



File WPCV 12-1
ERAM 1-1
and AGOR 20-256
WE 5/9
State of New Mexico

~~LOKAT~~
J. E.
Judith Espinosa
Secretary
Ron Curry
Deputy Secretary

ENVIRONMENT DEPARTMENT
Hazardous and Radioactive Materials Bureau

**NMED/DOE Oversight
and Environmental Surveillance**
WIPP Project Site, P.O. Box 3090
Carlsbad, New Mexico 88221
1-505-234-8947

April 11, 1994

Mr. Mike McFadden
Carlsbad Area Office
WIPP Site
Carlsbad, New Mexico 88221

Re: Comment on Proposed Environmental Surveillance Wells Constructed to Commercial and DOE/EH-0173T Standards for Monitoring Wells.

New Mexico Environment Department (NMED) Agreement-in-Principle (AIP) staff at the Waste Isolation Pilot Plant (WIPP) concur with the rationale presented in the Transition Plan (DOE/WIPP 94-009) for replacing existing Water Quality Sampling Program (WQSP) wells. NMED/WIPP staff also agree with the need to demonstrate the comparability of existing wells with those constructed to commercial and regulatory standards for monitoring wells. This is especially critical for validating baseline data for radiological and heavy metal constituents. Existing iron-cased wells have corroded to Fe (OH)₂ or Fe (OH)₃, materials that are known to adsorb and appreciably affect analytical measurements of trace quantities of these constituents.

Enclosed are comments regarding the drilling, placement and configuration of proposed environmental surveillance wells. These comments largely reiterate several observations and recommendations previously communicated to the Department of Energy (DOE) Carlsbad Area Office (CAO) in various NMED/AIP technical reports and NMED comments on the Land Management Plan. These reports include:

- "RCRA Facility Assessment for the Waste Isolation Pilot Plant" background report (NMED/WIPP 93-001),
- "Assessment of Off-Site Radioactivity Surveillance Systems at the Waste Isolation Pilot Plant" (NMED/WIPP 93-002), and
- "Initial Assessment of the Ground Water Monitoring Program at the Waste Isolation Pilot Plant" (NMED/WIPP 94-001 in preparation).

Staff understand the wells are not required under non-DOE regulatory requirements;

940401 5



therefore, we emphasize that the comments are not regulatory in nature. The suggestions are offered because oversight reviewers of WIPP environmental program considers this a significant opportunity.

Considering that the NEPA process on the proposed program is underway or completed, it is our hope that the basic design of the project is not finalized. In any case, if NMED/WIPP staff are offered an opportunity to discuss these issues among other interested parties, this communication will provide the necessary background for the technical exchange. Without knowledge of specific details of the proposed program, staff are interested in whether the following fundamental issues have been addressed:

- Use of air as a circulation media to identify water-bearing zones in the Dewey Lake Formation.
- Well locations selected to monitor only the spatial variability in the Culebra Member, or to monitor all potential flow paths (e.g. Dewey Lake, Magenta).
- Well clusters or multiple completion zones in a single well to monitor all potential ground water pathways: Dewey Lake (Redbeds) Formation, and the Culebra and Magenta Member of the Rustler Formation.
- Location of wells to collect information to fill in data gaps in site characterization identified by the NMED/AIP program.
- Primary objective(s) of program: early detection monitoring program, program to detect changes in hydrologic conditions, and/or program to evaluate casing and completion technologies during the operational phase for application to potential long-term monitoring requirements.

For your information, attached is a more detailed description of the issues outlined above. Staff look forward to discussing these issues and other details of the proposed program. In the meantime, if there are any questions, please feel free to call either myself or John Parker (505) 827-4355.

Respectfully Submitted,

Paul Sanchez (GEO III)

cc: Benito Garcia, NMED/HRMB
Beth Bennington, DOE/CAO
Jeff Cotton, WID/WIPP
File

NMED/WIPP Issues Concerning Drilling, Placement and Configuration of Proposed Ground Water Monitoring Wells

1. Potential Ground Water Pathways

Because of its relatively high permeability and regional persistence, the Culebra member of the Rustler Formation has been the focus of migration pathway studies for the WIPP site Performance Assessment. NMED/WIPP staff have communicated the need to consider the Dewey Lake Formation and the Magenta Member of the Rustler Formation as possible pathways. NMED/WIPP staff have made this recommendation formally to the Sandia Performance Assessment group and to the DOE/CAO in technical reports.

Dewey Lake Formation. DOE/WIPP and Sandia reports commonly dismiss the hydrologic importance of the Dewey Lake Formation as follows: "hydrologic Investigations at and near the WIPP site (to date) have not identified a continuous zone of saturation within the Dewey Lake Redbeds". NMED/WIPP staff have found that, in fact, there is a paucity of data on the Dewey Lake Formation, especially within the site boundary. The only hydrological test conducted in the Dewey Lake Formation occurred at H-14 between 100 -108.5 meters (327.5 - 356.0 feet) below the surface. The pump test was inconclusive, citing very little water in the formation. Other hydraulic tests conducted during the foundation investigation for the facility were limited in extent.

Where air foam was used as a drilling circulation media, Dewey Lake ground water is documented in the southern portion of the WIPP site between 53 meters (175 feet) and 69 meters (230 feet). Holt and Powers (1990) also suggest that geologic conditions conducive to perched ground water occur only in the upper Dewey Lake, consistent with the depths of Dewey Lake ground water noted in these air foam-drilled boreholes. Consequently, hydrologic and geologic evidence suggest that the pump test at H-14 (100-108.5 meters) was incorrectly completed in the wrong zone and is invalid. NMED/WIPP staff have concluded that the size and continuity of the Dewey Lake perched ground water zone are not adequately characterized.

