



KARST | 2005 EPA WIPP RECERTIFICATION FACT SHEET No. 6

Karst in the Area of WIPP

Some stakeholders believe that the geologic characterization of the subsurface surrounding the WIPP repository does not adequately identify the presence of karst. As a result of these concerns, EPA agreed to re-evaluate the potential for the presence of karst at WIPP and the possible impacts of the long-term containment of waste for WIPP Recertification.

While the EPA has not seen any indicators of karst within the Land Withdrawal Boundary to date, additional data can improve the details of our understanding of the geology around the WIPP site. EPA is continuing to review information related to karst at WIPP and the Agency will provide its findings at the time of the final recertification decision.

During the time of certification, EPA reviewed existing information to understand the issue of karst around the WIPP site. As a result of that review, EPA agreed that there are karst features in the vicinity of the WIPP site, but that karst feature development will not impact the containment capabilities of the WIPP for at least the 10,000-year regulatory period.

EPA based its decision on multiple lines of evidence including:

- **Hydrologic testing.** Pump tests on wells drilled into the Culebra Dolomite within the Land Withdrawal Boundary show evidence of flow through the rock matrix, fracture flow or both, however, they do not indicate any connection to cavernous flow zones. EPA's analysis of all available data supports the conclusion that karst features have not been found within the Land Withdrawal Boundary.
- **Geologic information.** The widespread evidence of the Mesacalero caliche (a desert soil formed by the near surface crystallization of calcite and/or other soluble minerals by upward-moving solutions) indicates that infiltration around the WIPP site is minimal and has

What is Karst?

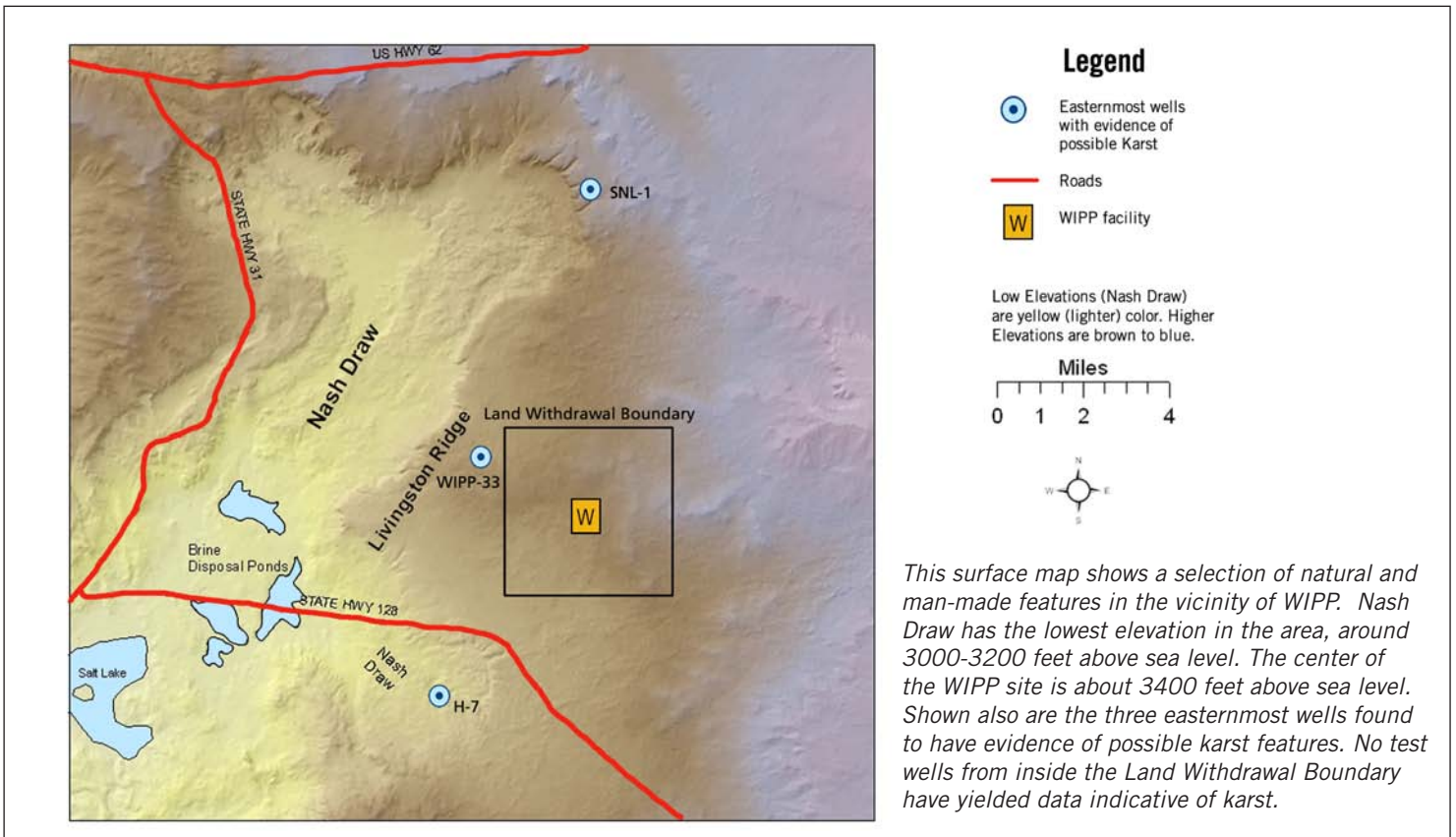
Karst is a type of topography in which there are numerous sinkholes and large voids, such as caves. Karst is caused when soluble rocks dissolve. Karst may form when rainwater, reacting with carbon dioxide from the air and forming carbonic acid, seeps through the soil into the rock. Soluble rock includes limestone and evaporite rocks, such as halite (salt) and gypsum.

