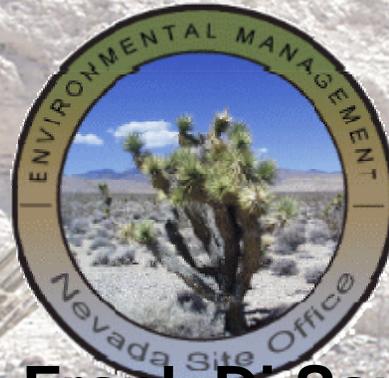


Nevada Test Site Radioactive Waste Transportation Update



E. Frank Di Sanza

Federal Project Director, Waste Management
Community Advisory Board
Transportation Waste Committee Meeting
December 20, 2006

**U.S. Department of Energy National Nuclear Security Administration
Nevada Site Office Environmental Management**

Topics to be Covered

- Key Players/Regulations/Qualifications
- Low-Level Waste (LLW)/Mixed LLW Shipments and Nevada Test Site (NTS) Preferred Routes
- NTS Transuranic (TRU) Waste
- Community Outreach



Key Players

- Many entities have a vested interest in the transportation of U.S. Department of Energy (DOE) radioactive waste
 - Waste Generators are DOE and U.S. Department of Defense sites involved in environmental cleanup activities
 - Carriers are trucking companies chosen by the Generators to transport containerized waste to the disposal facility
 - U.S. Department of Transportation (DOT) is regulatory authority on how shipments are to be conducted
 - Disposal facilities and Generators are held accountable by stakeholders to ensure waste is appropriately and safely shipped



Applicable Regulations / Commitments

- DOT regulations direct *Carriers* to choose routes not DOE
 - Requires Carriers to consider information on accident rates, transit time, population density and activities, and the time of day and day of week during which transportation will occur
- DOE negotiated the use of NTS preferred routes (see *Transporting Low-Level and Mixed Low-Level Waste to the Nevada Test Site* brochure) with the Nevada Governor's office and other stakeholders in calendar year 2000
- Generators can suggest to their Carriers the use of preferred routes
- Drivers complete/sign routing questionnaires and are interviewed upon arrival at the NTS disposal facility



Applicable Regulations / Commitments

(continued)

- Nevada Site Office may suspend a Generator from shipping waste to the NTS if waste is transported through the Las Vegas “Spaghetti Bowl” (violation of NTS Waste Acceptance Criteria Section 6.4)
- Interstate Commerce Law does not prevent designating a route, but rather prevents excluding a route due to unjustified opposition (i.e. protects Carriers’ business interest)



