

**Nuclear Waste Technical Review Board
Engineered Barrier System Panel Meeting**

Hanford Spent Nuclear Fuel Project

**Jerry Ethridge, Ph.D.
Spent Fuel Technology Program Office
Pacific Northwest Laboratories
(509) 373-6677**

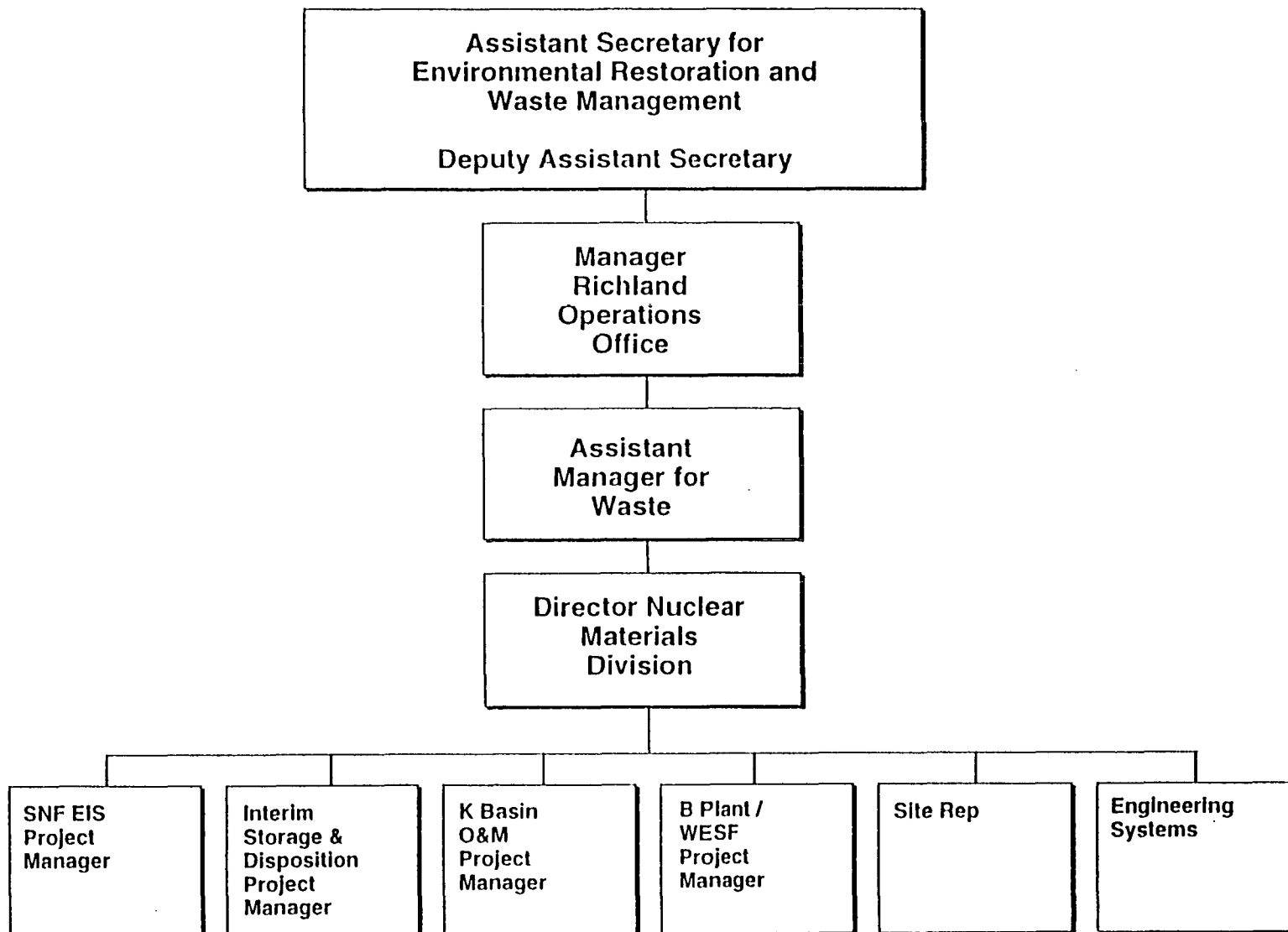
**Richland, Washington
June 15, 1994**

Hanford Spent Nuclear Fuel Project

Agenda

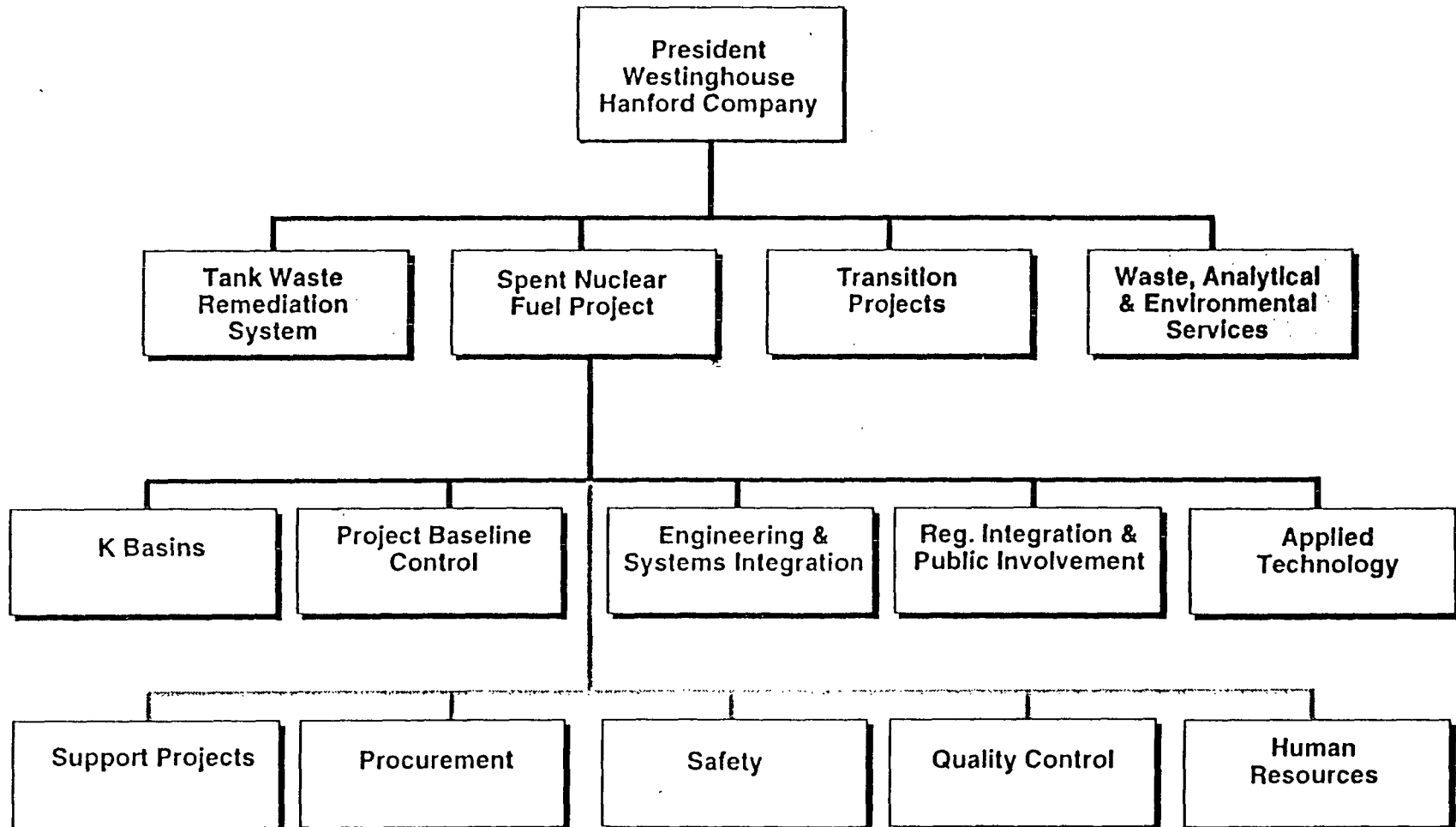
- DOE / WHC lines of authority
- Status
- Strategic objective for K Basin fuel
- Key milestones

U. S. Department of Energy Lines of Authority



Westinghouse Hanford Company

Lines of Authority



Hanford Spent Nuclear Fuel Project

*Number one priority is protecting the
Columbia River*

- No discharge is acceptable
- Isolate fuel from the environment
- Put in safe storage away from the river

Defense Nuclear Facilities Safety Board Recommendation 94-1

- (7) “That the program be accelerated to place the deteriorating reactor fuel in the K-East Basin at the Hanford site in a stable configuration for interim storage until an option for ultimate disposition is chosen. This program needs to be directed towards storage methods that will minimize further deterioration.”**

Hanford Spent Nuclear Fuel Project

Action needed to solve urgent problems

- Leak response plans
 - Earthquake vulnerability
- Aging facilities / worker safety
- Sludge/fuel characterization
- Sludge/fuel packaging

Hanford Spent Nuclear Fuel Project

Many pieces to the puzzle

- **Nowhere to put the fuel**
- **Don't know how to store it safely**
- **Don't want to trade today's problems for a future one**
- **Long-term solutions have to withstand the test of time — 30 to 50 year storage**

