

# AN OVERVIEW OF THE GEOLOGY AND HYDROLOGY OF THE YUCCA MOUNTAIN AREA, NEVADA

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## ABSTRACT

Yucca Mountain, in the southern Great Basin about 140 kilometers northwest of Las Vegas, Nevada, currently is being evaluated as a potential mined geologic repository for high-level nuclear waste. As described in the recently released Site Characterization Plan (1), geologic and hydrologic investigations will be conducted on both regional and local scales to support evaluations of the suitability of the site.

In the Yucca Mountain area, most rocks of pro-Cenozoic age are sedimentary; the maximum thickness of these rocks exceeds 8,000 meters. Rocks of Cenozoic age are both sedimentary and volcanic. The volcanic sequence of late Eocene and Miocene age consists principally of silicic units that exceed 3,000 meters in thickness. Volcanic rocks of Pliocene to Holocene age are basaltic and relatively thin compared to the older volcanic rocks. Yucca Mountain lies within the Walker Lane belt, a regional northwest-trending zone (about 100 kilometers wide) of oroclinal folding and right-lateral faulting.

Yucca Mountain is underlain chiefly by a stratiform sequence of silicic ash-flow tuffs of Miocene age; these tuffs are tilted to the east and broken by a complex network of faults. The thickness of this volcanic sequence probably is greater than 1,800 meters. Near Yucca Mountain, centers of polycyclic basaltic volcanism exists; eruptions from these centers began about 250,000 years ago and may have occurred as recently as 10,000 years ago.

Yucca Mountain lies within a subbasin of the Death Valley ground-water basin. In this subbasin, which underlies about 5,000 square kilometers, flow in the saturated zone occurs in alluvium, volcanic tuff, and carbonate rocks and generally is from north to south. Recharge occurs from the infiltration of rainfall, snowmelt, and streamflow. Discharge from the subbasin occurs about 55 to 65 kilometers south of Yucca Mountain, principally by evapotranspiration at Franklin Lake playa and perhaps by spring flow in Death Valley. Beneath Yucca Mountain, the potentiometric surface is steep in the northern and western parts and is almost horizontal in the eastern and southern parts.

If constructed, a repository at Yucca Mountain would be located in the unsaturated zone, which is 500 to 750 meters thick beneath the site. A water flux of 0.5 millimeter per year is estimated as a reasonable upper bound for average flux beneath the potential repository horizon. This flux probably is spatially variable to a considerable degree. In the unsaturated zone, flow probably is predominantly in the matrix of the tuff units, but, locally and periodically, flow also may occur in faults and fractures.

## REFERENCE

1. U. S. DEPARTMENT OF ENERGY, "Site Characterization Plan, Yucca Mountain Site, Nevada Research and Development Area, Nevada", DOE/RW-0199 (1988).

*A Full Paper Was Not Available*