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Impact of Inventory Changes on Performance Assessment

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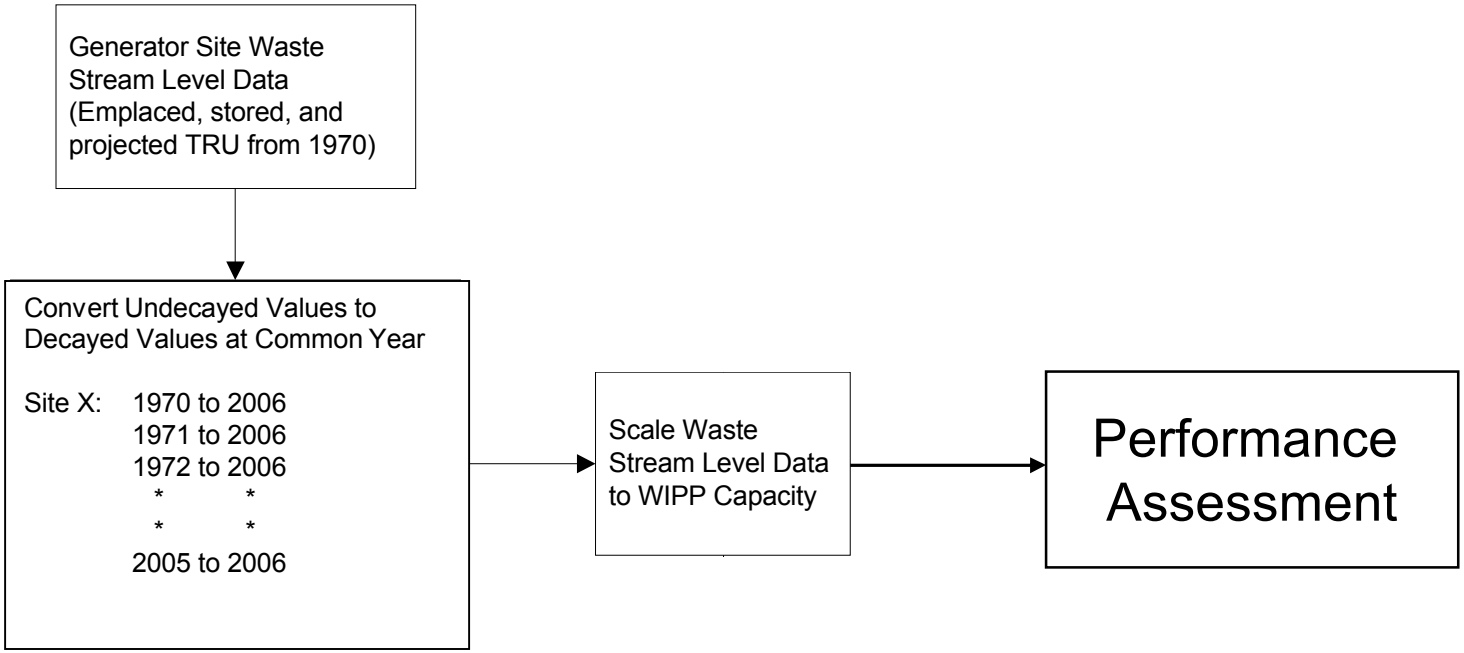
Outline

- Inventory in Performance Assessment (PA)
- Radionuclides in PA
- Radionuclide Comparison
- Non-radionuclide Material in PA
- Non-radionuclide Materials Comparison
- Summary

