Transuranic Wastes at Hanford

Robert Alvarez

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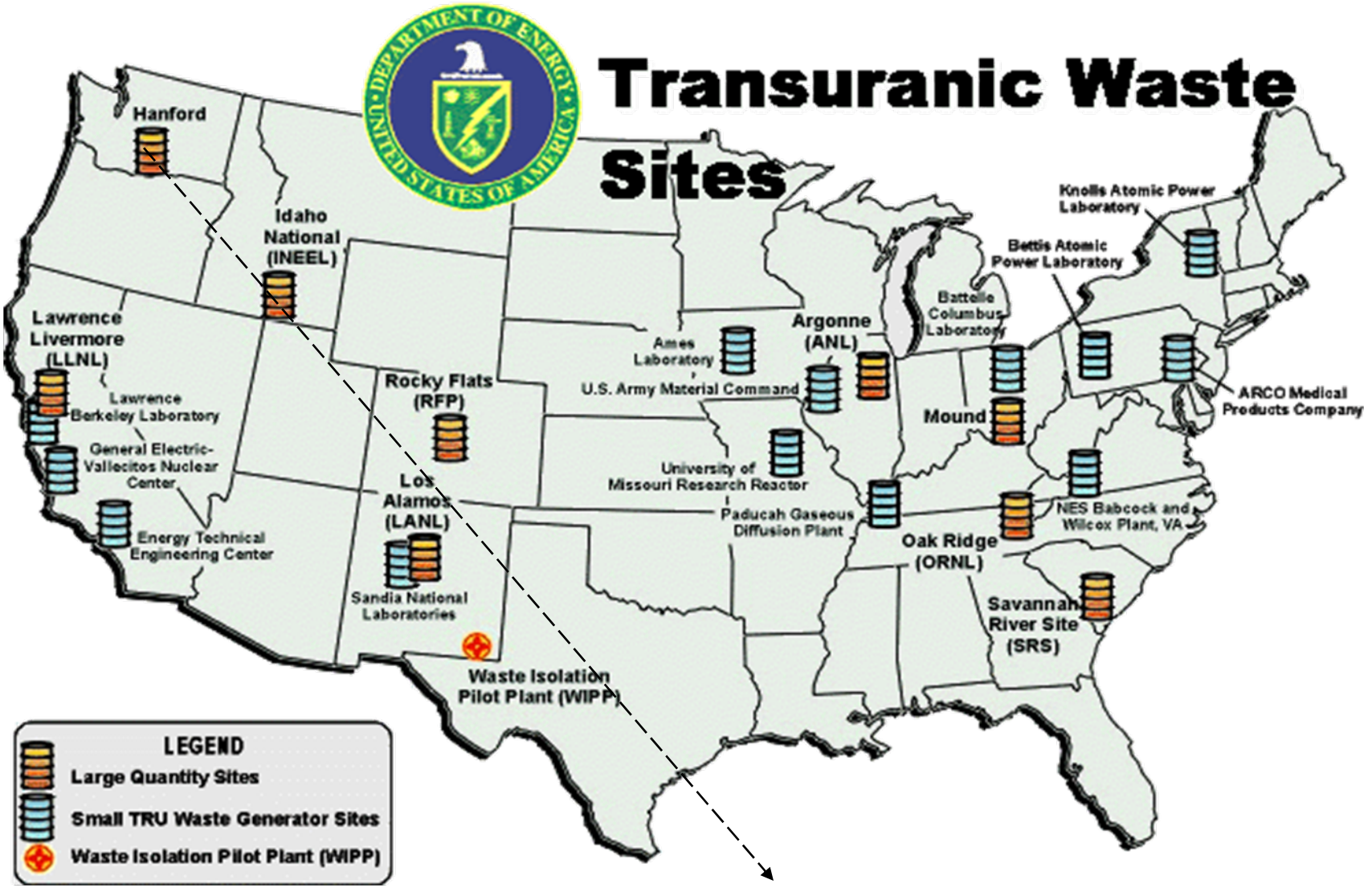
Transuranic (TRU) wastes are contaminated with radioactive elements heavier than uranium on the periodic chart (i.e. plutonium, americium, curium and neptunium).

They were generated by the U.S. nuclear weapons program, and to a lesser extent by commercial businesses during the 1960s and 1970s.

According to EPA regulation (40 CFR 91) these wastes contain more than 100 nanocuries of alpha-emitting transuranic isotopes, with half-lives greater than twenty years.

