GTCC Waste Streams From Nuclear Power Plants

Waste Management ‘17

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DW James Consulting

GTCC Waste Streams From Commercial Reactors

- Activated Metal Components
  - Mostly long-term core items in BWR's and fuel assembly hardware in PWR's
- Instrumentation
  - Fission chambers with Special Nuclear Material 'orphaned' from component
- Reactor Vessel Internals at Decommissioning.
  - Core region only
- Cartridge Filters
  - Reactor coolant filters from some PWR's
- Not Likely GTCC from Resins or Other Blendable Waste
- DOE Estimates of Volumes are Conservative but Reasonable

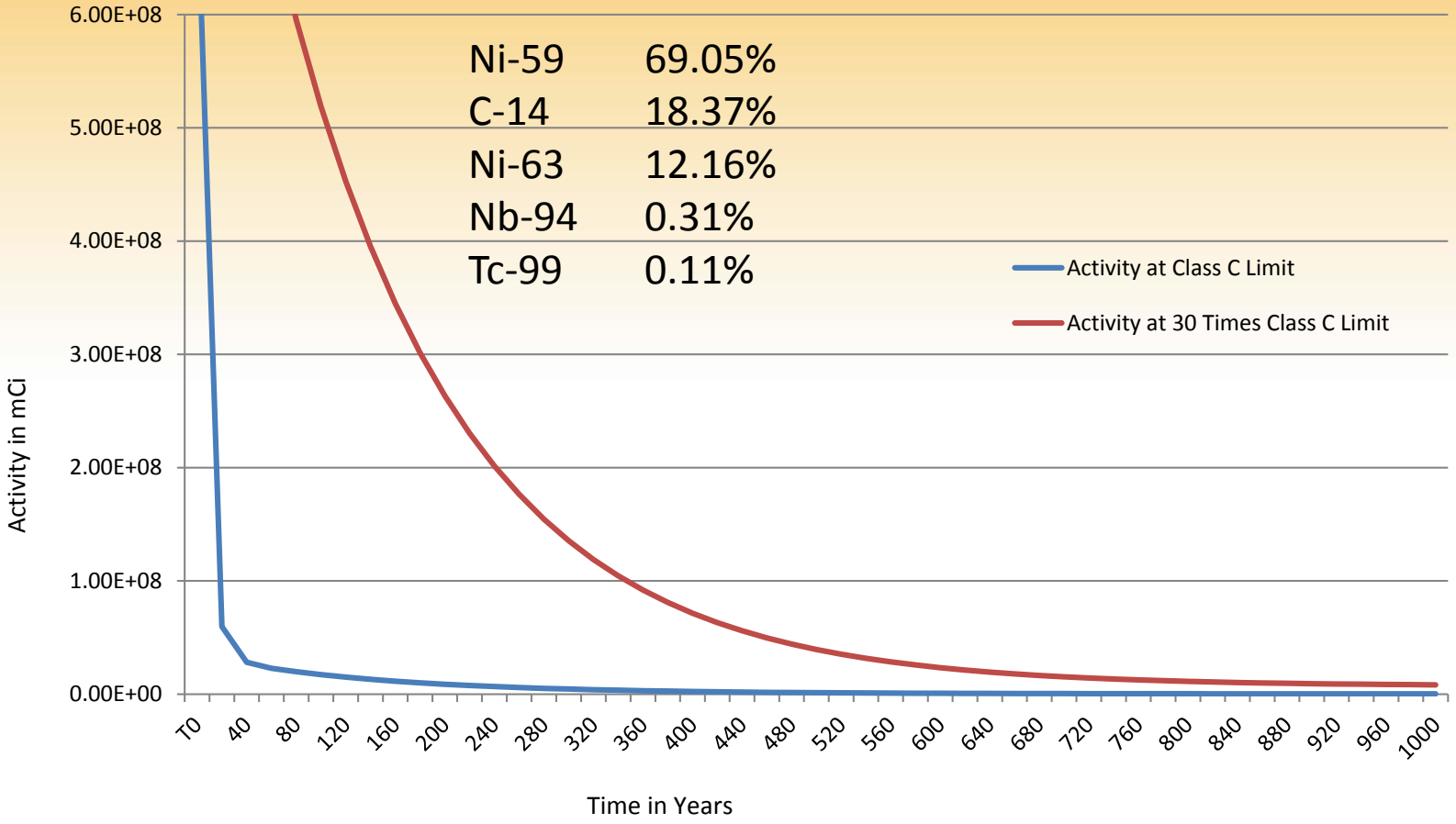
Isotopes of Concern

- Average Concentrations in Class C Activated Metal
  - ^{94}Nb - 0.09 Ci/m^3 (Class C fraction of 0.47) (Note: ^{94}Nb activity in stainless steel is based on inadequate data; likely overestimated)
  - ^{59}Ni – 20.4 Ci/m^3 (Class C fraction of 0.09)
  - ^{63}Ni - 3114.7 Ci/m^3 (Class C fraction of 0.44)
  - ^{14}C - 4.6 Ci/m^3 (Class C fraction of 0.06)
- Individual Components within a Factor of 2 or 10 of the Class Limit
- Significant TRU Concentrations Occur Only With Significant Fuel Defects
  - Not typical of commercial reactor waste

GTCC Waste Compared to Class C

- GTCC Stainless Steel from Core Regions
  - §61.55 Table 1 Fraction up to 18
  - §61.55 Table 2 Fraction up to 16
  - Not Significantly Different from LLW
- GTCC Waste from Other Metals
  - Principally specialty metals with constituent concentrations of Nb up to §61.55 Table 1 Fraction of 28
  - Small volume, mostly fuel assembly hardware
- Cartridge Filters
  - §61.55 Table 1 Fraction up to 83 (§61.55 Table 2 Class C)
  - Classification controlling radionuclides are ^{99}Tc and ^{14}C and likely to be significantly overestimated

Class C vs. GTCC Decay



GTCC Disposal

- Most GTCC Waste from Commercial Reactors is Similar to Class C Waste
  - Same materials
  - Higher activity
- Isotopes Driving Classification are Mostly Shorter Half Life
  - ^{63}Ni $t^{1/2} \approx 100$ years (^{94}Nb overestimated)
- Disposal of Commercial GTCC Waste in a Near-Surface Facility is Feasible

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