NUCLEAR DECOMMISSIONING: DANGERS & OPPORTUNITIES

An Overview of Failed Policies, State & Local Impacts, and Proactive Solutions

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Nuclear Information and Resource Service
For a Nuclear-Free, Carbon-Free World

Overview

1. What is Nuclear Decommissioning?
2. Why does Decommissioning matter?
3. Policy and Trends
4. State and Local Impacts
5. Corporate Liability
6. Nuclear Waste and Decommissioning
7. Policy Solutions

Decommissioning: What is it?

Reactor Decontamination and Dismantlement

- Funding Assurance and Trust Funds
- Up to 60 years to complete
- $1 billion+ per reactor

Cleanup and Remediation

- License termination – based on residual contamination
- State and federal jurisdiction

Radioactive Waste Management

- “Low-Level” Radioactive Waste
- Irradiated (“Spent”) Fuel Storage

Why does it matter?

Radioactive and Toxic Cleanup

Worker Health and Safety

Nuclear Waste Dangers

- Irradiated (“spent”) fuel to remain on-site for decades

Economic Redevelopment

Environmental Justice

- Thousands of tons of “Low-Level” Radioactive Waste (LLW)
- LLW dumps located in Black, Latinx, Indigenous communities

Yankee-Rowe: reactor building being dismantled, and site after decommissioning. Continued groundwater monitoring for PCBs and tritium (radioactive hydrogen)

Energy Solutions Radioactive Waste Dump -- Barnwell, SC

- **47% African-American**
- **$26,700 median income**
- **Tritium plume spreading to aquifer and creek**

Historical Background

Current regulations originally overturned (1995)

- Citizens Awareness Network v. NRC
- NRC “reinterpreted” prior decom rule without public notice
- Decided not to require Yankee Atomic to submit a plan before completing 90% of decommissioning work
- Court found NRC “arbitrary and capricious … utterly irrational … lacked any rational basis”

NRC issued new rule (1996)

- Formalized the practice in Yankee Atomic
- No approvals needed until License Termination
- No public hearing rights, no regular inspections, enforcement

Where is NRC Headed?

Industry Economic Pressures

- Reactor Closures, Decom Fund Shortfalls, Corporate Liability

Permissive Exemptions at Public Expense

- Use of Decommissioning Funds for Non-Decom Expenses
  - Taxes, Legal Fees, Irradiated Fuel Storage
- Elimination of Emergency Planning

NRC Proposed Rule

- Redefine decommissioning to justify further deregulation
- Codify exemptions, no restoration of public involvement

Problems Facing Decommissioning

False Choices

- DECON: Rapid Dismantlement
- SAFSTOR: Delayed Dismantlement (<60 years)

False Promises

- Cost-reduction & decom fund assurance
- Greenfield and re-development of site

False Security

- No need for emergency planning
- Removal of irradiated fuel

Corporate Interests

Decommissioning Trust Funds

- Required by NRC Decommissioning Funding Assurance regulation
- Similar to a pension fund – based on target date and cost estimate

Many Reactors have Insufficient Funds

- NRC cost estimate have proven too low
- Companies not saving enough -- planning to wait 60 years

Companies Want to Avoid Decom Liabilities

- Keep decom fund shortfalls off their balance sheets
- Avoid litigation with state and local governments

For-Profit Decommissioning

New Business Model

- Two new consortia “buying” reactors to decommission
- Acquiring decom trust funds
- Paying themselves to conduct decommissioning

Potential Bankruptcy Risks

- Parent companies under-capitalized
- Reactors owned by Limited Liability Corporations subsidiaries
- LLCs could go bankrupt, leave decom in limbo

Combining Decom with Nuclear Waste Storage

- Holtec and WCS/Northstar plans for consolidated interim storage

Risks of Consolidated Storage

Consolidated Interim Storage Proposals

- Transport irradiated fuel from reactors to “temporary” facilities
  - **Holtec** – New Mexcio (up to 180,000 tons)
  - **WCS** – Texas (up to 40,000 tons)

Environmental Racism

- Sites located in Hispanic communities

Increased Dangers

- Transport routes cross through 380+ Congressional districts
- Waste still remains at 70+ reactor sites for decades
- CIS could become *de facto* permanent
  - Law prohibits DOE from undertaking CIS before opening a repository

Nuclear Waste Profiteering

DOE Liable for Waste Storage Costs

- Violations of contract under NWPA
- Nuclear power companies sue for damages (~$300 million/year)

Nuclear Waste as a Business Opportunity

- Ownership of irradiated fuel AND the right to sue DOE for the cost of storing it
- Industry projects up to $50 billion in payments
- Costs could be greater if costs for CIS were accepted

Risk to Decommissioning Sites

- After waste moved to CIS, reactor sites could be abandoned
- Remaining cleanup in limbo

