

Teaching Notes

Operational Reactor Safety Course

Lecture: 10 – Safety Analysis Report and LOCA

Objective:

To gain an appreciation of what goes into a safety analysis report and the Chapter 15 transients and accidents that are analyzed. The analysis results of a typical loss of coolant accident are reviewed.

Key Points to Bring Out:

<u>Slide number</u>	<u>Points</u>
3	Identifies some of the key fission products that are of concern in an accident situation and why they need to be contained.
4	The message here is that simply shutting down the reactor is not sufficient to prevent core damage - decay heat must be removed.
5	Critical safety functions should be explained since this is the way most reactors are now maintaining safety of their plants.
6-11	A basic review of PWR engineered safety systems that describes each system individually.
12	Same description of a BWR engineered safety systems - repeat.
13-17	Begins the review of NRC requirements and criteria for reactor design - siting criteria which is dose based. General design criteria, single failure criteria. Encourage students to go to the NRC web site to read the specific guidance provided.
18-20	Defense in Depth is described in some detail and how safety strategies are implemented consistent with this philosophy. Be sure to point out defense in depth is not simply counting physical barriers but more of a systematic approach to safety.
21	Review chapter of a typical safety analysis report - if you have one show it to the students.

- 22-26 Review design basis accidents as required for the Chapter 15 safety analysis report. Level of detail provided is intended to show the rigor of the analysis and range of accidents and transients considered.
- 27-28 ECCS criteria for LOCA and schematic of what is postulated. All the criteria must be shown to be met - focus on 2200 F peak clad temperature with loss of offsite power and most damaging single failure.
- 28 The purpose of this slide is to show the events that need to take place to assure proper function - the event tree also begins to introduce the concept of probabilistic vs deterministic analysis as required by the regulations today for this event.
- 30-47 This series of slides goes through an example of a LOCA analysis beginning with reactor protective set points on slide 30. This slide is important since it shows what is needed to shutdown the reactor automatically based on system conditions. A LOCA indicator could be low pressure (large break) or high containment pressure - small break or ECCS initiation.. Review these slide to give the students an appreciation of how fast things happen in an LWR. This is a PWR sequence. Various break sizes are shown with different peak clad temperature results. The last few slides come from the FSAR to describe the results shown for the students.

MIT OpenCourseWare  
<http://ocw.mit.edu>

22.091 / 22.903 Nuclear Reactor Safety  
Spring 2008

For information about citing these materials or our Terms of Use, visit: <http://ocw.mit.edu/terms>.