If substantial and abundant karst features were present at WIPP, this could increase the speed at which releases of radionuclides travel away from the repository through the subsurface.

been so for the past 500,000 years. EPA's conclusions are also supported by recent research in the desert southwest. This research affirms DOE's expectation of minimal infiltration at the WIPP site over the last 10,000 to 15,000 years.

Karst is present west of the WIPP site in Nash Draw. Nash Draw formed around 600,000 years ago from dissolution and erosion of rock and is still being modified by these processes.

The Rustler Formation, which includes the Culebra and Magenta Dolomites, is near the surface where it intersects with Nash Draw and appears susceptible to infiltration of water from the surface. DOE studies indicate that the subsurface dissolution of the Rustler Formation extends east under Livingston Ridge, but does not approach the WIPP Land Withdrawal Boundary (LWB). The LWB is the point at which DOE must demonstrate compliance with regulatory release limits.



In contrast, the ground surface at the WIPP site is located several hundred feet above and to the east of Nash Draw and Livingston Ridge. Because the Rustler Formation dips, or tilts, to the southeast and is topographically lower than the plateau on which WIPP is located, the Rustler is more than 500 feet below the ground at the WIPP site itself and over 1,000 feet above the repository.

Ongoing EPA Activities

To ensure we have a complete understanding, the EPA continues to conduct a number of activities to further investigate any potential for karst near the WIPP site.

- EPA is examining the geophysical methods suggested by stakeholders to locate karst and will prepare a report on the efficacy of using these methods at the WIPP site. A final report will be released in conjunction with the Recertification Decision, but preliminary findings can be found in Issue Paper #5, *Stakeholder Karst Proposal*.

- EPA is conducting a thorough review of geologic and hydrologic information related to karst. As part of this effort, EPA made a field trip to re-examine the evidence of karst around the WIPP site.
- EPA is looking for karst indicators such as sinkholes, evidence of large-scale water exchange underground, or rapidly flowing springs in the vicinity of WIPP. EPA will release a report documenting our findings in conjunction with the Recertification Decision.
- EPA is considering all pertinent information, including the 1999 draft report by Carol A. Hill, *Letter Report: Intrastratal Karst at the WIPP Site*.
- EPA requested that DOE/Sandia National Laboratory (SNL) conduct a separate analysis of the potential for karst. This work will be complete in Summer 2005.

- EPA also requested DOE/SNL to review the hydrologic data and better explain why it believes that the data does not reflect karst development.
- EPA is also investigating an allegation that the draft Mercer and Orr (1979) report, *Interim Data Report on the Geohydrology of the proposed Waste Isolation Pilot Plant Site Southeast New Mexico* (USGS WRI 79-98), was modified. This work is ongoing.
- EPA has identified the need for DOE/SNL to perform additional testing of the Magenta and other units in order to verify that their present understanding of these units has not changed.

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