

DECOMMISSIONING FACT SHEET

By Bob Alpern

The decommissioning of a nuclear reactor involves safe removal from service and reduction of on-site residual radiation to a level that permits release of the property and termination of the operating license.

Under regulations of the Nuclear Regulatory Commission, the process must be complete within 60 years after the end of operations, unless an extension is required to protect public health and safety.

Release for unrestricted use requires reduction of residual radiation to a level "as low as reasonably achievable," considering economic and societal factors (ALARA) -- at a minimum, a total effective dose equivalent to that of an average member of the critical group of at least 25 millirems per year, including the dose from groundwater. Release for restricted use requires approval by the Nuclear Regulatory Commission on a case-by-case basis.

These strategies are available:

- Immediate Dismantlement (DECON) – clean-up of contaminated plant systems and structures and removal of radioactive fuel;
- Safe Storage (SAFSTOR), or delayed decon – maintenance and monitoring to allow radioactivity to decay;
- a combination of immediate dismantlement for portions of the facility and safe storage for the rest, and
- Entombment (ENTOMB) – permanent encasing, appropriate maintenance and monitoring.

The minimum cost of decommissioning is covered by contributions over the period of operations. Minimum cost is determined by formula under CFR Title 10, Part 50.75. The NRC estimates the costs for decommissioning a nuclear power plant from \$280-\$612 million.

Relevant documents are:

- the Post Shut-Down Decommissioning Activities Report (PSDAR)
- the License Termination Plan.

Relevant rules of the Nuclear Regulatory Commission are Code of Federal Regulations Title 10, Part 20, Subpart E, and Parts 50.75, 50.82, 51.53 and 51.95.

These American nuclear facilities have been closed:

- Piqua (OH)(1966)
- Humboldt Bay (CA)(1996)
- 3-Mile Island 2 (PA)(1979)
- Ft. St. Vrain (CO)(1989)
- Rancho Seco (CA)(1989)
- Yankee Rowe (MA)(1991)
- Trojan (OR)(1992)
- Shippingport (PA)(1993)
- Maine Yankee (ME)(1996)
- Connecticut Yankee (Haddam Neck)(CN)(1996)
- Big Rock Point (MI)(1997)
- Zion I and II (IL)(1998)

In addition, there is a closed interim storage pool in Morris (IL), intended for use as a reprocessing facility.

CITIZENS AWARENESS NETWORK, WEBSITE DISCUSSION OF DECOMMISSIONING

According to CAN: nuclear corporations choose the decommissioning option without community input, submit generalized plans with no detailed description of specific activities, and have sole responsibility for creating community advisory boards. NRC oversight is curtailed, because decommissioning is not considered a major federal action. There are no opportunities for adjudicatory hearings.

According to CAN: Stripping and shipping the reactor can be accomplished before the NRC approves the decommissioning plan (before 1993, NRC rules required preparation of an EIS and plan approval before major dismantlement could begin).

CAN believes decommissioning should involve:

- dismantling reactor components and transporting them for burial off-site
- site clean-up (“greenfielding”),
- safe on-site storage of spent fuel: removal from fuel pools, storage in dry casks;
- monitoring by an independent citizens oversight committee.
- full-funding.

Full-funding may be a special problem for “merchant” operators like Entergy: unlike utilities, merchant operators do not have ratepayers to charge for cost overruns.

The material on decommissioning on the CAN website raises these questions:

- Whose rules govern the processes of de-commissioning, release for unrestricted or restricted use, and payment? Do federal rules preempt state and local regulation? What are the roles of the NRC, USEPA, USHEW and USDOT? How is implementation overseen?
- On the decommissioning strategy: who chooses the strategy? When must the choice be made?
- On the Decommissioning Plan: when is a Plan required? What topics are covered, in what detail? What is the process for Plan approval? Can stripping and shipping precede approval?
- On release for unrestricted or restricted use: who makes the determination to release, either restricted or unrestricted? Is there any oversight after release?
- What citizen input is required or allowed, through a community advisory committee or adjudicatory hearings?
- How are the costs for decommissioning paid for?
- Is there a good, detailed description of the Rancho Seco model?

