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Why Yucca Mountain Would Fail as a Nuclear Waste Repository

In theory, it is possible to isolate radioactive waste from the habitable biosphere for as long as it is hazardous. This theory has not been proven; nonetheless, as a principle, isolation of waste is what distinguishes a repository from a dump. Dumps leak.

Irradiated (or “spent”) fuel from reactors contains over 95% of the radioactivity in all the waste generated by industrial-scale nuclear activity in the US. This is the waste that was to be sent to the Yucca Mountain site on Western Shoshone Treaty Lands in Nevada. Neither the Shoshone Nation, nor the State of Nevada support this plan.

In 1998 NIRS petitioned (then) Secretary of Energy Bill Richardson to disqualify Yucca Mountain from consideration as a nuclear repository site since new data showed that it would not meet the Site Suitability Guidelines in the Nuclear Waste Policy Act <http://www.nirs.org/radwaste/yucca/disqualifyyuccapetitionfinal.htm> . The key issue was the rate of movement of water inside the rock at the Yucca Mountain site. The tuff, a rock formed of compressed volcanic ash, is heavily fractured at this site due to ongoing seismic activity – likely linked to recent volcanic activity in the area. The fractures allow surface water to travel into and through the mountain far more quickly than the Guideline of 1000 years. The Petition to disqualify the site, consigned by 218 other organizations: (<http://www.nirs.org/radwaste/yucca/disqualifyyuccafinalletterwithsignatures.htm>).

Secretary Richardson responded acknowledging the issues but stating that, nonetheless, the study of the site would continue; the Secretary gave no justification for this position.

Both prior to, and after 1998 other “fatal flaws” (detailed below) have been identified – however in every case the previously defined rules have been ignored, exempted, changed, or subjugated to political decisions. Science does not prevail in the nuclear waste policy of the United States, as has been demonstrated by the most recent ruling on the site: that the Department of Energy does not have the authority to effectively, 12 years later, grant the Petition to Disqualify Yucca Mountain in the Motion to withdraw its application to the US NRC for a license to construct a nuclear waste repository at Yucca Mountain, Nevada.

Key failings of Yucca:

Fractured Rock – In addition to water moving fast in fracture flow pathways within the rock of the mountain, the very same fractures allow gases to move up and out of the

mountain. Some mornings you can see vapors rise out of Yucca with the naked eye. It is the impossibility at Yucca of containing gaseous emissions from radioactive waste that lead Senator Johnston (of Louisiana) in 1992 to amend the Nuclear Waste Policy Act (not the first time) to exempt the site from the Environmental Protection Agency's radiological standard (40CFR191) for deep geologic repositories. This is another case of molding the requirements to meet the site, rather than applying objective criteria in the determination as to whether the site is appropriate. It has been estimated (by European regulators) that the Carbon-14 emissions alone could cause as many as 25,000 "excess" cancer deaths worldwide over time. A new standard was written, for Yucca.

Fractured Salty Rock + Water + Oxygen + Heat = Corrosion of Steel (waste containers) – any complex project contains elements that are not immediately obvious. It was not until tunnels had been dug at Yucca that the full specter of how much moisture is inside the mountain became clear, or a full appreciation of the fact that air flows inside the mountain, or even a real focus on the chemistry of the rock (which is salty) was attained. Adding to these factors is the fact that radioactive decay **generates** heat – and given how close together the steel waste containers would be placed, would continue to heat the site to a level that would accelerate chemical reactions for hundreds of years. The key chemical reaction in this picture is corrosion of steel – and while engineered elements of proposed design at Yucca could retard that process, the realization came clear: fail-safe is not an option at Yucca. Without massive investment in titanium drip shields (that may or may not work to shield the containers from corrosive action) this site is definitely a dump, not a repository.

Fractured Rock – Symptom of Seismic / Volcanic Activity – During the initial years of studying Yucca Mountain the 200+ earthquakes at the site that measured over 2.0 on the Richter Scale were underreported. Indeed, one quake in the early 1990's broke windows and cracked the elevator shaft at the Yucca study facility. Over time the number of fault lines known to intersect the area where the waste would be placed has grown (to at least 3) – and indeed, as recently as 2007 the Department of Energy was stunned to discover that the transit of one of the faults was dramatically different than previously thought. In any case the volumetric fracturing of the Yucca rock is sufficient to indicate that this area has been actively bouncing for some time – and show no sign of stopping. In addition, the geologic record created by the row of lava cones extending in a straight line, pointing to where the tunnel has been dug in the Yucca would, even to the recreational geologist, suggest that Yucca is likely on top of a "hot spot." Studies done under contract with the US NRC in the 1990's, used a GPS tracking system and confirmed crustal expansion at this site – suggesting that there may be a geologic hot spot this area.

Waste Eruption – highly unlikely -- yes; impossible – no. The US Department of Energy included a geologic eruption through the waste repository in its environmental impact statement for Yucca. Any federal agency only includes "credible scenarios" in a site analysis. Unfortunately the Department then utilized "Voodoo math" to also report that the impact of a nuclear eruption would be "acceptable." DOE disingenuously pretends that the level of radiation dose that could result would be reduced by the probability of this event occurring; radiation levels are not lowered by likelihood! Yucca is a dump.