Source Term Isotope Selection Process

Overview
GE Hitachi wants to build their Economic Simplified Boiling Water Reactor in countries other than the United States. To do this they need a source term using more up to date methodology than that used by the NRC. The Penn State team was tasked with developing a process and a screening result using the National Council on Radiation Protection and Measurements methods.

Objectives
- Develop a source term isotope screening process using NCRP methods.
- Perform the screening process for GE Hitachi’s ESBWR design.

Approach
- The team began by researching the NCRP method of screening in NCRP’s report no 123 I
- Relevant constants and screening factors were researched in the ESBWR design control document
- A report on a similar analysis done at the Savannah River Site was researched as well
- The level I screening process was developed in an excel document for both atmospheric and surface water releases
- The values needed to run the process for the ESBWR were entered and results for level one screening were obtained
- Surface water was not found to exceed the limit for level I screening, but the level II and level III screening process for it was still developed for future use
- This screening development and evaluation cycle was repeated for level II and level III screening
- Future work necessary to complete this analysis process for a specific reactor was researched
- RADTRAD software analysis was found to be the next step in evaluations

Outcomes
Finally, list the outcomes for this project making sure to clearly convey their implications for the sponsoring company:
- A full process for analysing the reactor source term using the NCRP method was created.
- The ESBWR was found to be below recommended limits for all levels of surface water screening.
- However atmospheric releases were found to exceed recommended limits at all levels of screening.