TIM JUDSON Q&A

Q. Whose rules govern the decommissioning processes, including physical decommissioning, release, and finance? Do federal rules preempt state and local regulation? What are the roles of the NRC, USEPA, USHEW and USDOT? How is implementation overseen?

Judson: NRC rules govern. Soil and water rules are set by USEPA and the state (25 millirems – for male adults). Transportation rules are set by USDOT and the state – generally, the rules for transport of toxic waste, plus special rules for transport of reactor components.

Q. On the Decommissioning strategy: Who chooses the strategy? When must the choice be made?

Judson: The choice of strategy is part of the Decommissioning Plan – prepared by the operator, approved by the NRC.

Q. On the Decommissioning Plan: When is a Plan required? What topics are covered, in what detail? What is the process for Plan approval? Can stripping and shipping precede approval?

Judson: A Decommissioning Plan must be submitted two years before license expiration (still?). NRC approval follows (a) technical approval by NRC staff and a period for public comment and possibly intervention; and may be followed by appeal.

Q. On release: who determines release, either restricted or unrestricted? Is there any oversight after release?

Judson: NRC and State together determine release. Oversight after release is minimal.

Q. What citizen input is required or allowed, through a community advisory committee or adjudicatory hearings?

Judson: Advisory Boards are not required by the NRC; they are established voluntarily by the operator and the local municipality.

Q. How are the costs for decommissioning paid for?

Judson: NRC rules cover only the costs of stripping and shipping, not greenfielding. For Indian Point, the Decommissioning Fund was supported by ratepayers to Con Edison and NYPA and was transferred to Entergy when it acquired the plant: Entergy has made no contributions to the Fund.

Q. Describe the Rancho Seco model.

Judson: Rancho Seco differs in significant ways from Indian Point: its operator was a municipal utility; it was closed by a municipal referendum; the municipality was in charge of decommissioning.

RANCHO SECO NUCLEAR GENERATING STATION

The Rancho Seco Nuclear Generating Station was a 9130 MW nuclear facility in Herald, California, operated by the Sacramento Municipal Utility District (SMUD) from 1975 to 1989. Operation was terminated by municipal referendum 11 years before expiration of the NRC license in 2008.

Decommissioning took nearly 20 years to complete (2005)(?) at a cost of more than \$500 million (?)

After decommissioning, the NRC approved Release of most of the 2100 acre site for unrestricted use in 2009: 11 acres are in restricted use, including a building for storage of low-level waste and a facility for dry-cask storage of spent nuclear fuel. 22 dry-cask containers are stored on site.

MAINE YANKEE

Maine Yankee was a 900 MW nuclear plant in Wiscasset, Maine, that operated 24 years before it closed in 1997. Immediate Decommissioning took 8 years to complete at a cost of \$568 million. 60 dry-cask containers are stored on site.

ZION 1 AND 2

Zion 1 and 2 were two 1040 MW nuclear plants in Lake County, Illinois, 40 miles from Chicago and 42 miles from Milwaukee, operated by Commonwealth Edison, an Exelon subsidiary, from 1973/4 to 1997.

The Decommission Plan calls for long-term safe storage until November 2013, followed by decontamination and dismantlement and closure in December 2026. Estimated cost is \$1 billion.

However, decommissioning could not begin because the Decommissioning Trust Fund could not cover decommissioning costs after it lost 20% of its value: Exelon estimated the Fund would grow sufficiently only by the late 2020's. In 2011, Exelon transferred title to Zion 1 and 2 to EnergySolutions a nuclear waste company: however, EnergySolutions has had major financial and organizational problems and is being purchased by Energy Capital Partners.