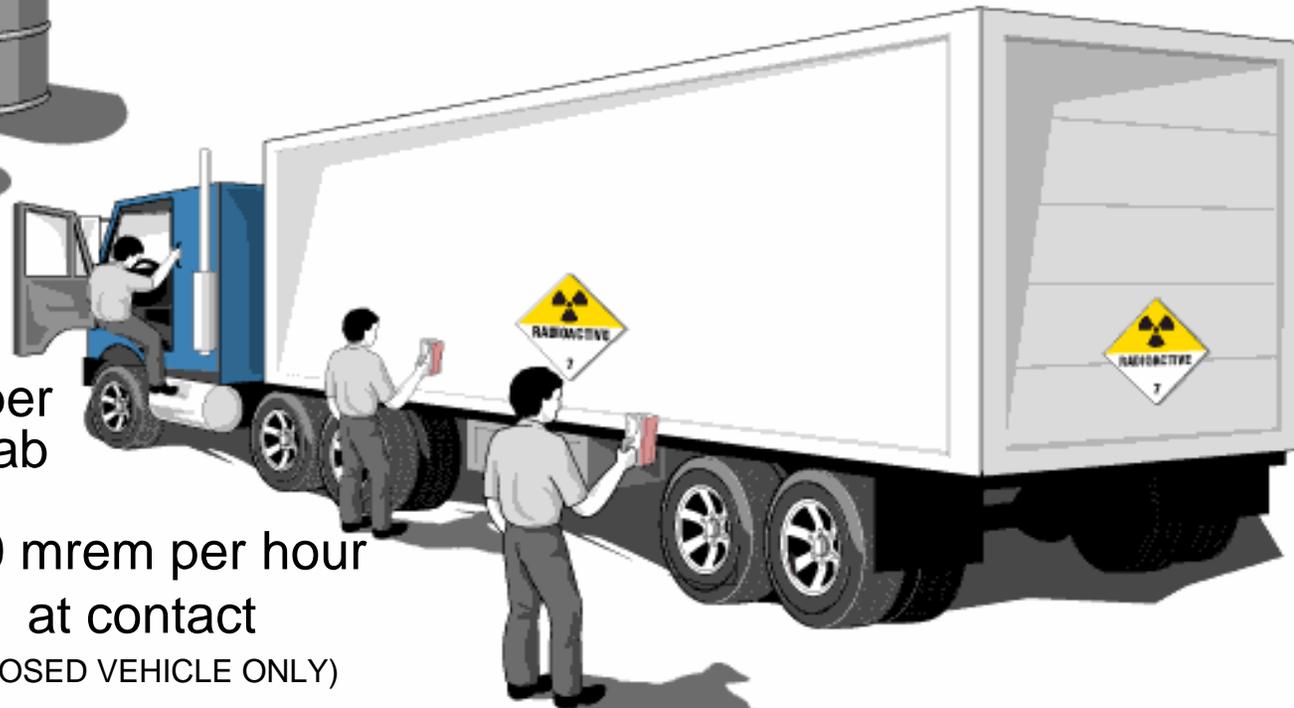
Maximum DOT Dose Limits For “Closed” Exclusive Use Vehicle



1,000 mrem/hour
at contact

2 mrem per
hour in cab

200 mrem per hour
at contact
(CLOSED VEHICLE ONLY)



10 mrem per hour at 2 meters (6.6 feet)



Potential Dose to Service Attendants

*SCENARIO:
Attendant
Changing Tire
or Fueling
Truck*



	TIME	DISTANCE	DOSE RATE	TOTAL DOSE
CASE 1 (MAX DOT ALLOWED)	15 MIN	CONTACT	200 MREM/HR	50 MREM
CASE 2 (ACTUAL NTS SHIPMENT)	15 MIN	CONTACT	1 MREM/HR	0.25 MREM

$$\text{TIME} \times \text{DOSE RATE} = \text{TOTAL DOSE}$$

NOTE: A SINGLE DOSE OF 0.25 MREM IS FAR BELOW WHAT CAN BE MEASURED BY A PERSONNEL DOSIMETER

Dose to Passer-By

SCENARIO:
*Truck Stopped in
 Traffic, Pedestrian
 Walks By Trailer on
 Sidewalk*



	TIME	DISTANCE	DOSE RATE	TOTAL DOSE
CASE 1 (MAX DOT ALLOWED)	15 SEC	2 M (6.6 FT)	10 MREM/HR	0.04 MREM
CASE 2 (ACTUAL NTS SHIPMENT)	15 SEC	2 M (6.6 FT)	0.05 MREM/HR	0.0002 MREM

$$\text{TIME} \times \text{DOSE RATE} = \text{TOTAL DOSE}$$

NOTE: THE TOTAL DOSE NOTED ABOVE ARE FAR BELOW WHAT CAN BE MEASURED BY A PERSONNEL DOSIMETER

Possible Annual Doses from Common Sources of Radiation*

Where You Live

- Living in Las Vegas, NV (natural background) – 60 mrem
- House construction (stone, concrete, or brick) – 10 mrem
- Radon (U.S. Average) – 200 mrem

What You Eat, Drink, Breathe

- Food, water, and air (U.S. average) – 40 mrem
- Using salt substitute (potassium chloride) and eating potassium-rich foods (i.e. bananas, Brazil nuts) – 10 mrem
- Human body (radiation from radioactive elements and minerals in the body) – 25 mrem

Medical

- One chest or dental X-ray – 10 mrem
- One lumbar spine X-ray – 130 mrem
- One lower gastrointestinal tract X-ray – 400 mrem

