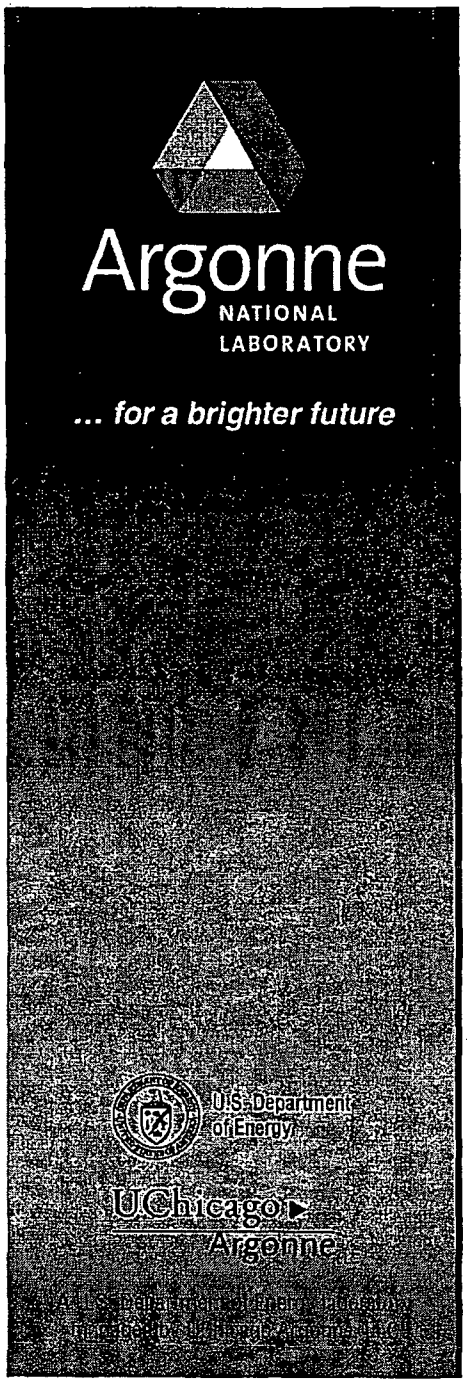


# *Lessons Learned from DOE and Other Site Decommissioning*

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*Advisory Committee on Nuclear Waste –*
*Working Group Meeting on Decommissioning Lessons Learned*

*Rockville, MD*
*November 14, 2006*

## ***Presentation Outline***

- Historical Perspective
- Cost Issue
- Environmental Impact Issue
- Design and Construction Issue
- Other Improvements
- Summary

## ***Historical Perspective - 1***

- Some DOE sites/facilities are in closure
- Some DOE sites have limited number of facilities or areas in closure
  - Some will be demolished
  - Some will be reused after decommissioning
- Some facilities are privately owned, but contaminated with Government radioactive materials (contract closure requires restoration)

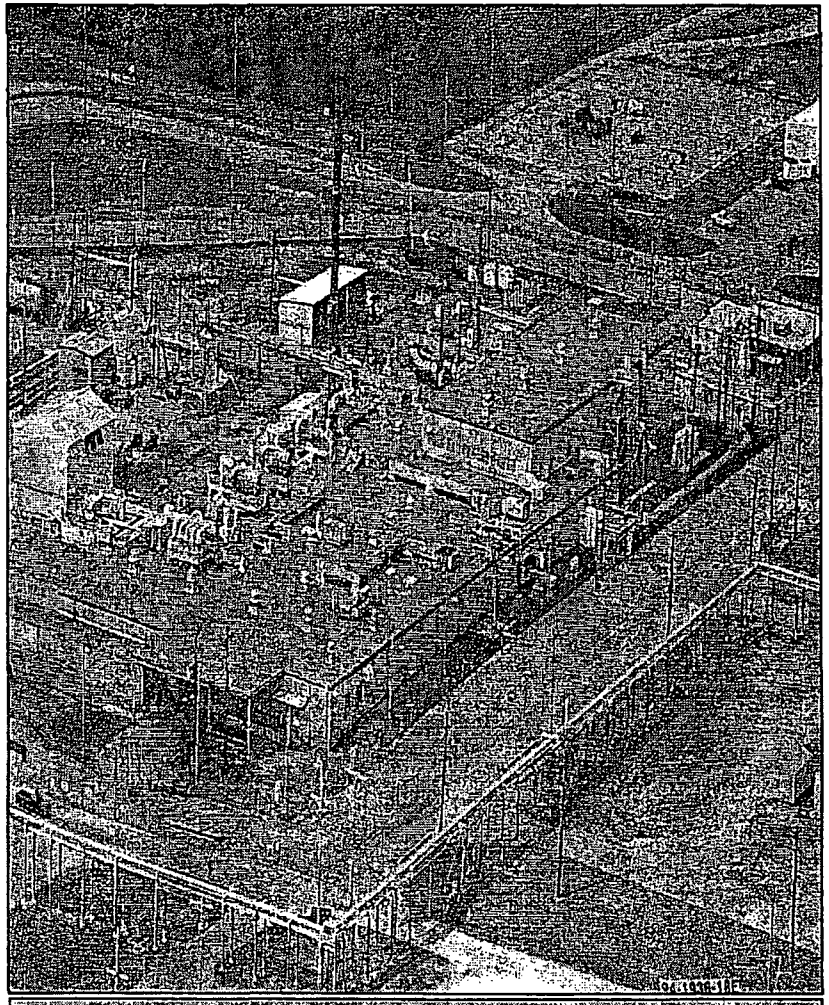
## ***Historical Perspective - 2***

- Many 'one-of-a-kind' facilities designed, operated and with their own unique history and problems
- Many quickly constructed and operated - or at the least not to current day standards – little concern about closure issues
- Recordkeeping issues – 'as built' records, operational history data – some good but lots of poor examples