Summary of Recommendations

Regulate Decommissioning for Community Restoration

1. Require Decommissioning Plans
2. Restore Public Hearing Rights and Safeguards
3. Restore NEPA Compliance
4. Require Full Decom Funding Upon Closure
5. Bar Exemptions for Decom Fund Expenses
6. Permit State Oversight of Decom
7. Mandate NRC Inspections and Oversight
8. Maintain Emergency Planning
9. Require Hardened On-Site Storage of Irradiated Fuel
10. Set Protective Standards for Dry-Cask Storage
11. Prohibit Consolidated Interim Storage
12. Pay Reactor Communities for Storing Waste (STRANDED Act)

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The Process

30 and 90 Days -- Shutdown Notifications

- Reactor shutdown and Removal of fuel from reactor

2 Years -- Post-Shutdown Decommissioning Activities Report (PSDAR)

- Short document, no specific plans, generic environmental impact statement
- Major activities to begin 90 days after submission
- No NRC approval required
- Public comment meeting - no hearing rights

≤ 60 Years -- License Termination Plan

- Must be submitted prior to completion of decommissioning
- Details site characterization, remediation plans, and final state

Decommissioning Options

NRC "Options"

- Timeframes and End State - not "models" or "methods"

DECON = Rapid Dismantlement ("strip and ship")

- Completion in 10-20 years
- Concerns: worker safety, community risk, waste disposal

SAFSTOR = Deferred Decom ("mothballing")

- Completion in up to 60 years
- Concerns: degradation, memory loss, decom fund, corp. liability

ENTOMB = Secure Reactor in Place

- Never used in U.S.

Which Way is Best?

Model Option Needed

- Guide Licensees in Decom Planning
- Help States, Communities Evaluate Decom Plans

Balance Short- and Long-Term Safety, Risk, Cost

Rancho Seco Example

- Decom Fund Shortfall at Closure Date (1989)
- Limited Use of SAFSTOR
- 5-10 Years of Careful Planning
- Retained ~50% of the Workforce
- Decom Completed in ~20 years (2009)

Planned Decom and Site Remediation (PDSR)

- Proposal by Citizens Awareness Network and NIRS

License Termination

Three Options for License Termination

- Decom can be very near completion before LTP submitted

Unrestricted Use

- Radioactivity reduced to "permissible level" - *NOT "greenfield"*
- 25 mRem/year - lower depending on state standards (10 mRem)

Restricted Use

- ≤ 100 mRem/year: specified uses of site (e.g., industrial)
  - NRC: 1 cancer fatality per 286 people
- ≤ 500 mRem/year: institutional controls, no public use, etc.

Background: Decom Funding

NRC Funding Assurance Rule (1986)

- Utilities Unprepared: Ft. St. Vrain, Rancho Seco

Shortfalls: Rowe, CT Yankee

- Utilities return to ratepayers

Utility Deregulation

- Merchant Reactors and LLCs
- Decom Fund transfers - no ongoing investment
    - Funds vulnerable to market crashes
- Parent Corporation Liability Uncertain (Unlikely?)

Decom Funding Methods

Four Methods under NRC Rules

- Combinations of Methods Acceptable

1) Sinking Trust Fund

- Similar to a pension or Social Security trust fund
- Depends on Annual Contributions and Adjustments
- Only Applies to Utility-Owned Reactors

2) Prepayment

- DTF Transfers to Merchant Reactors treated this way

3) Insurance or Surety Bond

- Verifiable Insurance Instrument/Policy

4) Parent Company Guarantee

NRC Permits Mismanagement

Exemptions for Use of Decom Funds

- Depletes Decom Funds for Non-Decom Purposes
- NRC Accepts SAFSTOR to Justify

Typical Exemptions Granted

- Fuel Transfer/Storage
  - Despite Dept. Of Energy legal settlements (~80% of cost)
  - No reimbursement of Decom Fund required
- Property Taxes
- Emergency Planning
- Lobbying and Legal Costs

Effectively a Subsidy to Parent Companies

Indian Point Decom Funding

Licensees Required to Report Every Two years

- DTF Balances and Decom Cost Projections
- Decommissioning Costs = radiological decommission ONLY
  - ***NOT*** fuel storage, site remediation, emergency planning, property taxes, etc.

Entergy March 2017 Report

Reactor	Trust Fund Balance	Cost Estimate	Difference
Indian Point 1	$442.9 million	$590.8 million	-$147.9 million
Indian Point 2	$564.1 million	$495.2 million	+68.9 million
Indian Point 3	$719.2 million	$495.2 million	+$224.0 million
TOTALS	$1.73 billion	$1.58 billion	+$145 million

Projections vs. Reality

Indian Point Funding Looks Good on Paper

- Better than Most Other Reactors
- Nine Mile Point + Ginna = -$365 million

PROBLEM: NRC Cost Projections Inadequate

- Universally Low vs. Reality
- Annual Escalation Factors not Accurate or Adequate
    - 2017 Indian Point estimates are LOWER than 2015

Site-Specific Estimates = 30%-60% Higher

- Vermont Yankee PSDAR: 33% increase
- Oyster Creek 2017: site-specific = 50% higher than NRC minimum

Actual Costs Escalate Further

- Complications, New Plumes, Waste Disposal Costs, etc.