TRU wastes mostly contain plutonium-239, which remains hazardous for hundreds- of-thousands of years.



Hanford has about 60 percent of all TRU wastes by volume.

TRU Waste Shipment

About 137,000 cubic meters of TRU wastes were “retrievably stored” at DOE sites after 1970 and are now being processed and are going to a deep geologic repository – the Waste Isolation Pilot Project in new Mexico (WIPP).

WIPP has an authorized disposal capacity of 175,000 cubic meters.

About 138,000 cubic meters of TRU wastes were buried at DOE sites prior to 1970 and are not considered a cleanup priority by the Energy department.

Total Volume and Radioactivity of Previously Disposed TRU-Contaminated Waste

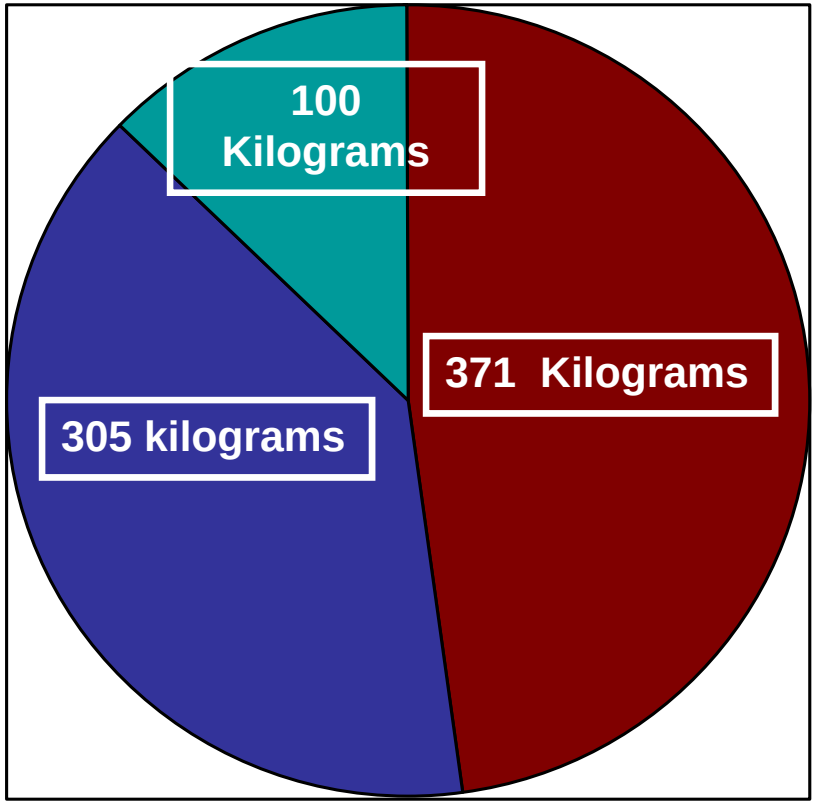
Site	Volume (Cubic meters)	TRU Activity
Idaho National Engineering Laboratory	36,800	297,000 Ci
Hanford Site (DOE)	75,800	60,000 Ci
U.S. Ecology	5,097	42,800 Ci
Los Alamos National Laboratory	8,620	21,000Ci
Savannah River Site	4,530	18,500 Ci
Oak Ridge Reservation	7,450	1,966 Ci
Nevada Test Site	116	493 Ci