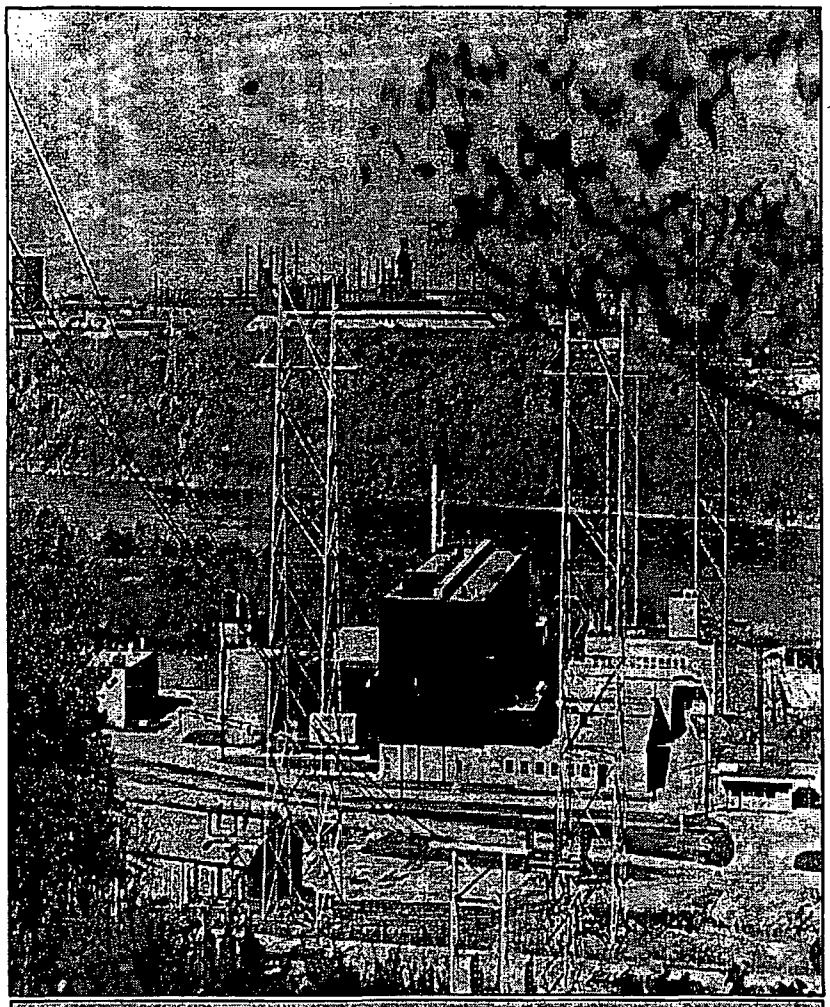
## ***Historical Perspective - 3***

- Many facilities poorly deactivated to a safe shutdown condition in 1950's-1990's; decommissioning inherited these problems
- Generally speaking there are no Decommissioning Funds – slows process of implementing decommissioning
- Poor past communication and past operational limitations on openness complicated stakeholder engagement process and comfort levels
- Labor forces used for decommissioning vary – some 'in-house' forces, others project specific contractors and at closure sites - integrators with subcontractors