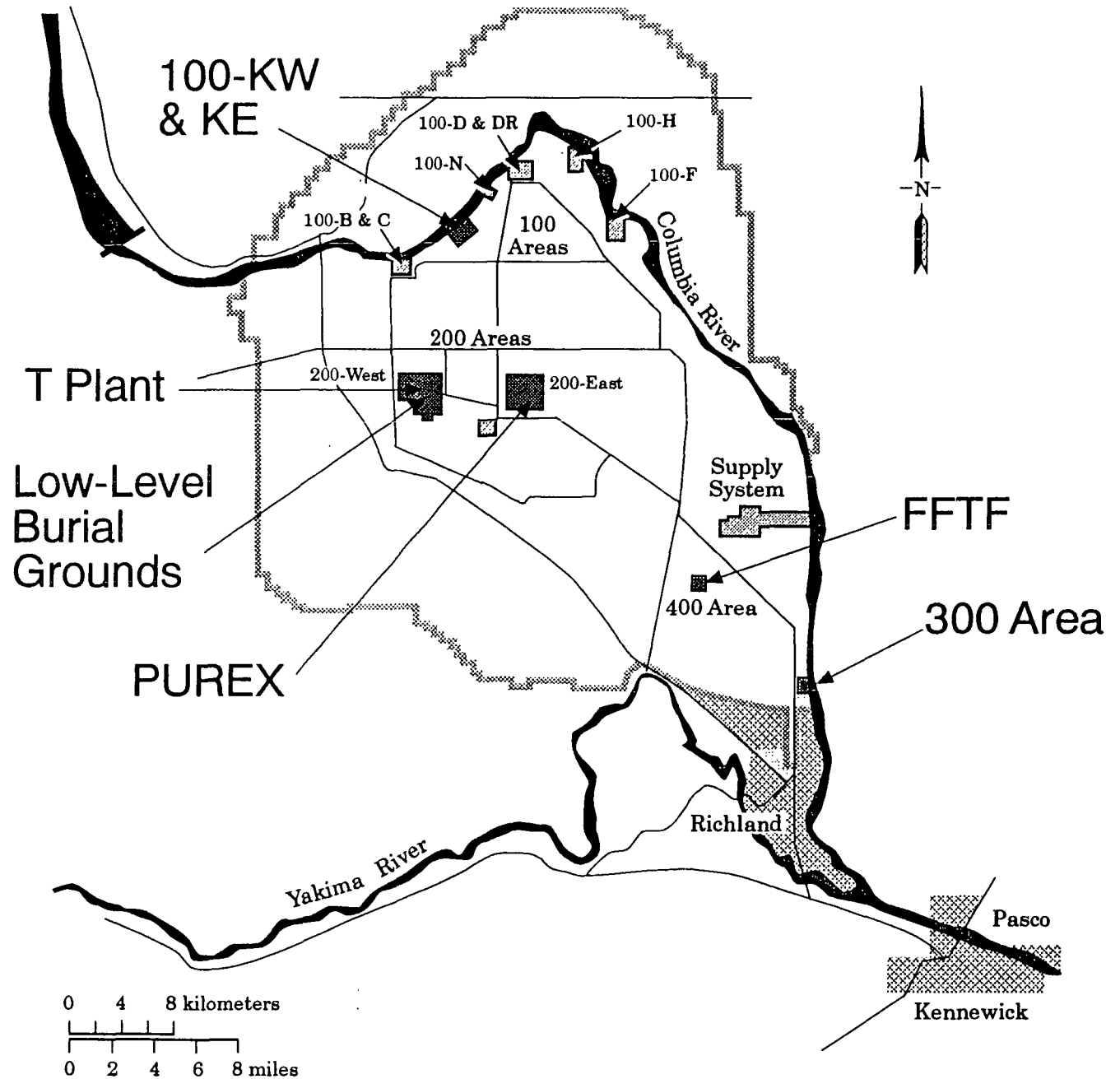
Hanford Spent Nuclear Fuel Project

Crucial decisions must be made

- Fuel and sludge encapsulation
- Expedited removal
- Fuel stabilization facility
 - Location
 - Cost and schedule
- Long-term storage
 - Programmatic EIS
 - Hanford EIS

Hanford Spent Nuclear Fuel Project Status

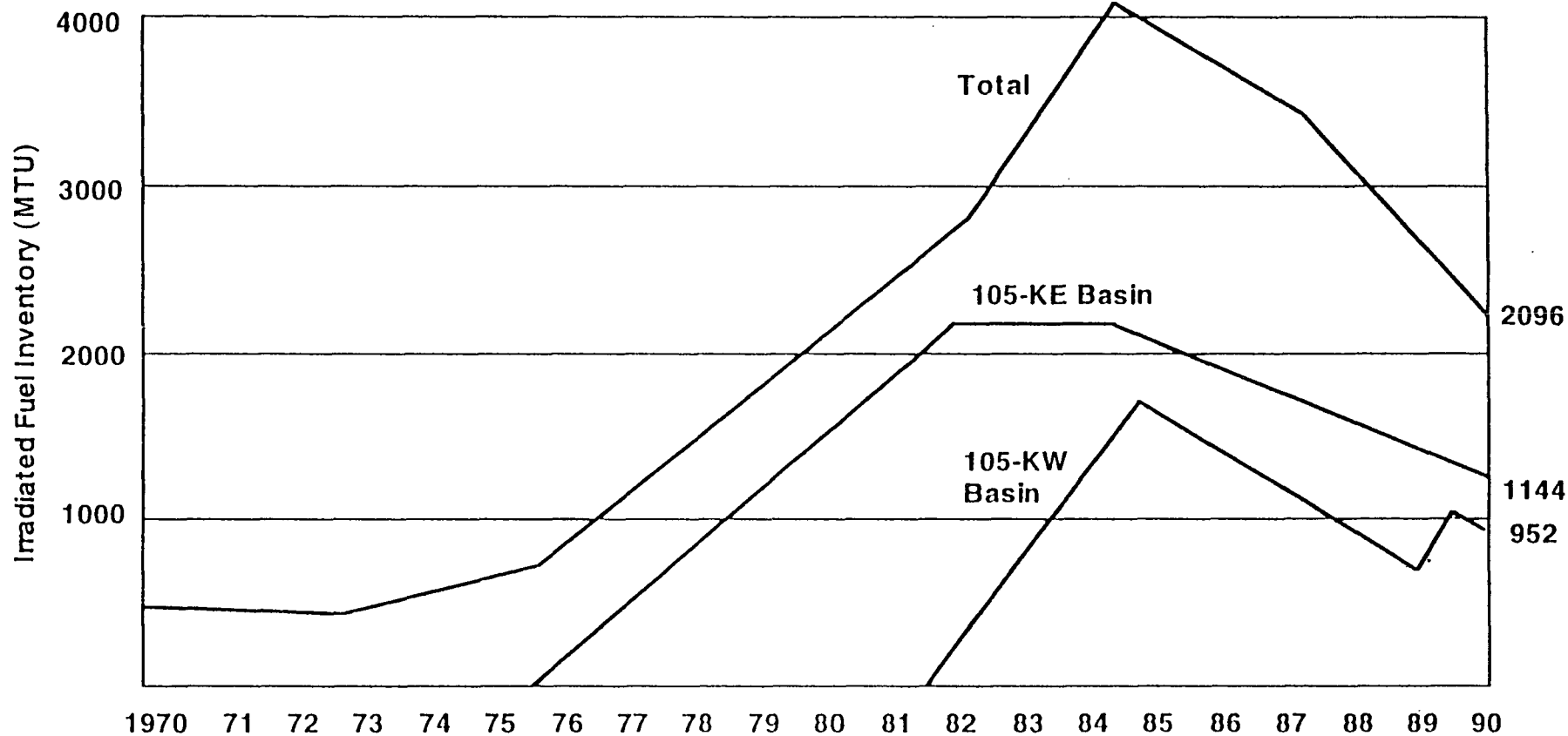
Location of Hanford Spent Nuclear Fuels



Irradiated Fuel Inventory at Hanford

<u>Fuel Type</u>	<u>Amount</u>	<u>Location</u>
• N Reactor	2095.8 MTU	K Basins, PUREX
• Single-pass reactor	3.4 MTU	PUREX, K Basins
• PWR Core II	15.7 MTU	T Plant
• FFTF	11.0 MTU	400 Area
• Miscellaneous	< 0.4 MTU	Low-level burial grounds
• Miscellaneous	2.2 MTU	300 Area

