U.S. DEPARTMENT OF ENERGY

Presentation for Public Hearings: Draft Environmental Impact Statement for the Disposal of Greater-Than-Class C (GTCC) Low-Level Radioactive Waste and GTCC-Like Waste

Office of Disposal Operations
Office of Environmental Management
April–May 2011

Presentation Overview

- Proposed action, purpose, and need
- GTCC waste inventory
  - GTCC LLRW
  - GTCC-Like Waste
- Proposed disposal methods and locations
- Alternatives evaluated
- Draft EIS analysis and potential impacts
- Considerations for development of a preferred alternative(s)
- Next steps

The Draft EIS does not identify a preferred alternative because DOE does not have a preference at this time. A preferred alternative will be included in the Final EIS.

Proposed Action, Purpose, and Need

Proposed Action: Construct and operate a new facility or facilities or use an existing facility for the disposal of GTCC LLRW and GTCC-like waste

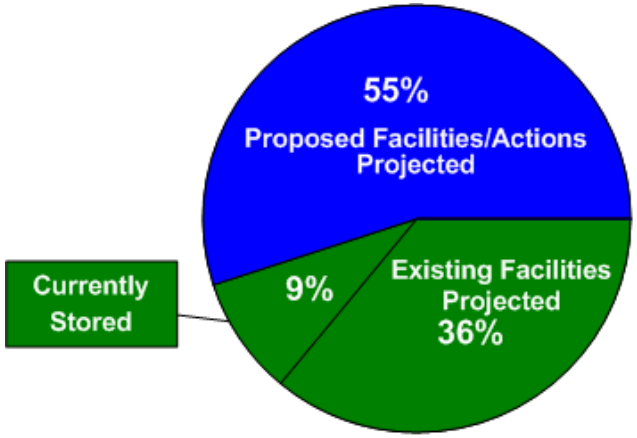
Purpose and Need:

- No existing disposal facility for GTCC waste
- Federal Government responsibility under section 3(b)(1)(D) of the Low-Level Radioactive Waste Policy Amendments Act of 1985
- Responsive to National Security Concerns: disused sealed sources
- Supports U.S. Programs: medical isotope production, clean energy, deep space exploration, and other programs
- Implements Environmental Stewardship: DOE and commercial cleanup commitments

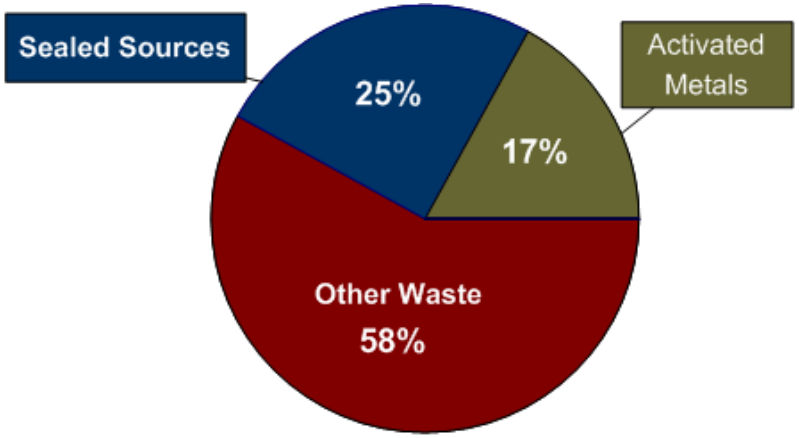
GTCC Waste Inventory

- GTCC Low-Level Radioactive Waste (LLRW): Most hazardous of the four U.S. Nuclear Regulatory Commission (NRC) classes of commercial LLRW
- GTCC-like Waste: DOE generated or owned LLRW or transuranic waste with characteristics similar to GTCC LLRW and no identified path for disposal
- Approximately 12,000 cubic meters (m^3) with ~160 million curies (MCi)
  - 8,800 m^3 (75%) is GTCC LLRW; 2,800 m^3 (25%) is GTCC-like waste
  - Relatively small volume but high activity
  - Less than 10% of total volume currently in storage; most waste will not be generated for several decades
  - Sealed sources present national security concern and therefore have a near-term disposal need
- Three Waste Types
  - Activated metals: 2,000 m^3 with 160 MCi
  - Sealed sources: 2,900 m^3 with 2.0 MCi
  - Other Waste: 6,700 m^3 with 1.3 MCi

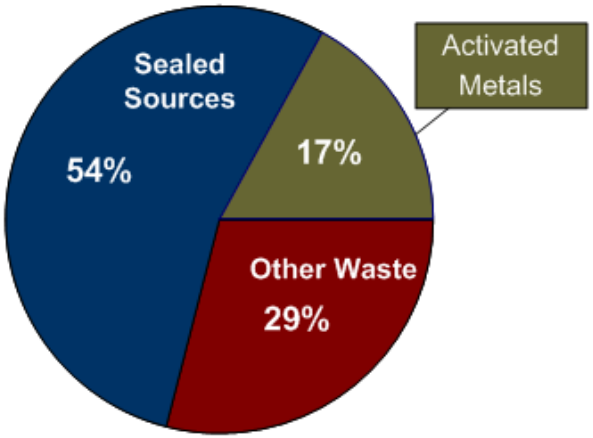
GTCC Waste Inventory (continued)



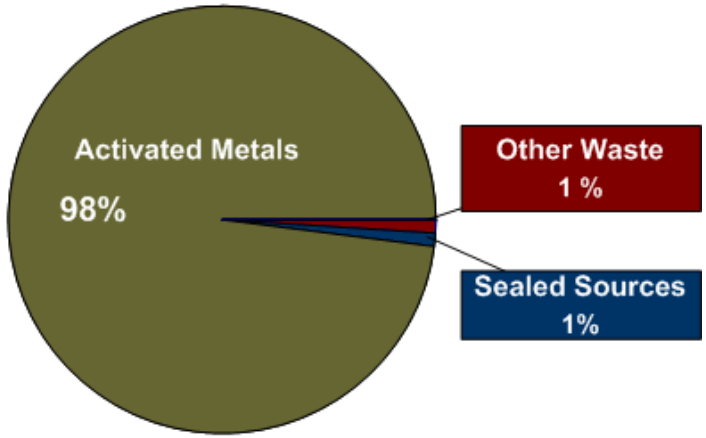
Total Volume of Waste = 11,600 m^3
Stored & Projected (existing facilities) = 5,200 m^3
Projected (proposed facilities/actions) = 6,400 m^3



Total Volume by Waste Type
Activated Metals: 2,000 m^3
Sealed Sources: 2,900 m^3
Other Waste: 6,700 m^3



