

**U.S. DEPARTMENT OF ENERGY
OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT**

**NUCLEAR WASTE TECHNICAL REVIEW BOARD
FULL BOARD MEETING**

**SUBJECT: SOURCE TERM FOR THE SANDIA
NATIONAL LABORATORIES (SNL)
TOTAL SYSTEM PERFORMANCE
ASSESSMENT**

PRESENTER: DR. RALSTON W. BARNARD

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**PLAZA SUITE HOTEL • LAS VEGAS, NEVADA
OCTOBER 14 - 16, 1992**

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**

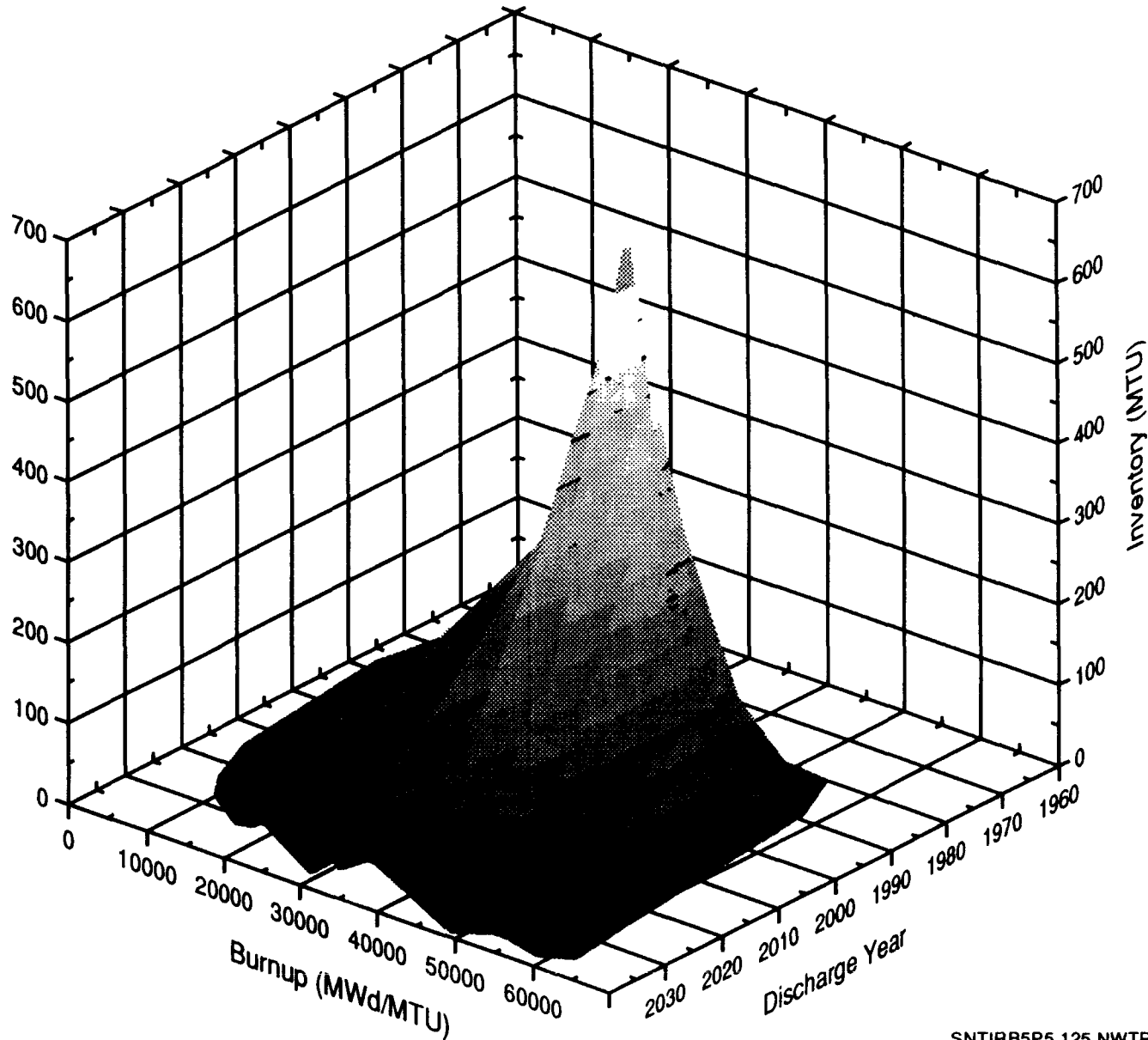
Standard--Taken from SCP, "Abstracted" for TSPA-91

