# U. S. Experience and Practices in Low-Level Waste Management

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# 10 CFR 61(Subparts A-G)

- general provisions
- licenses
- performance objectives
- technical requirements for land disposal
- financial assurances
- participation by States and indian tribes
- records reports tests, and inspections

# Licensing concepts

- near surface (within 30 meters)
- stable wastes and a stable site
- control and monitor water
- long term maintenance
- protect against intruders

# Class A, B, and C Increasing Quantities & Concentrations

- concern for long-lived mobile radionuclides and protection of the resident farmer (ICRP-2)
- protection against intruders limits the classification system
- DOE responsible for greater than Class C wastes
- some exceptions

# Institutional Issues

- land must be owned by state or federal government
- formal closure monitoring period (~5 years) and post closure ($\geq$100 years)  period
- Institutional Funds are not necessarily secure (South Carolina has borrowed from the fund)

# Performance Objectives

- protect the general public (ICRP 2 dose standards)
- protect the inadvertent intruder (ICRP 2 dose standards)
- protect workers (ICRP 26 dose standards)
- stability of the site after closure

# Site suitability

- capable of being monitored, modeled, and analyzed
- projected population growth won't affect meeting performance objectives
- avoid areas with natural resources
- not be in the 100-year flood plain
- sufficient depth to water table so that ground water intrusion will not occur
- avoid geologic areas with surface erosion, slumping, and land-sliding.

# Facility Operation and Closure

- segregate Class A wastes
- Class C must be 5 meters deep and incorporate intrusion barriers
- packages integrity must be maintained during emplacement and backfill
- surface dose rates below 10 CFR 20 unrestricted limits
- boundaries and locations of waste and site proper located with land survey – include buffer zone
- close trenches as you go

# Waste characteristics

- No cardboard boxes - minimize voids
- no liquids (<1% by volume)
- non explosive, no toxics, nonpyrophoric, no high gas pressure (>1.5 atm and <100 Ci)
- treat hazardous biological pathogenic and infectious material to extent practicable
- survive moisture, microbes, radiation effects, chemical effects and overburden
- waste or package can provide stability

