

After Yucca Mountain: How to store US nuclear waste

With the planned Yucca Mountain storage facility now out of the picture, a policy paper in this week's edition of *Science* suggests that the US should consider planning for several regional storage facilities instead.

By John Timmer | Last updated July 10, 2009 7:30 AM CT

There's a general consensus that nuclear power will be an inevitable part of US attempts to wean itself off fossil fuels. There are two obvious limits to the expansion of nuclear power, however: we can't possibly build plants fast enough to meet our expected needs, and we still haven't decided how to handle spent fuel. The latter issue became more acute when the proposed long-term waste repository at Yucca Mountain was finally taken off the table, leaving the US back at square one when it comes to handling spent fuel and high-level radioactive waste. Today's issue of *Science* contains a policy forum suggesting that several regional repositories will ultimately be better than one.

The authors of the forum argue that long-term storage is probably the best solution. Nobody seems to be happy with continued storage at individual reactor sites, especially given that several of these reactors have already been decommissioned, and more are nearing the end of their planned lifespans. On-site storage threatens to create a situation where there's essentially an indefinite proliferation of long-term radioactive waste storage.

Reprocessing of waste for use as fuel remains popular in France and Japan, but many countries have recently stopped shipping their waste to these nations, and the UK has recently dropped its reprocessing efforts. The authors of the policy forum also cite a study by the National Academies of Science that concluded reprocessing will be extremely expensive. The final concern with reprocessing is its ability to foster the spread of nuclear weapons capabilities. This isn't simply a hypothetical; the US had been reprocessing until some plutonium it had assisted in the purification of wound up being used for a nuclear test in the 1970s.

The end result is that the authors consider long-term storage the best bet. Given that, they argue that we need to restart the search for a safe repository and use the failure of Yucca Mountain as a lesson in order to do better this time around. The two biggest errors, they argue, were the exclusive focus on one site and the choice of that site over local objections.

Their basic thesis is that there are probably multiple geological formations that can ultimately provide safe, long-term storage, but the exclusive focus on Yucca Mountain ensured that we'd never identify most of them. They point to Scandinavian countries that are on the verge of opening their own storage facilities; these will use a combination of granite for geological stability and clay for preventing infiltration by groundwater. Other stable combinations might be available in the US, and our experience with identifying the problems at Yucca—more groundwater than expected and greater geologic complexity than first realized—may actually improve our ability to identify good sites.

The authors don't explicitly state it, but it's clear that they believe that one of the reasons for local resistance in Nevada was the fact that Yucca was dictated on the federal level. But they clearly state that they'd like to see the process taken out of the hands of the Department of Energy, and they suggest that the Environmental Protection Agency's role should be simply establishing a set of standards that have to be met in terms of waste containment, regardless of local geology.

To ensure that there's more local involvement in the choice of location, the authors suggest that the task be divided among the four regions (West, Midwest, Southeast, and Northeast) that the Nuclear Regulatory Commission uses to manage facilities. Each region would be responsible for choosing and developing its own long-term repository. That may ultimately allow the facilities to be sited in areas where the populace is already served by a utility that runs a nuclear plant, which may heighten public trust in the process (again, the authors point to Sweden, where something of this sort took place).

That's hardly a guarantee that there will be public acceptance, and I'm somewhat skeptical that each region will be likely to contain a site that fits the geological bill. Still, merely exploring a broad range of locations could greatly improve our ability to model storage on the time scales required, which should improve confidence in any areas that come through the process. It may not get us four regional sites, but it could manage to provide a single site where the confidence is much higher and the public opposition much lower.

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