Inventory Stored Irradiated N Reactor Fuel



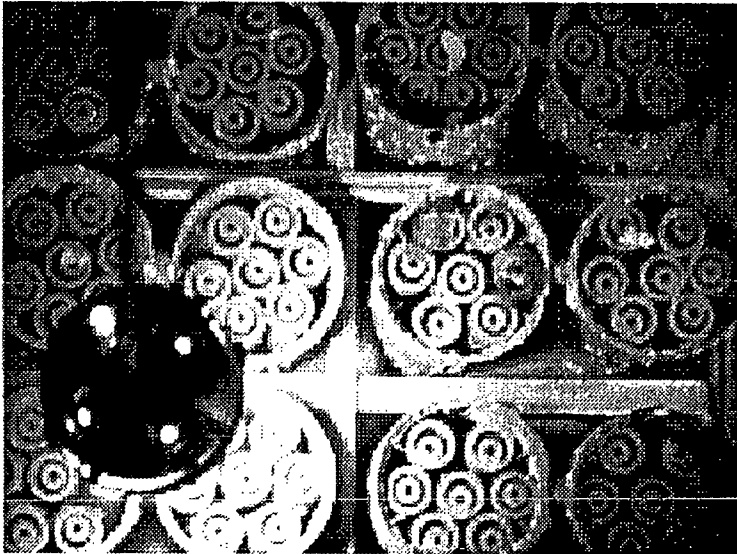
OPERATING

NOT OPERATING

N Reactor Operation

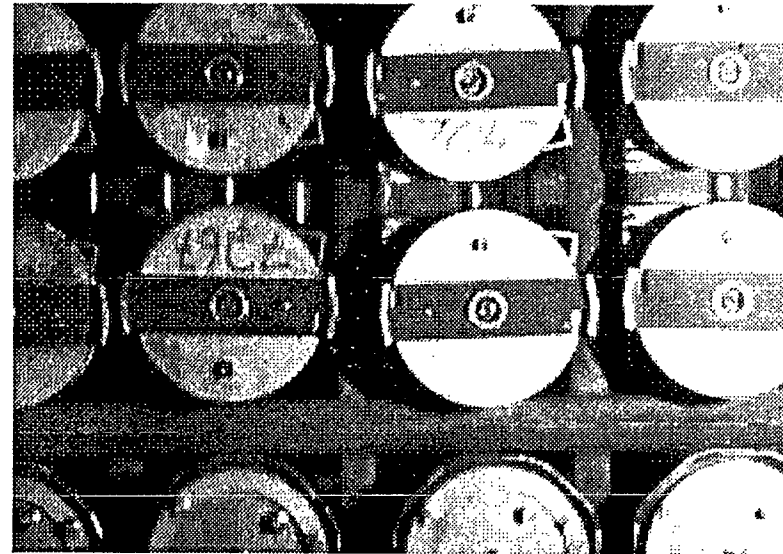
PUREX Operation

Two Basins, Two Histories



K-East Basin

- Reactivated to store irradiated N Reactor fuel in 1975
- Superficial cleaning of basin surfaces, not drained, concrete surfaces not coated
- Received N Reactor fuel in open canisters



K-West Basin

- Reactivated to store irradiated N Reactor fuel in 1981
- Drained, completely decontaminated, concrete surfaces coated with epoxy resin
- Received N Reactor fuel in sealed, encapsulated canisters

Both basins have systems for heat, particulate and dissolved radionuclide removal

Tri-Party Agreement Milestones

- Issue Notice of Intent for N Reactor Fuel EIS June 1994
- Begin K-East Basin fuel encapsulation June 1994
- Submit engineering study on moving K-East fuel to K-West Basin Sept. 1994
- Submit schedule for disposing of contaminated K-East Basin water Oct. 1994
- Provide a schedule for fuel / sludge encapsulation and contaminated water removal / replacement to regulators March 1995
- Begin K-East Basin sludge encapsulation June 1996
- Negotiate long-term fuel storage and disposition with regulators *June 30, 1996
- Complete K-East fuel and sludge encapsulation Dec. 1998
- Remove encapsulated fuel and sludge from K Basins Dec. 2002
- Remove, replace, or treat contaminated K-East Basin water *TBD