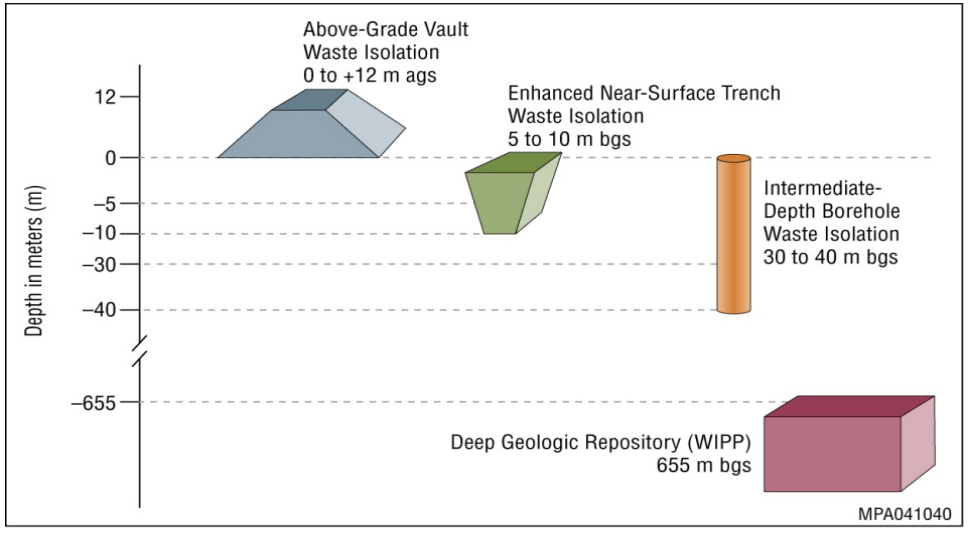
Total Volume of Stored & Projected Waste (existing facilities)
Activated Metals: 890 m^3
Sealed Sources: 2,800 m^3
Other Waste: 1,550 m^3



Waste Type Curies for Total Waste Volume
Activated Metals: 160 MCi
Sealed Sources: 2 MCi
Other Waste: 1MCi

Proposed Disposal Methods

- Geologic repository-Waste Isolation Pilot Plant (WIPP) (≤26 new rooms)
- Intermediate depth boreholes (≤110 acres)
- Enhanced near surface trenches (≤50 acres)
- Above grade vaults (≤60 acres)

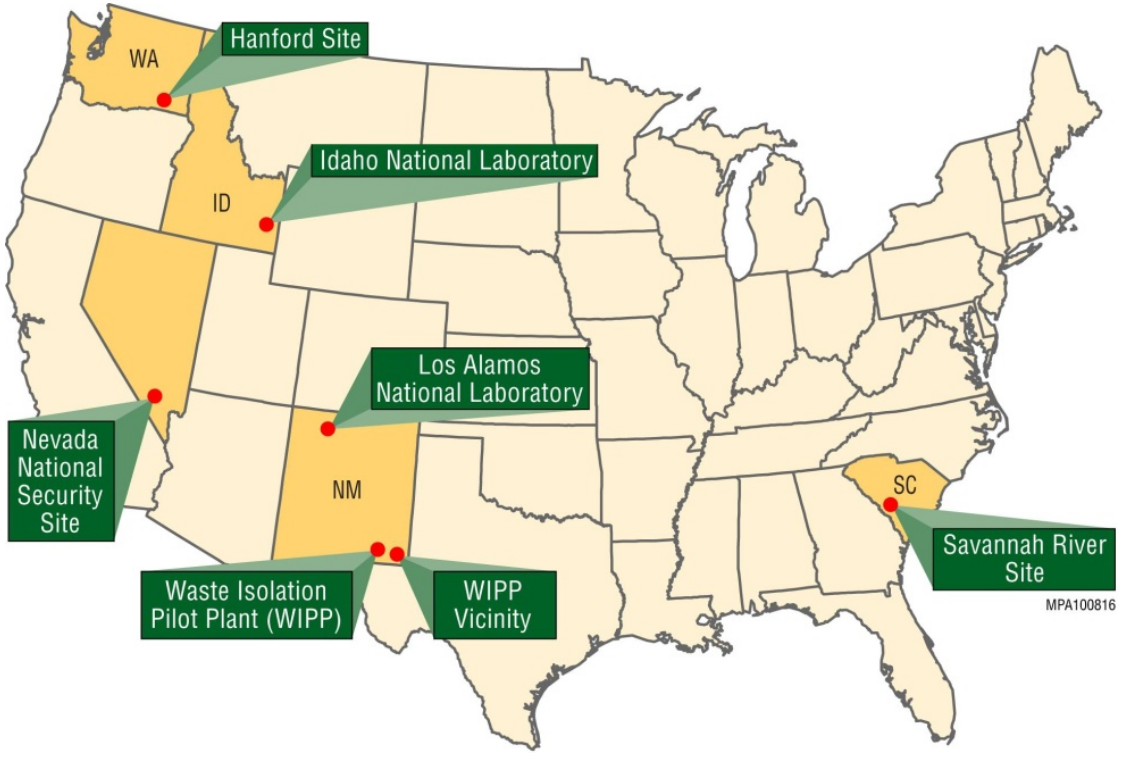


Disposal Method Considerations in Draft GTCC EIS

- NRC regulations require GTCC LLRW to be disposed in a geologic repository, but allows for alternative land disposal methods to be considered
- Draft EIS assumes protection of the inadvertent human intruder by institutional controls, disposal depth, control of waste concentrations, waste form stabilization, and intruder barriers

Proposed Disposal Locations

- Six DOE sites with existing radioactive waste disposal operations and federal land in the WIPP vicinity
- Generic commercial facilities in four NRC regions across the U.S. (Region I-Northeast, Region II-Southeast, Region III-Midwest, and Region IV-West)



Reference Locations for Borehole, Trench, and Vault Facilities

The evaluation of reference locations serves as a starting point for each of the sites being considered. DOE would conduct further studies as appropriate to optimize facility location at the selected site or sites.

- **Hanford Site:** south of 200 East Area in central portion of Hanford Site
- **Idaho National Laboratory (INL):** southwest of the Advanced Test Reactor Complex in the south central portion of INL
- **Los Alamos National Laboratory (LANL):** within Technical Area-54
- **Nevada National Security Site (NNSS):** within Area 5
- **Savannah River Site (SRS):** northeast of Z-Area
- **WIPP Vicinity:** section 27 inside WIPP Land Withdrawal Boundary (LWB) and section 35 just outside the WIPP LWB to the southeast

Alternatives Evaluated

1. No Action (continue current storage practices)
2. Geologic Repository at WIPP
3. Boreholes at Hanford, INL, LANL, NNSS, WIPP Vicinity, and generic commercial location in Region IV (west)
4. Trenches at Hanford, INL, LANL, NNSS, SRS, WIPP Vicinity and generic commercial location in Regions II and IV (southeast and west)
5. Vaults at Hanford, INL, LANL, NNSS, SRS, WIPP Vicinity, and generic commercial location in Regions I-IV (northeast, southeast, midwest, and west)

DOE Does Not Have A Preferred Alternative

- Preferred alternative(s) to be developed for Final EIS in consideration of public comments on Draft EIS
- Combination of alternatives might be appropriate

Draft EIS Analysis: Scope

- Evaluated 11 environmental resources areas and potential cumulative impacts
- Potential impacts analyzed for construction, operations, and post-closure phases
- EIS describes models, input parameters, key assumptions, and uncertainties
- For Alternatives 2-5 (geologic repository, borehole, trench, and vault):
  - Analysis assumes that the total waste inventory would be disposed at a single disposal location
  - EIS structured so that decisions on disposal method(s) or location(s) could be by waste type