# Variety of Facilities

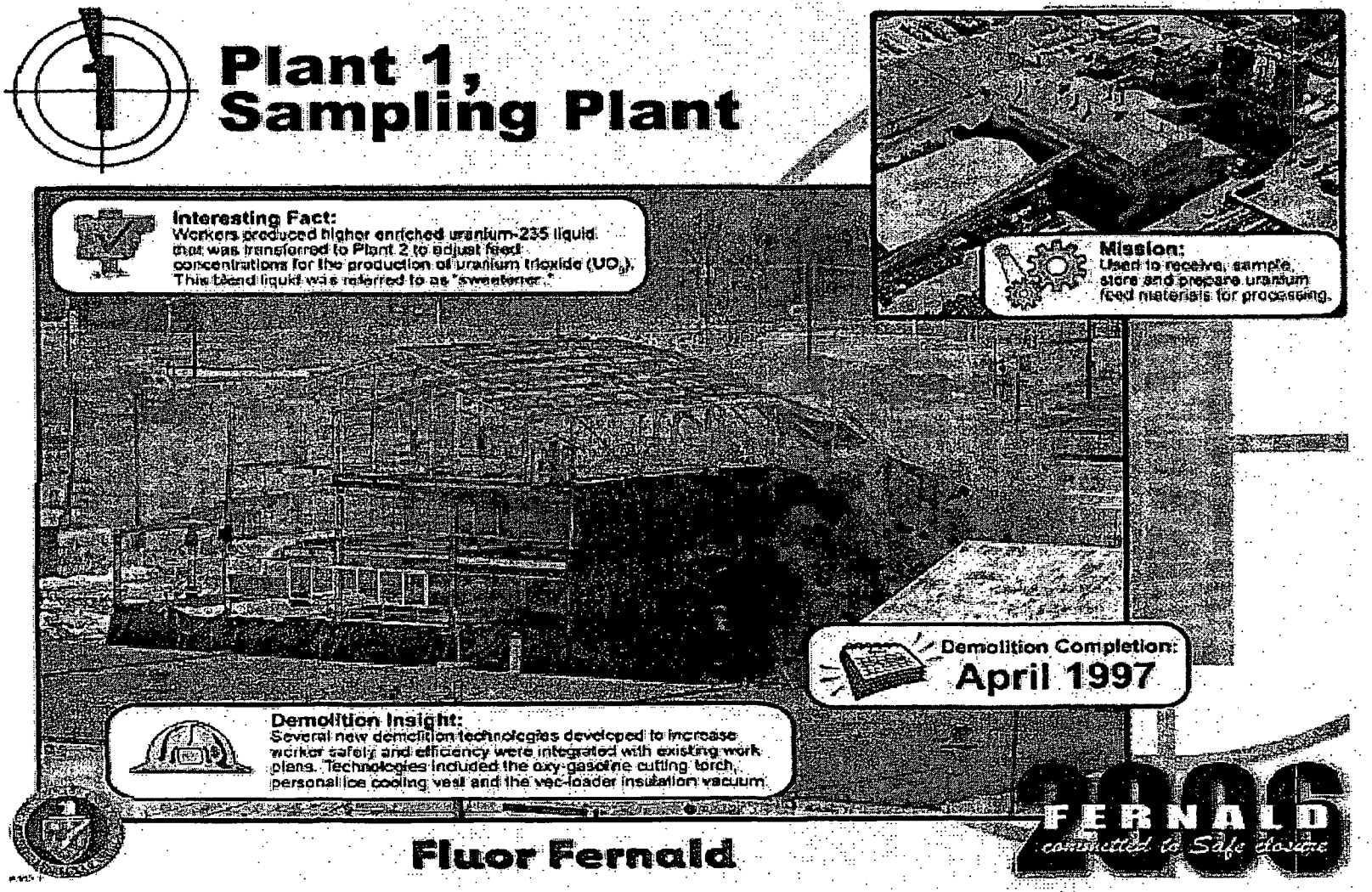


DOE – SRS Fuel Fabrication Facility

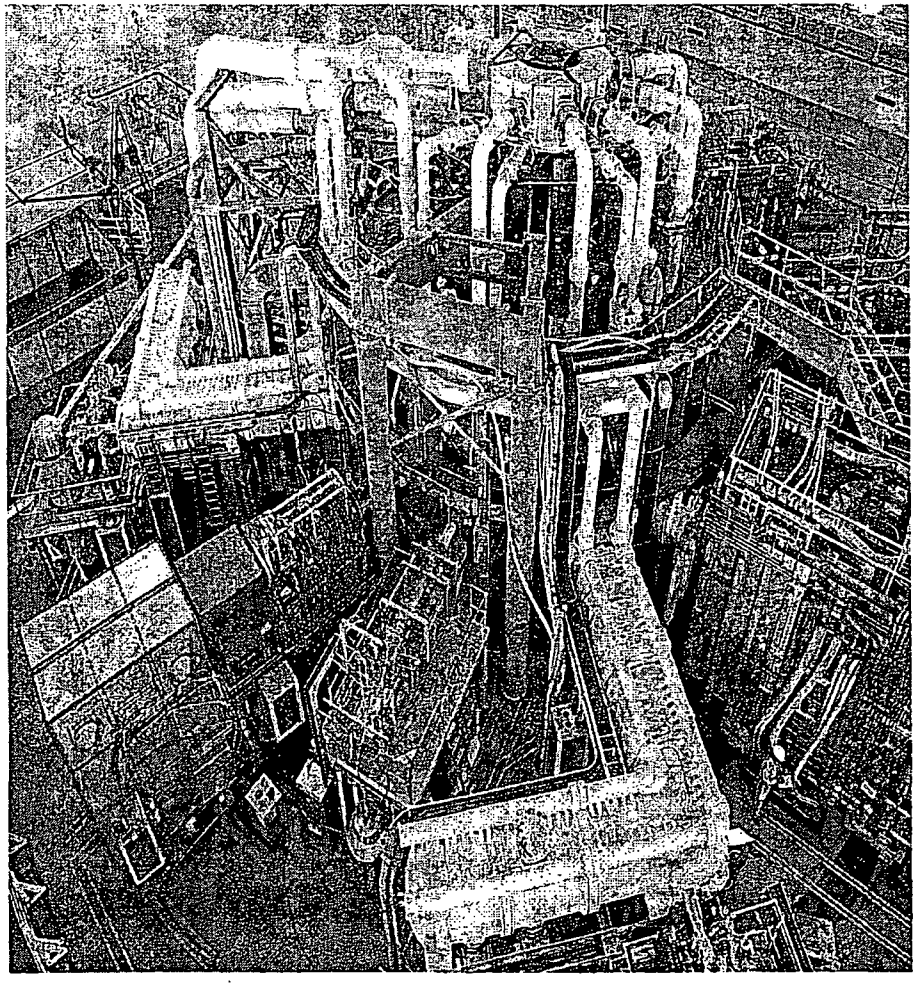


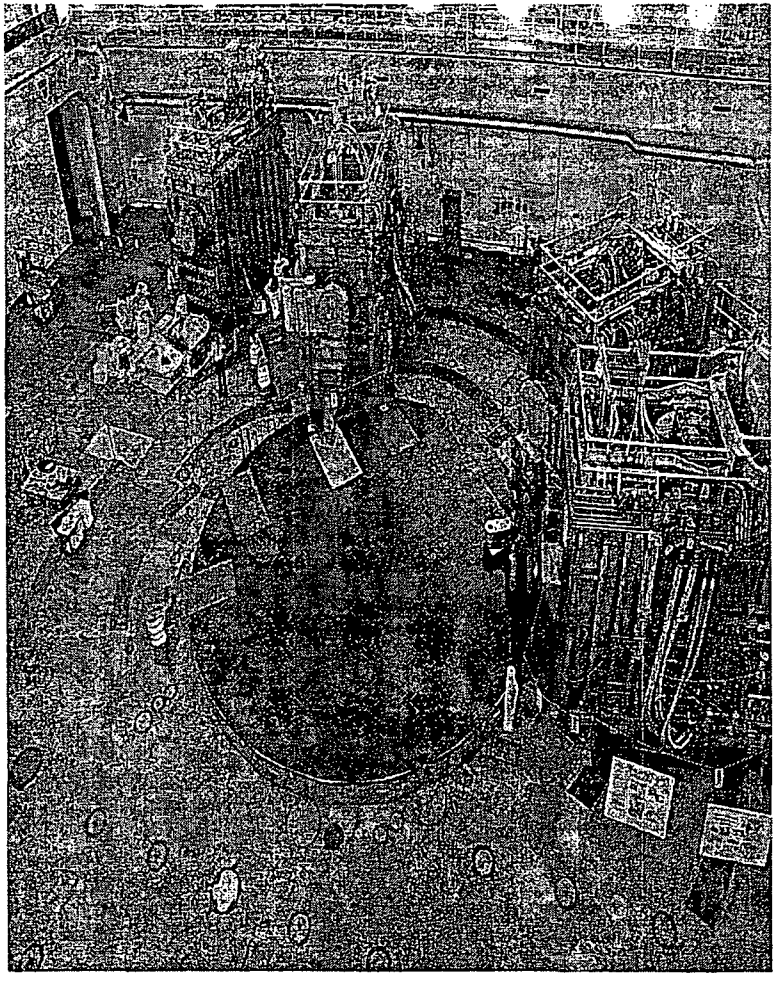
DOE-Shipping Port Reactor

# Fernald Site - Plant 1



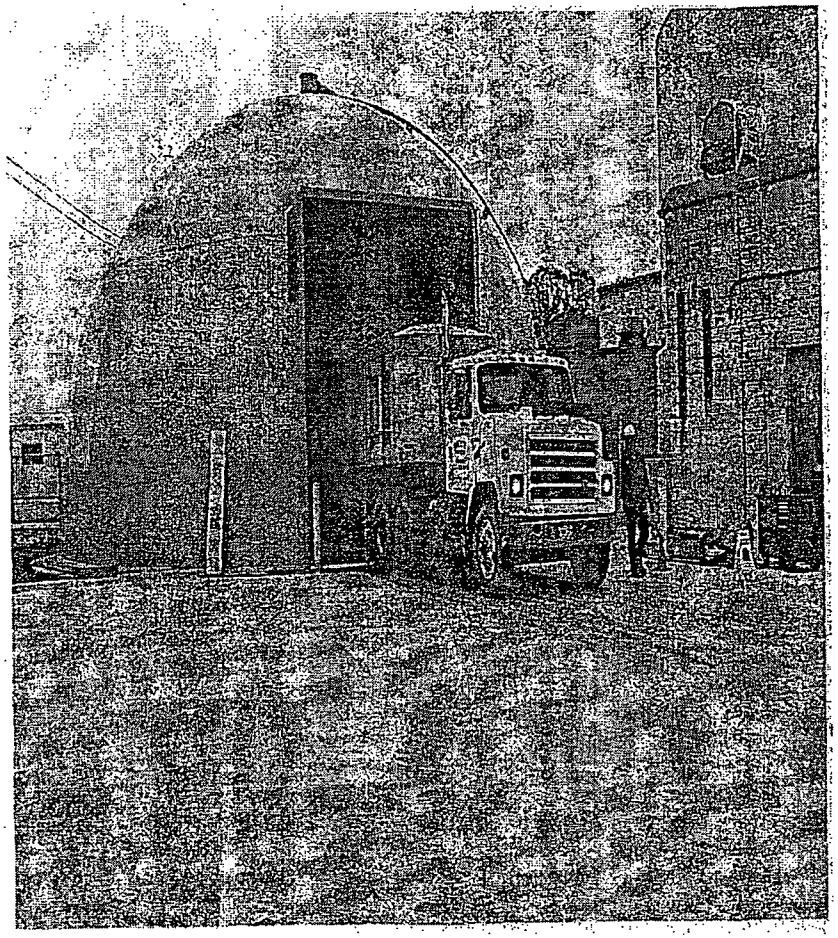
# Before & After Decommissioning - TFTR



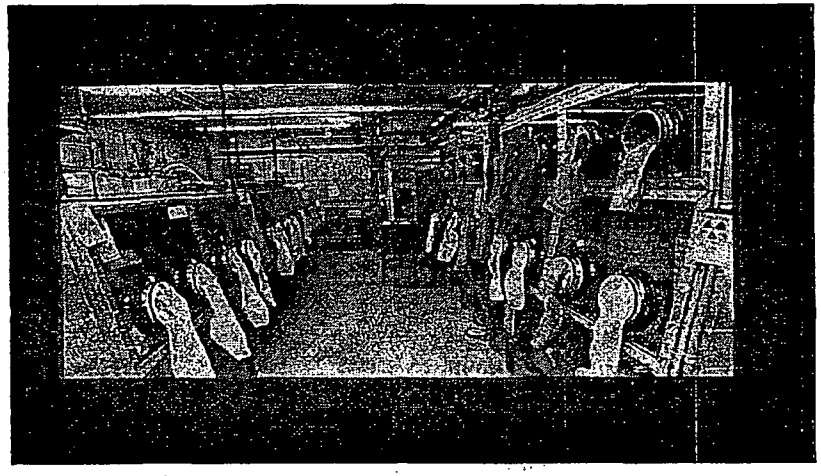


Tokamak Fusion Test Reactor at DOE-PPPL Site, Princeton, NJ

# Facility Re-Use at ANL



CP-5 Vaporsphere



Building 212 Gloveboxes Laboratory

# Cost Issue - 1

- Major cost elements are:
  - the labor cost to perform the decommissioning and
  - the cost to manage the generated wastes