Inventory in Performance Assessment

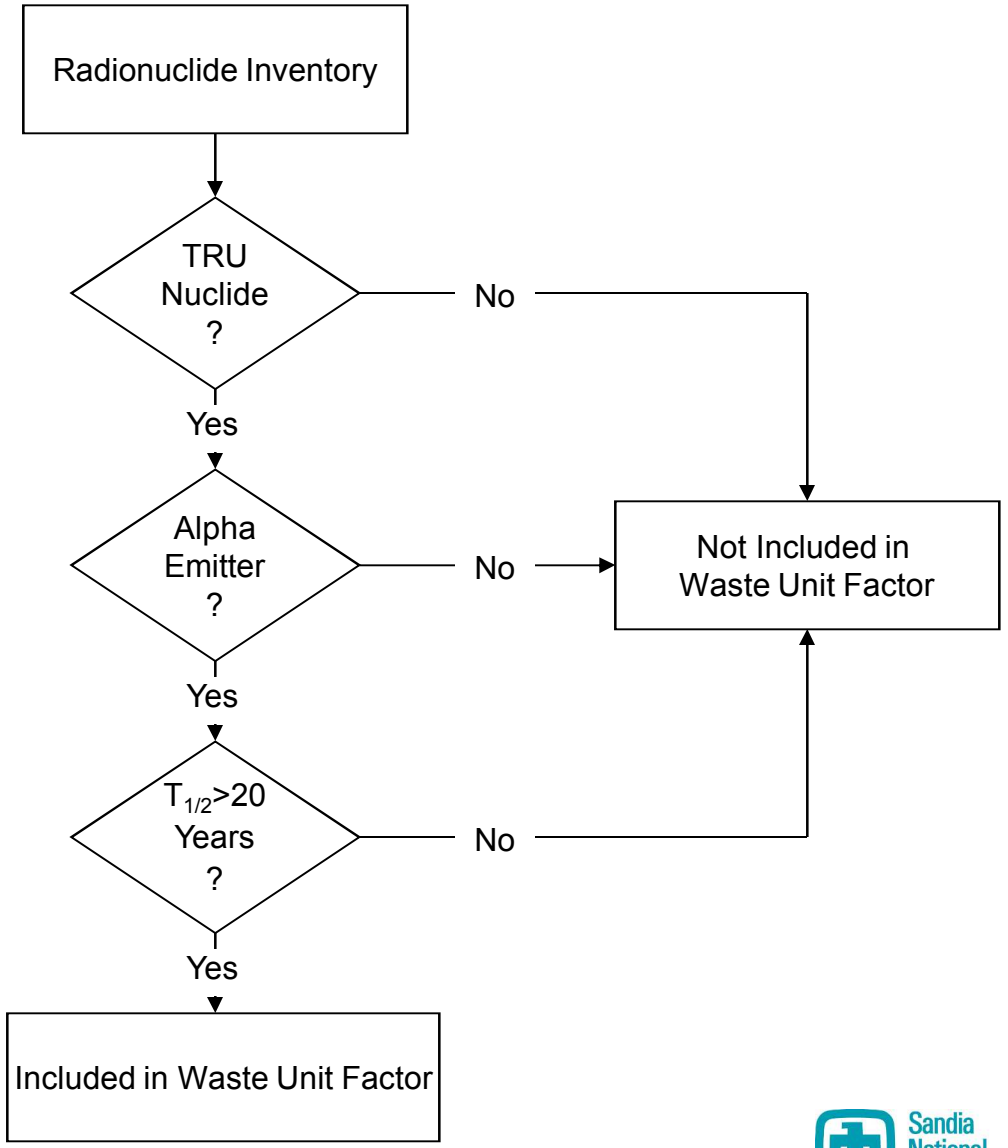
- **What is WIPP PA?**
  - ***WIPP PA is the probabilistic modeling framework that DOE uses to demonstrate compliance with EPA containment requirements.***
- **How is the inventory used in WIPP PA?**
  - ***The inventory is used in PA to calculate long-term release from the WIPP and to determine the chemical and physical states of the repository.***

Radionuclides in PA



Waste Unit Factor

- **The WUF is the number of millions of curies (Ci) of α-emitting TRU radionuclides with half-lives longer than 20 years (40 CFR Part 191, Appendix A), based on the TRU waste inventory to be disposed.**

