Sorption of ^{237}Np by UO_2 under Repository Conditions

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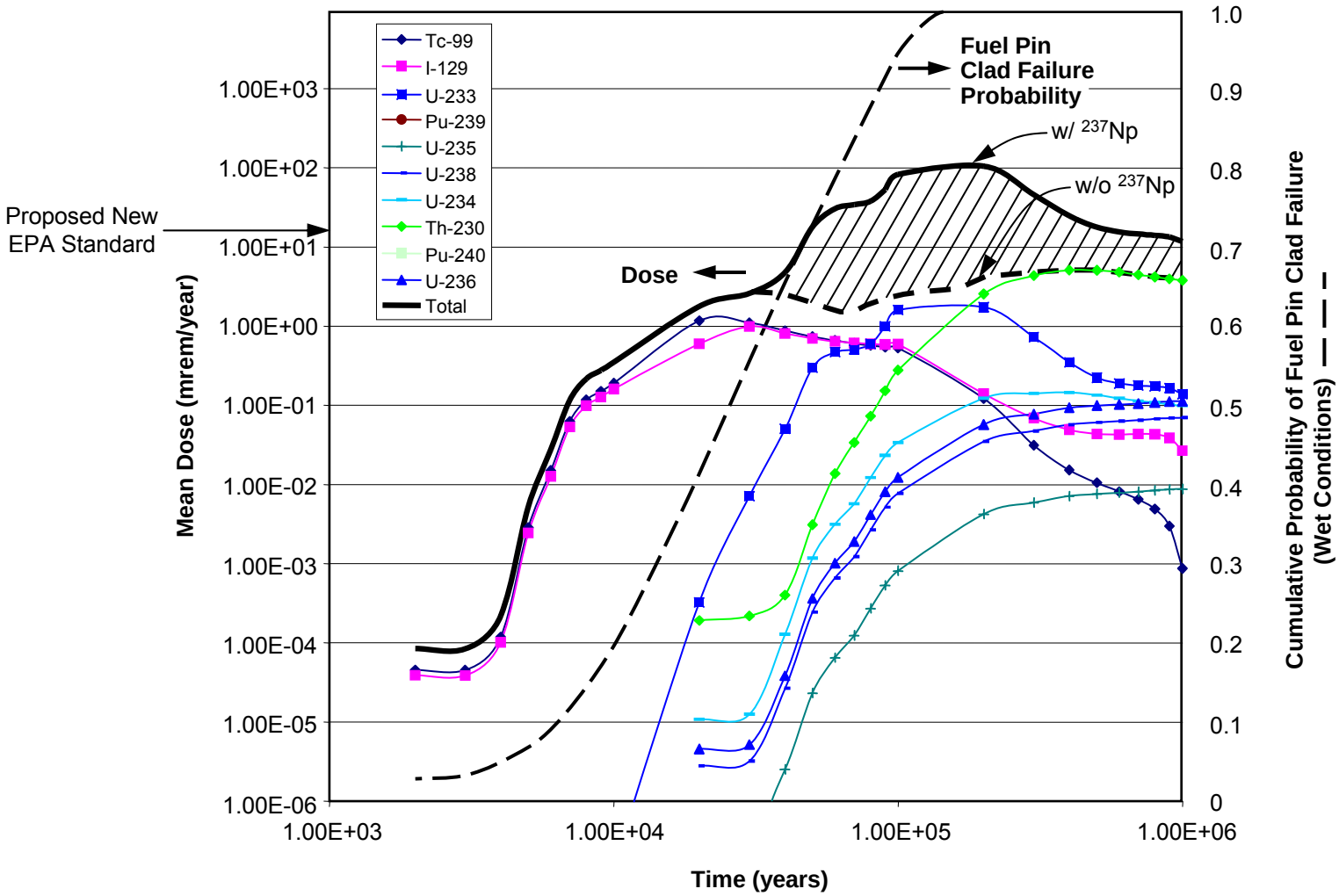
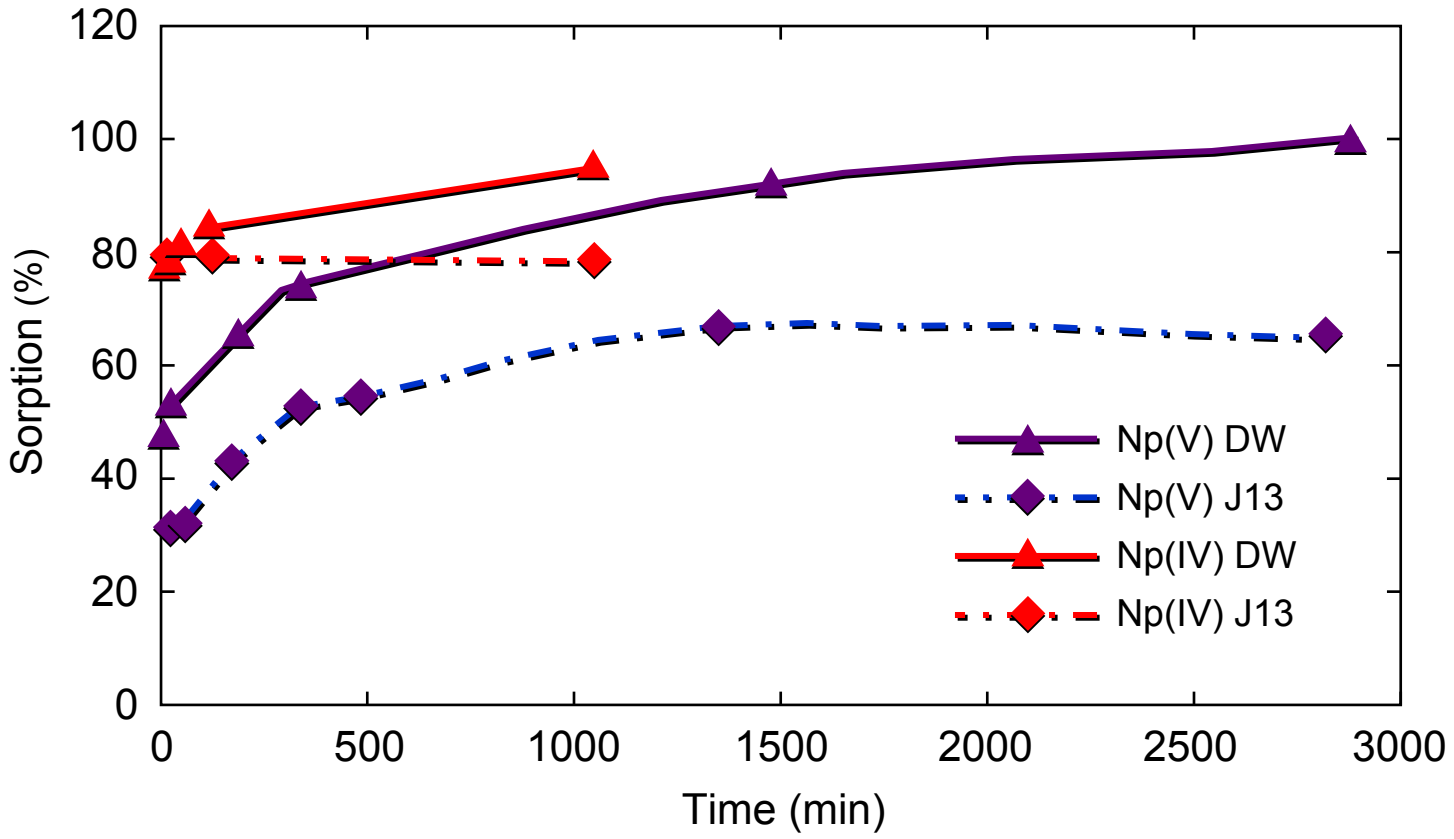
The Contribution of ^{237}Np to Total Site Boundary Calculations