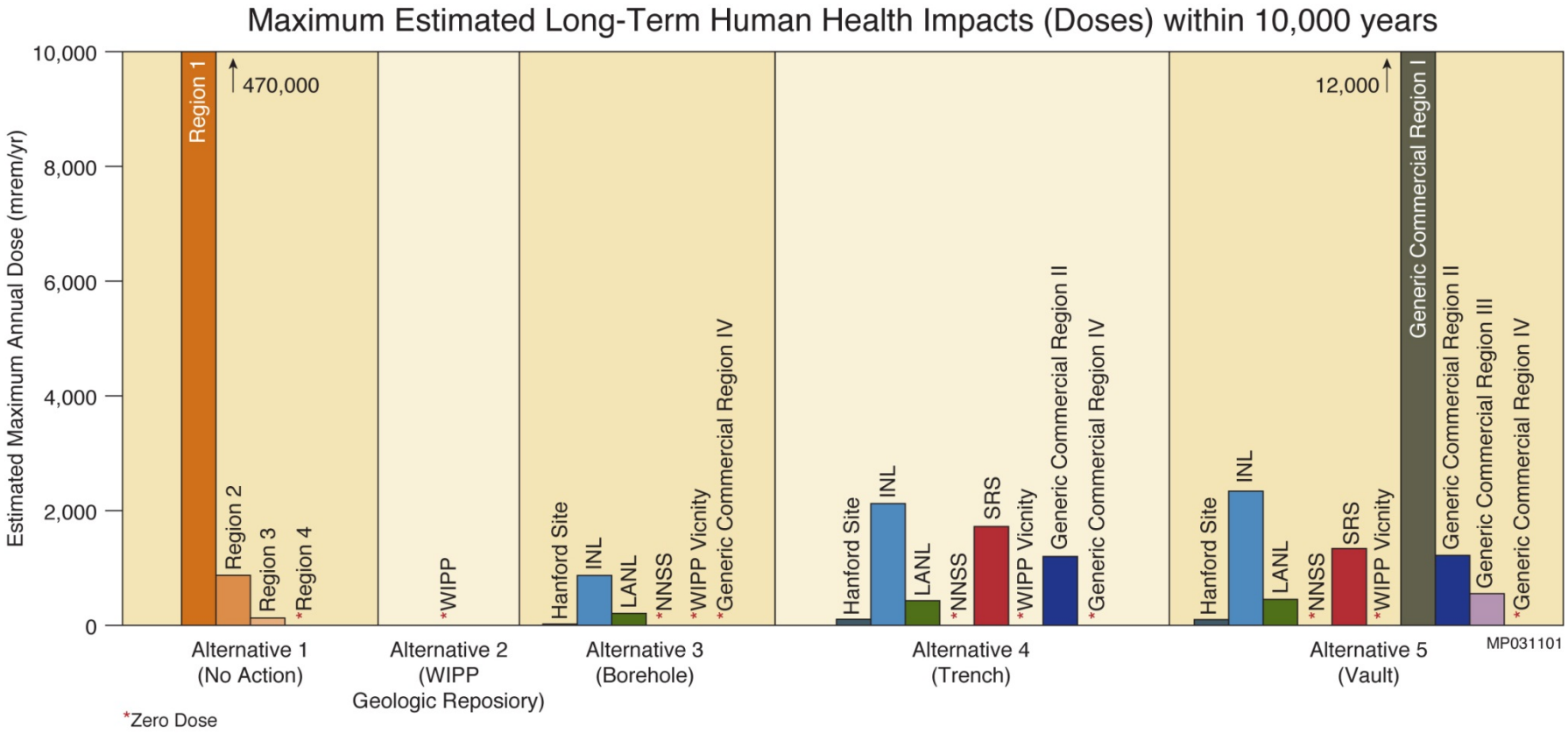
Resource Areas Evaluated in Draft EIS

1. Climate, Air Quality, and Noise
2. Geology and Soils
3. Water Resources
4. Human Health
5. Ecology
6. Socioeconomics
7. Environmental Justice
8. Land Use
9. Transportation
10. Cultural Resources
11. Waste Management

Draft EIS Analysis: Potential Impacts

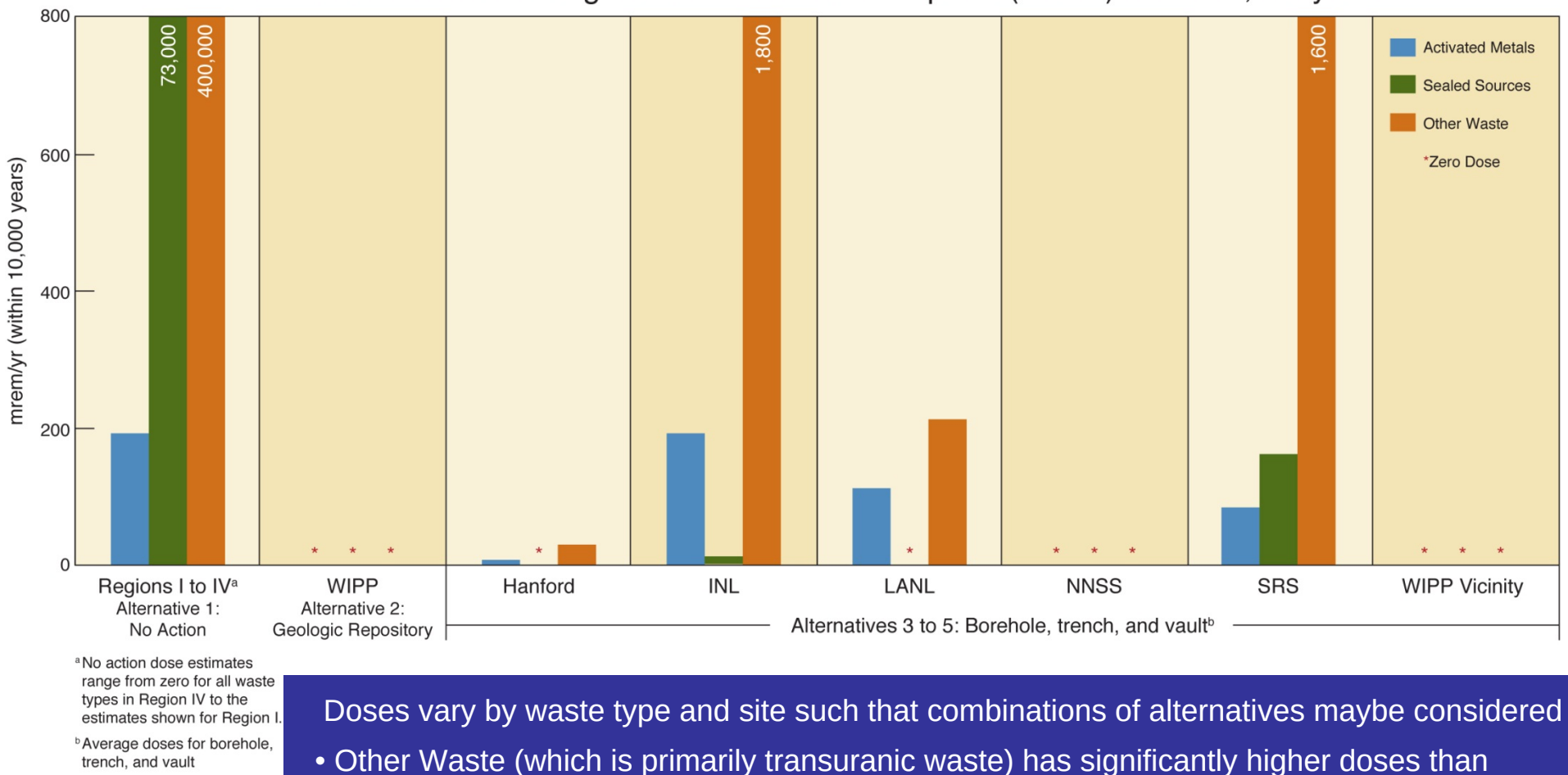
- **Alternative 1-No Action (continue current storage/management practices):** potential long-term human health impacts; no incremental impact for other resource areas; wastes would not be shipped therefore no transportation was assumed; and national security risk for disused sealed sources remains.
- **Alternative 2-WIPP:** Impacts would be low for all resource areas
  - Transportation: an estimated 11,800 rail shipments or 33,700 truck shipments over approximately 60 years, which could result in one to two non-radiological accident fatalities
- **Alternative 3, 4, and 5 (borehole, trench, and vault):** Low impacts for all resource areas except potential long-term human health impacts at some sites
  - Environmental Justice: subsequent NEPA analysis would consider unique exposure pathways to tribal and other sensitive populations
  - Cultural Resources: known cultural resources within GTCC reference locations at LANL, NNSS, and SRS
  - Cumulative Impacts: potential cumulative human health impacts at Hanford, INL, LANL, and SRS
  - Transportation: an estimated 5,000 rail shipments or 12,600 truck shipments over approximately 60 years, which could result in one non-radiological accident fatality