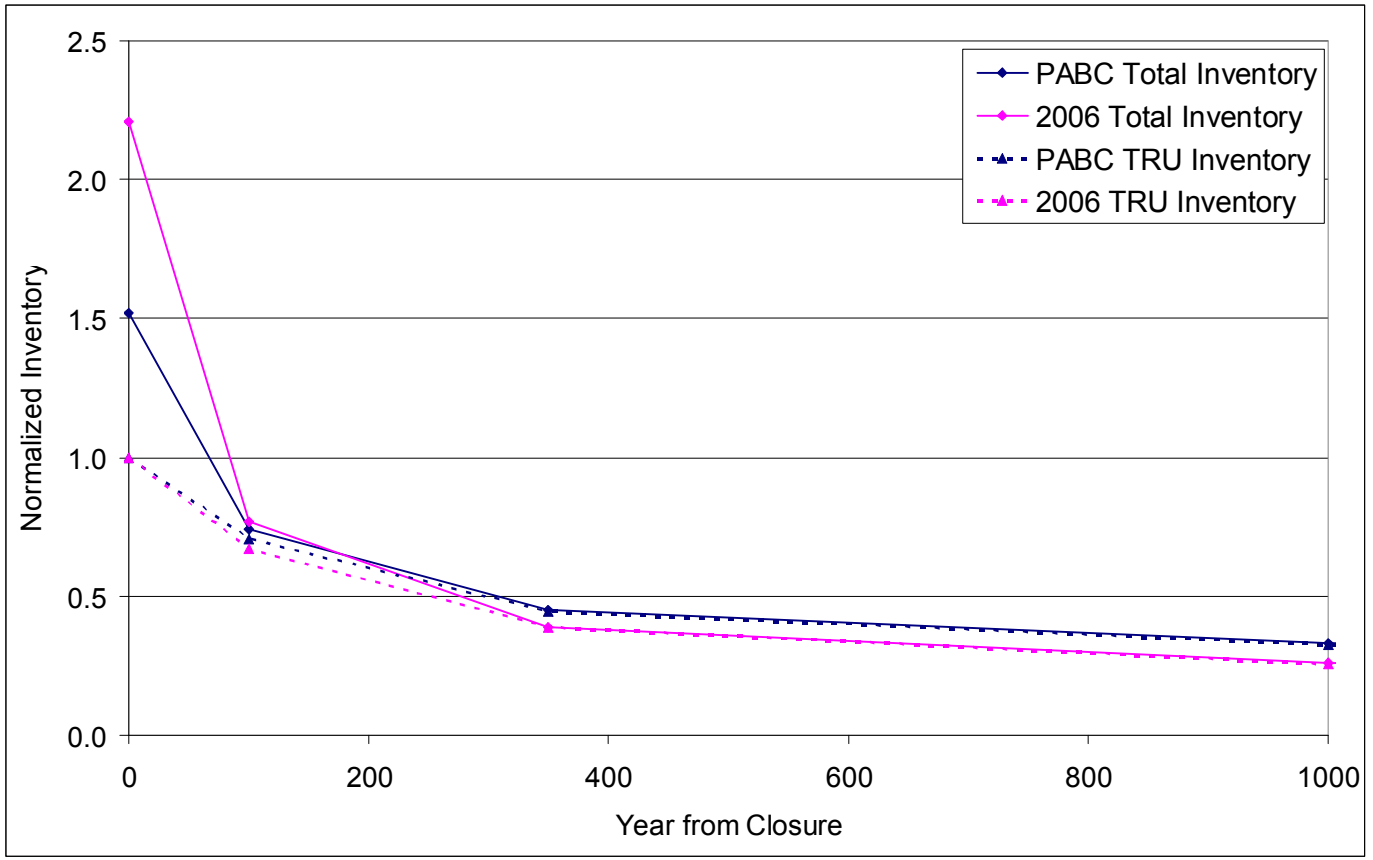


WUF in PA

- The WUF is used to calculate EPA units.
- The number of EPA units of a radionuclide is the activity (in Ci) of the radionuclide divided by the release limit for that radionuclide and the WUF.
- Therefore, the WIPP PA releases in the repository are normalized using the WUF.
- The WUF for the PABC was 2.32
- The WUF for the 2006 inventory is 5.1

