Idaho Cleanup Project

Subsurface Disposal Area

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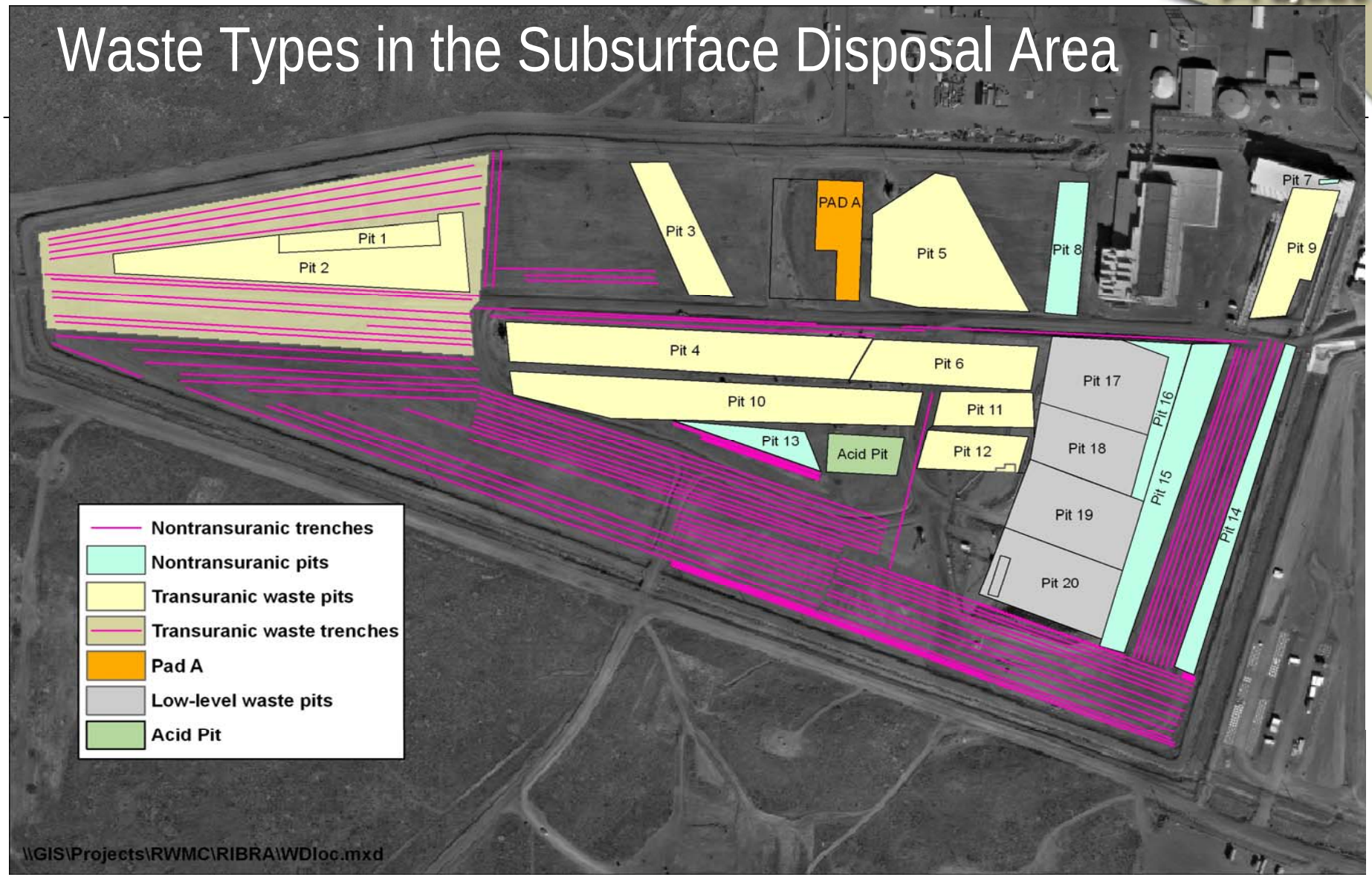
CH2M•WG IDAHO, LLC