Potential Human Health Doses Based on Entire Waste Inventory



- Estimated doses for sites arid regions are lower than sites in humid regions (INL estimates incorporate fractured basalt assumptions)
- Potential impacts for alternatives should be used in a comparative manner given the simplifying assumptions and uncertainties
- Sensitivity analysis performed for critical input parameters to address uncertainties

Potential Human Health Doses by Waste Type



[a] No action dose estimates range from zero for all waste types in Region IV to the estimates shown for Region I.

[b] Average doses for borehole, trench, and vault

Doses vary by waste type and site such that combinations of alternatives maybe considered

- Other Waste (which is primarily transuranic waste) has significantly higher doses than activated metals and sealed sources where shown
- NNSS, WIPP, and WIPP Vicinity have no doses; Hanford has lower dose estimates as compared to LANL, SRS, and INL

Considerations for Preferred Alternative(s) for Final EIS

Preferred alternative could be a combination of two or more alternatives, based on the considerations below

- *Public comments on Draft GTCC EIS*
- *Waste type considerations*: radionuclide inventory, waste form stability, physical characteristics, and availability for disposal
- *Disposal method considerations*: inadvertent human intrusion, construction and operational experience, post-closure care, and cost
- *Disposal location considerations*: potential human health impacts (including cumulative impacts); cultural resources and tribal concerns; laws, regulations, and other requirements

Next Steps

- Public Comments due June 27, 2011
- Develop Final EIS with preferred alternative in consideration of public comments on Draft EIS
- Issue Final EIS
- Issue Report to Congress and await Congressional action
- Issue Record of Decision
- Implement selected alternative or alternatives
  - Some alternatives may require new or modification to existing federal legislation for implementation

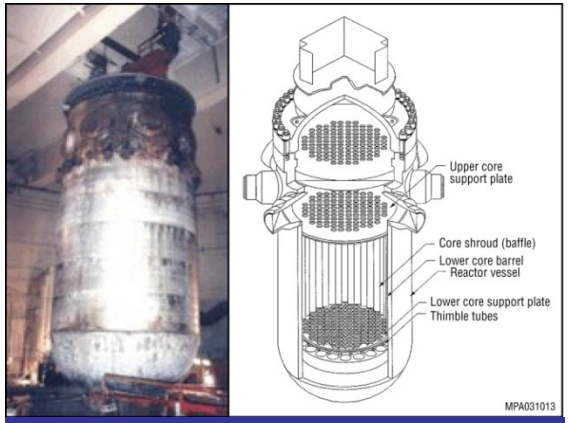
For Further Information

- Arnold Edelman
  GTCC EIS Document Manager
  Office of Disposal Operations (EM-43)
  Email: gtcceis@anl.gov

- You can continue to stay informed by visiting the GTCC EIS website at: http://www.gtcceis.anl.gov

Additional Background/Location Maps

GTCC Waste Types



Activated Metals

Largely generated from the decommissioning of nuclear reactors. Prevalent radionuclides include C-14, Mn-54, Fe-55, Ni-59, Ni-63, Nb-94, and Co-60

Sealed Sources

Widely used in equipment to diagnose and treat illnesses (particularly cancer), sterilize medical devices, irradiate blood for transplant patients, nondestructively test structures and industrial equipment, and explore geologic formations to find oil and gas. Prevalent radionuclides include Cs-137, Am-241, and Pu-238

Other Waste

Other Waste primarily includes contaminated equipment, debris, scrap metal, filters, resins, soil, and solidified sludges. These wastes are associated with the production of molybdenum-99, production of radioisotope power systems, and environmental cleanup. Photo shows GTCC contaminated glove boxes. Prevalent radionuclides include Tc-99, I-129, Cs-137, and several transuranic radionuclides including isotopes of plutonium, americium and curium

GTCC Generator and Storage Locations

- GTCC LLRW
  - Activated metals: primarily from nuclear power plants, most of which are located in eastern and midwestern states
  - Sealed sources: throughout the U.S. (e.g., hospitals and universities)
  - Other Waste: Missouri, New York, Texas, and Virginia
- DOE GTCC-like Waste
  - West Valley Site, New York
  - Babcock and Wilcox facility, Virginia
  - Idaho National Laboratory, Idaho
  - Oak Ridge Reservation, Tennessee
  - Los Alamos National Laboratory, New Mexico

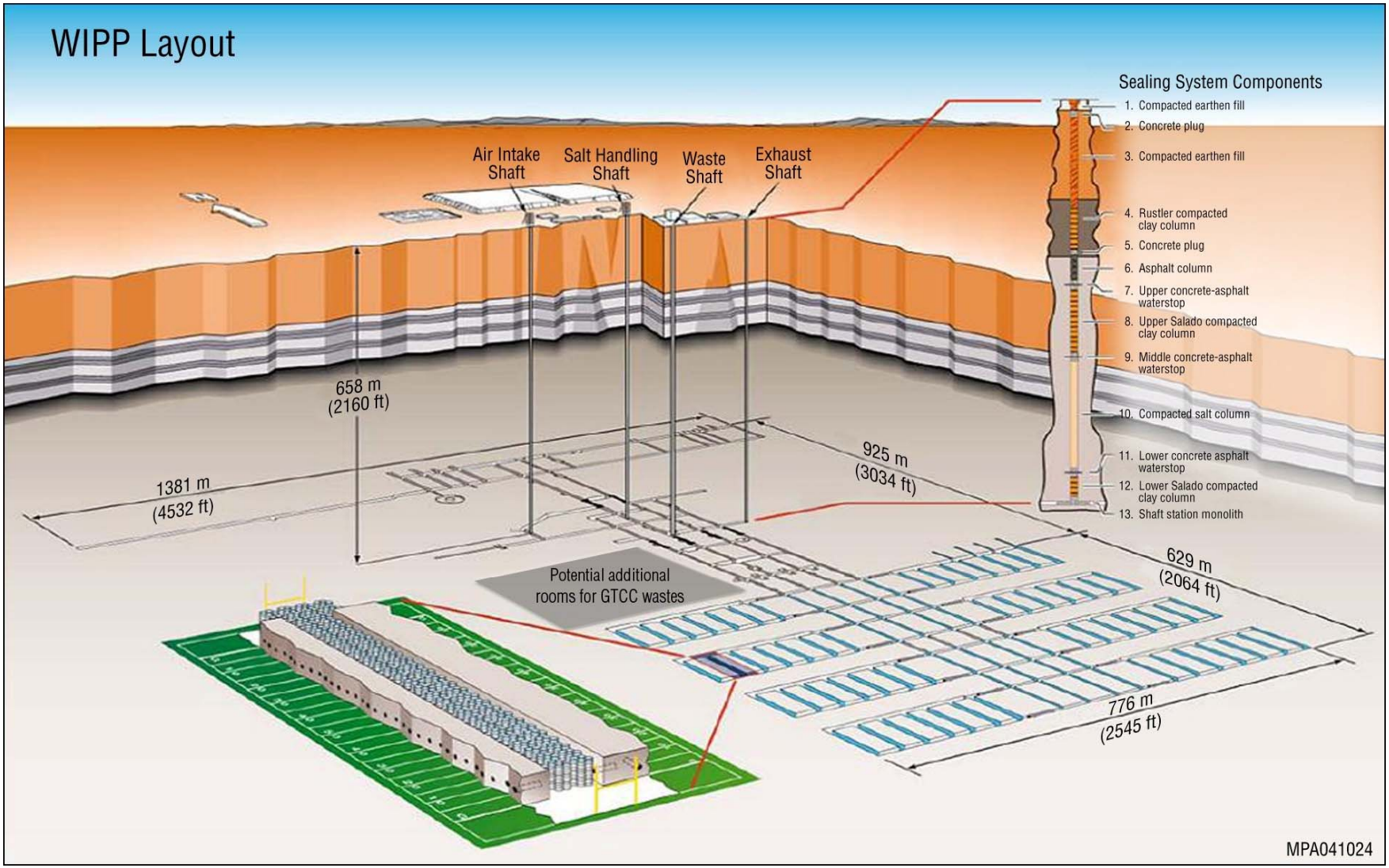
Transportation: Number of Truck Shipments