How You Live

- Jet plane travel (one U.S. round-trip coast-to-coast flight) – 5-12 mrem
- Watching TV (viewing four hours of TV every day for a year) – 2 mrem
- Cooking (with natural gas) – 10 mrem
- Smoking cigarettes (one pack every day for a year) – 4,000 mrem

Additional Doses of Interest

- Airline flight crew per year – 500-1,200 mrem
- Maximum allowable per radiation worker per year – 5,000 mrem
- Maximum allowable per astronaut per mission – 25,000 mrem

*Information from BEIR Report IV, Health Risks of Radon and Other Internally Deposited Alpha-emitter, National Academy of Sciences

Safety First!

Carrier and Driver Qualifications

- Carriers and their drivers must comply with numerous DOT requirements in order to transport radioactive waste
- In addition to DOT regulations, DOE Order 460.2A requires that Carriers be approved through its Motor Carrier Evaluation Program
 - Uses information from DOT inspections
 - DOE also conducts on-site inspections at Carrier facilities and evaluates performance based on numerous criteria
 - Continuously monitors performance monthly after approval



Transporting Radioactive Waste to the NTS

- NTS only disposes LLW and mixed LLW from Generators that comply with NTS Waste Acceptance Criteria
 - Waste must be packaged in approved DOT containers
- Generators make arrangements with Carriers to ship waste
 - Truck shipments
 - Intermodal shipments (rail shipments transferred to trucks prior to entering Nevada) are allowed if pre-arranged
 - Carriers responsible for following DOT regulations regarding radioactive waste shipments – radioactive placard requirements based upon dose readings and packaging
- Generators enter shipment information into the NTS inbound shipment reporting system *

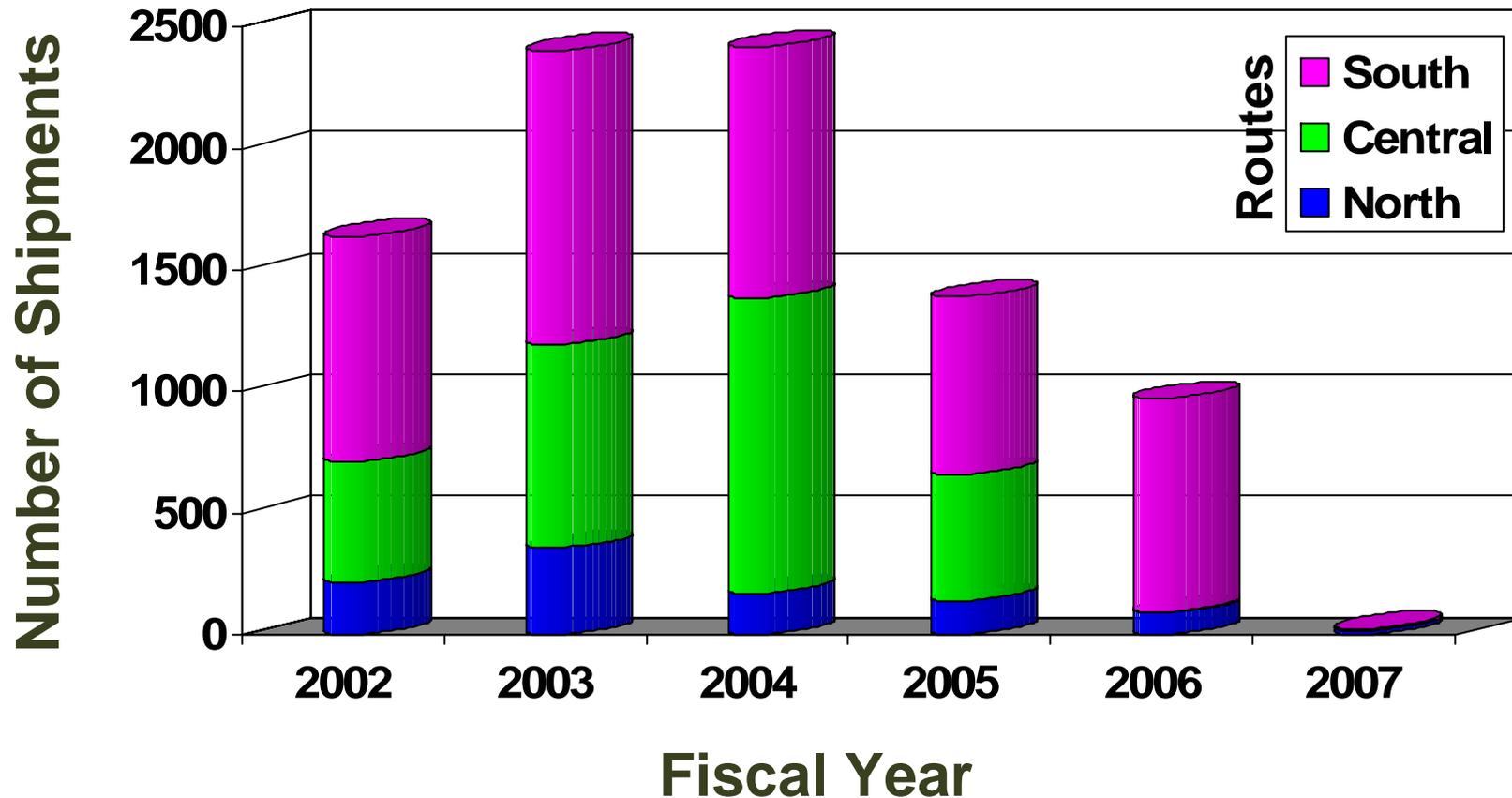
*A summary report of scheduled shipments is available on the Internet at <http://www.nv.doe.gov/emprograms/environment/wastemanagement/haztrak.htm>