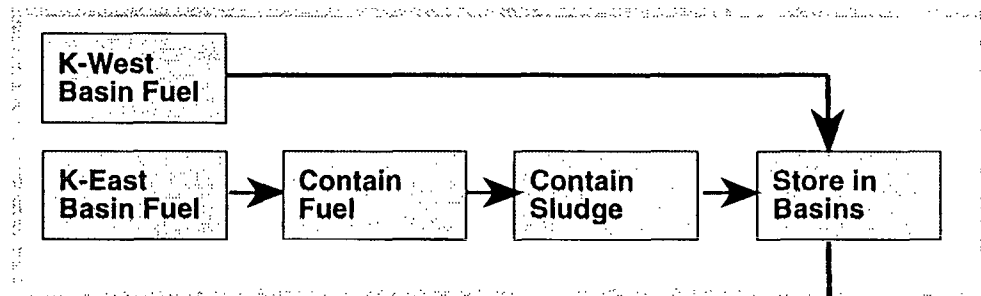
*Enforceable milestones

***Spent Nuclear Fuel Project
primary objective:***

Eliminate urgent risk

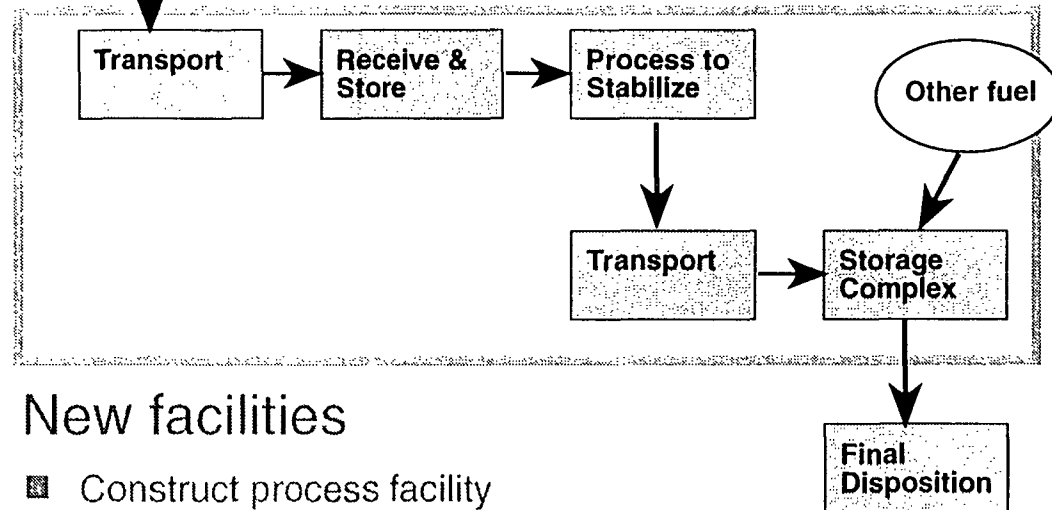
- **Remove fuel, sludge and contaminated water from the K Basins as soon as possible**

Current Path for Removing K Basin Fuel



K Basins

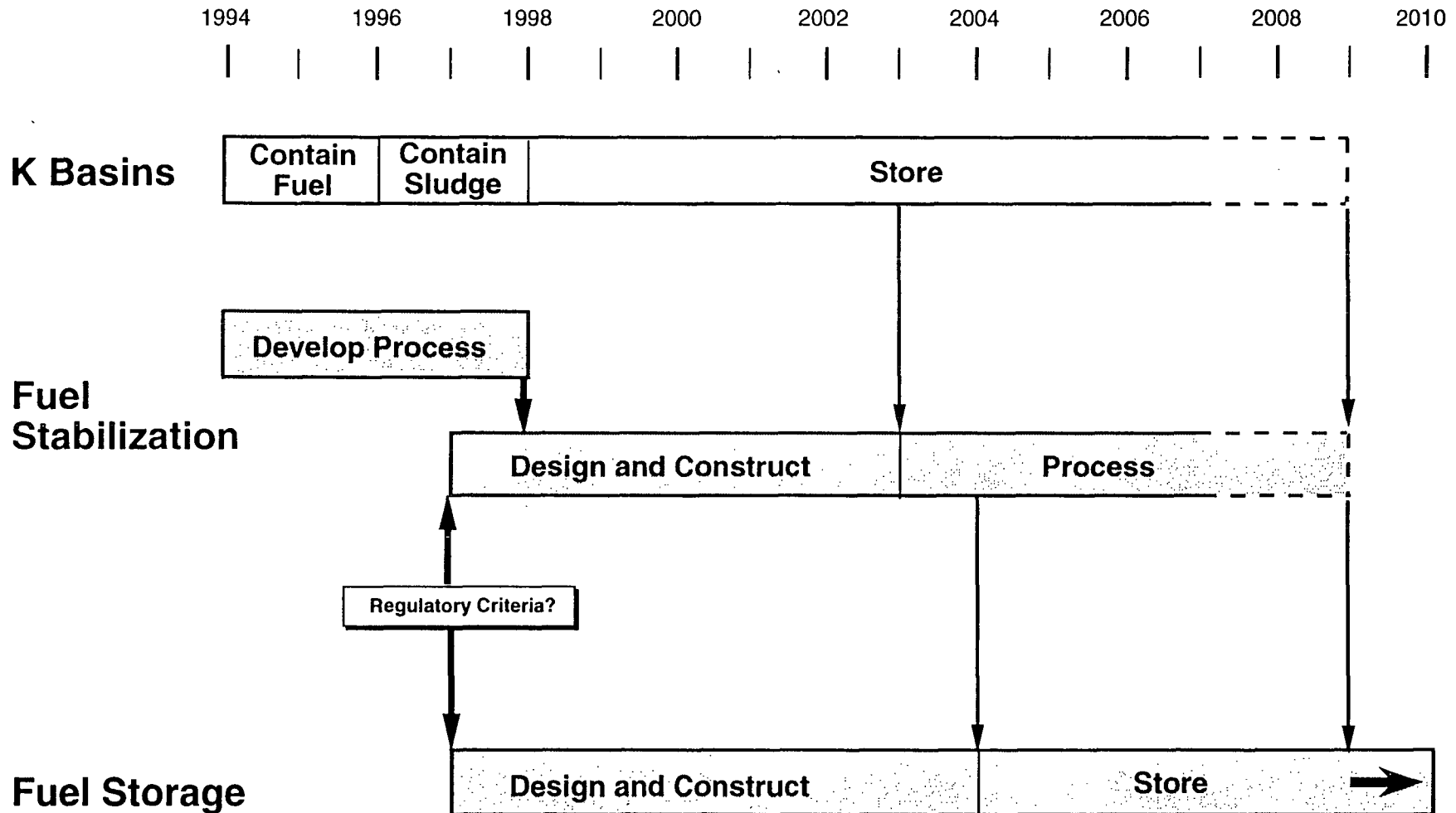
- Contain fuel (East Basin)
- Contain sludge (East Basin)
- Remove fuel & sludge by 2002?



