November, 1998

Petition for Disqualification of Yucca Mountain from Consideration as a Nuclear Waste Repository

In accordance with the Nuclear Waste Policy Act of 1982, as amended, and 10 C.F.R. 960.3, Yucca Mountain should be immediately disqualified for the reasons outlined throughout this petition.

The Nuclear Waste Act states, in Section 113 (c) (3):

- If the Secretary **at any time** determines the Yucca Mountain site to be **unsuitable** for development as a repository, the Secretary shall

  (A) **terminate** all site characterization activities at such site;
  (B) notify the Congress, the Governor and legislature of Nevada of such termination and the reasons for such termination;
  (C) remove any high-level radioactive waste, spent nuclear fuel, or other radioactive materials at or in such site as promptly as practicable;
  (D) take reasonable and necessary steps to reclaim the site and to mitigate any significant adverse environmental impacts caused by site characterization activities at such site; (emphasis added)

The basis for suitability is defined in the Site Recommendation Guidelines as provided for in the Nuclear Waste Policy Act, and promulgated by the Department of Energy in 10 CFR 960.

The Guidelines state in Section 960.3-1-5:

- A site shall be **disqualified at any time** during the siting process if the evidence supports a finding by DOE that a disqualifying condition exists or the qualifying condition of any system or technical guideline cannot be met. (emphasis added)

The language in the Guidelines for Site Suitability is clear. The site **shall** be disqualified if a single disqualifying factor exists or a single qualifying condition cannot be met. (emphasis added)

Section I - Yucca Mountain Repository Site will not isolate nuclear waste, violating two guidelines for site suitability as a nuclear waste repository.

Guideline: 960.4-2-1 Post-Closure Disqualifying Condition for Hydrology:

- A site shall be disqualified if the pre-waste-emplacement ground-water travel time from the disturbed zone to the accessible environment is expected to be less than 1000 years along any pathway of likely and significant radionuclide travel.

Recent analyses of samples collected at the underground Exploratory Studies Facility (ESF) at the Yucca Mountain site indicate that water infiltrating from the ground surface above the study facility has traveled rapidly downward in fractures in the Mountain to, and through, the proposed repository horizon, toward the water table. Samples collected from the fracture walls in the ESF contain elevated amounts of chlorine-36 that are sufficiently high to indicate that the source must have been atmospheric weapons testing in the Pacific. Chlorine-36 was produced by the activation of the salt in seawater. It was deposited in fall-out and rain across the Northern Hemisphere. Since chlorine-36 does not occur at such large ratios in nature, it provides a marker for the travel time of surface water.

Therefore, transport of this bomb-pulse isotope to its current depths by infiltrating precipitation must have taken place within the last 50 years. This significant discovery contradicts earlier conceptual models depicting unsaturated zone flow at Yucca Mountain as being dominated by very slow downward movement through pores in the rock.

DOE s recent unsaturated zone flow models, based on chlorine-36 and other data, indicate that within acknowledged bounds of uncertainty, water infiltrating through the waste emplacement horizon will quickly reach the water table. And according to saturated zone flow models, travel to a point at which it is accessible to humans through water wells is less than 1000 years. This meets the conditions of 960.4-2-1 for disqualification; therefore Yucca Mountain must be disqualified.

With Clorine-36 showing that radionuclide travel to be faster than anticipated, it is clear that the expected performance of the repository will result in significant radionuclide contamination of the groundwater and, ultimately, the surface waters down-gradient from the site.

Guideline: 960.5-2-6 Preclosure Disqualifying Condition for Socioeconomic Impacts:

- A site shall be disqualified if repository construction, operation, or closure would significantly degrade the quality, or would significantly reduce the quantity, of water from major sources of offsite supplies presently suitable for human consumption or crop irrigation and such impacts cannot be compensated for, or mitigated by, reasonable measures.

The expectation of the Guidelines was that the geologic barrier of the site would limit radionuclide releases from the repository through time, such that environmental

contamination away from the repository would not be significant. Now, as discussed, the picture is quite different. The expected performance of a Yucca Mountain repository will result in significant amounts of radionuclides degrading the quality of off-site supplies of groundwater that are presently suitable for and used for human consumption and crop irrigation. Current land use in the Yucca Mountain area includes large-scale milk production. With 92% of milk comprised of water, our children may eventually be drinking radionuclides for breakfast, lunch, and dinner.

