Source-Term Sensitivity Studies
Done in TSPA-91

- Human-intrusion analysis used both standard source term and modified ("detailed") one
  - Other analyses used only standard source

- Detailed source term--inventory changes due to reactor operations
  - Reactor type (PWR, BWR)
  - Fuel burnup
  - Decay since discharge
Characteristics of Source Terms

- Standard--Taken from SCP, "abstracted" for TSPA-91

- Detailed--Developed from Characteristics Data Base
Standard--Taken from SCP, "Abstracted" for TSPA-91

- 60% spent PWR fuel; 40% spent BWR fuel

- Fuel burnup:
  - PWR: 33,000 MWe/MTU
  - BWR: 27,500 MWe/MTU

- 10-year decay
Detailed--Developed from Characteristics Data Base

- PWR spent-fuel inventories as a function of burnup and decay
- Detailed source term used in TSPA-91
PWR Spent-Fuel Inventories as a Function of Burnup and Decay
Detailed Source Term used in TSPA-91

- Investigate consequences for disruptive events
  - Surface release for human-intrusion drilling

- Repository active until approximately 2040
  - Repository loaded with oldest fuel first

- Inventories grouped by decay times
  - 10-year increments to 2040
  - Weighted-average burnups for each decay group
  - Detailed source term weighted by reactor type, burnup, decay
Comparison of Standard and Detailed Source Terms

Direct Releases due to Human Intrusion

Normalized release to accessible environment

Complementary cumulative probability

- EPA limit
- Base Case (Standard Source Term)
- Detailed Source Term

SNTIRB5P7.125.NWTRB/10-14/16-92
Most Important Direct Releases

- $^{137}\text{Cs}$
- $^{239}\text{Pu}$
- $^{240}\text{Pu}$
- $^{241}\text{Am}$
Inventories of Important Radionuclides

$^{239}\text{Pu}$

$^{241}\text{Am}$
Conclusions

• Detailed source term may not be necessary for initial TSPAs
  - Burnup and decay values affect releases from individual radionuclides
Future work for TSPA-93

- Releases from individual isotopes
- Use new Quantities Data Base
- More enrichment values used for calculating burnup