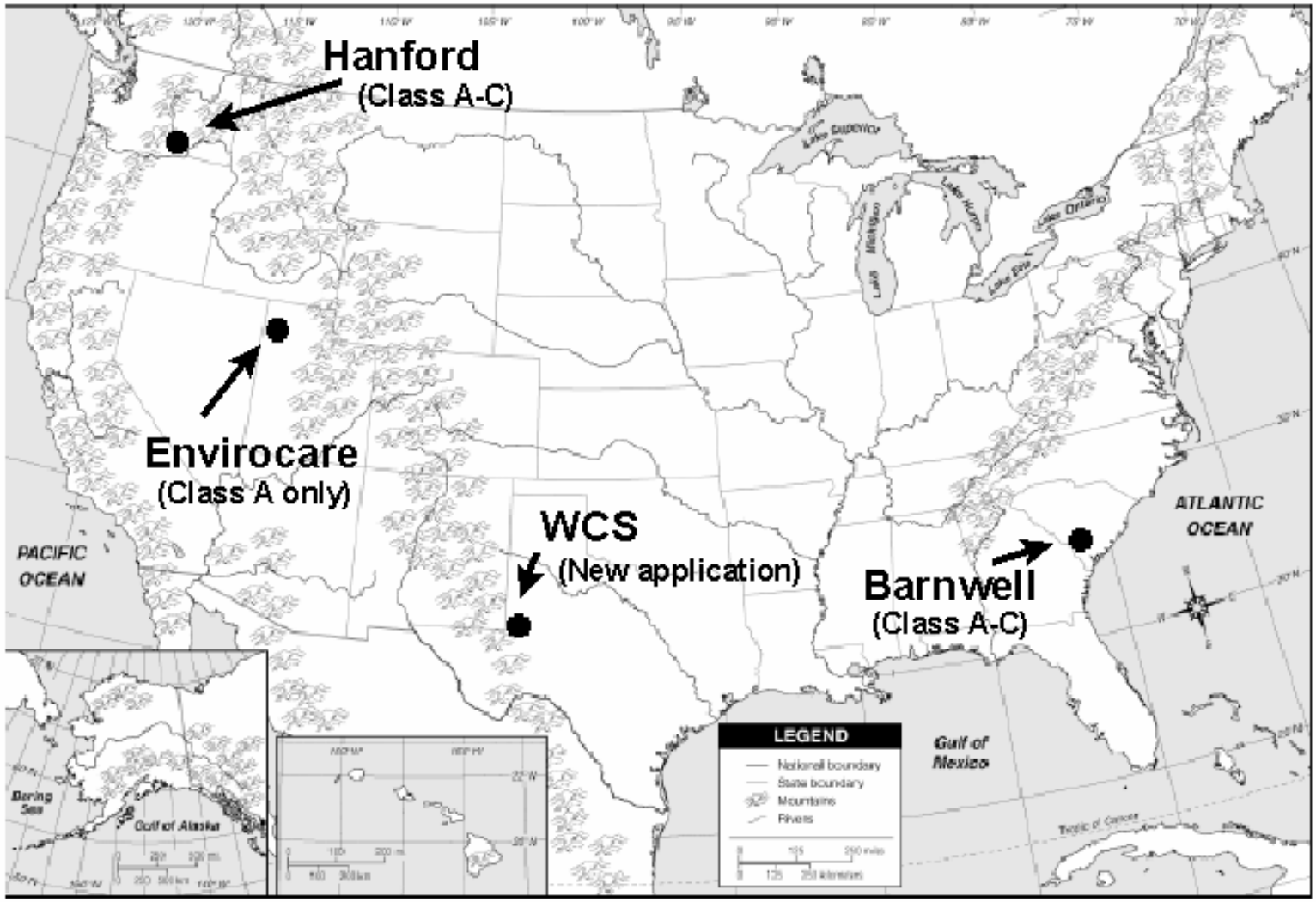
# Environmental Monitoring

Environmental monitoring serves two purposes

- demonstrate compliance
- enhance knowledge of environmental modeling

# LLRW Facility Status

- Beatty NV 1962 - 1992
- Maxey Flats KY 1962 - 1977
- West Valley NY 1963 - 1975
- Richland WA 1965 - present
- Sheffield IL 1967 - 1987
- Barnwell SC 1971 - present
- Clive UT 1991 - present
- Andrews Texas – license submitted 2004




Commercial low-level waste sites in the U.S.

# Low-Level Radioactive Waste Policy Act 1980 and its Amendment in 1985

- Each state responsible for its own wastes
- State can work together in Compacts
- In 1985 set 1992 deadline
- states must perform and certify
- Michigan was denied access to existing sites for non-performance