Sources: DOE 2001, NRC 1980, DOH 2004

Buried Plutonium at the Hanford Site

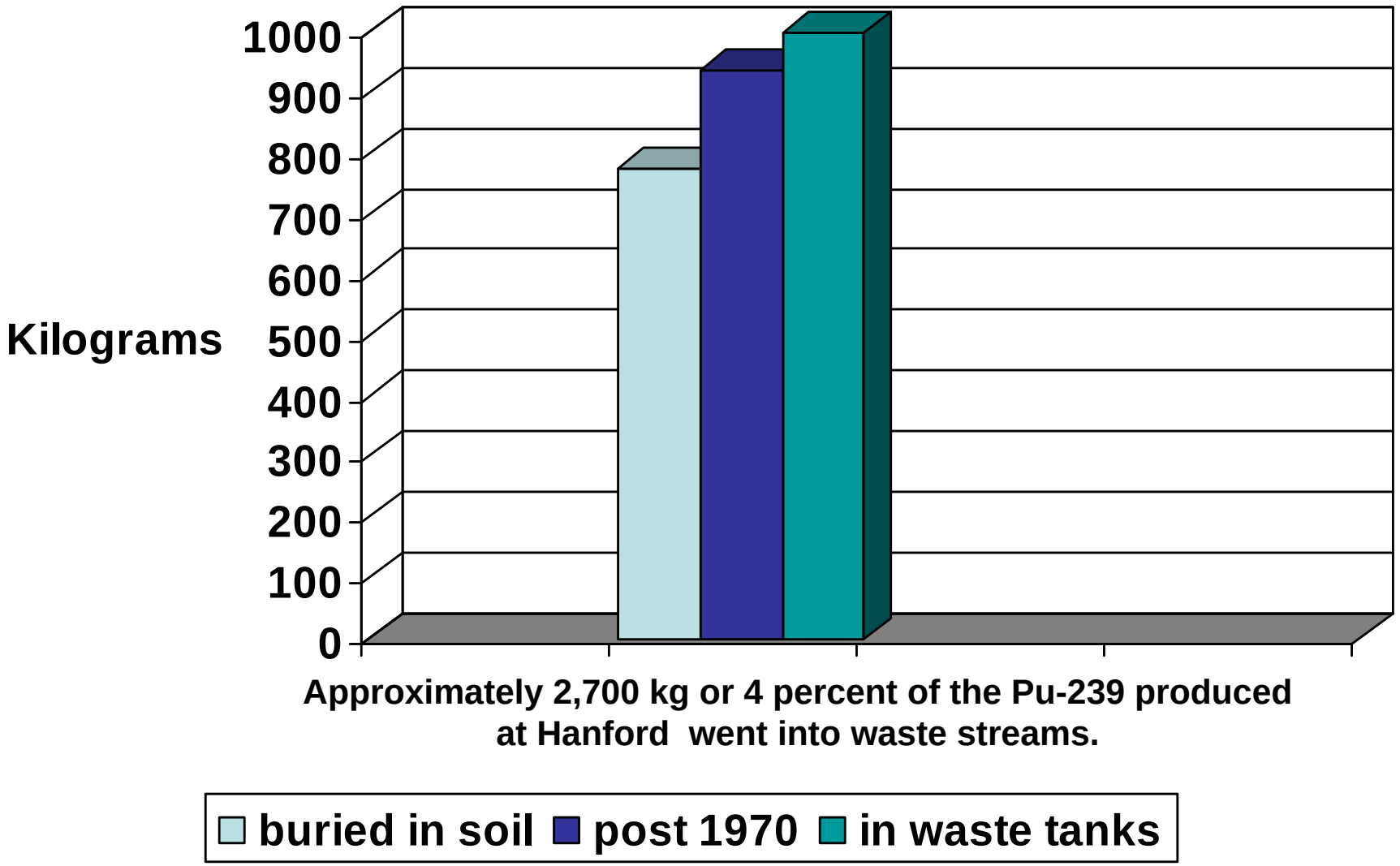
- About 776 kilograms of Pu-239 -- enough to fuel 129 Nagasaki-size atomic bombs -- were dumped at 55 sites from the 1940's to the early 1970's.

- At least 16 sites contain average concentrations of transuranics (TRU) greater than 100 nCig -- the DOE standard requiring geological disposal.



Sources: WHC-SD-WM-ES-325, RHO-LD-114, PNL-11800

Plutonium in Wastes at Hanford



Sources: WHC-SD-WM-ES-325,
RHO-LD-114, WA- DOH 2004, DOE/TRU-2008-3379 , DOE TWINS Data 09/03

In 2004 the Washington Health department recommended against removing these wastes.

The U.S. Ecology site is a commercial radioactive waste disposal facility operating in the Hanford 200-Area.

It is regulated by the Washington State Department of Health under an agreement with the Nuclear Regulatory Commission.

Between 1966 and 1980, about 5,000 cubic meters of transuranic wastes, containing about 100 kilograms of plutonium were disposed in unlined trenches.