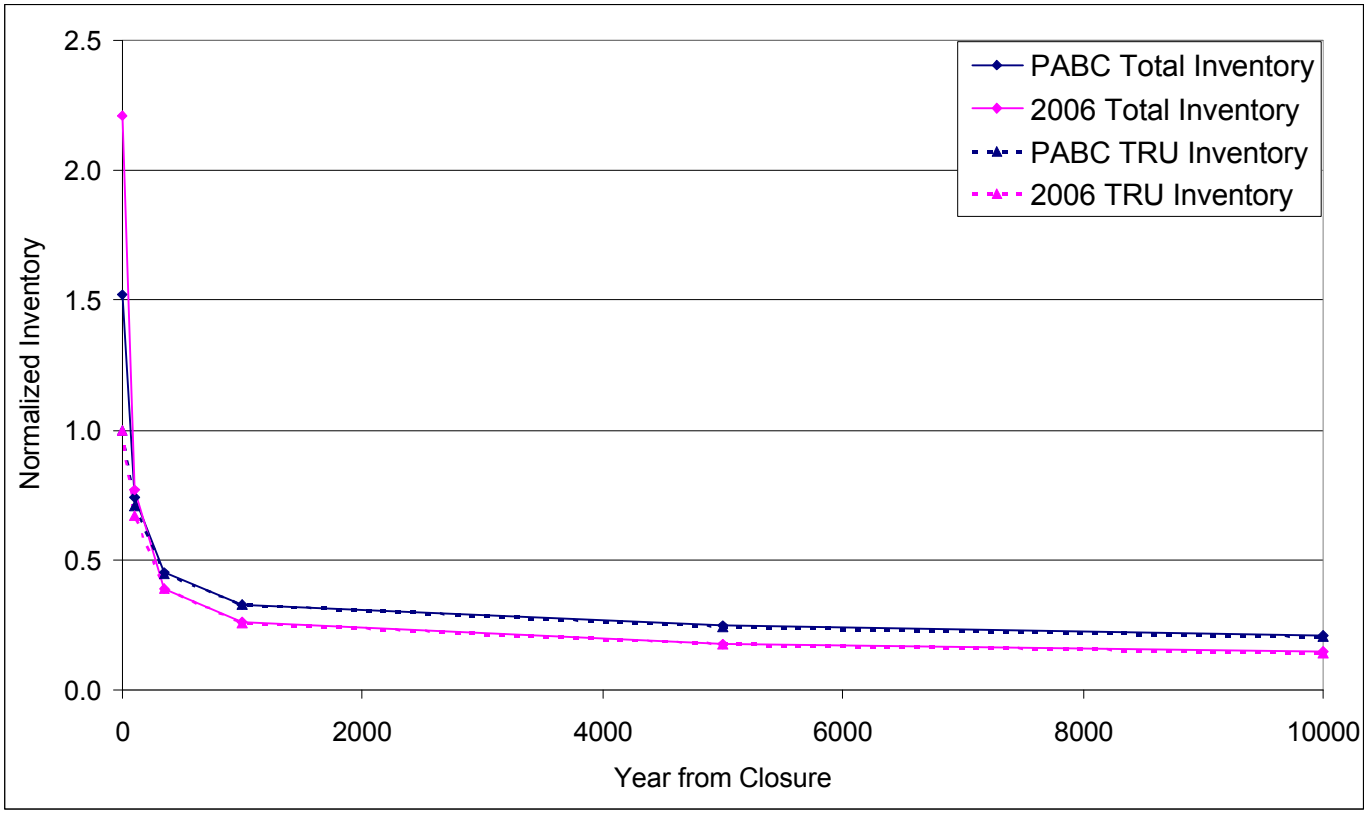
Radionuclide Comparison (0-1,000 years)

- 2006 inventory initially higher due to increases in ^{137}Cs and ^{90}Sr.
- 100 years after closure normalized inventories are nearly identical
- After 100 years normalized inventories are lower in 2006 inventory