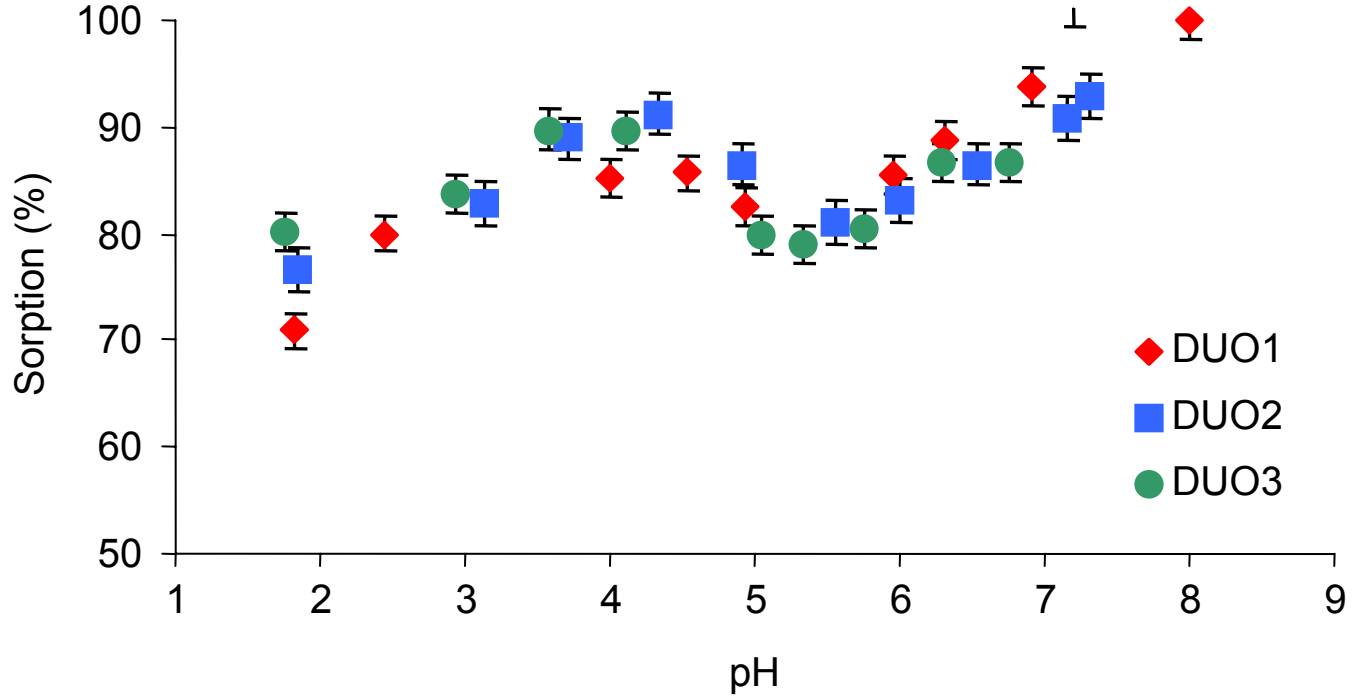


(Ref. Scientific and Technical Priorities at Yucca Mountain, EPRI Report No. 1003335, December 2003).