Alternative	Total Estimated Number of Shipments for All Waste (over 60 Years)	Estimated Annual Average Number of Shipments		
		Activated Metals	Sealed Sources	Other Waste
1. No Action	0	0	0	0
2. WIPP	33,705	369	8	185
3-5. Borehole, Trench, and Vault	12,623	92	8	111

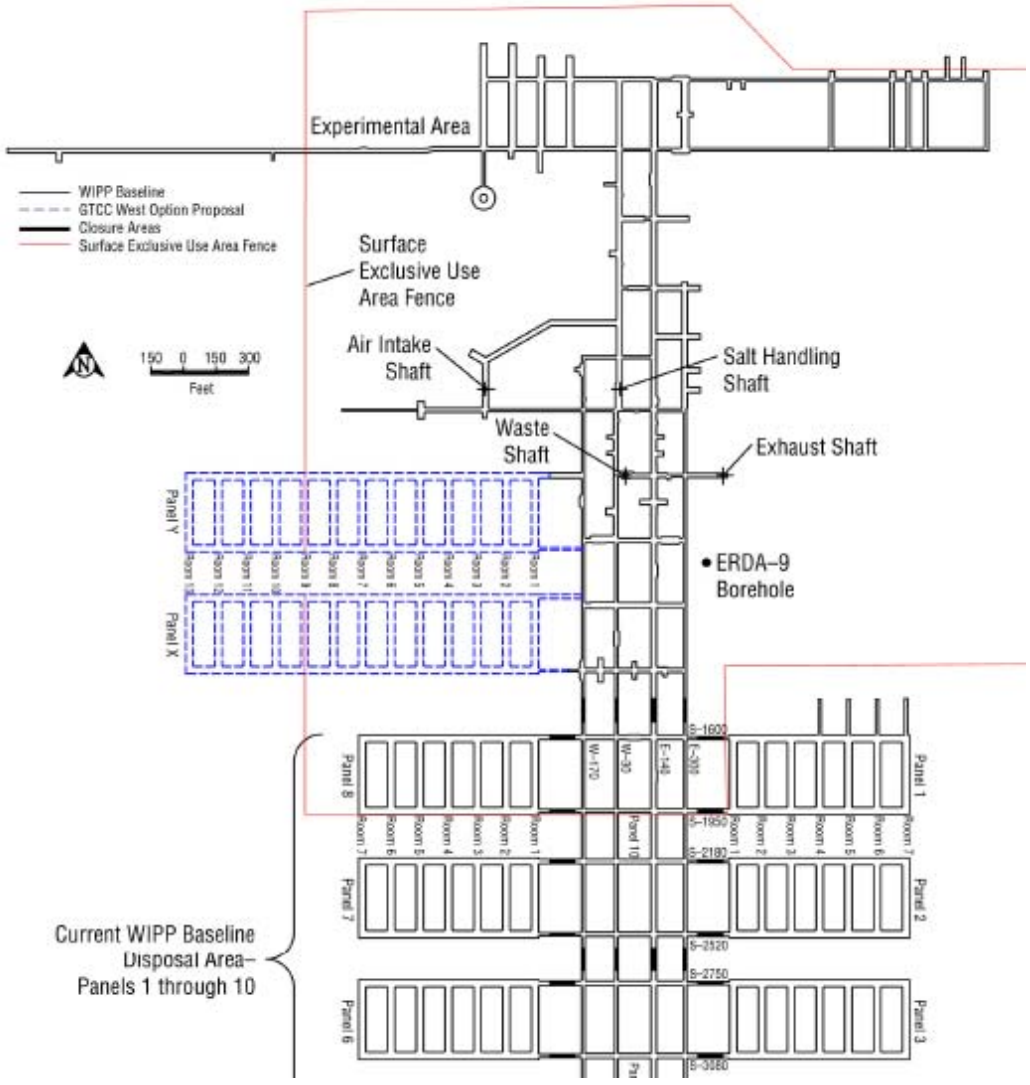
Number of Shipments Varies by Alternative and Waste Type

- Alternative 1 (No action) – no shipments; waste would remain at generator storage locations
- Alternative 2 (WIPP) more shipments than Alternatives 3-5 due to remote-handled (RH) waste packaging assumptions (RH waste includes activated metals and some Other Waste)
- Sealed sources would require the least amount of shipments
- One-third of Other Waste shipments are from proposed projects