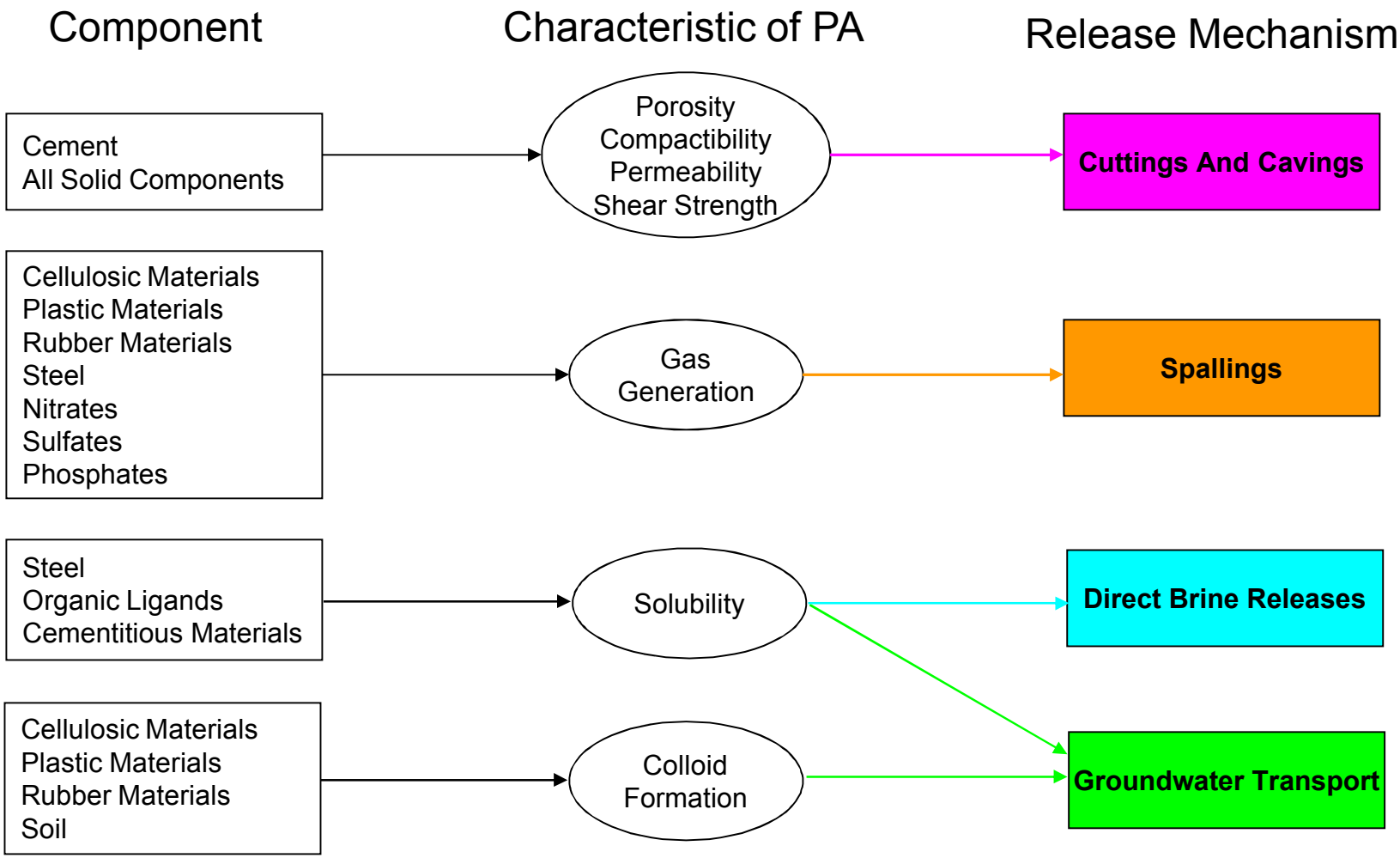


Radionuclide Comparison (0-10,000 years)

- After 100 years normalized inventories are lower in 2006 inventory.
- Active institutional controls prevent intrusions for the first 100 years.
- Therefore, normalized solid releases (in EPA units) will be lower using the 2006 inventory.



Non-Radionuclide Materials in PA



Non-Radionuclide Materials in PA

- After analyzing the non-radionuclides materials in the 2006 inventory, the materials of particular concern to the PA are
  - Cellulosic, plastic, and rubber (CPR) Materials
  - Organic Ligands (specifically EDTA)

