

Abstract

US Nuclear Regulatory Commission(USNRC) and Nuclear Industry had spent an extensive effort to investigate and study the Three-Mile Island Accident since it happened in 1979. Through this effort , USNRC has set many mandatory requirements to keep the core damage accident as that of Three-Mile Island from happening again in nuclear power plants . One of them is to request utilities establishing , based on NEDO-22215 , the capability of obtaining the concentration of radioisotopes of reactor coolant and containment to evaluate the extent of core damage during and after severe accident.

The capability is achieved by setting up Post Accident Sampling System (PASS) , which can obtain the concentration of radioisotopes of reactor coolant and containment. But after more than 20 years of PASS sampling experience , it has been found that PASS sampling is a time consuming job , which could not give plant personnel the current information about the core conditions during the accident to take correct mitigation actions to cope with the accident.

The purpose of this study is to develop the plant specific core damage assessment guideline of Chinshan Nuclear Power Plant based on the generic guideline NEDC-33045P of US BWR Owners Group. In the new guideline the on-line plant instrumentation such as reactor water level , radiation level and hydrogen concentration level of primary containment are used to assess the extent of core damage. The new guideline can help plant personnel make a quick assessment of the extent of core damage and take correct actions to mitigate the accident and protect the health and safety of public in a timely manner.

This study also utilizes MAPP4.04 program to analyze the representative sequences series of high/low pressure accidents such as loss of coolant accident and transients. The purposes of analysis are to understand the primary parameters as the release fraction of fission products, the extent of oxidation of fuel rod cladding, and hydrogen production and their relations to the extent of core damage. These information can be used by Technical Support Center personnel and reactor operation personnel during and after an un-anticipated severe accident.