- Waste disposal at large waste volume generating project sites requires careful planning and cost-benefit analysis for decision making
- Management of the interfaces associated with off-site shipments and the associated work involved in establishing and maintaining that process is typically time-consuming
- Not to be forgotten is site characterization and the historic site assessment

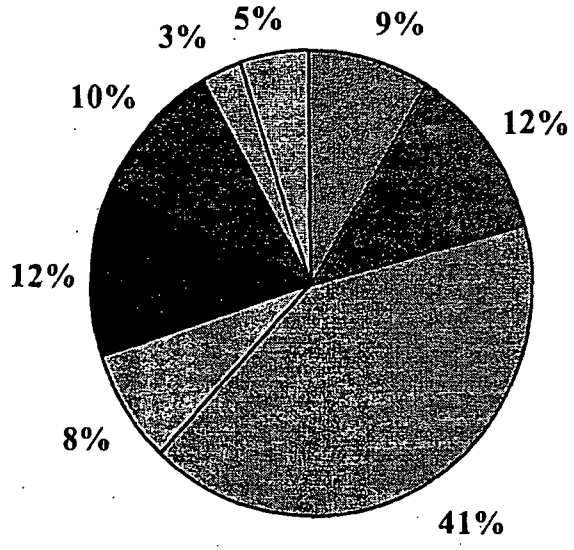
## Cost Issue - 2

- Clearance (for free release) of larger volumes of material that would not require management as wastes would reduce the costs
- Intact large component/equipment removals save funds as well as schedule and reduce risks
- Find ways to optimize the decommissioning process through 'optioneering' studies including cost-benefit analyses and value engineering
- Industrial safety issues need close monitoring – electrical safety, rigging and lifting, control of contractors - to mention just a few – its very expensive to 'sit and wait' due to work stoppages or other problems

## ***Cost Issue - 3***

- Technologies are available off the shelf to support decommissioning
- Final site end-state must be developed and agreed to early to avoid costly delays and re-work of areas

# ANL JANUS Reactor D&D - Costs Detail




- Project Management
- Surveillance & Maintenance
- D&D
- Waste
- Project Engineering
- Characterization
- Equipment & Materials
- Closeout

