

Decommissioning: A New Era in the U.S. Nuclear Power Industry; A Critical Need for Congressional Oversight

A backgrounder compiling information and views from a range of public interest groups*

The US civilian nuclear fleet is aging out and shutdowns are accelerating. Six plants have closed since 2013. Most of the rest will inevitably close over the next 20 years. The process of dismantling a closed plant, securing or removing its radioactive waste, and lowering the site's residual radioactivity is called **decommissioning**. Getting it right is critical to public health, safety and security, while getting it wrong poses existential threats.

Testifying before the US Joint Committee on Atomic Energy in 1959, L.P. Hatch of Brookhaven National Laboratory said, "If we were to go on for 50 years in the nuclear power industry, and find that we reached an impasse, that we had been doing the wrong thing with the wastes, and we would like to reconsider disposal methods, it would be entirely too late." Fifty years later, after decades of building up nuclear waste at reactor sites with no solution for disposal, we're fast approaching that impasse.

As nuclear plants close, what were previously profitable assets become liabilities, including large quantities of high-level radioactive waste, which owners are eager to offload. Enabled by recent legislative and regulatory changes, with more coming, two private decommissioning companies in particular are acquiring closed nuclear plants and improvising nuclear decommissioning and waste disposal methods for profit, with little or no input from affected communities or local or state governments. The two companies are Holtec (i.e. Holtec International's joint venture with the Canadian firm SNC-Lavalin) and NorthStar (i.e. NorthStar's joint venture with French subsidiary Orano, formerly Areva).

Their methods include dismantling the plants as quickly and cheaply as possible to claim the maximum remaining ratepayer-financed decommissioning funds as profit, dry storage of intensely radioactive and thermally hot spent fuel in canisters not designed for the periods required, and surface transport of spent fuel and high-level waste across the US to "consolidated interim storage" (CIS) sites in New Mexico and Texas owned by Holtec and Northstar.

These practices can generate big profits for the companies, but they also raise unresolved dilemmas and safety issues: e.g., how fast can nuclear plants be safely dismantled, to what standard a site should be remediated to protect public health and safety, how long highly radioactive spent nuclear fuel should be left on site before it can be moved and how to contain it safely in dry storage as the fuel pools where it was stored temporarily are emptied and torn down.

It's imperative that spent nuclear fuel stay isolated from the environment. It will be an immediately lethal radiological hazard for centuries and a lingering environmental and food chain hazard for a million years. It is thermally hot, with some isotopes gaining heat for thousands of years to the point of melting rock. Some 40% of spent nuclear fuel at US reactors is "high burn-up" fuel (HBF). HBF was an innovation to keep reactors going twice as long between refueling than conventional nuclear fuel, but due to longer periods of irradiation in the reactor, when HBF becomes spent fuel, it is much hotter thermally and much more radioactive than conventional spent fuel, making it even more difficult and dangerous to handle, transport and store, and requiring a much longer time to cool in fuel pools before moving.

Many independent experts argue that for most reactor sites (though not all), to protect public safety and health, spent fuel should remain on site for many decades before it can be moved to a permanent repository. But recently formed decommissioning companies positioning themselves to acquire shuttered plants and dismantle them quickly are unlikely candidates for long-term waste stewardship. They are much more likely to be long gone 30 or 50 or 100 years from now, leaving reactor communities at risk for getting burdened with stranded waste.

However, before focusing on when and where to ship the waste offsite, there's a prior imperative to provide adequate containment on site. We need robust containers that can be reloaded and replaced if something goes wrong. Currently there is no way to unload a dry waste storage container and transfer the contents to a new container within safety margins and without leaking. With very rare exceptions, plants have no provision for maintaining fuel pools or hot cells on site in case a dry storage canister fails and the fuel needs to be repackaged.

Yet failure is far from unthinkable. Holtec uses welded, thin-walled dry storage canisters which have been plagued with defects and loading problems, and which do not meet Nuclear Waste Policy Act of 1986 (NWPA) storage and transport safety requirements. The NRC has exempted them from such requirements, and amendments to the NWPA now before Congress would roll them back further.