Other Radioactive Waste Shipments

- Non-DOE radioactive material/waste shipments traveling through Southern Nevada must also comply with U.S. DOT regulations
 - Shipments to a commercial disposal facility in Utah
 - Medical material/waste shipments
 - Construction materials

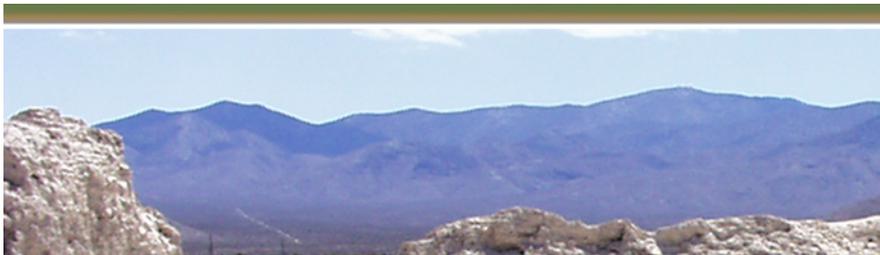
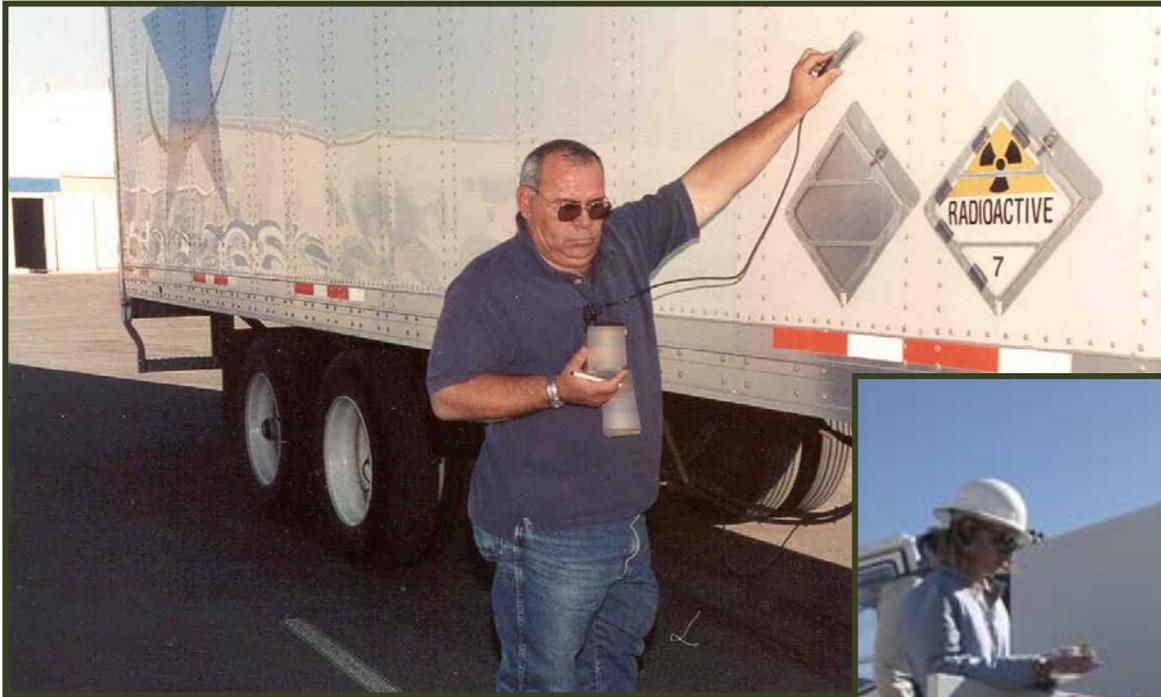