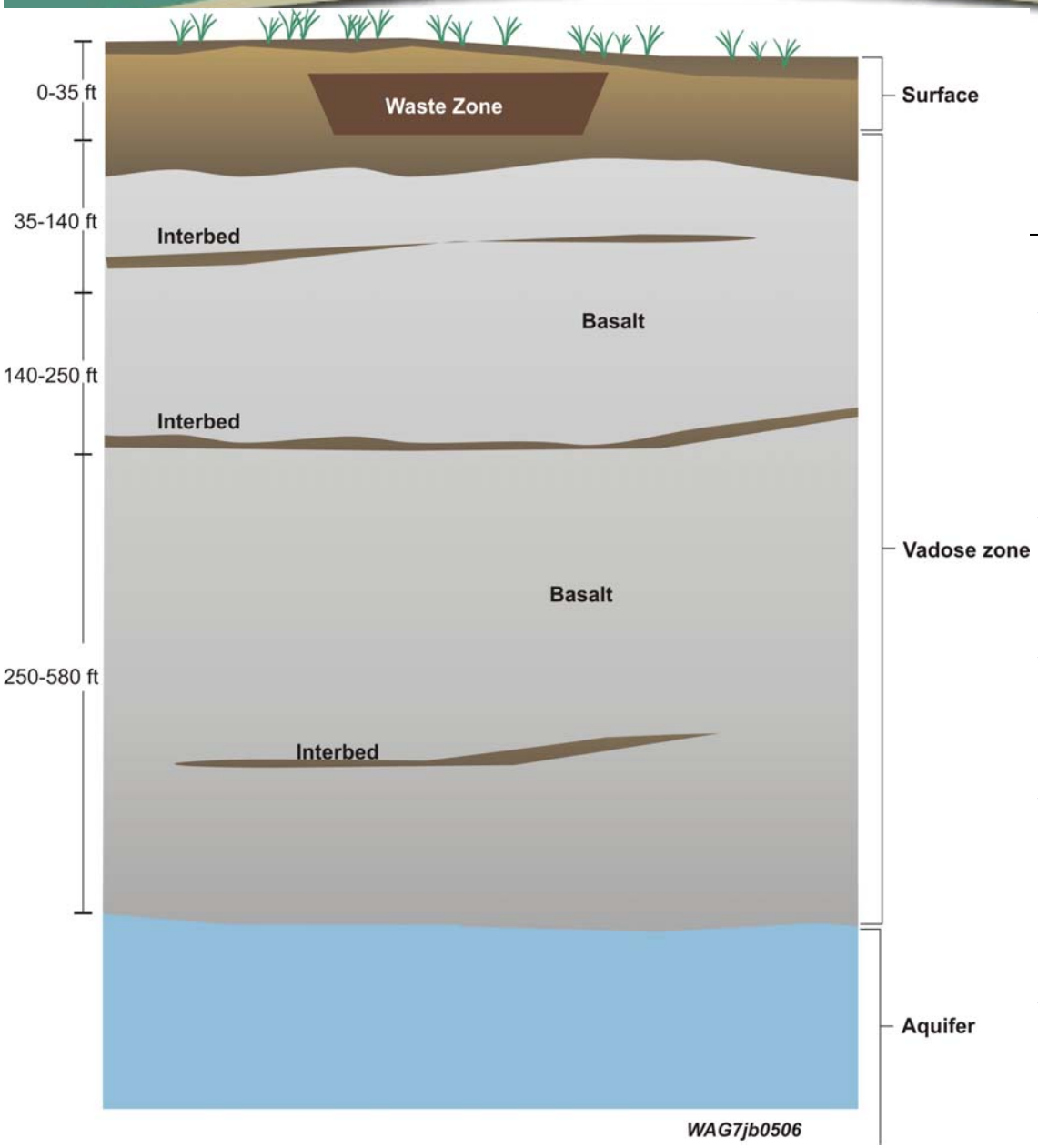
Landfill Operations

- Opened in 1952
- Disposed of transuranic, mixed transuranic, and other radioactive waste until 1970
- Practices involved stacking and dumping
- Nontransuranic mixed waste disposal was allowed until 1983
- Since 1983, only low-level waste disposal is allowed

Waste Types in the Subsurface Disposal Area



1969 Flooding in Pit 9



Depth Intervals

- 0 to 35 ft --buried waste, surface sediment, A-B interbed
- 35 to 140 ft—basalt flows and the B-C interbed
- 140 to 250 ft—basalt flows and the C-D interbed
- 250 to 580 ft—basalt flows and interbeds (not modeled)
- 580 ft—water table