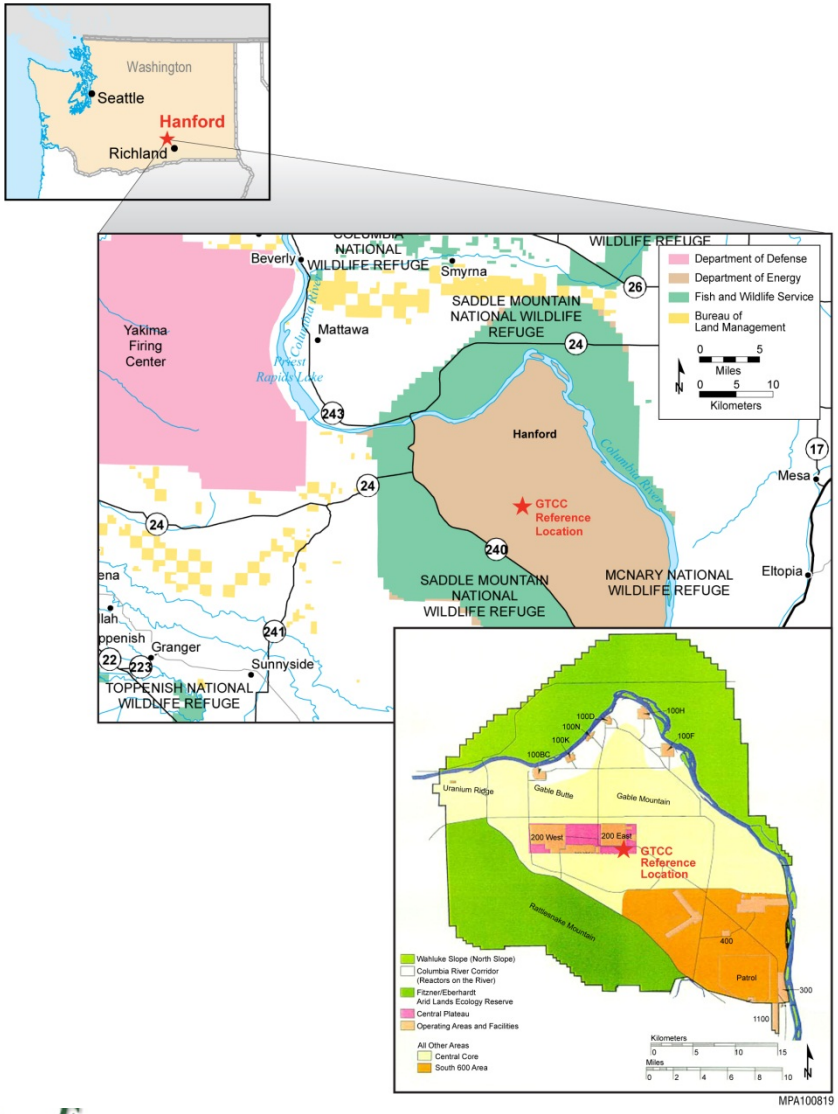
Current WIPP Layout

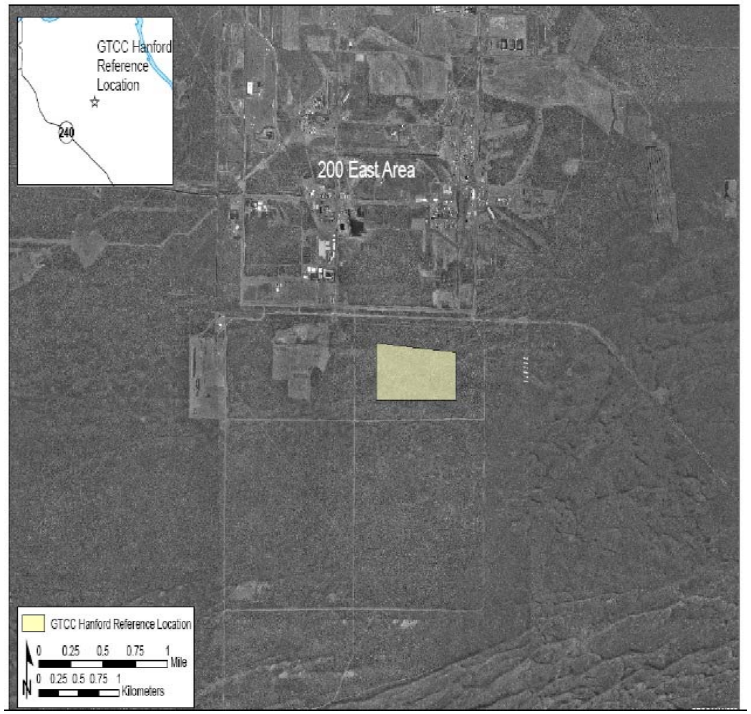


WIPP: Additional Rooms

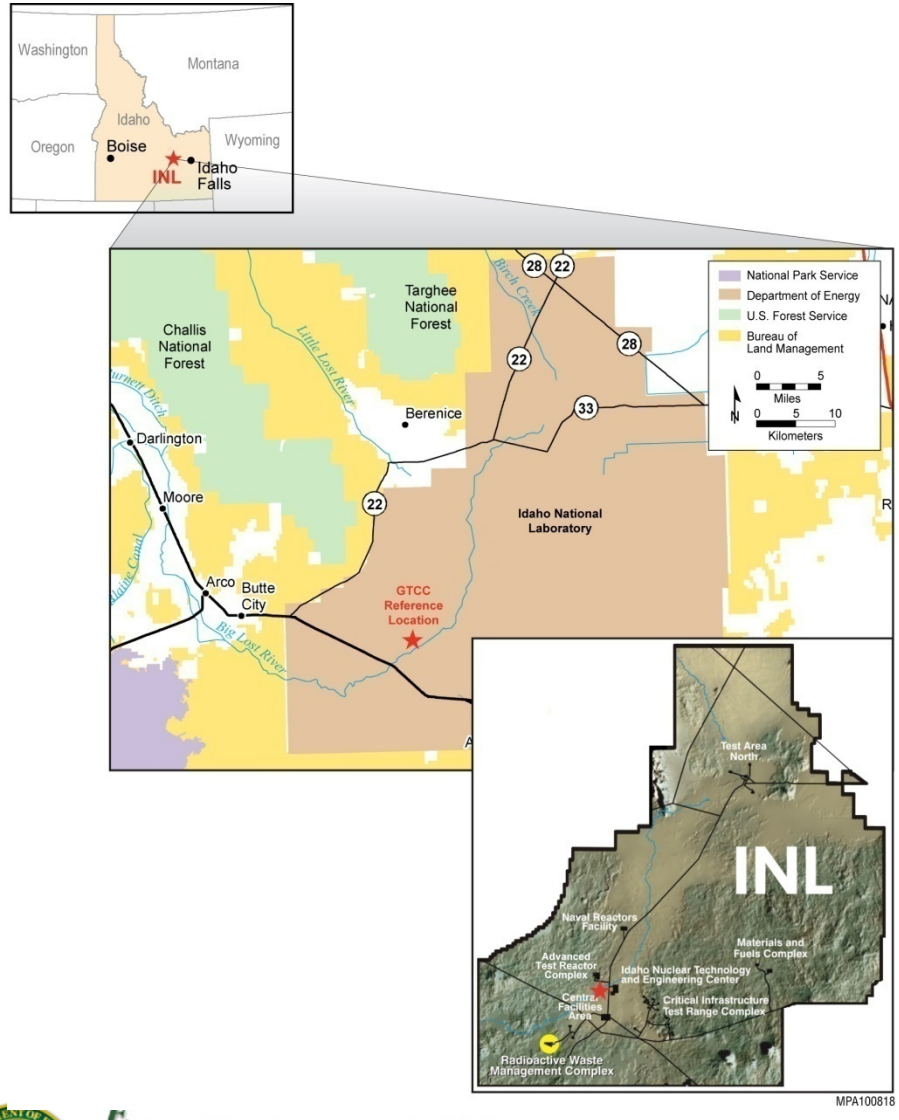


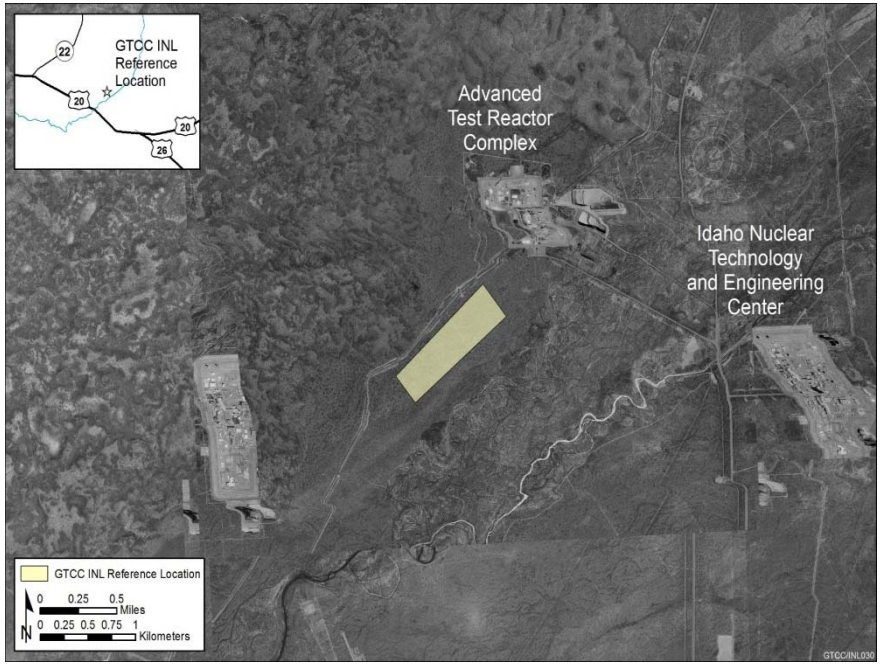
GTCC Reference Location at the Hanford Site