LLW and Mixed LLW Off-Site Shipments to the NTS



*Bar colors coordinate with route colors on *Transporting Low-Level and Mixed Low-Level Waste to the Nevada Test Site* brochure

LLW Shipment Arrival and Radiological Surveys at the NTS



LLW Shipment Disposal and Post-Offloading Radiological Survey at the NTS



TRU Waste Shipments to WIPP

- 1,860 drums (48 shipments) of NTS TRU waste transported to WIPP for disposal between January 2004 and November 2005
- Remaining TRU waste requires repackaging, characterization or a DOT approved shipping container
 - 151 drums
 - 58 oversize boxes
 - 2 spheres
- Anticipate shipping the remaining waste to a Central Characterization Facility (CCF) or WIPP by December 2007



NTS TRU Waste Routing to WIPP

- Routing of 48 NTS TRU waste shipments to WIPP



Possible Routing to a CCF



- Remaining NTS TRU waste requiring additional characterization will be shipped to a CCF (has not yet been identified)

Community Concern: Potential Exposure from LLW Shipments

- LLW and mixed LLW shipments must not exceed DOT regulations on radioactive dose rates
- Containers and “closed” trailers are used to minimize exposure to drivers, the public, and environment
- Radiological surveys are conducted before a shipment departs a Generator site, upon arrival at the NTS disposal facility, during offloading and before the empty truck trailers are released from the disposal facility
- Potential doses from LLW and mixed LLW shipments are comparable to common doses from natural and other man-made radiation



Community Support / Outreach

- DOE grant funding for community emergency response initiated in 2000 to assist counties in reaching operations-level preparedness
 - Generators are charged an additional \$.50 per cubic foot of LLW and mixed LLW disposed at NTS
 - State of Nevada Division of Emergency Management administers funding
 - Clark, Elko, Esmeralda, Lincoln, Nye and White Pine counties submit grant applications to fund emergency response resources (i.e. equipment, facilities, training, planning, etc.)
- Active Community Advisory Board
 - Members include citizens of Nye and Clark counties and representatives from the State of Nevada and Nye county



Community Support / Outreach

(continued)

- Informational materials and exhibits are continually updated and available to the public
 - LLW Transportation to NTS exhibit rotated to libraries in Pahrump, Amargosa Valley, Beatty, Caliente, and Ely
 - Briefings and meetings with local officials
 - Quarterly transportation reports distributed to local and regional officials
 - Transportation information, fact sheets and reports posted to the DOE Nevada website at <http://www.nv.doe.gov/emprograms/environment/wastemanagement/transportation.htm>



Update ... Transuranic (TRU) Waste in the Trenches



Bruce Crowe, SNJV/Battelle
Community Advisory Board
Transportation Waste Committee Meeting
December 20, 2006

**U.S. Department of Energy National Nuclear Security Administration
Nevada Site Office Environmental Management**

Overview

- Background: TRU Definitions and Disposition
- TRU Waste in the Trenches
 - Where is it?
 - How much is there...and why?
 - What are the issues?
 - What steps have been taken to address the issues?
 - What are the remediation options?
 - What are the recommendations / path forward?



