

## Teaching Notes

### Operational Reactor Safety Course

#### Lecture: 20 – Chernobyl

##### Objective:

The main objective of this lecture is to have students understand what happened at Chernobyl with the point of showing that engineering and design matter particularly in the core design. This lecture should demonstrate how bad things can get without proper vigilance in design and operations. A comparison with TMI is made. Most of these slides come from an INPO presentation on Chernobyl.

##### Key Points to Bring Out:

<u>Slide number</u>	<u>Points</u>
2-5	Describe the location and layout of the Chernobyl plant. Key Points to bring out are the common turbine hall and large reactor size.
6-9	Discuss basic plant design - pressure tube boiling water reactor - large core which poses neutronic coupling issues as does the graphite moderator.
10-14	Photos illustrating large reactor components and control room that is also large with many indicators that are difficult to monitor.
15-17	Review detailed consequences according to the time line and violations of procedures for this test. Discuss role of xenon, timing of test, implications of delay in test sequence, operator knowledge of reactor.
18-33	Show photos of consequences of Chernobyl including what happens when a core melts and the energy stored in the core.
34	Known design issues should be explained to future nuclear engineers. Each should be described to gain an appreciation of its significance. Explore why a plant would be designed like this?
35	Review causes of Chernobyl to be sure students can correlate the

cause to a design or procedural error. Begin to introduce the role of safety culture. Recall all nuclear operators were college degreed people.

- 36-37 Even though the design of Chernobyl and TMI are quite different, both had meltdowns - why? This slide shows that a combination of design and training issues were a common cause. Focus on a lack of a questioning attitude.
- 38-42 Review consequences of the Chernobyl accident on the future of nuclear energy, economic consequences in Russia, contamination, and Russia's energy supply. Discuss improvements made to keep some of the RBMKs operating. The 4 Chernobyl plants have now been shutdown.

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