New facilities

- Construct process facility
- Construct storage complex
- Needs to operate by 1998 to meet 2002

Current Schedule Dilemma



Potential Strategies

- Expedited fuel removal
- Foreign alternatives

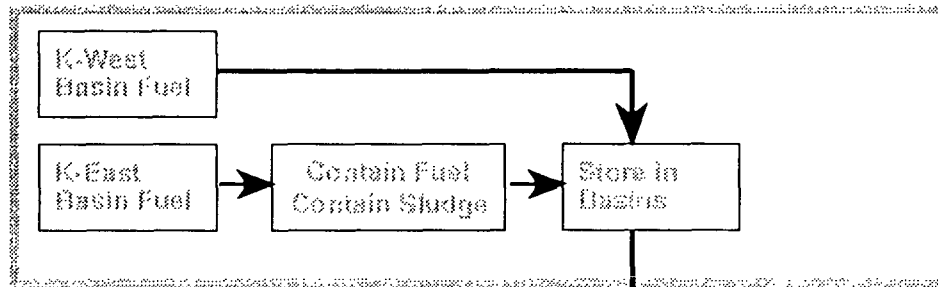
Expedited Fuel Removal

- **Modify an existing facility for near-term storage of K Basin fuel**
 - **Ideally use facility as feed storage for stabilization process**
- **Fuel and sludge removed much earlier**
- **Doesn't affect fuel stabilization, storage, and disposition options**
- **Stabilization and long-term storage are off critical path for K Basin closure**
- **Near-term construction budgets are reduced**

Expedited Fuel and Sludge Removal

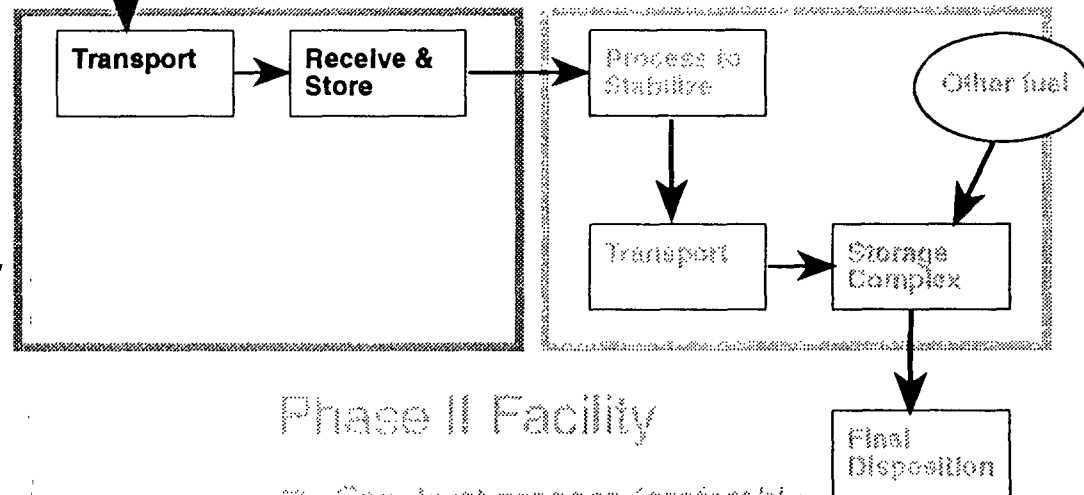
K Basins

- Contain fuel (East Basin)
- Contain sludge (East Basin)
- Remove fuel & sludge before 2002



Phase I Facility

- Construct storage facility in existing alternate facility (FMEF / Canyon facility / Spray Ponds)
- Operate by 1997 (target)
- Store for up to 10 years



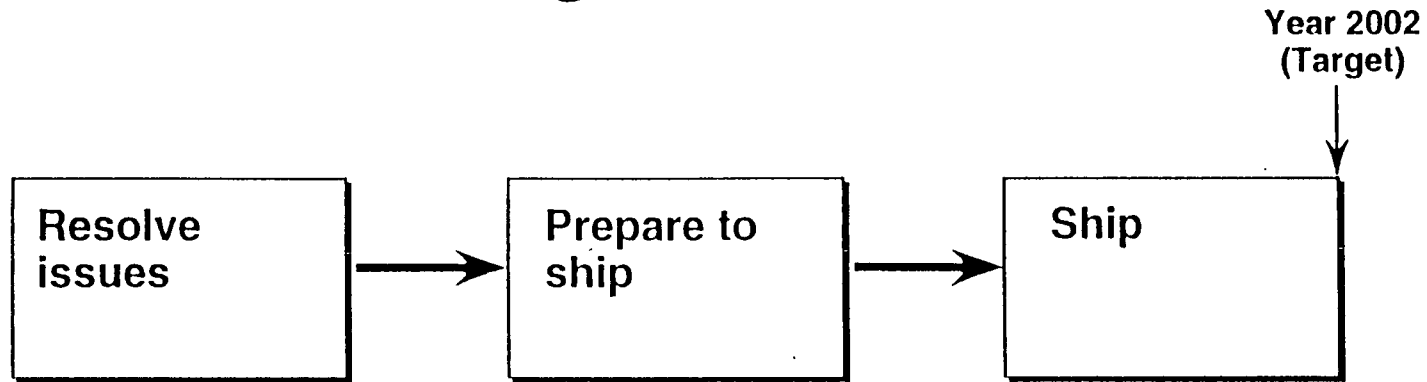
Phase II Facility

- Construct process (preferably in same or adjacent facility)
- Construct storage complex
- Operate when ready (> 2000)

Achieving Expedited Strategy Requires...

- **NEPA review concurrent with facility design and modification**
- **Issue NOI for Interim Action**
- **Capital funding plan for FY 1995 modification**
- **Early definition of regulatory criteria for near-term storage**
- **Development of acceptable retrieval/storage methodology**