## ***Environmental Issues - 1***

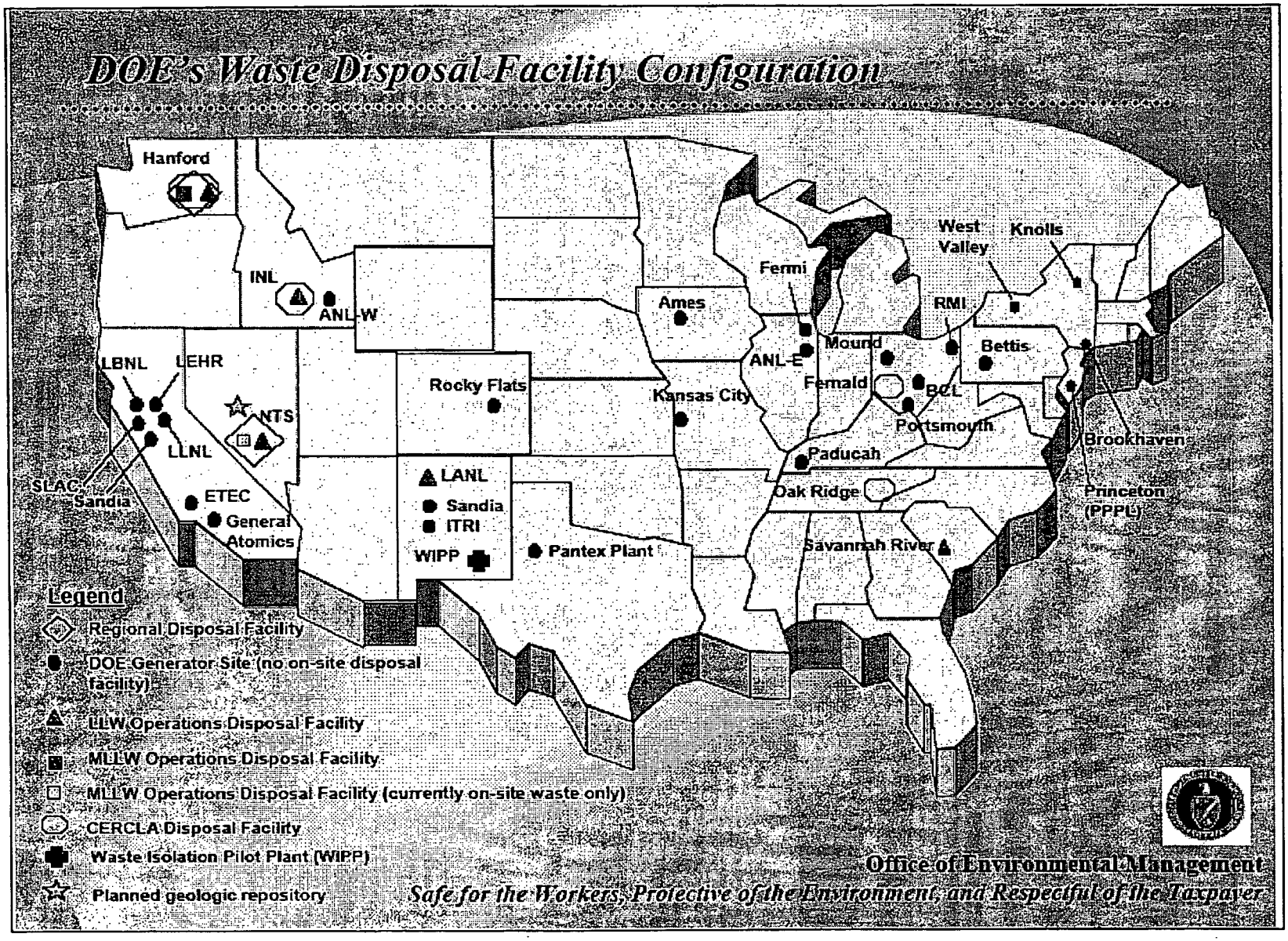
- Highly site specific and site dependent concerns
- NEPA environmental document prepared for each decommissioning project
- Careful consideration to lead times, permitting and regulatory approvals
- Generally speaking has been an evaluate and document issue

# ***Waste Management Issues - 1***

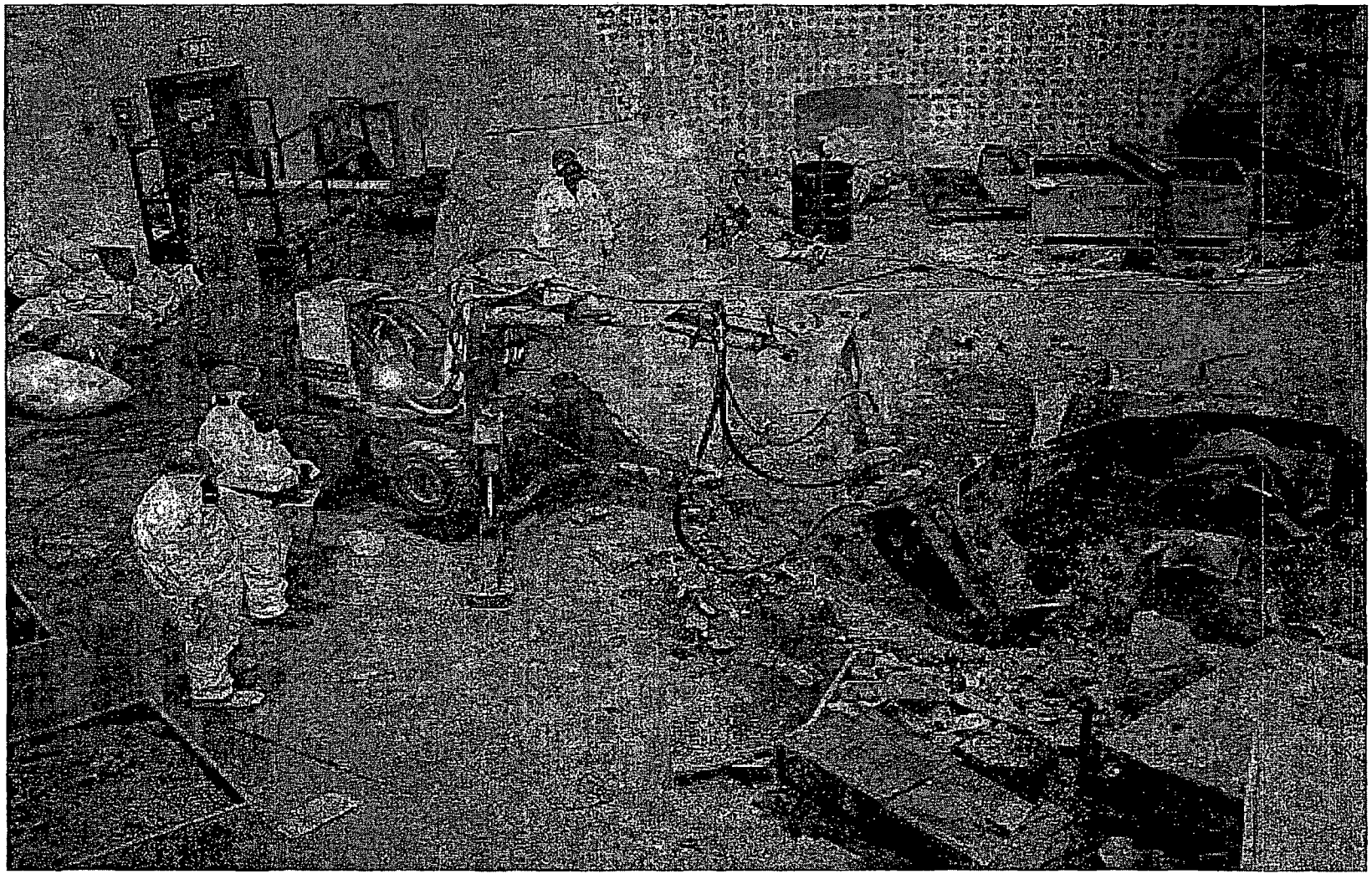
- Waste management - the easier and quicker you can move material off the work site the better
- Larger waste material volumes have allowed sites to negotiate for much better rates for some wastes at some commercial disposal sites
- Easier and more cost effective to dispose of material than to decontaminate it – disposal is cheap and clearance is a historic issue
- Many DOE sites have on-site disposal cells which alleviate many waste disposal issues and make the 'flow process' easier – cheaper and whatever bounds the process