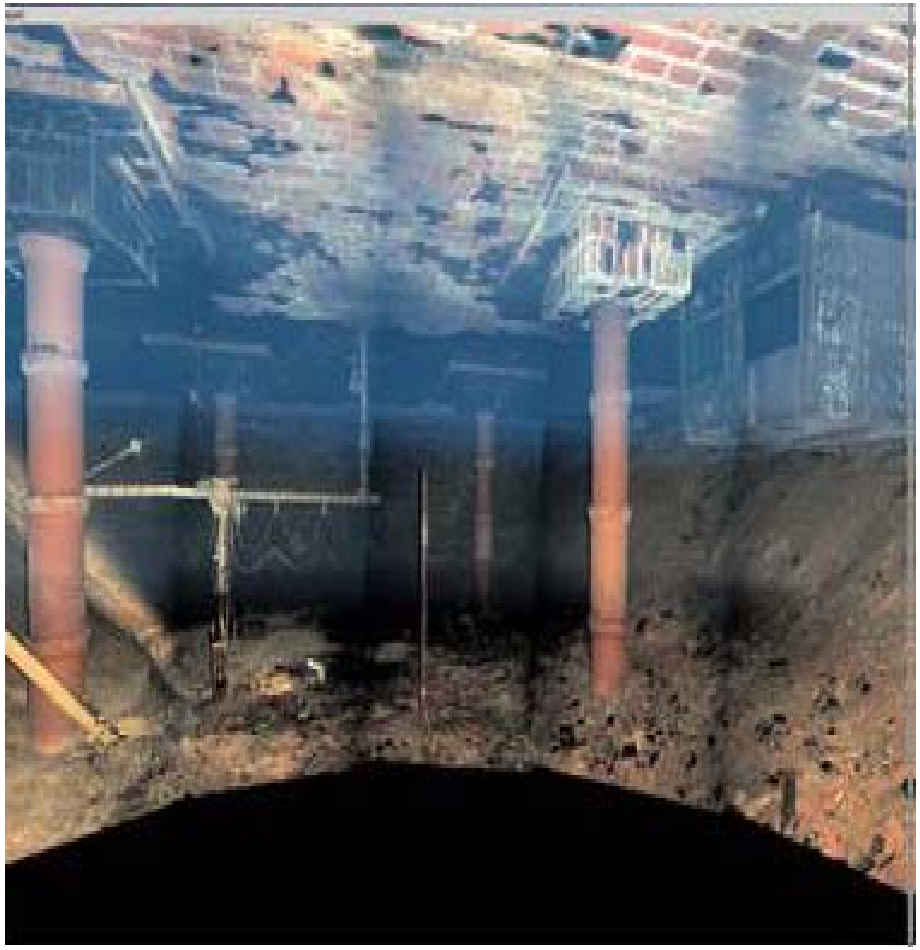
The Hazards of Plutonium At Hanford

*** Inhalation or ingestion of microscopic amounts of plutonium can cause cancer.**

• Plutonium has migrated deep into the subsurface and has contaminated the ground water the flows into the Columbia River.

• According to DOE in 2004, subsurface migration of plutonium at Hanford "is highly enhanced" because it was mixed with acidic liquids and organic solvents.