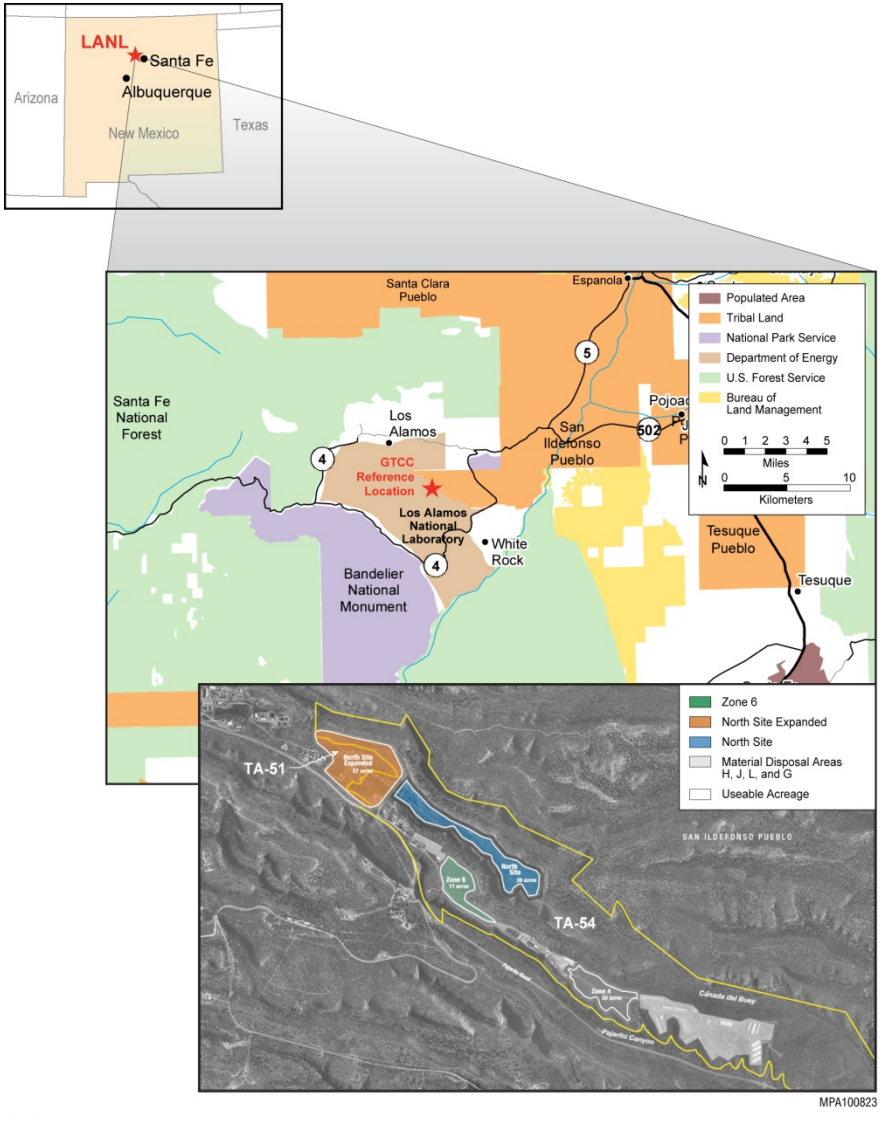


GTCC Reference Location at INL





GTCC Reference Location at LANL



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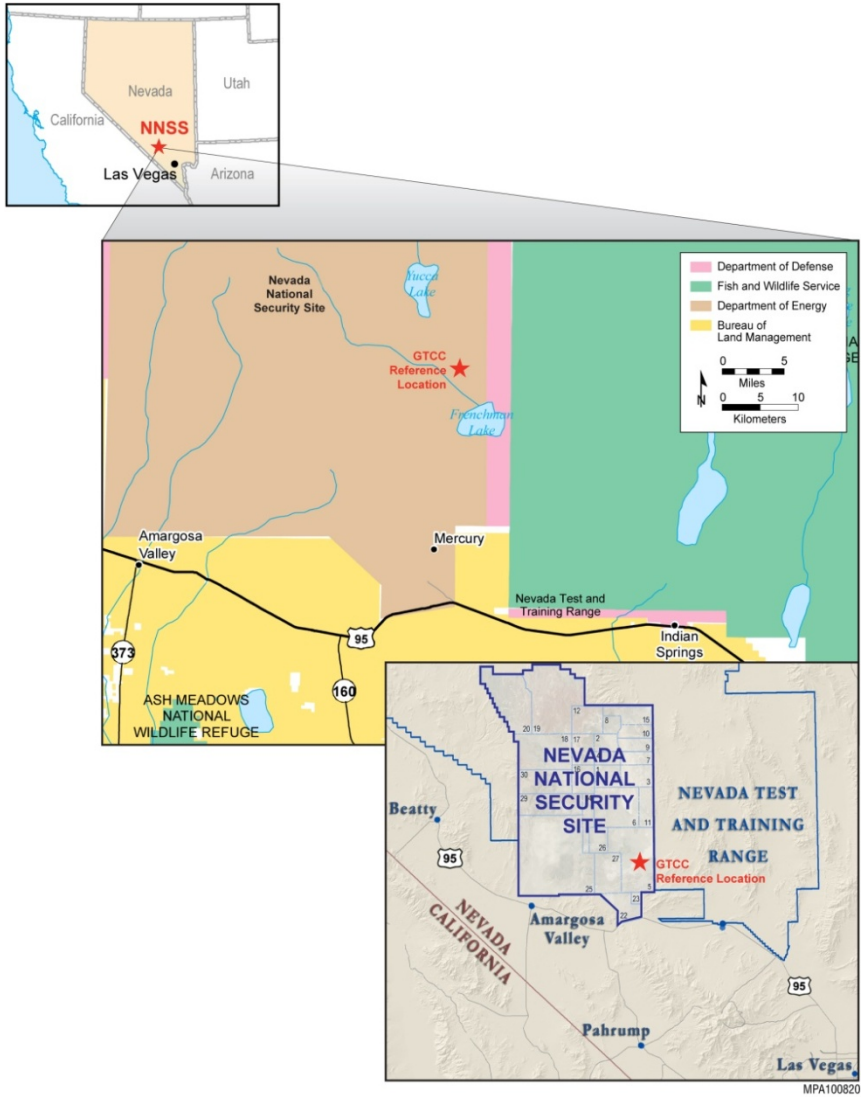
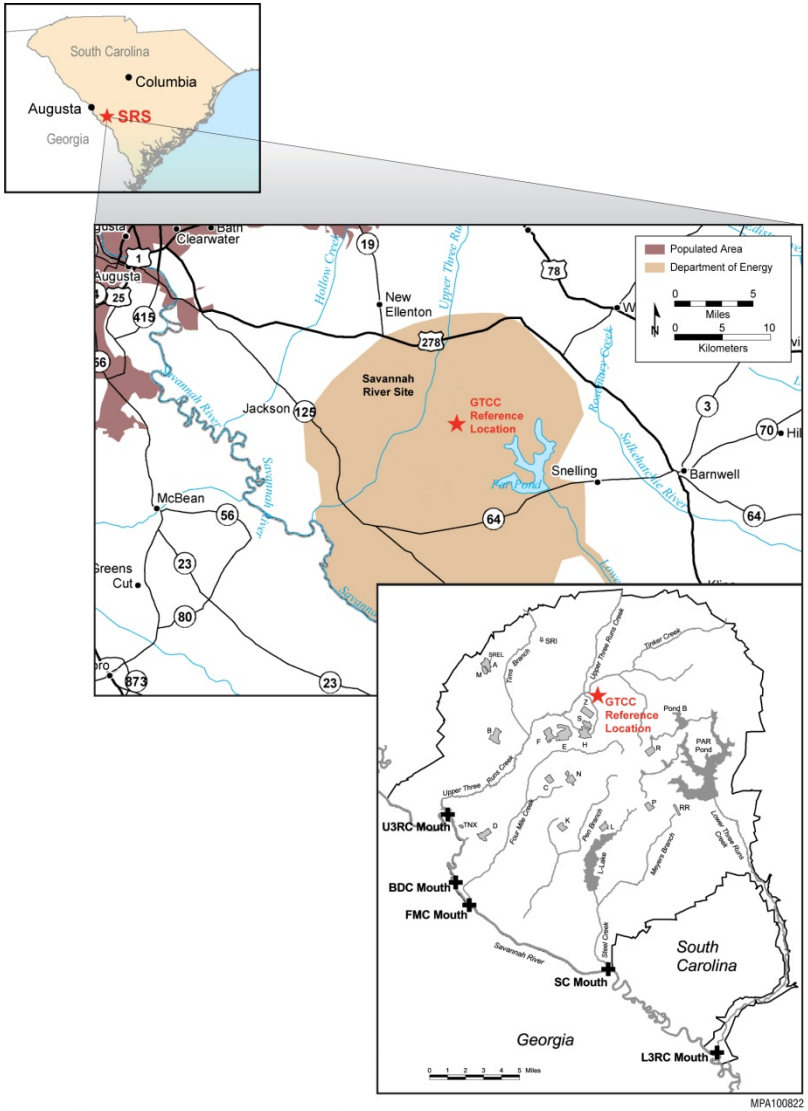