1. Require Full Decom Funds

Decommissioning Funding Crisis Undermines Safety

- Reactors Closing without Adequate Decom Funds
- Licensees Exploit SAFSTOR to Avoid Compliance
- Deferring Cleanup for Decades

Easily Fixed: Require Full Decom Funds by Time of Closure

- Require Full Decom Funding when Reactor Closes
- Do Not Permit SAFSTOR to Make Up for Inadequate Planning

2. No Use of Decom Funds for Non-Decom Expenses

Trust Funds Only for Radiological Decom

- NOT High-Level Waste Storage
- NOT Emergency Planning
- NOT Property Taxes
- NOT Lobbying

NRC Exemptions Compromise Decom Funding

Permits Profiteering from Decom Funds

- HLW Settlements Cover 80% of Costs
- NRC Does Not Require Licensees to Reimburse Trust Fund

3. Restore NEPA Compliance

Reclassify Decom as a Major Federal Action

Requires Meaningful Oversight

EPA Involvement Needed

- EPA Role Limited to Groundwater Contamination
- Significant Chemical Contamination at Reactor Sites

4. Restore Public Hearing Rights and Democratic Safeguards

Decom Must be Accountable to Communities, States

NRC Rule Changes Afford No Meaningful Public Involvement

- Only One Public Meeting (PSDAR)

Full Hearing Rights Needed

- Cross Examination
- Discovery

5. Require Full Decom Plans

PSDAR = Figure-It-Out-As-We-Go

Decommissioning Highly Site-Specific

- Reactor Design, Modifications
- Operational History and Contamination
- Geological and Hydrological Features

Detailed Site Surveys and Planning Required

- Worker Safety and Radiation Exposure
- Radiological Controls and Community Safety
- Site Remediation and Pollution Controls
- Financial Planning and Cost Management

6. Place Restrictions on SAFSTOR and DECON

Choice of Decom Options not Neutral

- DECON = Radiation Risk to Workers, Community
- SAFSTOR = Contamination Spread, Site Abandonment Risk

Decom Method Selection Must be Justified

- Community Protection over Financial Concerns

Use of SAFSTOR Must be Limited, Conditional

- Term of SAFSTOR Minimized/Optimized
- Begin Decom at Earliest Possible Date

7. Create a 4th Decom Option

Model Option Needed

- Guide Licensees in Decom Planning
- Help States, Communities Evaluate Decom Plans

Balance Short- and Long-Term Safety, Cost

Rancho Seco Example

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- Several Years of Careful Planning
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Planned Decom and Site Remediation (PDSR)

8. Establish Site-Specific Advisory Boards

Affected Communities Have a Right to Be Informed, Involved

Community Advisory Boards Provide a Model

- Regular, Open Meetings
- Forum for Q&A with Licensee, Regulators
- Weakness: No Real Authority

Formalize Site-Specific Decom Advisory Boards

- Stakeholder Representation: Tribal, Local and State Governments, Public Interest Organizations, Reactor Workers
- Access to Information, Licensee and NRC Staff
- Resources to Hire Technical Consultants

9. Allow States to Regulate Decom

Decom Outcomes Affect States Directly

- Delays Affect Communities, Tax Base
- Failures Require State Intervention
- Fund Shortfalls Cost Taxpayers, Ratepayers

NRC Certifies States to Regulate Radioactive Materials

- Agreement States Program Provides Mechanism
- States Regulate Chemical Pollution

Safety Issues Reserved to NRC

- ANPR Affirms Nuclear Safety Concerns Minimal
- HLW Waste Management

10. Require Inspections and Oversight

Currently No Basis for Oversight or Enforcement

- No Decom Plans
- No Resident Inspectors, Assigned Staff, or Inspections

Dedicated Inspection Staff Needed

- Report to Community Advisory Board
- NRC Institutional Knowledge of the Decom Project
- Creates Atmosphere of Accountability

Regular Inspection Schedules

- Programmatic Oversight and Performance Evaluation
- Unannounced Inspections Possible

11. Increase Decom License Fees

NRC License Fees Send the Wrong Message

- Decom License Fees = less than 5% of Operating Reactor Fees
- 2015: $223,000/yr. vs. $5,030,000/yr.

NRC Must Have Resources for Decom Oversight

Conflict of Interest for NRC

- Enforcing Regulations Undermines Job Security at NRC

NRC Must Adapt to Industry Changes

- Agency Funding Crisis Looms with Reactor Closures