Background...

TRU Definitions and Disposition

- 1969-1970 Atomic Energy Commission definition
 - Greater than 10 nano curies per gram (nCi/g)
 - Unsuitable for shallow-land disposal
- Post-1970: retrievable storage of TRU
- DOE Order 5820.2A: **revised** definition of TRU
 - Atomic number greater than 92; half-life greater than 20 years; concentration greater than 100 nCi/g



Background...

TRU Definitions and Disposition

(continued)

- Regulations for TRU: U.S. EPA 40 CFR 191 (1993 version)
 - Containment, Individual Protection, Assurance and Groundwater protection requirements
 - Regulations for a TRU geologic disposal facility
- Disposal site: Waste Isolation Pilot Plant (WIPP) located near Carlsbad, New Mexico
 - Characterization, certification, shipment to WIPP



Background...

TRU Definitions and Disposition

(continued)

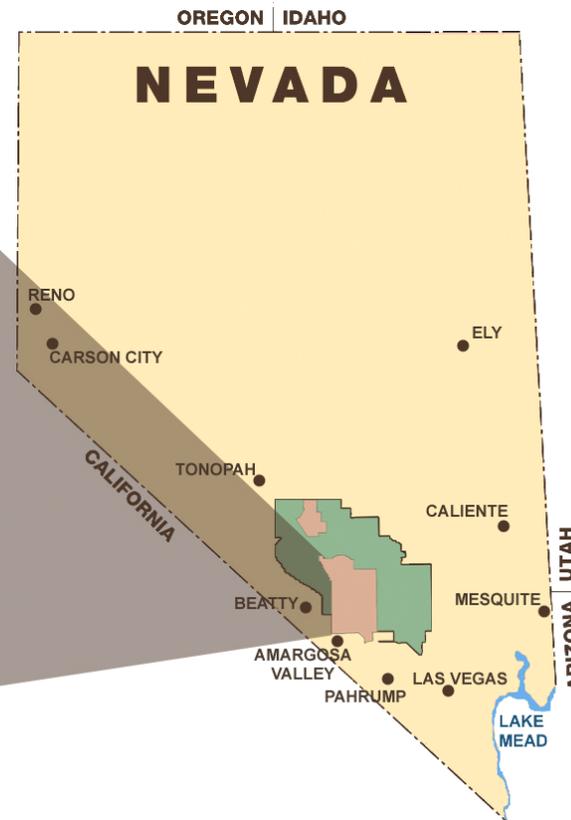
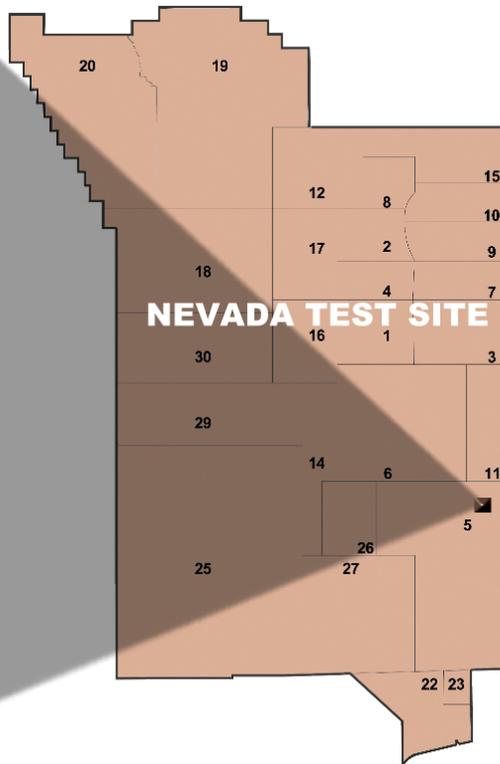
- DOE complex: what to do with TRU waste “disposed” in shallow trenches?
- DOE asked the National Academy of Sciences (NAS) to evaluate issues for both high-level waste (HLW) and TRU waste
 - Recommended a risk-informed process (cost-benefit trade-offs)
- For reference: DOE LLW is regulated by the Low-Level Waste Disposal Facility Federal Review Group (LFRG)
 - DOE Order 435.1