# ***Waste Management Issues - 2***

- Use of previously unregulated materials - lead based paints, heavy metals, PCB's and asbestos and other chemicals - in a currently regulated materials space
- Management of mixed waste on some projects
- Disposal of very low levels of radioactively contaminated soils with approvals in sanitary landfills or RCRA landfills
- Meet the Waste Acceptance Criteria for the disposal site – don't complicate it any more than necessary


DOE's Waste Disposal Facility Configuration
Hanford
INL
ANL-W
LBNL
LEHR
NTS
LLNL
SLAC
Sandia
ETEC
General Atomics
Rocky Flats
LANL
Sandia
ITRI
WIPP
Pantex Plant
Ames
Fernl
ANL-E
Mound
Kansas City
Fernald
BCL
Portsmouth
Paducah
Oak Ridge
Savannah River
West Valley
Knolls
RMI
Bettis
Brookhaven
Princeton (PPPL)
Legend
Regional Disposal Facility
DOE Generator Site (no on-site disposal facility)
LLW Operations Disposal Facility
MLLW Operations Disposal Facility
MLLW Operations Disposal Facility (currently on-site waste only)
CERCLA Disposal Facility
Waste Isolation Pilot Plant (WIPP)
Planned geologic repository
Office of Environmental Management
Safe for the Workers, Protective of the Environment, and Respectful of the Taxpayer

