3-2006

Nevada Test Site Mixed Waste Disposal Facilities

Heart of America Northwest

Heart of America Northwest
The Public's Voice for Hanford Cleanup
A Citizen's Guide to the Nevada Test Site 2006

Nevada Test Site Mixed Waste Disposal Facilities

Background
The Nevada Test Site is located approximately 65 miles northwest of Las Vegas and encompasses about 1350 square miles of Nevada desert, in the Yucca FlatsRegion.

The NTS was used for nuclear weapons testing from 1951 through 1992 including both above ground testing and below ground shots. It is pocketed by craters from former Nuclear Testing. Pit 3, an underground crater formed during previous testing in Area 5, is the only location permitted for onsite Mixed Waste disposal. The site is located on a closed basin where groundwater is unable to exit or drain into any river systems. The groundwater table is flat with an extremely slow Horizontal Flow. The annual average precipitation is less than 5 inches with an evapotranspiration rate 5 times greater than the precipitation. The groundwater is located at a depth of 790 feet below the surface, securing the groundwater as an unviable resource. There is an ongoing debate of whether a liner and leachate collection system is necessary. It should be noted that the maximum projected lifetime of a liner is fifty years, and maximum consideration of performance for engineered barriers is 10,000 years. However, the flow of surface moisture to the groundwater at NTS is 51,000 years. New facilities for Mixed Waste at NTS are in the process of being permitted.

Documentation on the NTS waste disposal operations was difficult to obtain and the only sources available for this review come from performance assessments that were prepared for the two principal low level waste disposal facilities at NTS.

Waste Disposal Facilities
Area 3 is located within the Yucca Flat region of NTS. The Area 3 RWMS was first used for disposal of site generated low level waste (LLW) in 1968 when bulk wastes were disposed in subsidence craters created by underground test shots. Currently, 5 subsidence craters are used for disposal of LLW. Area 3 does not contain a permitted mixed waste disposal facility so it is not described in any detail.

The Nevada test site (NTS) contains two principal areas at NTS that are used for radioactive and hazardous waste disposal include the Area 3 Radioactive Waste Management Site (RWMS) and the Area 5 RWMS.

Area 5 RWMS is a 91 acre site located within Frenchman Flat in the southeast corner of NTS. Area 5 RWMS contains a number of pits or trenches that are used for waste disposal. Pit 3 is the only permitted mixed waste pit. It has been used since 1987 to dispose of on-site mixed waste. The new mixed waste disposal facility is to be located just north of the existing footprint of the RWMS. This new facility is in the process of being permitted. No details on the Area 5 mixed waste site or the new mixed waste facility were available for this review.

Map courtesy of the US Geological Survey, Water Resources Division

Hydro-geology of Frenchman Flat:
Pending a Mixed Waste Disposal Facility
Frenchman Flat is a large alluvium filled intermontane basin with desert shrub habitat of varying productivity. It has an average annual precipitation of just under 5 inches and a potential evapotranspiration rate of roughly 5 times the precipitation.

The only surface water in the Frenchman Flat region is found as ephemeral stream channels. Storm water will occasional run down from the slopes and accumulate in central valley playa areas before it evaporates or infiltrates into the soil. Frenchman Flat is also a closed basin, meaning that the groundwater does not exit or drain into a river system. It is within the Colorado River drainage but, due to the lack of

NTS Site Description Continued...

infiltration or recharge, the groundwater does not flow out of its confined basin.

The groundwater beneath the Frenchman Flats is found at a depth of about 790 ft below ground surface within the alluvium. The groundwater table is essentially flat with no measurable hydraulic gradient across the RWMS. This indicates there is an extremely slow or no horizontal groundwater flow and the flow direction cannot be determined.

Measurements of chloride content and isotope profiles in the soil indicate there is negligible recharge below about 30 ft. Chloride migration below 30 ft ceased to occur about 20 to 30 thousand years before present. The net evaporative demand of the near surface soil is so great that water in the subsurface tends to flow upward from a depth as great as 115 ft.

The downward flow of unsaturated moisture in the sediment below 115 ft is extremely low and the median travel time to groundwater has been estimated at 51,000 years which exceeds the 10,000 year performance assessment criteria.

The performance assessment of the Area 5 RWMS (DOE 2001a) indicates that the most significant potential dose that could be realized is due to volatile radionuclides that migrate to the surface largely in vapor phase. The main contributors to that dose are tritium and radon. The dose is also directly proportional to the quantity and concentration of the contaminant in the waste or for radon, the concentration of the parent radionuclides Th-232 or Uranium.

Sensitivity analyses in the performance assessment shows that the factor in the model with the greatest sensitivity to total dose are the biological release coefficients that are used to factor in the transport of contamination to the surface by plants and burrowing animals. In other words, the greatest influence to dose comes from the surface release mechanisms. Not surprisingly, the modeling also shows that the intrusion scenarios creates the greatest potential dose.

The new mixed waste facility that is to be located north of the Area 5 RWMS is planned to receive materials from both on-site and off-site waste from other DOE facilities. There is an ongoing argument between DOE and the State (NV) over whether or not the new facility should have a RCRA compliant double liner and leachate collection system. DOE's argument is that the natural soil conditions create a natural liner system and that studies have shown that travel times to groundwater greatly exceed any site performance requirements making additional engineered liner systems unnecessary.

Nevada Test Site: Summary and Key Findings

- NTS has a negative net recharge to groundwater in a closed hydrologic regime.
- The groundwater at NTS is of good quality but, at 790 ft deep, it is not a vaiable or economical water source and likely never will be.
- USDOE is seeking to proceed with a Mixed Waste landfill without liner and leachate collection, which is neither appropriate for a landfill above a groundwater resource, nor compliant. USDOE doesnot propose to mitigate this by having early detection in the soil column. Groundwater monitoring at the existing Low-Level Burial Grounds are not adequate.
- By permit restriction, Nevada has barred offsite Mixed Waste disposal until there is a final environmental review and permit. USDOE has not considered the federal Superfund law's Offsite Waste Rule; and, does not know the cumulative impacts from other waste disposal at the Site, nor how additional wastes (especially if disposed without liner and leachate collection) may affect cleanup.

Crater at NTS--Photo Courtesy of Department of Energy

Produced in Cooporation with Citizen Alert. Funding for this publication was provided by a grant from the Citizen's Monitoring and Technical Assessment Fund.