TRU Waste in the Trenches



Where Is It?



How Much TRU is in the Trenches... and Why?

- Approximately 102, 55-gallon steel drums with classified TRU materials inadvertently disposed at Area 5 Radioactive Waste Management Site in a classified material trench
 - Two shipments in 1986 from Rocky Flats
 - Likely intended for Greater Confinement Disposal (GCD)
- Approximately 30 m³; 229 curies, including isotopes of Plutonium (Pu), Americium (Am), and Uranium (U)



What are the Issues?

- Shallow-land disposal not fully consistent with requirements for geologic disposal
 - What must be done for final disposition?
 - New performance assessments required specific to TRU in the trenches (e.g., what regulations apply?)
- TRU inventory currently included in composite analysis
 - Meets all requirements of DOE Order 435.1
- Regulatory intent vs. safety issue
 - Leave in place vs. ship to WIPP?
 - Cost-benefit trade-offs?



What are the Issues...Why Now?

- Closure plan, 92-acre portion of the Area 5 Radioactive Waste Management Site
 - Requires resolution of TRU in the Trenches
- Trench is adjacent to the Pit 3 Mixed Waste Disposal Unit
 - Five-year operational phase and closure per agreement with the State of Nevada



What Steps have been Taken?

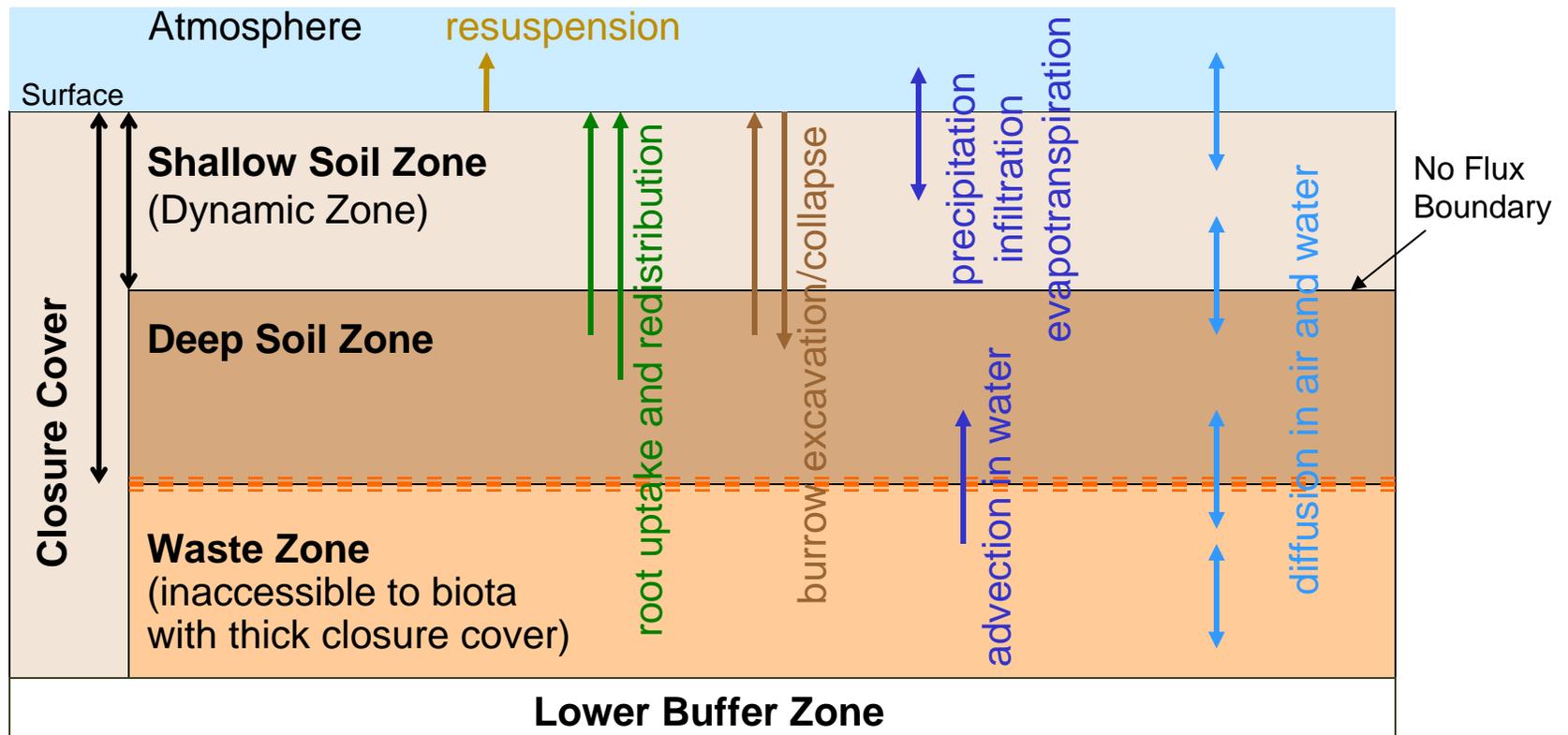
- Performance Assessment completed and accepted for Nevada Test Site disposal facilities – included TRU in the trenches
 - A Performance Assessment is an estimation of the behavior of a waste disposal system (Area 5 and Area 3 Radioactive Waste Management Sites) used for evaluating compliance (1,000 years) and for long-term facility management
 - A Performance Assessment traces processes that can disperse waste after burial (fate and transport) and the resulting radiological effects (human health effects for receptor scenarios)



Performance Assessment Model:

Area 5 Radioactive Waste Management Site Shallow Land Burial