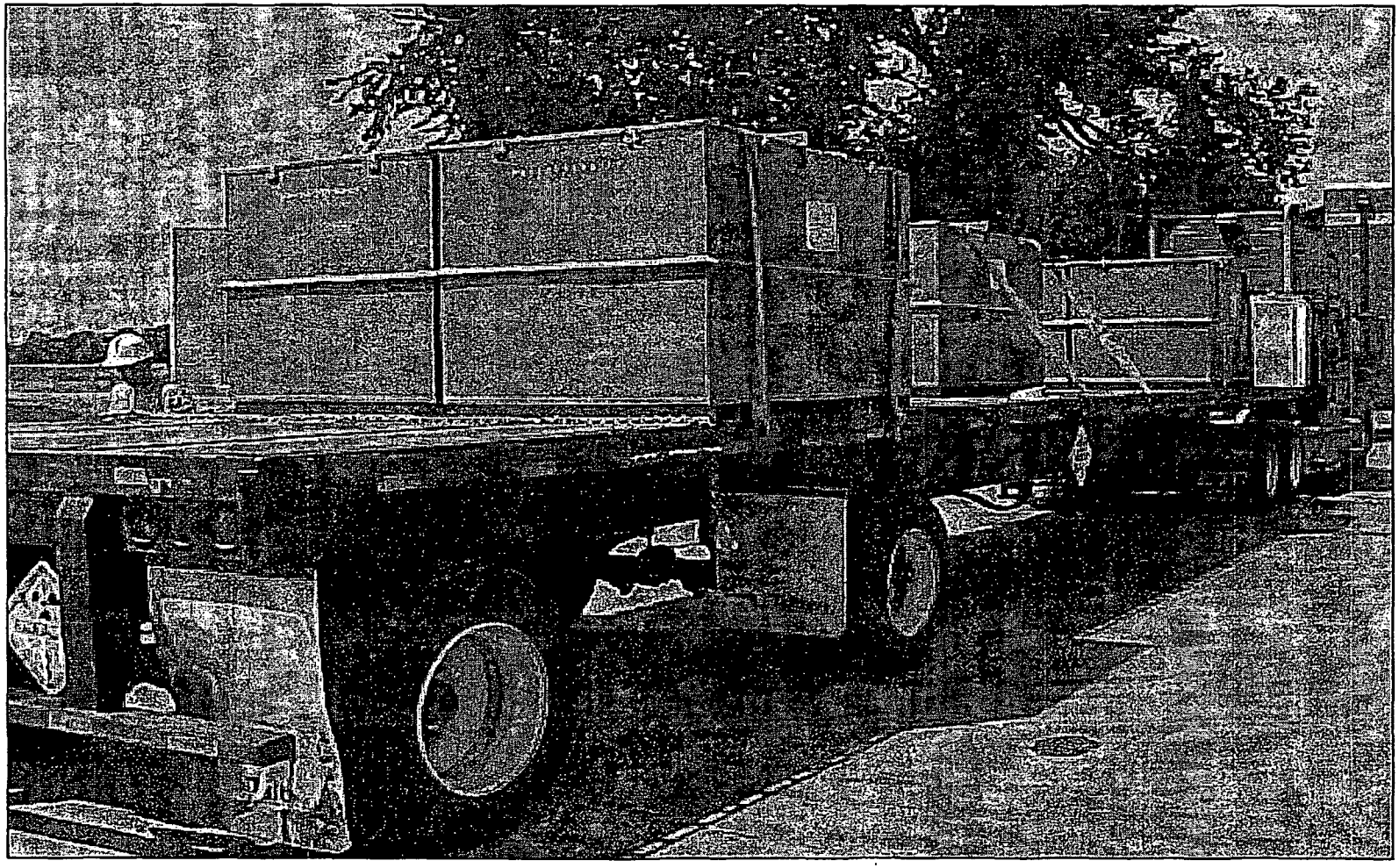
# CP-5 Research Reactor D&D



# Demolition Debris

Staged rubble from building dismantling activities

# Packaged Waste



Typical low-level radioactive waste shipment to off-site disposal

# DOE-Hanford Environmental Restoration Disposal Facility (ERDF)

# ***Secrets of RFCP Success****

- Technological and operational innovation
  - Technology experimentation
  - No time to 'develop' something – 'steal' something !
  - Big technological busts
- No micromanaging
- Proper contract in place to hold accountable yet properly incentivize
- Are we overly compensating/ incentivizing the contractor ?
- Compromise on "Soil Action Levels"

*Also see GAO report GAO-03-52

## ***Design & Construction Features - 1***

- Stay away from embedded piping – difficult to assess if contaminated and to remove if needed
- Stay away from large massive concrete structures made by use of a 'one pour' construction technique – disassembly difficult
- Use secondary containment to contain leakages - soil contamination issues from spills, leaks and legacy practices

## ***Design & Construction Features - 2***

- Any NPP or other features which are often touted as an 'O&M' feature can actually also be thought of as a 'decommissioning friendly' feature
  - Reduced impurities in fabrication materials
  - Reduced contamination from plant operations
  - Optimize plant layout for decommissioning – pre-place aids for removal of equipment
  - Waste minimization in facility design/modularization
- Use of standardized 'cookie cutter' designs for future plants allows for optimization of decommissioning implementation

## ***Other Possible Improvements***

- Share lessons learned – we are not doing as good of a job as we did in the past in this area
  - IAEA documentation
  - DOE Lessons Learned and Operating Experiences reports
  - NRC Regulatory Information Summaries
- Prepare for decommissioning in advance better than we do now – have a 'living' decommissioning plan and develop the decommissioning strategy and path forward as the facility is being used – minimal effort and good way to stay current in planning and good public relations
- For nuclear industry to remain viable and grow – we must be able to handle legacies of the past - closure of current facilities/sites

# *'Top Ten Lessons Learned'*

1. Communications
2. Specialist Support
3. Final Surveys and Endpoints
4. Planning/Cost Estimating
5. Deactivation
6. Waste Management
7. Hazards Assessment
8. Site/Facility History
9. 'OTS' Technologies
10. Facilitate Info Exchange & Teamwork

**Understand what the industry has done and is doing – spend some early planning funds to accomplish this !! Training, Site Visits, Mock ups**

**Expect the unexpected because it will occur sometime or even multiple times during the project !! Contingencies, emergency plans, etc required**

# Lessons Learned Sources

- www.energy.gov
  - DOE Operating Experience weekly reports
  - DOE Lessons Learned website
- www.iaea.org
  - IAEA TECDOC-1394
- www.nrc.gov
  - NUREG-1757 Volume 2, Appendix O
  - USNRC RIS-02-002 LTP and DP process
  - USNRC RIS-04-008 LTP process
- www.orau.gov/ddsc/
  - DDSC Website

## *A Closing Note*

- Remember that decommissioning is not "rocket science" – do not make it any more complicated than necessary
- Learning from experience is difficult – the test comes first and the lessons come later - the exact opposite of how learning typically occurs
- Learn from what others have done and not done – many have walked down this path before you – don't be afraid to seek out help and ask questions