Foreign Alternatives

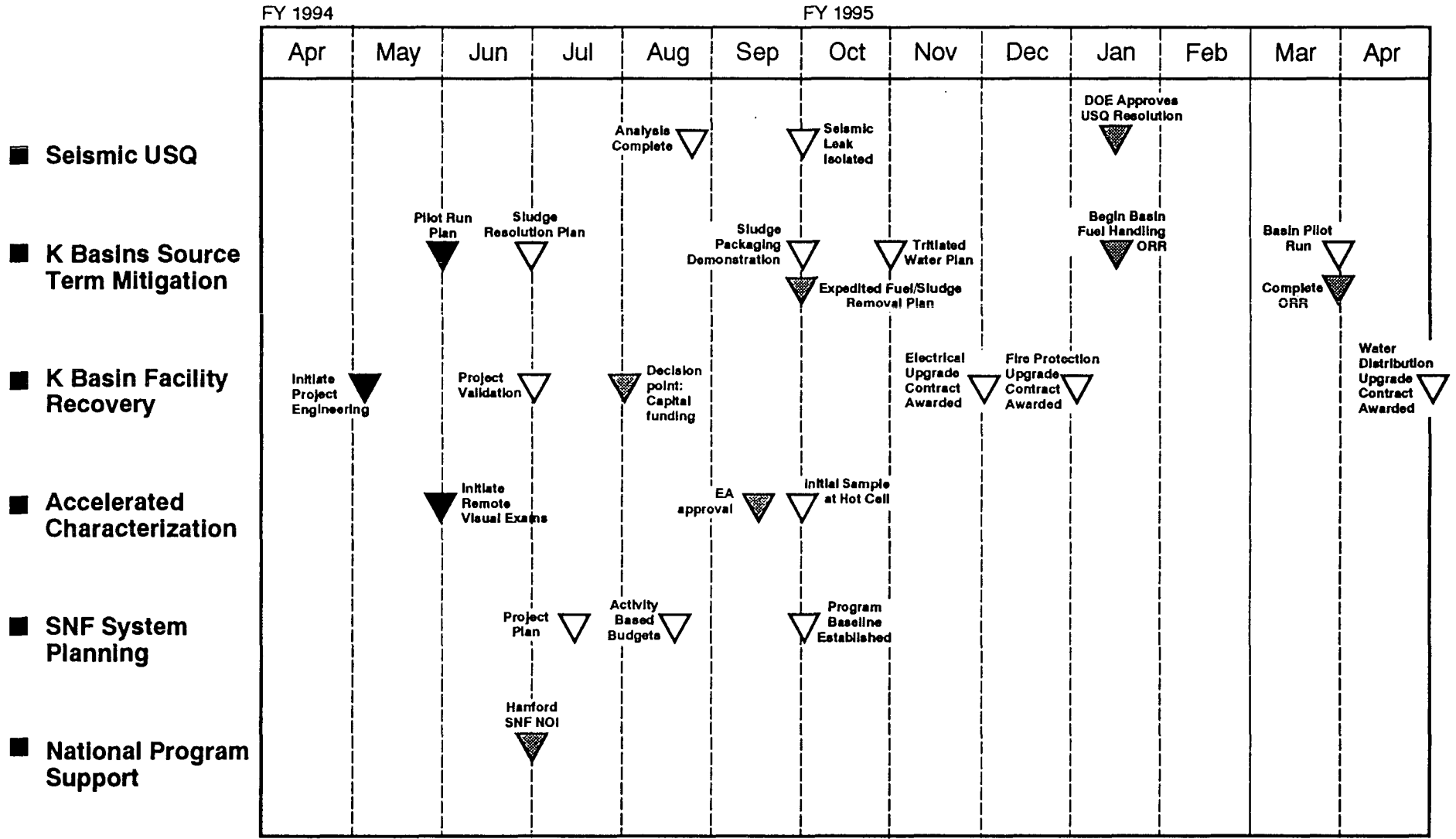


- **Advantages**
 - Lower investment in new facilities
 - Potentially lower life-cycle costs
 - No additional facilities to clean up
- **Issues**
 - Public involvement
 - Shipping
 - Institutional barriers
 - Challenge to meet 2002 target date

Key Milestones

Key Project Milestones

▼	Milestone complete
▽	HQ action required



To Achieve Milestones We Must...

Reprogram capital funding

- Accelerate fuel removal to interim facility
- K Basins essential systems

Reprioritize expense funding

- FY 1994: Reprioritize budgets to accommodate 60% increase in scope
- FY 1995: Anticipate additional budget review and reprioritization

Streamline review and approval process

- Delegation of approval authority to field
- Design/construction in parallel with NEPA review process

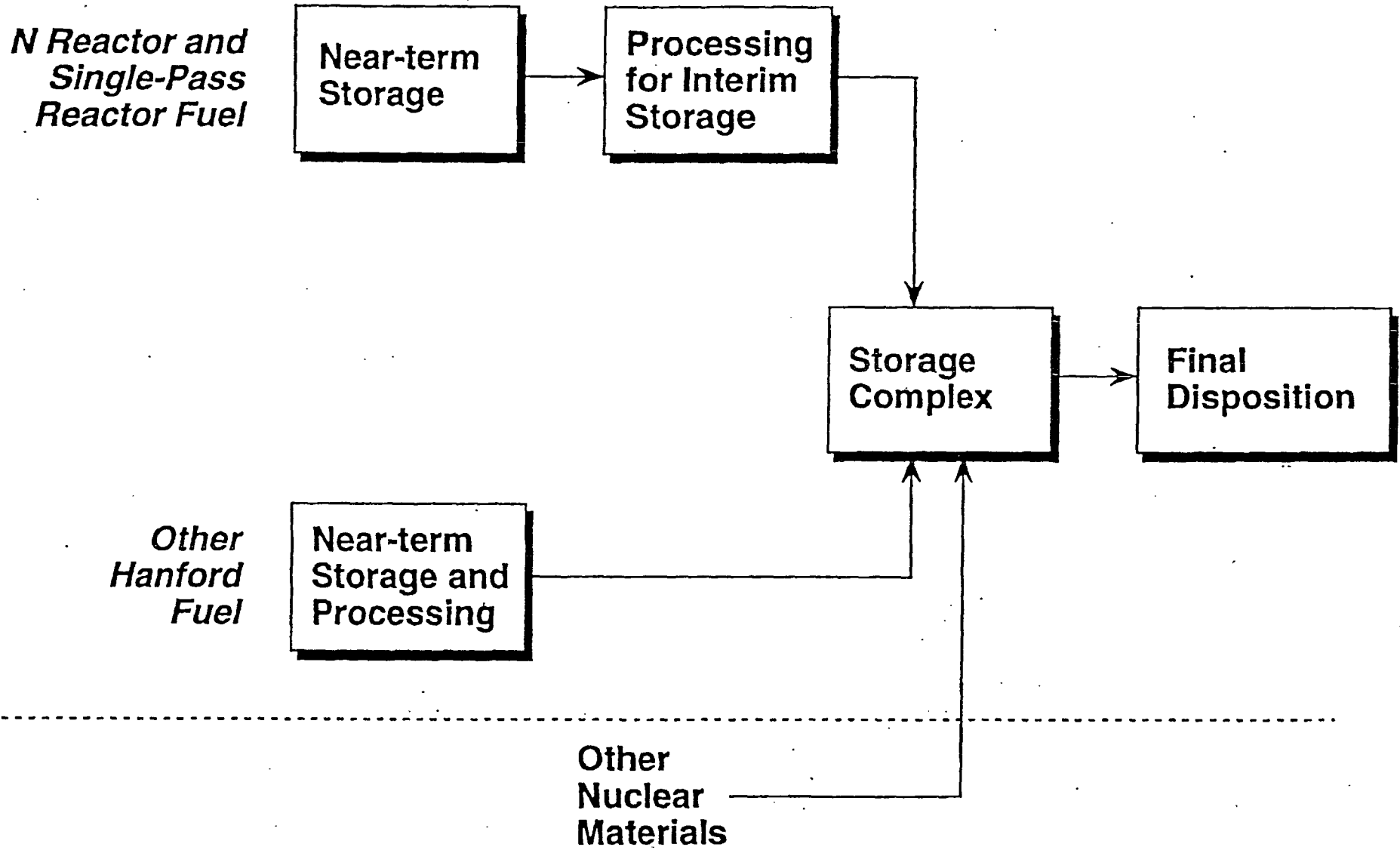
Define regulatory policy for future facilities