The Z-9 Crib



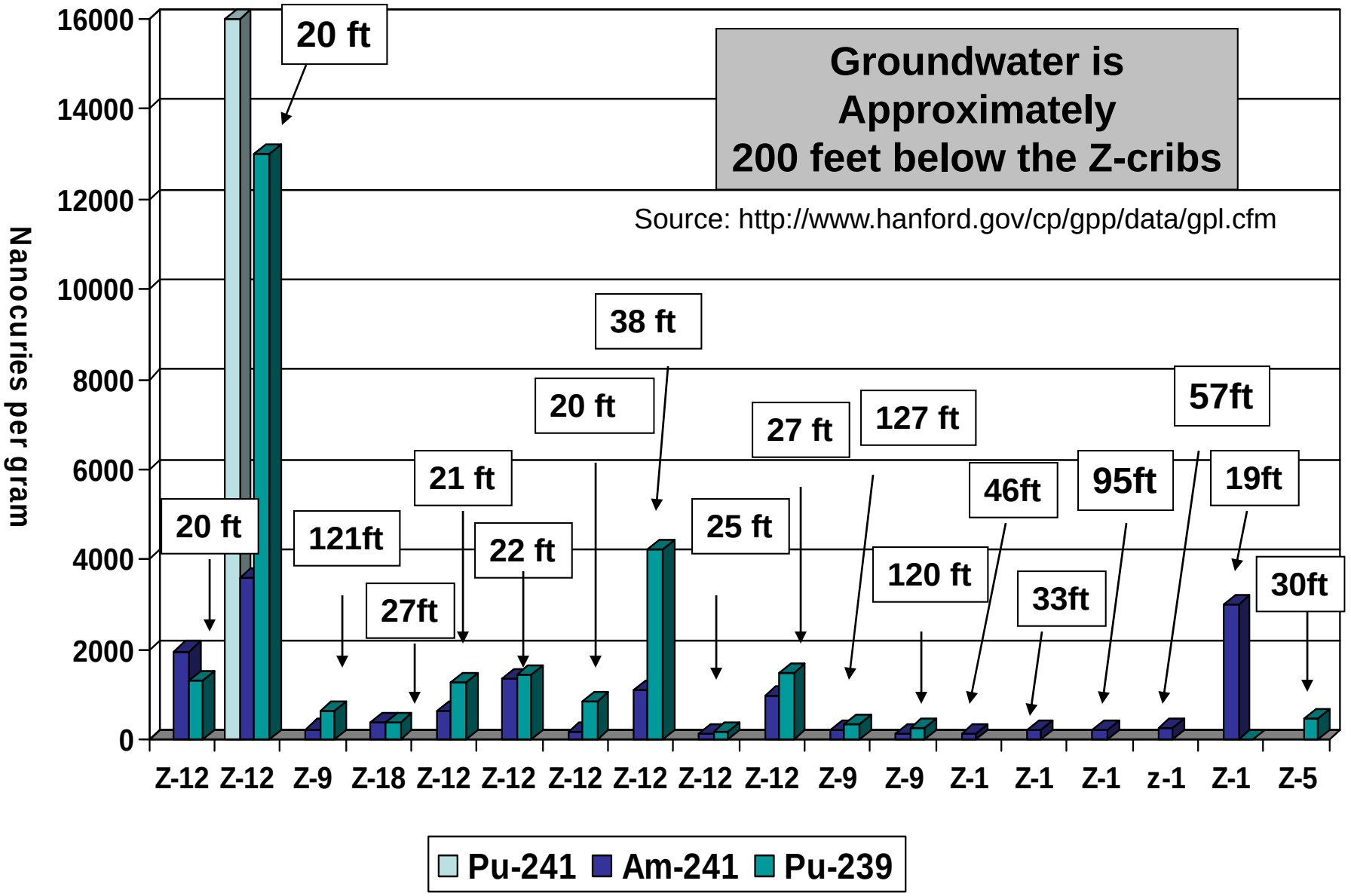
Between 1955 and 1962 as much as 150 kg of plutonium were discharged into the Z-9 Crib.

Because of criticality fears, about 58 kg of plutonium were removed between 1974 and 1976 and placed in drums.

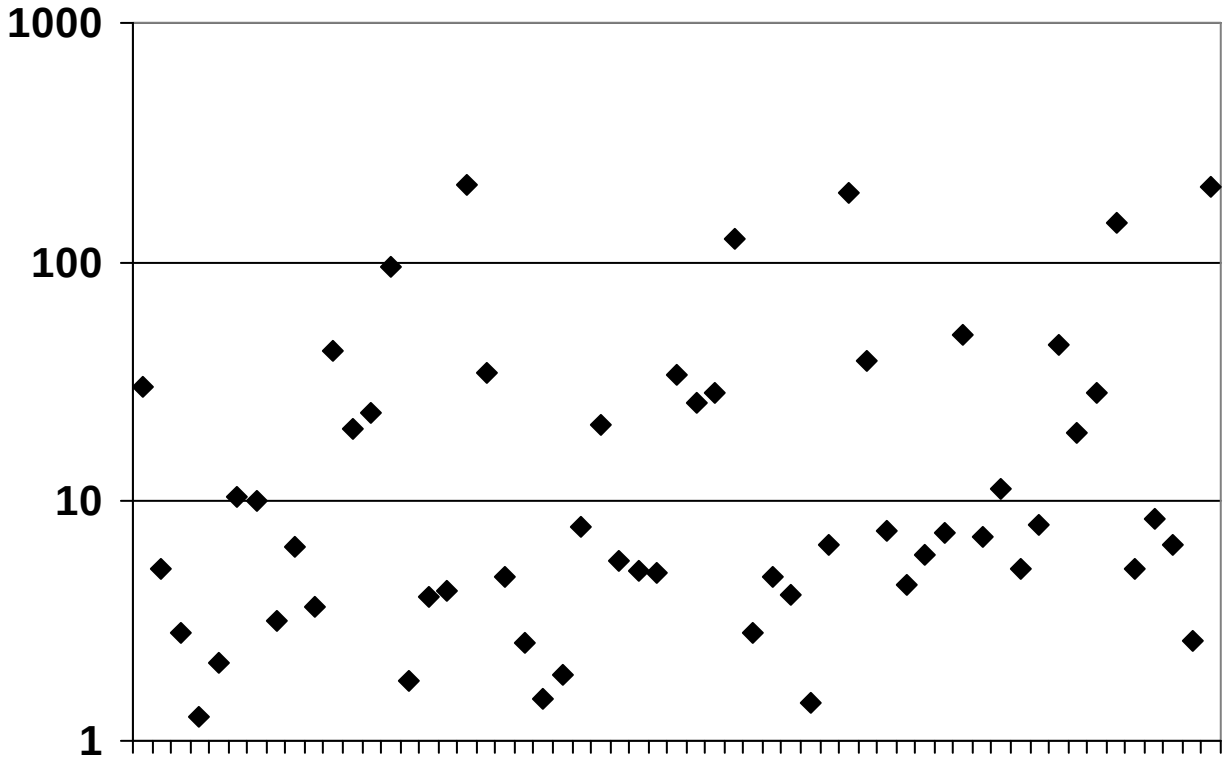
Plutonium from this site has reached the groundwater and as measured at a level of 350 n/Ci/g -- 127 feet beneath the trench.