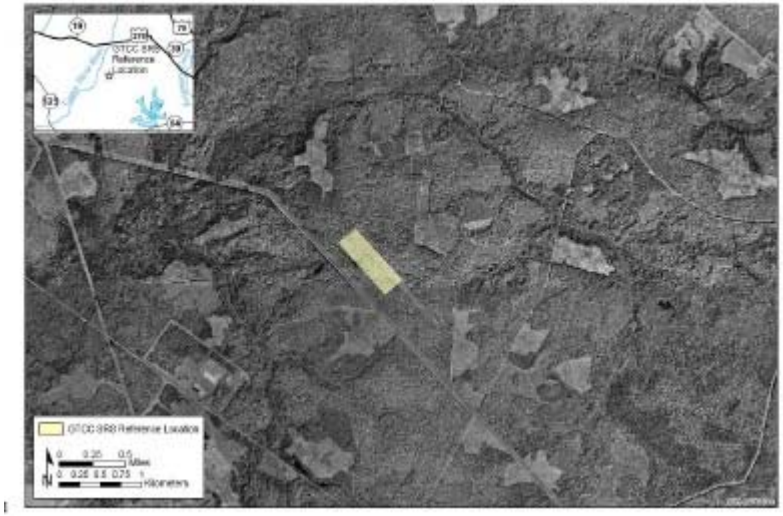
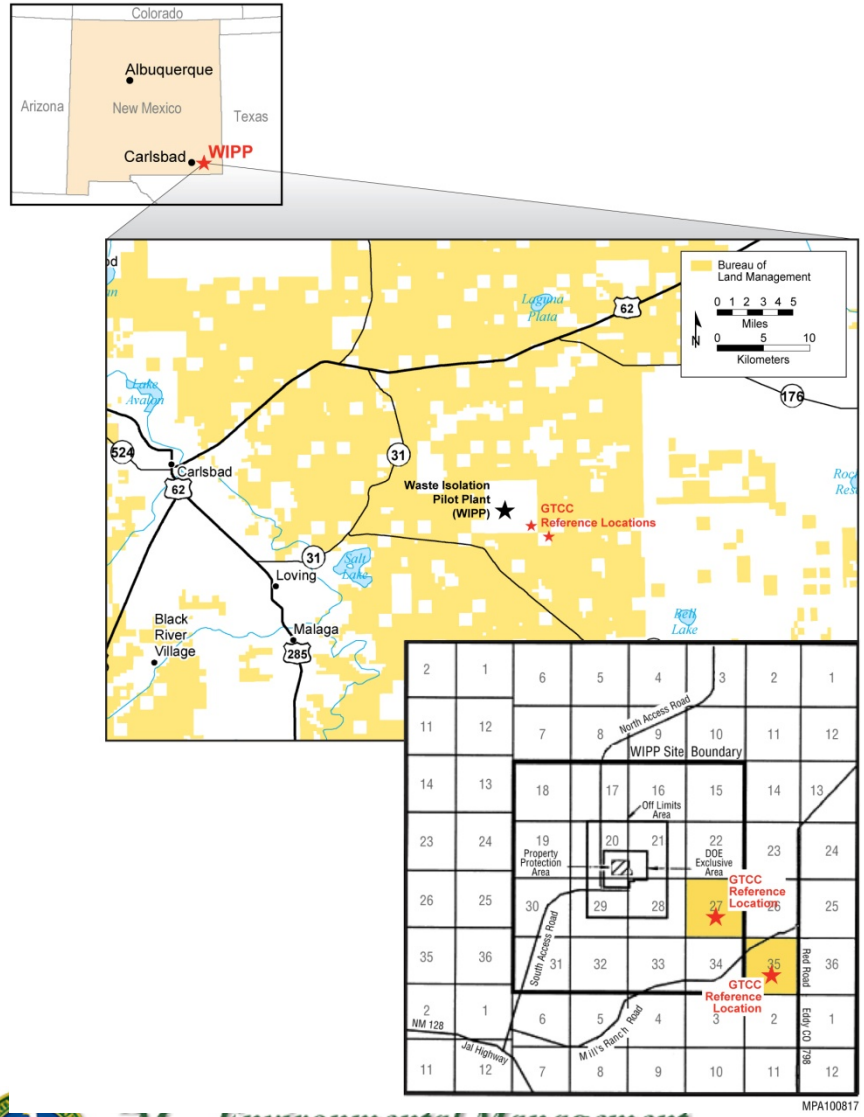
GTCC Reference Location at NNSS



GTCC Reference Location at SRS





GTCC Reference Location (Sections 27 and 35) at the WIPP Vicinity