Receptor scenarios



Not to scale
Figure denotes the upper approx. 10 meters of the disposal unit

[no groundwater pathway]



What Steps have been Taken?

(continued)

- Does the current disposal configuration meet the requirements of 40 CFR 191?
 - Revised Performance Assessment analyzes TRU requirements: PASS
- Still need to assess the impact of climate change
 - 1,000 versus 10,000 years (*natural* climate change)
- Nevada Site Office (NSO) working cooperatively with the Savannah River site on similar TRU disposal issues
- NSO has identified a range of remediation options
- Use a risk-based perspective to evaluate and select a preferred remediation option



What are the Remediation Options?

Option 1	Excavation, certification, shipment to WIPP
Option 2	40 CFR 191 performance assessment Low-Level Waste Disposal Facility Federal Review Group (LFRG); leave in place if safe
Option 3	Exemption and risk-informed process recommended by the National Academy of Sciences
Option 4	EPA Federal Register notice to approve alternative disposal requirements
Option 5	Leave trench unclosed until regulatory issues with non-geologic disposal of TRU waste are resolved (national level decision)



What are the Remediation Options?

(continued)

- June 2005: Remediation options presented to the LFRG
 - LFRG agrees with Option 2
 - Consistent with regulatory authority: DOE Order 435.1
- NSO Preference: Option 2 -- but develop risk/benefit analysis for all options
 - Follow National Academy of Sciences risk-informed process



What are the Recommendations / Path Forward?

- Complete final Performance Assessment revisions and assess options risk/cost
 - Engineered barriers for assurance requirements
 - Climate change
- September 2007: Recommendations to the LFRG
 - Joint presentation with Savannah River Site
- LFRG will implement regulatory review process
- Anticipated Resolution: fiscal year 2008

