Office of Inspection and Enforcement conducts inspections during construction of the plant to help ensure that the plant is being built in accordance with the safety design and quality requirements. Inspections are continued during the operating life of the plant to help ensure that the requirements of NRC's licenses are adequately enforced, that problems arising in operation are well handled, and valuable feedback from operating experiences is incorporated into the safety reviews of additional plants. Furthermore, NRC licenses require utilities to test important safety systems periodically and to report failures of all safety related equipment to the NRC. The results of NRC inspections and reports of equipment failures are routinely made public.

In summary, the NRC believes that, while nuclear power plants (or any other of man's technological endeavors) cannot achieve risk free operation, the current system has provided a sound basis to ensure that nuclear power plants present no undue risk to the health and safety of the public. It also believes that the excellent safety record so far achieved can be maintained if there is continued support for a technically strong and vigilant regulatory program.