Total CPR Changes

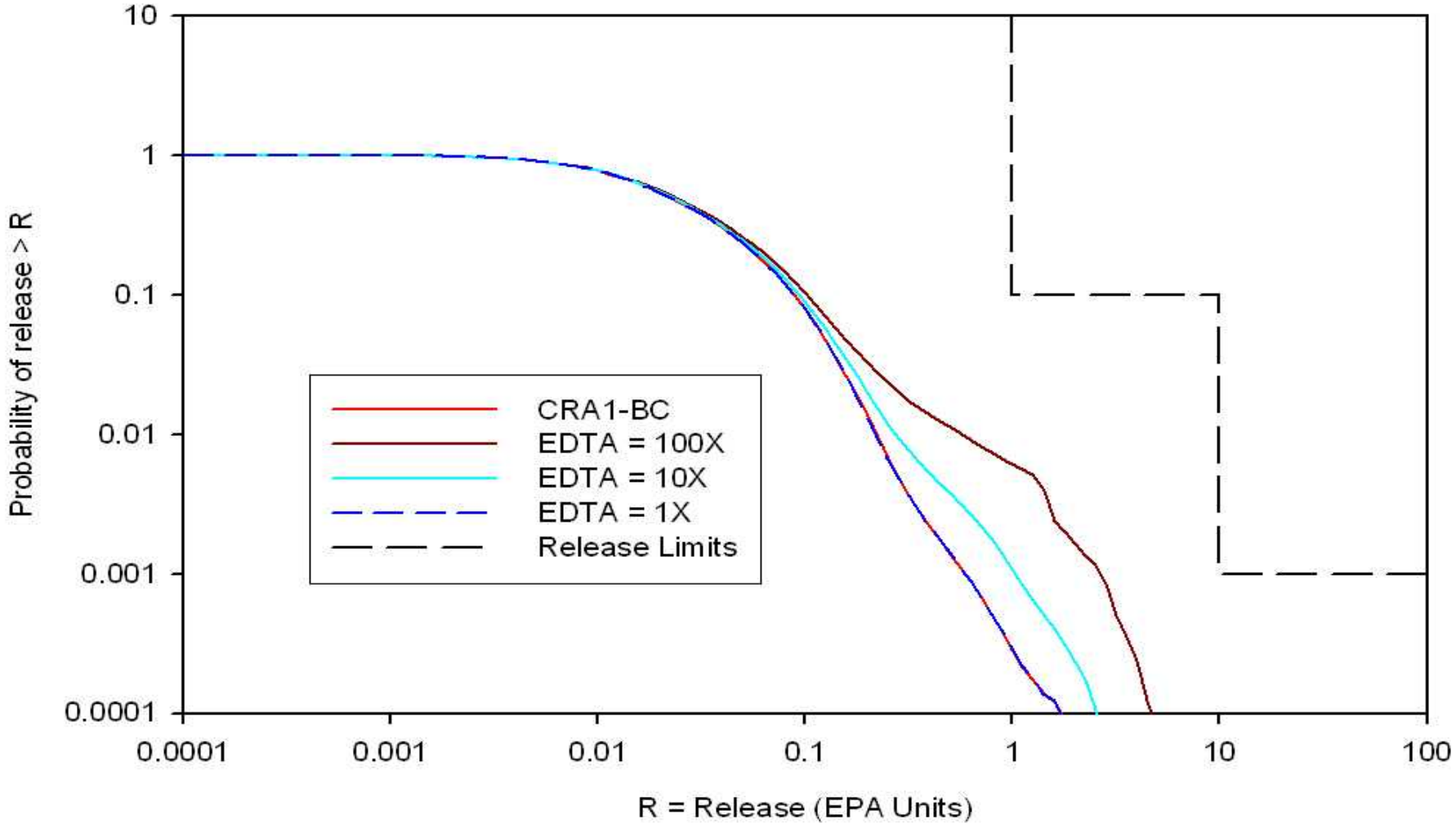
	2006 Inventory Total (Kg)	PABC Inventory Total (Kg)	Percent Difference
Cellulosics	1.57E+07	1.19E+07	32%
Plastic	2.33E+07	1.35E+07	73%
Rubber	1.90E+06	3.32E+06	-43%

- **Resulting in a ~50% increase of moles of organic carbon available.**
- **Past analysis have show that a 250% increase in CPR materials had insignificant impacts on releases.**
- **Therefore, the increase in CPR will not have a significant impact on releases.**

Organic Ligands Changes

- Organic ligands have the potential to impact the solubility of actinides in the waste.
- Of the organic ligands, EDTA, was identified as having a significant increase in the 2006 inventory.
- EDTA increased from a concentration of 8.1×10^{-6} M in the PABC to 7.8×10^{-5} M in the 2006 inventory (9.5 times more than in the PABC inventory).

EDTA Sensitivity Analysis Results



Summary

- Normalized solid releases will decrease from the PABC inventory to the 2006 inventory.
- The increase in CPR will not have a significant impact on long-term releases.
- The increase in EDTA will increase releases.
- Overall, the PA results would still be well under the regulatory limit using the 2006 inventory.