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Draft

OUTLINE OF PLAN TO DEAL WITH SPENT FUEL POOL RISK AT DECOMMISSIONED NUCLEAR POWER PLANTS

A. WHY IS THE RISK ASSESSMENT TO BE PERFORMED?

Assumption: to augment deterministic evaluation of offsite consequences from spent fuel pool Zircaloy cladding fires

B. EXPECTED USE OF THE RISK ASSESSMENT (i.e. what questions will need to be answered and what do we expect to use the risk assessment for in the rule-making process?)

Assumption: will be part of basis for proposed rule to modify how insurance and emergency planning zone are dealt with at decommissioned plants.

C. SCHEDULE

George Hubbard told me on 3/25/99, that my description of what we know about spent fuel pool risk assessment and what we plan to do is due by the end of May 1999.

D. DESCRIPTION OF SPENT FUEL POOL RISK ASSESSMENT FOR DECOMMISSIONED PLANTS

1. Examine existing evaluations of spent fuel pool risk. Completed: NUREG-1275, Vol 12;

2. Work with INEL to see if we can get information on how the AEOD risk assessment of spent fuel pools was developed.

3. Description of spent fuel pool cooling and other systems to be modeled (BWR and PWR) including instrumentation available to the operators

   Assumption: It is acceptable to model generic spent fuel pools similar to that done by AEOD in NUREG-1275, Volume 12.

4. Initiating events to be considered including loss of inventory events and loss of cooling events. Will include consideration of heavy load drops.

5. Determine frequency of initiating events (e.g., need seismic hazard curves for sites, need frequency of heavy load drops and need to understand why the drops happen) (Need to talk to Chemical industry about frequency of draining large tanks?) Talk to navy ship yards about heavy load drops.

6. Times at which to evaluate risk assessment

3/99

Assumption: 30 days after refuel, 365 days after refuel, and 1095 days after refuel

7. Human errors to be considered

   a. Operator pumps water out of SFP

   b. Operator diverts flow of cooled spent fuel inventory

   c. Operator opens or removes spent fuel pool gate

   d. Operator drops heavy load

   e. Operator improperly rigs load, which subsequently drops

   f. Operator turns off spent fuel pool cooling system

   g. Operator isolates spent fuel pool cooling system

   h. Operator turns off component cooling water system/service water system

   i. Operator turns off ultimate heat sink

   j. Operator ignores alarm for SFP Cooling Trouble

   k. Operator ignores alarm for SFP level

   l. Operator ignores alarm for SFP temperature

   m. Operator ignores radiation alarm in SFP area

   n. Operator fails to start normal makeup to SFP

   o. Operator fails to initiate alternative method of making up to the SFP

8. Passive failures to be considered

9. Attentiveness of operations and maintenance staff at a decommissioned plant and its effect on the human error rates for a decommissioned plant (Survey of resident inspectors at decommissioned plants? Need to visit plants? How much does NRC watch over decommissioned plants? Maintenance history at decommissioned plants? Reporting of problems at decomm plants?)

   a. Assumption: One year after decommissioning, most operators have been fired and there is only a skeleton crew.

b. Assumption: One year after decommissioning, most maintenance people have been transferred offsite or have been laid off.

c. Assumption: One year after decommissioning, there is no effective NRC day-to-day inspection of the decommissioned plant.

d. Assumption: One year after decommissioning, the spent fuel pool is isolated from most of the rest of the nuclear plant including alternative water sources and pumps to supply water.

e. Assumption: One year after decommissioning, the operator error rate is 10 times higher than at the beginning of the decommissioning.

10. Will comparison to operating plant risk from SFPs be necessary? If so, what has to be modeled differently for operating plants besides human factors?

11. Determine what backup systems will be available in the event of loss of inventory at a decommissioned nuclear power plant. (E.g., RHR)

12. Determine what is the expected presence of electricians and other maintenance workers onsite once the plant is decommissioned. What about on the back shift?

13. Will all offsite power lines continue to be maintained? Will emergency diesel generators be maintained? Will dc power systems (i.e., batteries) be maintained?

E. AREAS WHERE INFORMATION ALREADY EXISTS

F. AREAS WHERE INFORMATION NEEDS TO BE DEVELOPED

G. AREAS WHERE INFORMATION CANNOT BE OBTAINED AND FOR WHICH ASSUMPTIONS MUST BE MADE

H. ASSUMPTIONS

1. No recovery will be credited (i.e., you cannot put more water in the pool) once fuel is uncovered (less than 4 feet of water covering pool?).

2. No recovery will be credited if alarms do not sound in the control room.

3. Losses of SFP or refueling water inventory are dominated by human error.

I. PROBLEMS AND POSSIBLE SOLUTIONS

J. RECOMMENDATIONS ON WHAT DECOMMISSIONED PLANTS MAY NEED TO DO TO REDUCE RISK SO THAT EXEMPTIONS CAN BE GRANTED

1. Utility to assure that antisiphon devices are correctly designed and installed. Antisiphon devices must be included under the Maintenance Rule process.

2. Shipping cask pool drains must be .....

3. Connected systems must be evaluated to determine vulnerabilities to draining the spent fuel pool. Vulnerabilities to be reported and fixed. (Time to drain a consideration e.g., size of line??)

4. Spent fuel pool makeup sources (e.g., RWST, condensate storage tank) need to be maintained and available.

K. WHAT NEEDS TO BE BACKFIT TO ALREADY DECOMMISSIONED PLANTS? (e.g., more/better instrumentation/alarms, more/better operators, more/better maintenance?)

L. DATA

1. Frequency [loss of coolant inventory events where more than one foot of inventory was lost] < .01 event per reactor year. (NUREG-1275, Vol. 12)

2. Frequency [loss of spent fuel pool cooling where pool temperature increases more than 20 degrees F] ~ .002 per reactor year (NUREG-1275, Vol 12)

M. REVIEW STATUS OF HEAVY LOAD CONTROL PROGRAM

N. IMPACT OF WATER VAPOR AND POTENTIAL INTERNAL FLOODING FROM SPENT FUEL POOL BOILING OR EVAPORATION

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