The Z-9 crib received 142 percent of soil volume.

TRU Concentrations Beneath Hanford Z-Cribs (>100nCi/g)



Kd Values for Plutonium in soil at the Hanford*



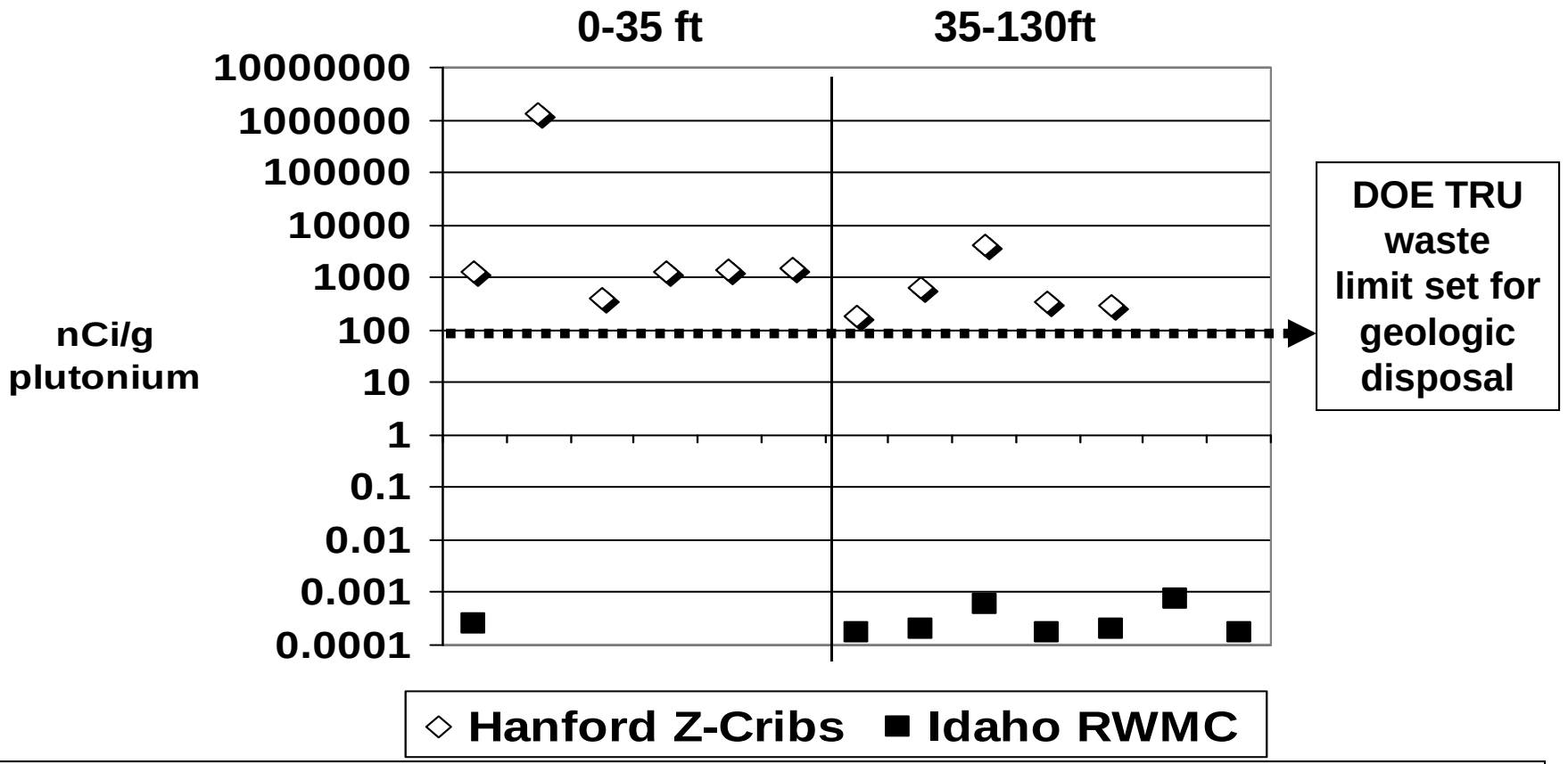
Kd- values for plutonium at Hanford differ by a factor of 140 times.