- DOE / NRC / EPA / RCRA

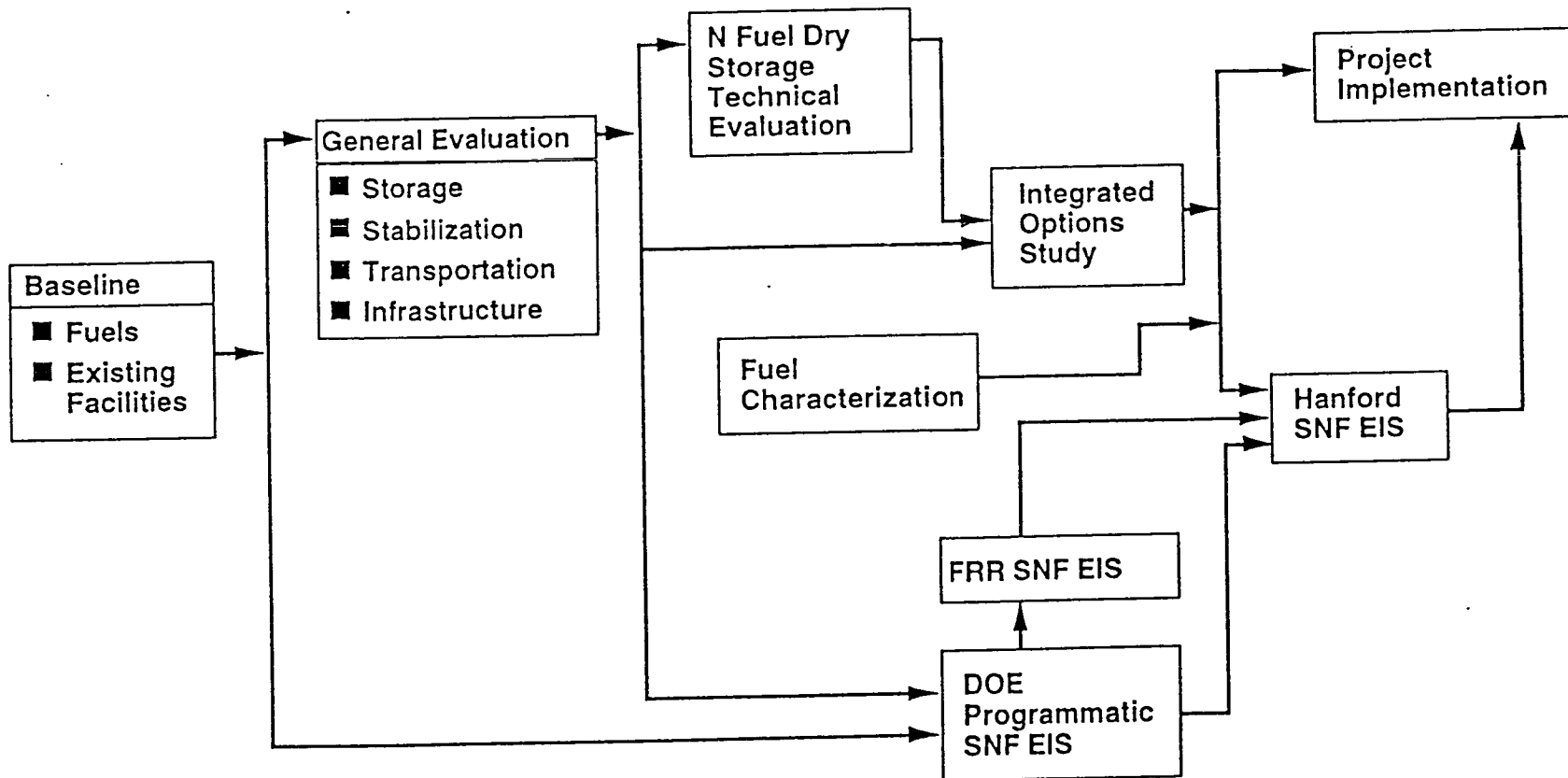
Assure public involvement in the SNFP decision process

- Strategic planning
- Fuel disposition alternatives

Spent Nuclear Fuel Project Logic



Technical Approach



Hanford Spent Nuclear Fuel

General storage concepts

- Separate fuel storage
- Fuel storage complex
- Multi-purpose storage complex

Storage options

- Dry cask or caisson
- Wet pool
- Dry vault

Hanford Spent Nuclear Fuel

Stabilization options

- Drying
- Oxidation
- Separations