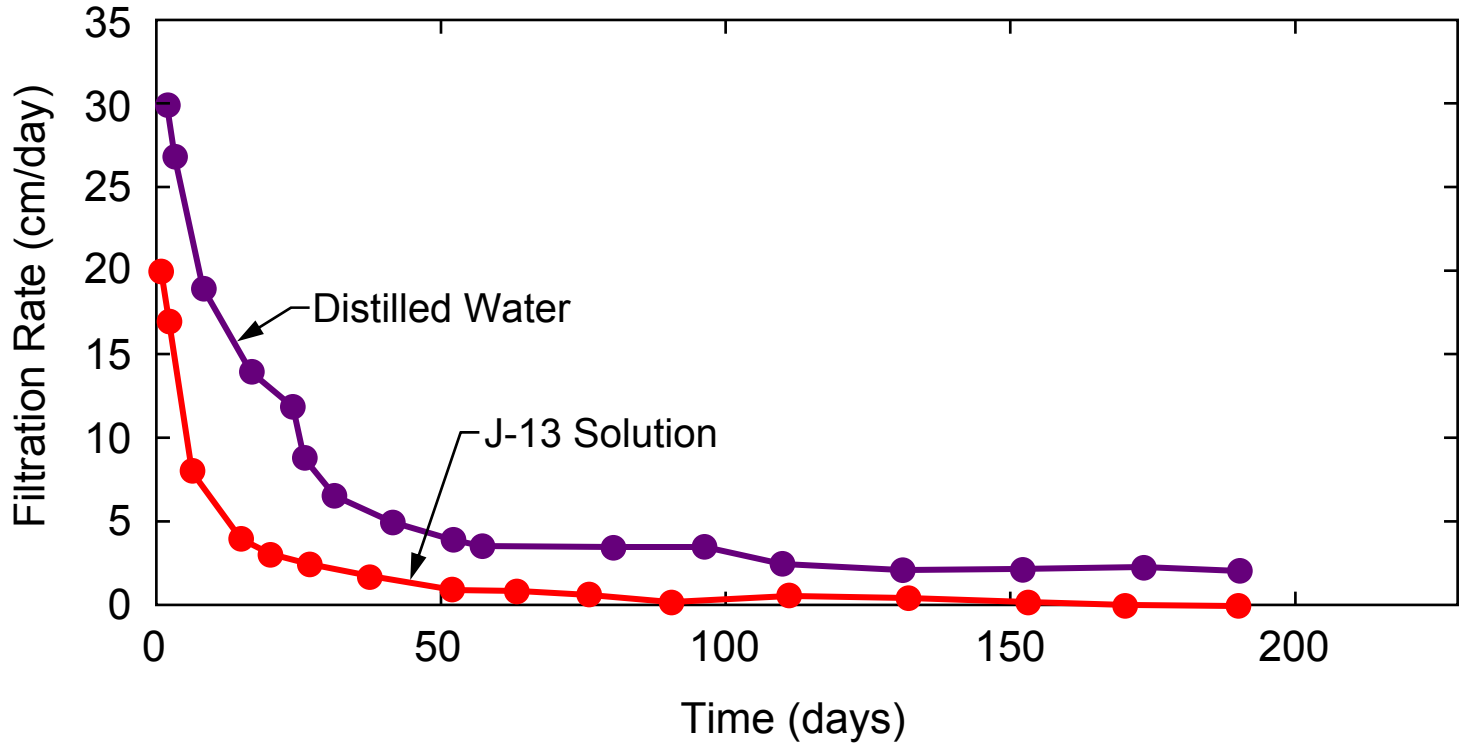
Neptunium Sorption from Aqueous Solutions onto Uranium Dioxide



Np(IV) Sorption onto DUO_2 vs pH



Relatively Thin Layers of UO_2 Become Impermeable to Water



*Data courtesy of T.V. Kazakovskaya (VNIIEF, Russia) and E.V. Zaharova (IPC, Russia)

Some Key, General Conclusions of Russian/American Sorption onto UO_2 Research

- **UO_2 sorbs Np(V) and Np(IV). Equilibrium is reached rapidly. UO_2 pretreatment temperature affects the amount sorbed. Increase of temperature to 95°C increases the amount sorbed. Np(V) sorption is irreversible**
- **TC(IV) sorbs onto UO_2**
- **Filtration of water flow through UO_2 is almost complete in a short period of time**

Experiment Data Implications

- **UO_2 may be an effective chemical barrier to key radionuclide release**
- **Spent nuclear fuel burn-up is ~<5%. The remaining 95% UO_2 may retain key radioisotopes**
- **Radionuclide retention might be enhanced by using depleted uranium (DU) oxides in a Richard's Barrier (i.e., as backfill), using DUO_2-steel cermets as a material of construction for waste packages, filling the void space within the waste canister with DUO_2, using DUO_2 as ballast in the invert**

Potential DU Dioxide Applications in a Geologic Repository