

February 2022

### **TMI2 Accident Analyses Questions**

The licensee is seeking to use revised accident analyses to develop what systems, components, controls, and actions are necessary to safely move into a decommissioning phase at TMI2 from the PDMS. The PDMS is more of a static configuration whereas decommissioning will involve numerous activities to remove residual reactivity that remains following the 1979 accident.

NRC staff agree that non-mechanistic or incredible scenarios may not be useful unless the results of technical analyses are below established safety limits. However, 'conservative' scenarios may be used to account for uncertainties. Because TMI2 represents a one-of-a-kind situation, uncertainties may be larger than for other reactor decommissioning sites.

The following questions and comments were developed as part of the initial review to determine if sufficient information is available to complete the acceptance review. The comments should not be viewed as comprehensive and additional comments may be provided as part of the acceptance review or after the acceptance review.

Overall, the staff will be looking for a description of the analyses that will allow the staff to verify the licensee results. Staff will be looking for the source term that is assumed including the concentrations and quantities of radionuclides that were included. The staff would look for a basis for radionuclides that are known to be present and not have been included. For example, the licensee could identify Table(s) X, Y, Z of references A, B, C as providing the source term information and provide the references in the submittal. Next, describe the release fractions, leakage pathway factors, airborne release fractions that are used. Then, what is the release point and release type (puff, continual). Finally, what is the atmospheric information that was used to translate concentrations at the release point to the receptor (X/Q, etc.) and where is the receptor located and for how long. NRC staff can piece together the information from historical references if that is what is relied upon but it is likely to be less efficient and involve potentially more questions than if this information is provided by the licensee.

- 1) What is the source term (radionuclides) analyzed in terms of characterization data and in what references (Table #'s) is this information found? What is the uncertainty in the source term data?
- 2) The reactor building fire appears to be most limiting of the currently analyzed scenarios. Is credit being taken for the reactor building or not? If the doors are open would this analyzed scenario be most limiting?
- 3) Where are the fuel and energy sources that will be introduced during decommissioning described? Can any of these result in a new more limiting scenario?
- 4) What radioactive material is located outside of the reactor building? Do all of those locations have HEPA filtration? Would a fire outside of the reactor building with different material and a different release point be bound by scaling the reactor building fire result to account for no HEPA filter?
- 5) References cite the source term uncertainty as plus or minus 50%. Given the 97 mrem dose result is very close to the 100 mrem limit, how has uncertainty in the source term been accounted for?

- 6) The ratios of the results for different radionuclides may require further explanation. For some scenarios one would expect the ratio of key fission products (Sr, Cs) to actinides (Pu) would be fairly similar but some are substantially different.
- 7) The radionuclides evaluated for different scenarios are different. One usually starts with the complete list of known radioactivity and then performs some sort of screening to eliminate isotopes with low contribution to dose.
- 8) The revised document discussed a "normalized composite mix". Please provide documentation describing what this is and how it was calculated.
- 9) Please provide the reference "Reactor Building Fire Analysis".
- 10) It is good to establish limits (dose rate cutoffs) substantially below the regulations to allow for a factor of safety and account for uncertainties. NRC staff would like to be able to establish how those limits were derived.