

GEOLOGIC AND HYDROGEOLOGIC OBSERVATIONS
AT THE
PROPOSED DAVIS AND LAVENDER CANYON NUCLEAR WASTE SITES, UTAH

by

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PURPOSE

The writer conducted a field examination of the proposed Davis and Lavender Canyon high level nuclear waste repository sites during the period May 21-23, 1985. The objectives of the field investigation were to identify adverse or disqualifying geologic and hydrologic conditions as defined in DOE (1984) that were not treated in detail in Huntoon (1985) which could be discerned from an examination of the exposed geology and hydrologic relationships on the surface at the sites.

The investigation consisted of two parts; (1) an aerial reconnaissance of the area surrounding the sites extending a minimum distance of 6 miles from the centers of the sites, and (2) a field check of specific features within the area that were of potential concern.

GEOLOGIC SETTING

Approximately 75 percent of the surface area of the region examined is comprised of exceptionally well exposed gently northeast dipping bedrock consisting of Permian and Triassic sedimentary rocks. Most of the valley areas are covered by a thin to thick veneer of Quaternary alluvium. Talus and landslide deposits locally obscure slopes developed on the bedrock along the walls of canyons and buttes.

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STRUCTURAL GEOLOGY

The planimetric distribution of the exposed bedrock in the area provides sufficient coverage to allow me to conclude that no faults or local folds exist at the surface within a 6 mile radius of the proposed disposal sites other than the previously mapped broad and gently dipping Indian Creek syncline and Gibsom Dome anticline (Huntoon and others, 1982). Extensional joints with trends parallel to the axis of the Gibsom Dome anticline are very well exposed in the Permian Cutler Group along Indian Creek north of the proposed sites. The extended joints are eroded yielding a dramatic set of low fins developed from the intervening blocks. The fins parallel the strike of the anticline along Indian Creek in T29-30S, R20-21E. Less pronounced but equally abundant joints occur within the vicinity of the Davis and Lavender canyon sites, however these joints - located close to the axis of the Indian Creek syncline - are not extended to the degree found along the axis of the Gibsom Dome anticline.

No localized collapse features including breccia pipes were documented in any exposed bedrock surface within the area examined. Unfortunately this does not preclude their existence in the area. The low areas in the Lavender, Davis, Indian Creek, Bogus Pocket, and Salt Creek drainages are extensively buried by Cenozoic deposits which may in part exist as a result of subsidence of the land surface over salt dissolution features.

Two suspicious rubble deposits were located on the erosional bench developed on the Triassic Moss Back Member of the Chinle Formation in the southeast quarter of section 30, T31S, R21E, that appeared from the aerial reconnaissance to be similar to exposed breccia pipes in Lockhart Basin. The locations of these deposits are shown on Figure 1. I examined these features on the ground and am 95 percent certain that they are landslide deposits originating from the nearby Wingate cliff. Exposures between the

two hills of debris and surrounding bedrock upon which they appear to rest are obscured by outwash debris. The deposits consist of disaggregated rubble that are eroded to produce rounded hills. Individual clasts within the rubble range in size up to 20-25 feet in diameter, the blocks are subangular in shape, and layering of the blocks within the deposits was not obvious. The larger clasts consist of the resistant sandstones of Wingate and Chinle lithologies, with possible inclusions of Triassic Kayenta blocks.

I did not locate ring fractures, infolded bedrock, or altered or bleached clasts within the rubble hills or surrounding bedrock which would be indicative of a breccia pipe. The element that is unusual and eye-catching about these two hills is the lack of similar features as outliers to the Wingate cliff in similar topographic settings anywhere in the immediate vicinity. Thus these features should be scrutinized further to dispell any doubt that they are breccia pipes should site characterization be commenced for either the Davis or Lavender canyon sites.

SHALLOW AQUIFER

The Cenozoic alluvium that fills the valleys in the area, especially those of Davis, Lavender, and Indian Creek, are locally significant but largely undeveloped shallow aquifers. These deposits range from thin veneers along the flanks to undetermined thicknesses toward the centers of the valleys. They are in perfect hydraulic connection with the flowing Indian Creek. All but flood runoffs sink in the deposits in ephemeral channels developed along the valley walls. A considerable amount of shallow fresh water is contained in these sediments that could be developed with shallow drilling. Richter (1980, p. 25-26) identified these deposits as potential sources of fresh water, and advised that one irrigation well is presently developed within the alluvium as a source of water for use at the nearby Dugout Ranch.

These alluvial and aeolian deposits are of particular interest at the Davis Canyon site. The following questions have yet to be answered at that locale. (1) How thick are the Cenozoic deposits? (2) How productive are the deposits? (3) Why do these deposits exist in such abundance at the site?

One explanation for the existence of the Cenozoic deposits is that they deposited in the Indian Creek drainage as the result of current salt tectonic uplift along the Gibsom Dome anticline (Huntoon, 1985, p. 16-19). Another scenario includes local subsidence and sediment accumulation resulting from salt dissolution along the Indian Creek syncline (Huntoon, 1985, p. 33-34).

REFERENCES CITED

- Department of Energy, December 6, 1984, Nuclear Waste Policy Act of 1982, 10 CFR Part 960, General guidelines for the recommendation of sites for the nuclear waste repositories, final siting guidelines: Federal Register, v. 49, no. 236, p. 47714-47761.
- Huntoon, 1985, Geohydrologic and tectonic evaluation of the proposed Davis Canyon high level nuclear waste repository, Paradox Basin, southeastern Utah: National Park Service Project Report CX-0001-4-0066, 98 p.
- Huntoon, P., and others, 1982, Geologic map of Canyonlands National Park and vicinity, Utah: Canyonlands Natural History Association.
- Richter, H. R., 1980, Ground water resources in the part of Canyonlands National Park east of the Colorado River and contiguous Bureau of Land Management lands, Utah: University of Wyoming MS Thesis, 80 p.