DOE intends for the contamination to occur during the long postclosure period, and affect much of the ground water in the Amargosa Valley before it is finally discharged to the ground surface where contaminants will be reconcentrated. Compensation for this degradation, as allowed for in the Guideline, is impossible. If mitigation were feasible, it would have to be included in the repository assessment; it is not.

The ability to avoid significant groundwater degradation after closure of the repository should be no less a siting requirement than it is before and during closure. These Guidelines were designed to prevent the emplacement of high-level nuclear waste at a site that is known to contaminate water supplies. Omission of this disqualifying factor from the Post-Closure Guidelines was in actuality an affirmation of the national commitment in the Nuclear Waste Policy Act to assuring the long-term isolation of radioactivity from the environment.

Section II Problematic Unresolved Issues

It is clear that additional study of the Yucca Mountain site will not result in significant reduction in the projected dose rates to individuals, nor will it likely reduce the broad range of uncertainty. The purpose of this section is not to suggest that further study should be conducted at Yucca Mountain. Instead, we bring to attention significant factors and relatively new data which disarm any suggestion that the site and any scenario at Yucca Mountain is "good enough" for nuclear waste disposal.

Seismic Activity

Geologic factors, in addition to rapid groundwater flow in the unsaturated zone, increase the risk and uncertainty about loss of waste containment and isolation at the Yucca Mountain site. Seismic risk is said by project officials to be "acceptably low," but it is acknowledged that the potential exists during the hazardous lifetime of the waste, for the repository to be impacted by an earthquake nearby in the magnitude range of 7.0 to 7.5.

The potential for large nearby earthquakes exists during the operational life of the surface facility of the repository. An unexpected magnitude 5.6 earthquake occurred at Little Skull Mountain, adjacent to the study site in June 1992. This quake was associated with a much larger event in Southern California.

Operation of a nuclear waste repository at Yucca Mountain will require three irradiated fuel pools to facilitate waste transfer operations. The faulting and earthquake history of the area is such that a nuclear power reactor with its irradiated fuel pools could not be licensed there. Therefore, on what basis does the Department intend to locate multiple irradiated fuel pools at the Yucca Mountain site? This unresolved issue is of critical importance.

Volcanism

Yucca Mountain was formed by multiple volcanic events. There are lava cones that sit in a line with the Mountain, which are the results of recent volcanic activity. The two nearest cones are 9 and 15 kilometers from the boundary of the waste emplacement area. The risk of recurrence of volcanism, considered a low probability, high consequence event, in the near vicinity of Yucca Mountain is said to be "acceptably low."

A recent study, reported in Science Magazine in 1998, challenges former assessments with the use of the Global Positioning System satellites to gauge crustal expansion at Yucca Mountain. This study shows that the movement of the earth s crust at the site is about 20 times greater than previously estimated and that it is currently accelerating. The authors conclude that more study is needed, but assert that all previous estimates on crustal movements could be incorrect since acceleration was not previously factored. Further, they conclude that the evidence is consistent with the possibility of a magma pocket under Yucca Mountain.

Given this new information, it clear that we cannot assert that this site is necessarily subject to a "low risk" for future volcanism. If we consider for a moment that the repository program and the Nuclear Waste Policy Act were founded upon a commitment to intergenerational equity, perhaps we should ask ourselves: Would we be able to understand our ancestors if they had chosen a volcanically active site for their most concentrated radioactive waste? It is not clear that this site is subject to disruption by future volcanism, but it is also not clear that it is not. This new data on Yucca Mountain increases that uncertainty.

Human Intrusion

Human intrusion remains an unresolved issue with respect to the long spans of time associated with a repository. Yucca Mountain lies in the midst of a number of natural resources and mineral deposits. In fact, there is now an operating gold mine within sight of Yucca Mountain. It is not realistic to make projections on repository performance without factoring in the potential natural resources and the impact on those who would seek them in the future.

III - Conclusion

From Section I, we conclude that the Secretary of Energy must immediately disqualify Yucca Mountain from consideration as a permanent repository. From Section II, we conclude further study of Yucca Mountain will only increase the basis for disqualification, thus is needless, wasteful, and an irresponsible use of Nuclear Waste Fund monies.