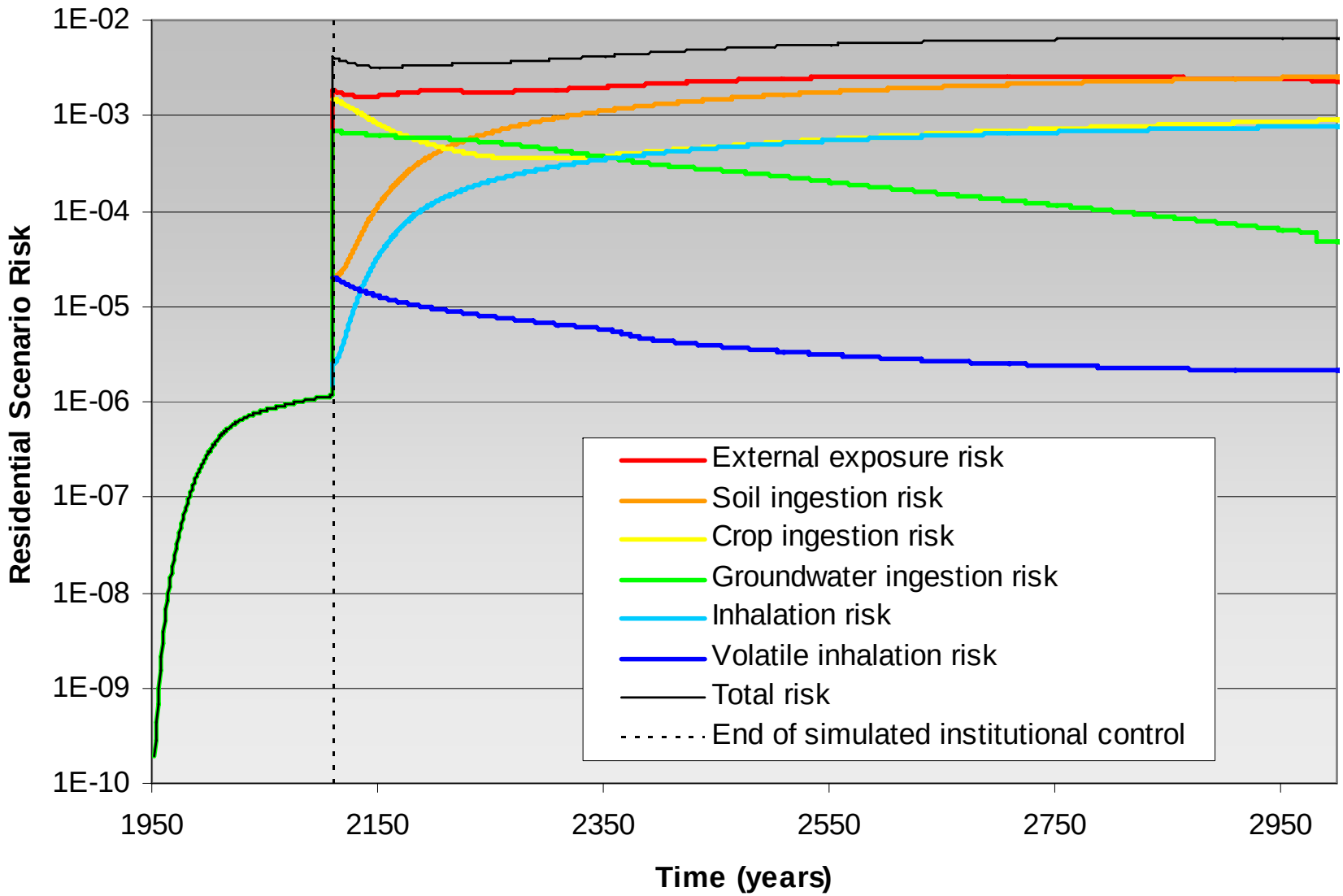
Risk

- Carcinogenic risk is the probability of developing cancer over a lifetime
- Approximately 42 in 100 people will develop an intrusive cancer (risk is 4.2E-02)
- Environmental cleanup decisions are based on a range risk from 1 in 1,000,000 to 1 in 10,000 (1E-06 to 1E-04)