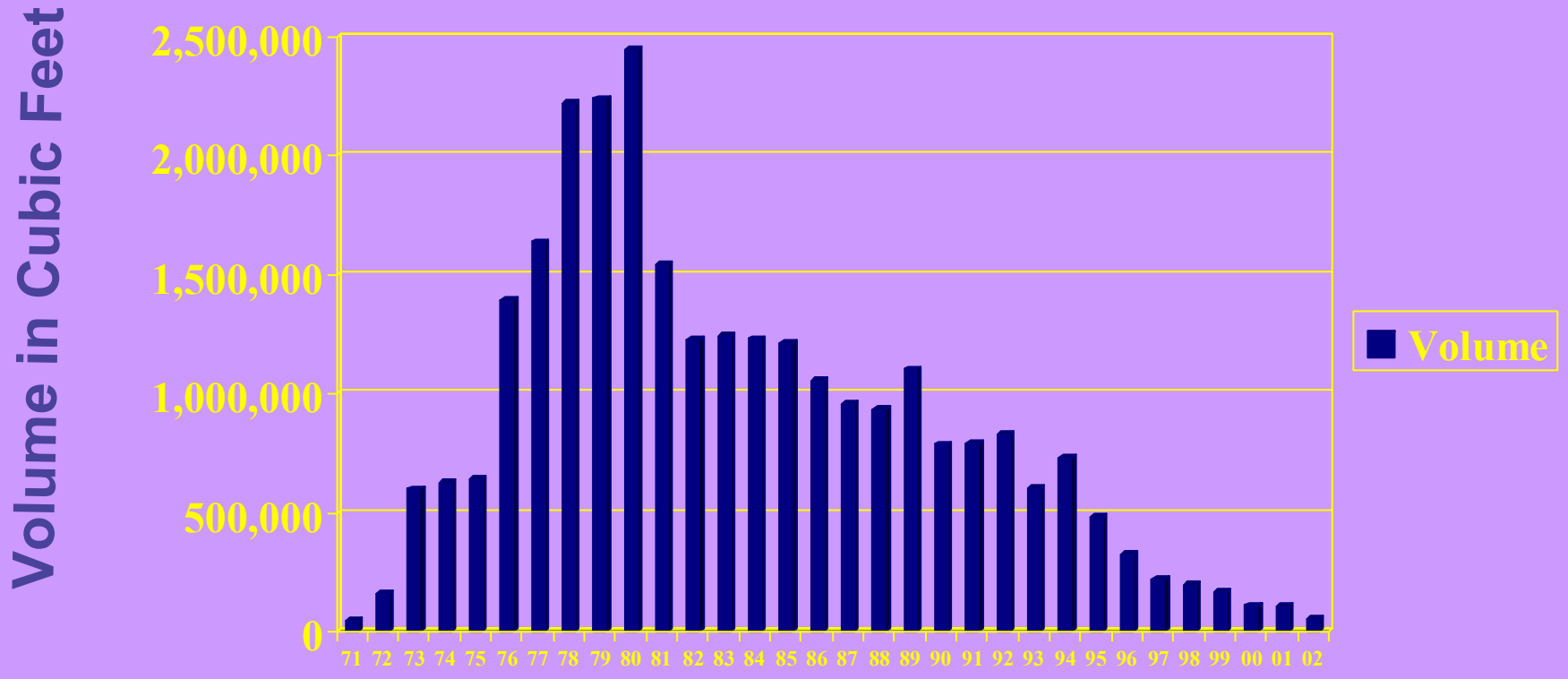
# Current Conditions

- lots of capacity to manage LLRW
- political issue, not technical issue
- sources of commercial waste (volumes) are dramatically down!!
- Dilute wastes are being managed in Utah
- Some Low-activity wastes are being managed at sites authorized to take hazardous chemical wastes