Commonly cited statements by Mercer (1983) include: "ground water flow movement within the Dewey Lake is restricted because of the perched character of the water in these lenticular sands" and occurrences of Dewey Lake ground water are "localized and isolated". On a regional scale this is probably true; however, it's localized nature does not preclude significant occurrence of the aquifer on-site. Furthermore, these statements nor the available hydrologic evidence preclude hydrologic connection with off-site drinking water wells at Mills Ranch. Figure 3.4 from the RCRA Facility Assessment study delineates where the presence of Dewey Lake ground water is documented, precluded or uncertain, and the possible extent of the zone as far north as H-3.

There are several reasons for monitoring Dewey Lake ground water on-site:

- Information on water quality, extent, transient recharge and flow characteristics of the Dewey Lake water-bearing zone (s) is nonexistent and only a monitoring program can supply this information.
- Potential secondary pathways are monitored in detection monitoring program guidance found in EPA RCRA Ground Water Monitoring Technical Enforcement Guidance (TEGD).
- If the purpose of the program is to "...identify and quantify new or existing environmental quality problems", or to provide data for management and protection of ground water resources, the Dewey Lake is a viable candidate for monitoring. One

significant management issue is that there are certain on-site non-repository related activities, as well as off-site contamination sources, that can impact the water quality of the Dewey Lake (ie. mudpits for boreholes and degraded oil production casing).

- If one objective of the program is to monitor changes in hydrologic conditions, the transient character of the Dewey Lake is especially significant. Lambert (1992) has noted meteoric recharge at Ranch Well (Lambert 1992) and Holt and Powers (1990) have suggested recent meteoric rainwater may be responsible for occurrences of moist and wet units described down to 50 meters (165 feet) below the surface in the AIS. NMED/WIPP staff have also observed prodigious amounts of free water seeping in within the Dewey Lake Formation at the Exhaust Shaft. Video surveyors report increased inflow in the Dewey Lake during years of heavy precipitation. Transient recharge may affect water level and water quality, and tracking such changes might influence the characterization of this potential ground water migration pathway.

Magenta Member (Rustler Formation). The following comment is a ground water monitoring recommendation occurring in *"Assessment of Off-Site Radioactivity Surveillance Systems at the Waste Isolation Pilot Plant"* (NMED/WIPP 93-002):

"Current Magenta observation wells are located outside potential contaminant migration pathways. Although the Magenta is not considered in formal risk analyses conducted in support of the Performance Assessment, a ground water monitoring system may require consideration of the potential for contamination of this water-bearing zone. Some investigators have suggested that leakage downward from the Magenta Formation may be a component of recharge for the Culebra water-bearing unit (Mercer, 1983; Seigel et al., 1991). The groundwater radiological baseline could be improved by sampling the Magenta water-bearing zone in the potential contaminant flow path and closer to the western boundary of Zone II (extent of underground excavation)."

The locations for the proposed ground water wells are not placed relative to the flow path of the Magenta Member. Staff are aware that aquifer yield is low in this member, making monitoring a difficult endeavor. Nevertheless, many of the same arguments for monitoring the Magenta are the same as those posed for the Dewey Lake, including monitoring of secondary pathways, documenting transient changes in ground water flow etc.

2. Well Cluster Versus Multiple Zone Completion Wells

EPA RCRA Ground-Water Monitoring Technical Enforcement Guidance recommends use of well clusters to monitor discrete stratigraphic zones. Concern for contamination between completion zones by leakage of bridge plugs often argues against the use of single-well multiple-zone completions. Nevertheless, NMED/WIPP staff recommend use of multiple zones for the following reasons:

- From a cost perspective, a multiple-zone configuration would be less expensive than drilling several wells for a well cluster. By requiring only one borehole, additional costs would occur only in the completion and maintenance of the wells.
- The concern for contamination between zones is a regulatory issue for a facility required to maintain a ground water monitoring program. The WIPP facility is not required to monitor ground water.
- The objective of the wells should be one of continued site characterization and evaluation of casing and completion technologies for application to potential long-term monitoring requirements.

Table 1: Compilation of Comments on Ground Water Occurrence in the Dewey Lake.

EEG	NMD	DOE
<p>"Dewey Lake Redbed Hydrology has never been properly studied in spite of repeated suggestions by EEG and other review groups that it should be" (SAND92-007/1 B-38 comment on 1992 Performance Assessment)</p>	<p>A number of wells on the southern boundary of the WIPP site detected water in the Dewey Lake but were never monitored for water quality or properly tested for hydraulic properties. The RFA concludes that the Dewey Lake aquifer may extend under a portion of southern half of the WIPP site and may be of potable quality (NMD comment on Land Management Plan and NMD/WIPP 93-001 RFA Facility Assessment B.R.)</p> <p>"....there is a lack of monitoring wells in the Dewey Lake Formation on the WIPP site, especially within the suspected shallow groundwater zone along the southern boundary (NMD comment on Land Management Plan)</p> <p>"No background (radiological) data exists for the Dewey Lake water bearing zone within the site boundary....In general more information is needed to characterize the distribution and hydraulic properties of Dewey Lake ground water on the southern half of the site" (NMD/WIPP, 93-002 Agreement-in-Principle Deliverable).</p>	<p>"Hydrologic Investigations at and near the WIPP site have not identified a continuous zone of saturation within the Dewey Lake Redbeds. Where water is present, it is in small perched or semi-perched water tables, and its occurrence is localized" (RFA Part B permit application and SAND92-0700/2 page 2-26 references Marcoer, 1983)</p>

Figure 3.4: Potential Shallow Groundwater Zone used for Migration and Exposure Assessment