The Kd-value (partition or coefficient distribution) is a measure of how readily a contaminant is held up in soil.

The higher the Kd-value is, the more readily the contaminant is held up.

*** Delegard et al 1983**

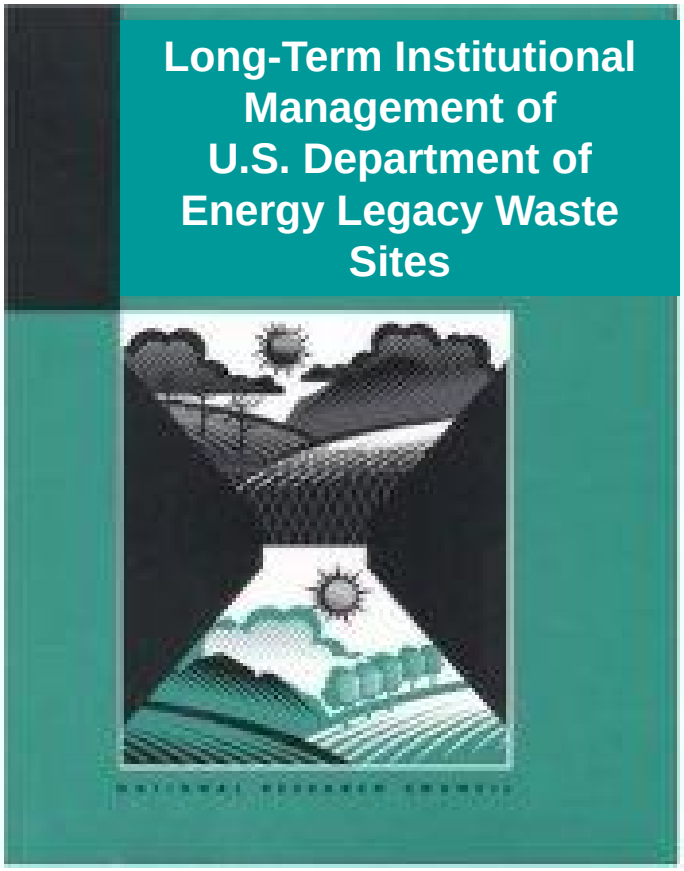
Subsurface plutonium at Hanford and INEL



Plutonium contamination of the Hanford vadose zone appears to be orders of magnitude greater than at the DOE's Idaho site, which three times more concentration of buried TRU wastes.

Sources: EGG-ER-10456 Rev. 03
http://www.hanford.gov/cp/gpp/data/gpl.cfm

Who's in charge?



National Research Council (2000)

"… **the likelihood that institutional management measures will fail at some point is relatively high."**

" Other things being equal, contaminant reduction is preferred to contaminant isolation and the imposition of stewardship measures whose risk of failure is high."

"..much of our current knowledge of the long-term behavior of wastes in environmental media may eventually be proven wrong."

What is being done at Hanford?

The threat to ground water and the Columbia River from buried plutonium at Hanford appears to be far more serious than other DOE sites.

The State of Idaho is forcing DOE to remove buried plutonium for geological disposal.

Yet DOE and the Washington Health Department propose to not remove large amounts of buried plutonium at Hanford.

After decades of delay, cleanup of buried transuranic wastes at Hanford should become a priority.