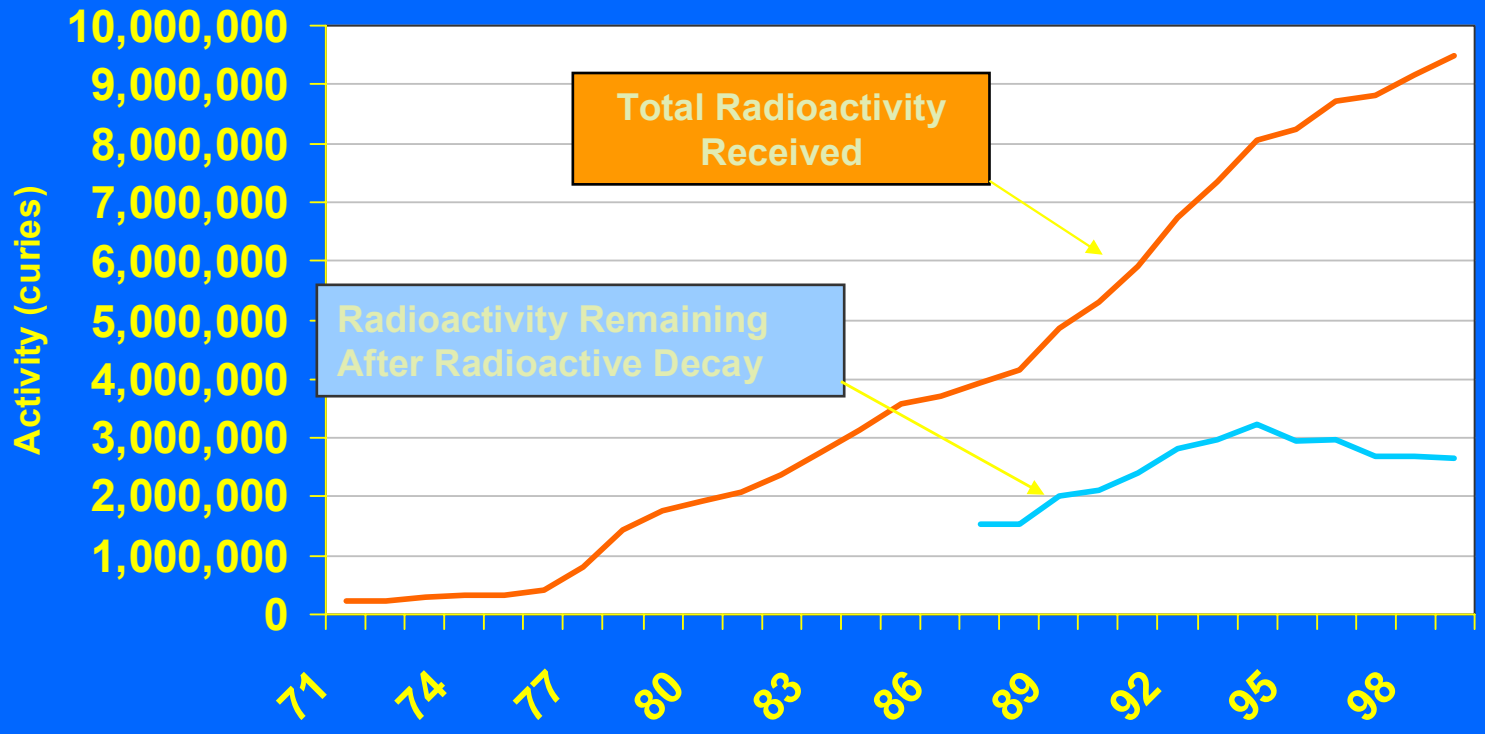
# Legislated Benefits for South Carolina

- **$12 million available for Barnwell County economic development when SC joined the compact**
- **Barnwell County receives $2 million/year from disposal operations**
- **South Carolina generators get 33% rebate**
- **South Carolina disposal revenue goes to Children's Education Endowment Fund (30% scholarships; 70% infrastructure)**

# Barnwell Disposal Volumes



# Barnwell Radioactivity



# Atlantic Compact Legislation

- Members: SC, CT, NJ
- Volume Caps:

| Volume | FY |
|---|---|
| 160,000 cu ft | 2001 |
| 80,000 cu ft | 2002 |
| 70,000 cu ft | 2003 |
| 60,000 cu ft | 2004 |
| 50,000 cu ft | 2005 |
| 45,000 cu ft | 2006 |
| 40,000 cu ft | 2007 |
| 35,000 cu ft | 2008 |

- NJ and CT allowed no more than 800,000 cu ft total
- No out-of-compact generators allowed after FY 2008

# A Brief Tour of the Barnwell Low-Level Waste Disposal Facility

## Class B/C Trench

## Class A Trench

# Large Component Disposal

# Big Rock Point
# Reactor Pressure Vessel (RPV)

# Routine Cask and Waste Handling


# Barnwell Environmental Monitoring

- On-site environmental laboratory
- Comprehensive radiological and non-radiological monitoring and analysis
- 240 groundwater monitoring wells
  - On-site, boundary and off-site
- 140 trench standpipes
- Site characterization, groundwater and contaminant modeling, and site performance evaluation

# Finished Trench Cap and Monitoring Wells

# Web sites for Low-Level Waste

http://www.nrc.gov/waste/low-level-waste.html

http://www.chemnuclear.com/disposal.html

http://www.doh.wa.gov/ehp/rp/waste/llw.htm

http://64.224.191.188/wcs/

http://www.radiationcontrol.utah.gov/BNC/Enviro care.htm

http://www.radiationcontrol.utah.gov/drc_lows.htm