- **60% spent PWR fuel; 40% spent BWR fuel**
- **Fuel burnup:**
 - **PWR: 33,000 MWd/MTU**
 - **BWR: 27,500 MWd/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

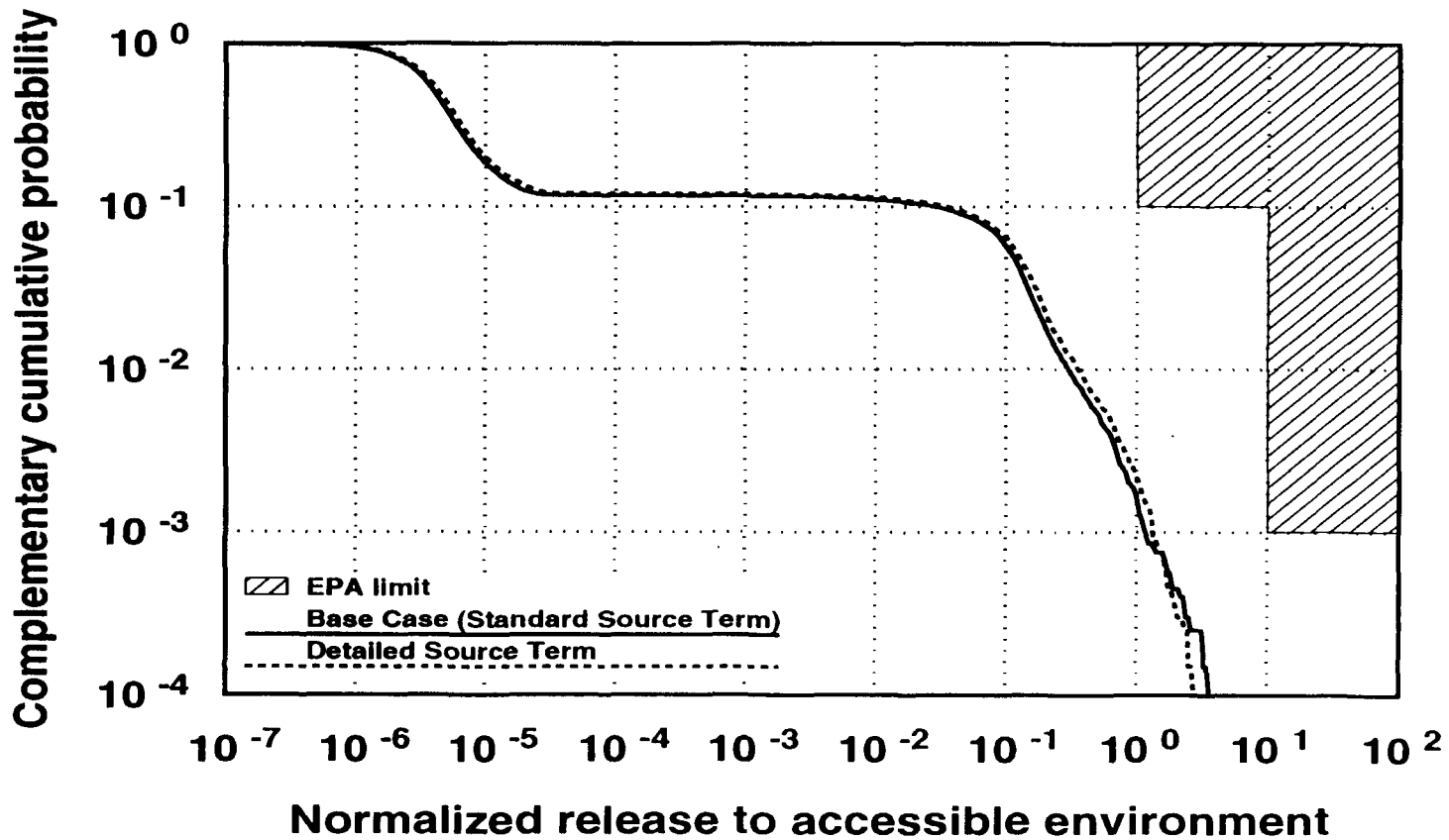


Detailed Source Term used in TSPA-91

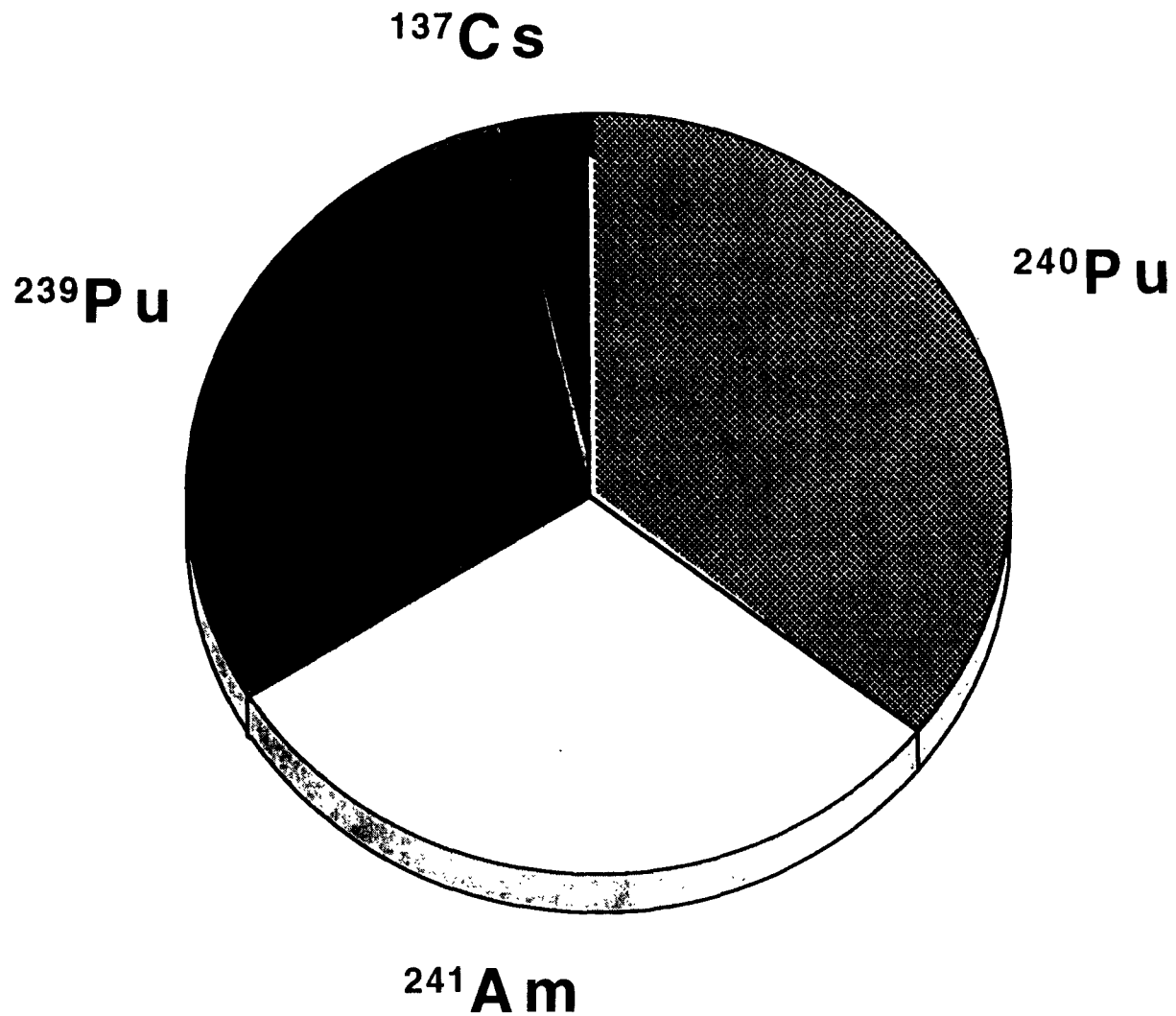
- **Investigate consequences for disruptive events**
 - **Surface release for human-intrusion drilling**
- **Repository active until approximately 2040**
 - **Repository loaded with oldest fuel first**
- **Inventories grouped by decay times**
 - **10-year increments to 2040**
 - **Weighted-average burnups for each decay group**
 - **Detailed source term weighted by reactor type, burnup, decay**