The changes are designed to facilitate transport of the waste to private CIS sites, but transport to CIS would greatly exacerbate the above problems. Current federal law prohibits nuclear waste being moved to interim facilities before a permanent storage site has been identified, but we have no such permanent site, and that law may be about to change. Meanwhile efforts to restart and refund the scrapped program to build a geologic repository at Yucca Mountain deliberately ignore the fact that Yucca's geology (fractured rock, seismic activity, a likely magma pocket) and hydrology do not offer needed isolation of high-level waste and its radioactivity from the environment. Instead, DoE's continued push for Yucca is based on an assumption of major retrofits using technology that does not yet exist.

Rushing to establish CIS is a dangerous expedient for getting around this dilemma. CIS is "interim" in name only, since once the waste is offsite there will be little or no incentive to move it again. CIS is *de facto* permanent storage, but without the protections of a permanent geologic repository, which leaves it vulnerable to failure and to attack. It would unfairly saddle disproportionately burdened communities with high-level nuclear waste from other parts of the country. Concentrating spent fuel in CIS facilities could also lead to reprocessing of civilian waste into fuel for nuclear weapons, constituting a re-closing of the nuclear fuel cycle and raising nuclear proliferation risks. Despite these problems, last week the Atomic Safety Licensing Board, which is part of the NRC, swept aside all petitioners' objections (nearly 50 of them) to Holtec's proposed CIS facility in New Mexico. Holtec expects it will be licensed in 2020 and could be ready to accept shipments of nuclear waste starting in 2023.

If that happens, it would trigger thousands of truck, train and barge shipments of dangerous radioactive waste across the country on unsecured roads, rails, and waterways, over aging transportation infrastructure not adequate for such heavy loads. Department of Transportation regulations require highway shipments of nuclear waste to take the most direct Interstate routes, even if these routes traverse densely populated metropolitan areas. Transportation routes to CIS would likely go through 43 states and the District of Columbia. They could impact 87% of Congressional districts and a majority of Americans. For the next 50 years at least one nuclear shipment would be on US rails or highways daily.

Waste transport, CIS and the emerging privatized model of decommissioning and waste stewardship raise dilemmas and potential safety threats that have yet to be solved, or in some cases adequately studied in terms of cost, risk and alternatives. Despite this, Congress will be called upon this year to make key decisions regarding related to decommissioning, including on legislation (new amendments to the Nuclear Waste Policy Act and other measures), and appropriations to facilitate CIS, Yucca Mountain and waste transport.

Any congressional proposals or funding requests promoting the expedited transfer of spent fuel from pools, waste transport, or CIS should first address the problem of unsafe waste storage canisters, and NRC's regulatory role.

NRC has a history of granting waivers and exemptions from safety and other regulations to decommissioning companies, and has avoided confronting unsolved dilemmas of decommissioning in favor of expediting quick and "temporary" expedients such as CIS. That makes it all the more important and necessary for Congress to assert its oversight role. It has the power to oversee NRC decisions and to commission studies on decommissioning and related issues.

The United States needs a coherent national plan for safe decommissioning and radioactive waste storage. Currently there is no general standard for high-level radioactive waste isolation. Instead of rushing to implement inadequately studied, profit-driven, "temporary" expedients that in fact will have permanent consequences, the US should adopt an adequate, science-based standard, and frame decommissioning and nuclear waste policy to meet it.

** This document is for informational purposes only. It reflects information and a range of views from various public interest groups and advocates following nuclear plant decommissioning closely and seeking to inform decision makers and the public on key dimensions of the issue, including at a Congressional briefing on decommissioning held May 13, 2019. For information on that briefing, including presenters and co-sponsors, see <https://www.eesi.org/briefings/view/051319nuclear>. For a more in-depth primer on decommissioning, written in July 2018, including some case studies of how it has affected communities that have been through it, see https://www.eesi.org/files/Nuclear_Plant_Decommissioning-Background.pdf.*