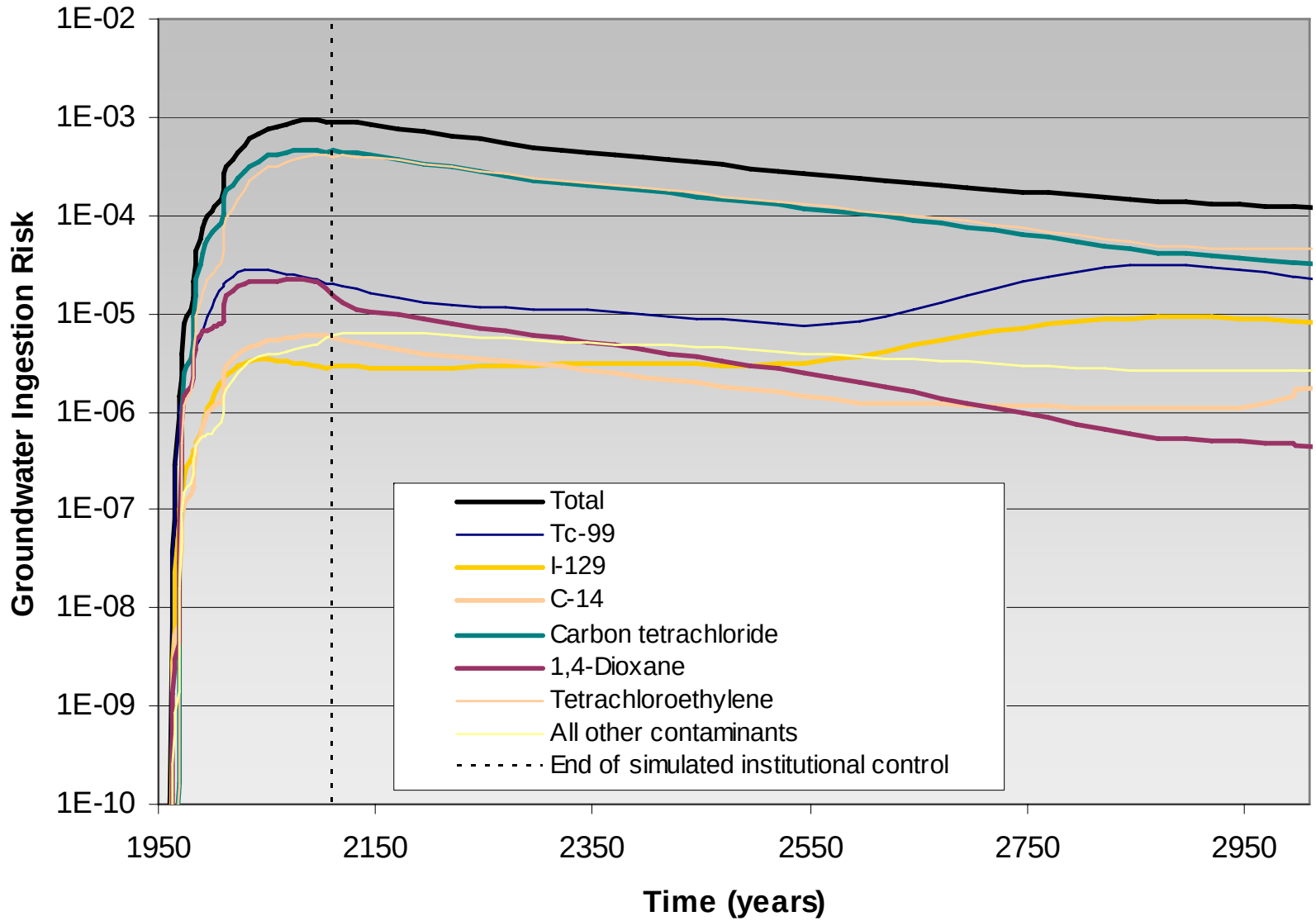
Risk Assessment

- Baseline risk assessment estimated risk for a potential resident living next to the SDA with no steps to reduce exposure
- Models were used to predict environmental concentrations
- Exposure pathways include external exposure (radiation), inhalation, and ingestion
- Media include surface soil, air, and groundwater; focus is typically on protecting the aquifer

Total Risk Over Time by Pathway



Groundwater Ingestion Risk Over Time



Plutonium Risk

- Three plutonium isotopes, Pu-238, Pu-239, and Pu-240, are among the 18 contaminants identified as risk-drivers
- Plutonium poses surface-pathway risk, but not groundwater-pathway risk

Plutonium Modeling

- Models applied a site-specific distribution coefficient of 2,500 mL/g based on column studies
- A potential mobile fraction (e.g., colloids) was modeled as released from the source with a distribution coefficient of zero and no sorption to basalt fractures
- Plutonium was modeled as migrating to interbed sediments, where it sorbed and moved no further

Plutonium Monitoring

- Routine analysis for plutonium in environmental samples is by alpha spectroscopy
- Pu-239/240 is frequently detected at the surface; some is attributable to global fallout

Vadose Zone Monitoring

- Detection rates are low and typically occur at or above the B-C interbed
- Cores
  - Pu-238--7.5% (11 of 146 samples)
  - Pu-239/240—13.7% (21 of 153 samples)
- Soil moisture and perched water
  - Pu-238—2.6% (3 of 116 samples)
  - Pu-239/240—2.6% (3 of 116 samples)

Aquifer Monitoring

- Aquifer detections are very low and occur at the rate expected for false positives
  - Pu-238—1.6% (14 of 877 samples)
  - Pu-239/240—0.6% (5 of 876 samples)