Comparison of Standard and Detailed Source Terms

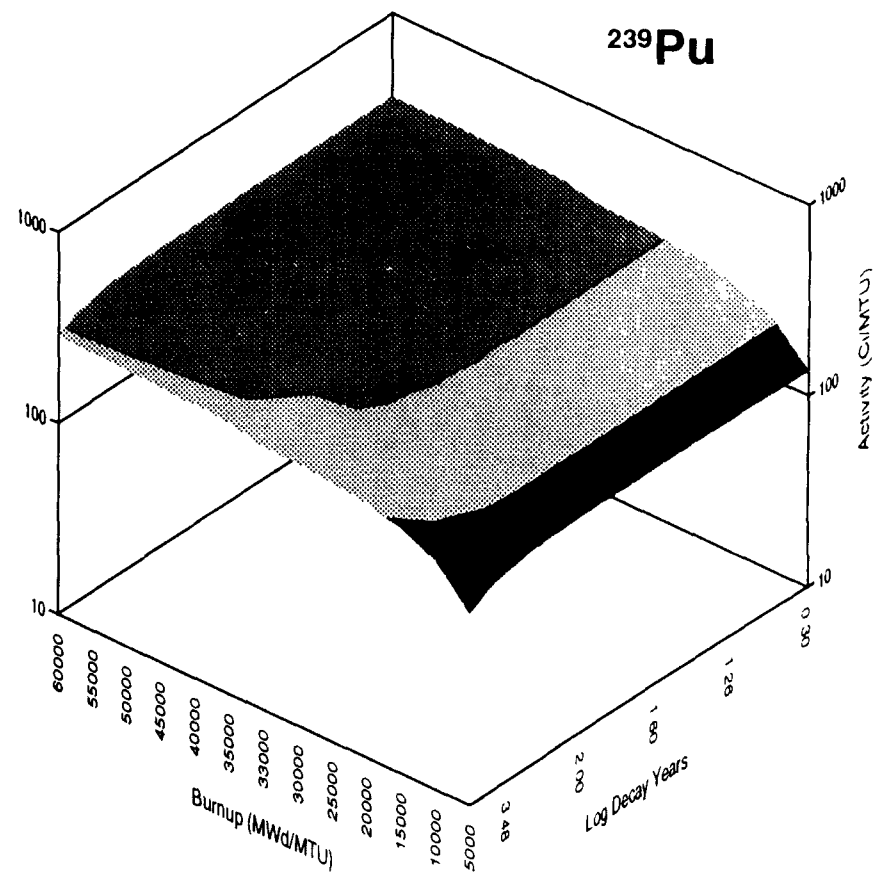
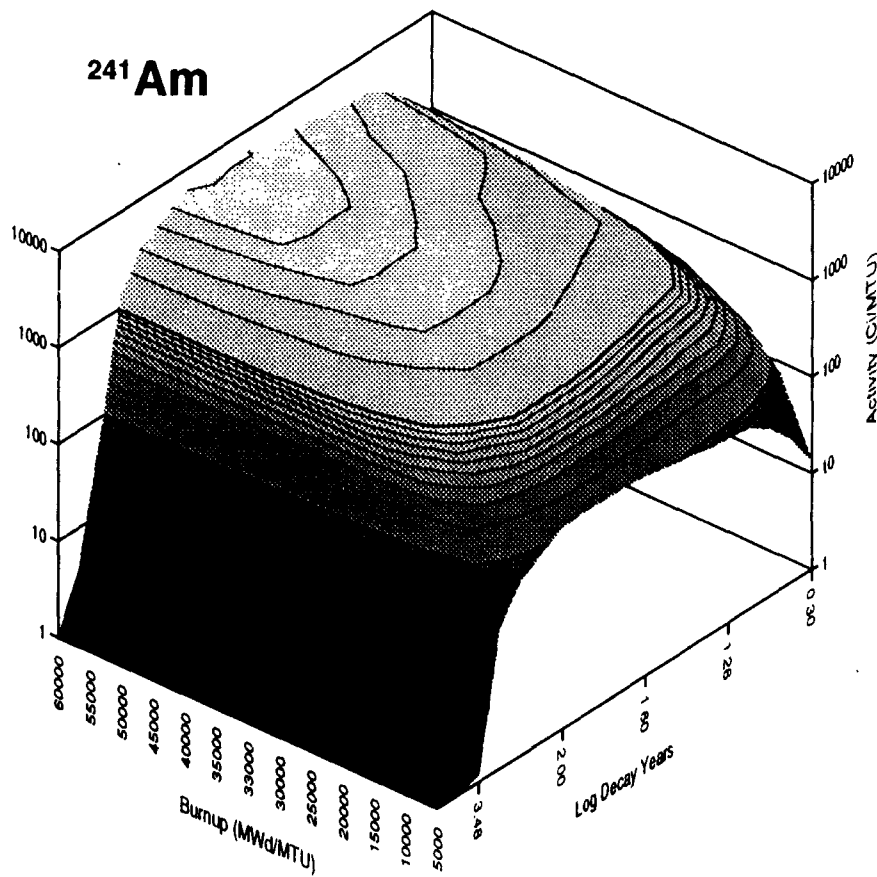
Direct Releases due to Human Intrusion



Most Important Direct Releases



Inventories of Important Radionuclides



Conclusions

- **Detailed source term may not be necessary for initial TSPAs**
 - **Burnup and decay values affect releases from individual radionuclides**

Conclusions

(Continued)

Future work for TSPA-93

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