Plutonium-bearing Waste

- Almost all plutonium in the SDA came from Rocky Flats weapons-production processes
- Some of the inventory is included in process sludges

Isotope	Estimated Curies	Portion from Rocky Flats
Pu-238	1,850	88.7%
Pu-239	63,000	98.3%
Pu-240	14,100	96.6%

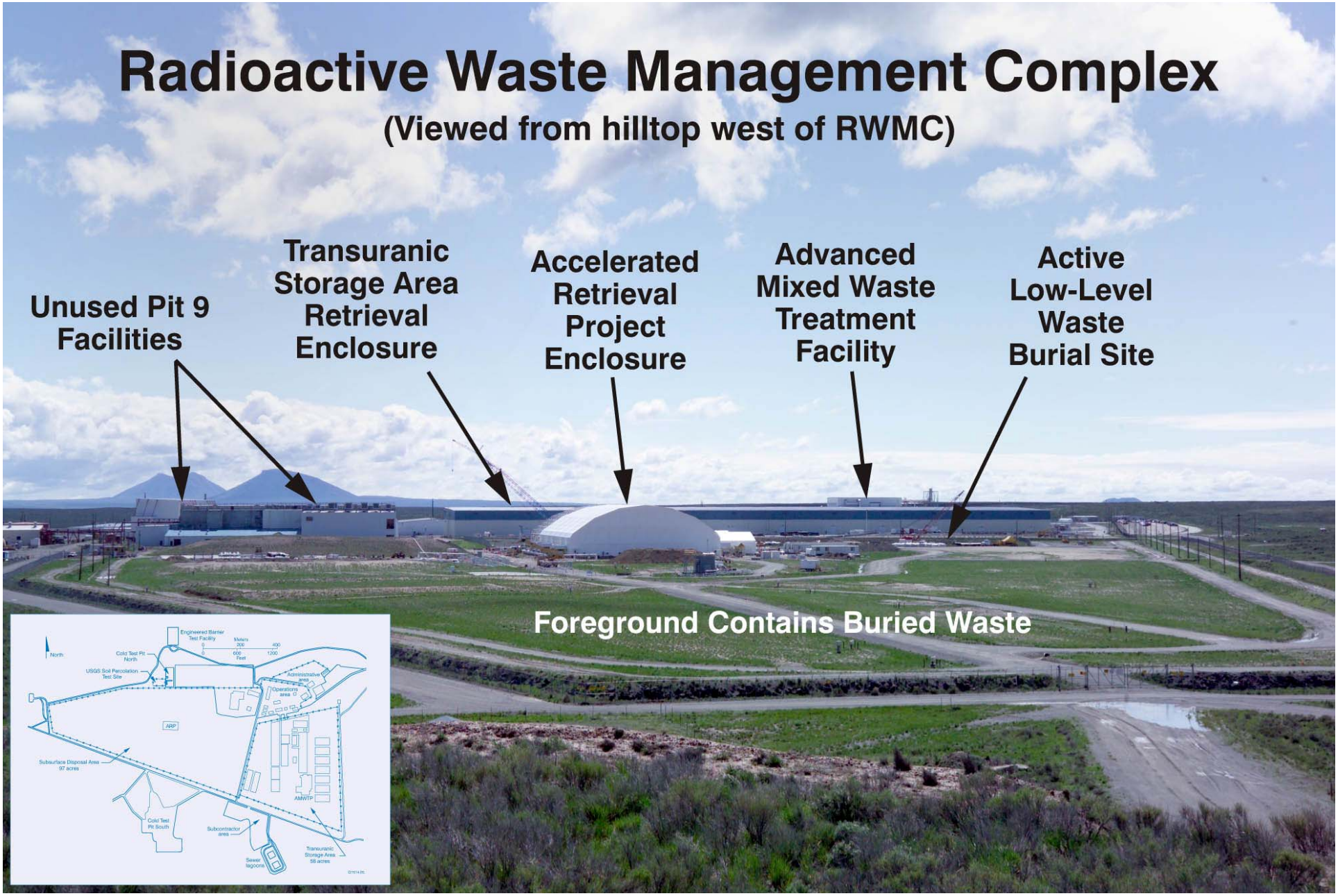
- Most of the inventory occurs in debris waste forms
  - Graphite molds, crucibles, and scarfings
  - Filters
  - Combustible and noncombustible trash

Status

- Site characterization and risk assessment are complete
- Remedial alternatives are being evaluated; all alternatives include a cap, maintenance, and monitoring
- Decisions will be reached within the next year

Radioactive Waste Management Complex

(Viewed from hilltop west of RWMC)



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