

# WASTE ISOLATION PILOT PLANT (WIPP)

## Lessons Learned During Site Characterization

Wendell Weart  
Scientific Programs Manager



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## Topics

- Brief WIPP History
- Geotechnical Setting
- Major Scientific Issues
- "Supprises" from In Situ and Site Characterzation Tests
- Regulatory and Stakeholder Issues
- Summary of Lessons Learned

## WIPP Historical Timeline

- |           |  |
|-----------|--|
| 1957      | National Academy of Science recommends geologic disposal, especially salt                                    |
| 1973-1975 | WIPP site selection  |
| 1975-1981 | WIPP site characterization   |
| 1977      | Conceptual design completed  |
| 1979      | Title I design completed   |
| 1980      | Surface based studies show WIPP site to be acceptable  |
| 1978-1982 | Lab/Field studies show brine migration to be only a minor concern  |
| 1982      | Comprehensive in situ R & D program developed  |
| 1983      | SPVD program complete, site selection validated full facility construction begins, in situ testing commences |
| 1984      | "Final" design criteria  |
| 1985      | 40CFR191 promulgated   |

## WIPP Historical Timeline

- |      |  |
|------|--|
| 1987 | 40CFR191 remanded  |
| 1988 | Brine seepage becomes a <i>cause celebre</i>   |
| 1988 | WIPP construction complete, initial operation planned                                      |
| 1993 | DOE determines not to place any waste at WIPP while EPA certifies compliance with 40CFR191 |
| 1994 | 40CFR191 repromulgated   |

## Major Site Selection/Characterization Issues

- Dissolution of salt
  - Regional
  - Localized ("Breccia Pipes")
- Natural resources
  - Potash
  - Hydrocarbons
- Tectonics
  - Deformation
  - Brine reservoirs
  - Seismicity
- Hydrology
  - Conceptual model
  - Karst geohydrology

## "Surprises" During In Situ and Post Site Selection Process

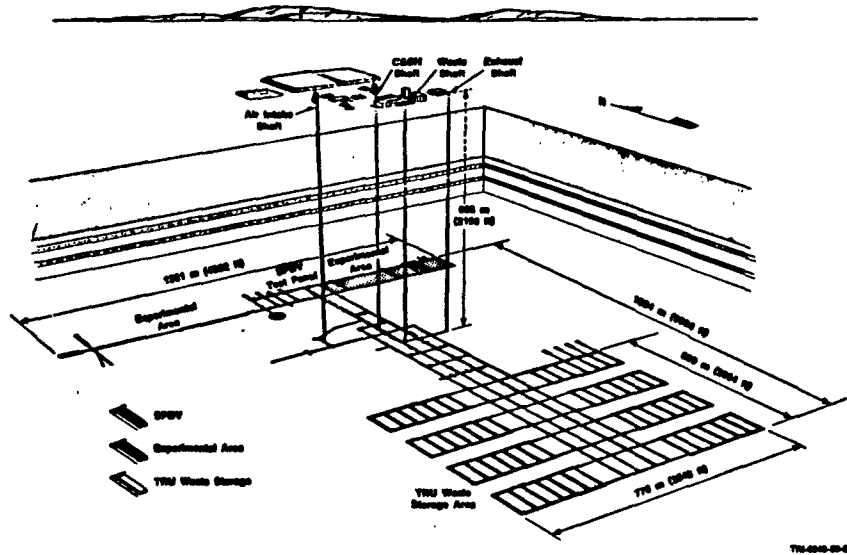
- Mining horizon modified after "hands on" examination in shaft
  - Clay seam undetected in core
- Brine reservoir in subdued Castile structures
  - Resulted in reorientation of underground excavations
- Creep rate/closure of openings three times predicted rate
  - Resolved with better modeling, more lab testing
- Brine seepage in absence of thermal gradients
  - Major stakeholder concern
  - Large resource commitment to resolve
- Hydrology of overlying aquifer proves to be more complex than first believed
  - Still a focus of field and lab studies

## Regulatory Issues

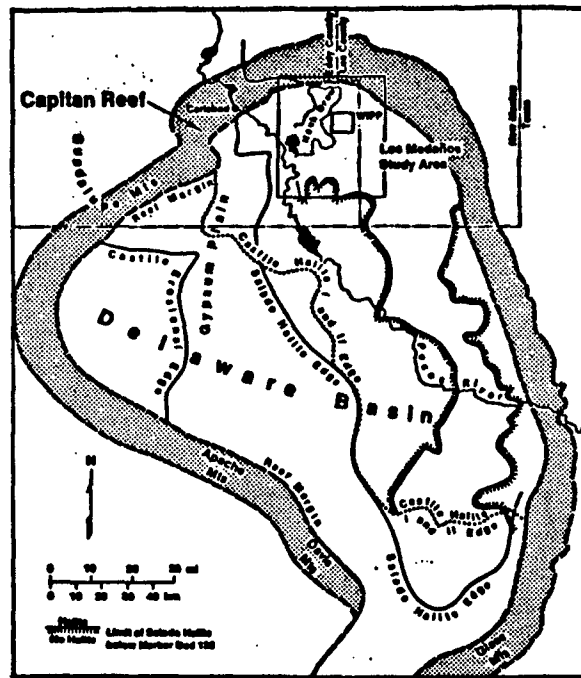
- No standards to guide site selection
  - 40CFR191 promulgated in 1985
  - 40CFR191 remanded in 1987
  - 40CFR191 repromulgated in 1993
- DOE self regulatory for WIPP until 10/92 Land Withdrawal Act
  - Public confidence issue
- Hazardous material regulations (RCRA) applied late
  - No migration variance
  - VOCs a major concern
  - Drives new studies on waste and on fluid transport in the Salado
- Criteria for application of 40CFR191 still in development by EPA
  - Criteria may alter guidance provided with 40CFR191
- Land withdrawal act requires EPA to determine the need for radioactive experiments at WIPP
  - DOE cancels radioactive test plans
- Stipulated agreement with New Mexico
  - Provides for certain state assurances; issue resolution
  - Provides for consultation/cooperation agreement

## Summary of Lessons Learned

- One is most confident of the site and repository issues at the beginning of detailed investigation
- Site studies will inevitably find "issues" the critics will utilize to pursue their case
- The site and repository design must be robust enough to weather uncertainties in models or natural variation in physical parameters as detailed knowledge of the site unfolds
- Do not oversell or over-simplify the attributes of the site until they are confirmed
- Involve stakeholders in issue resolution, early and meaningfully



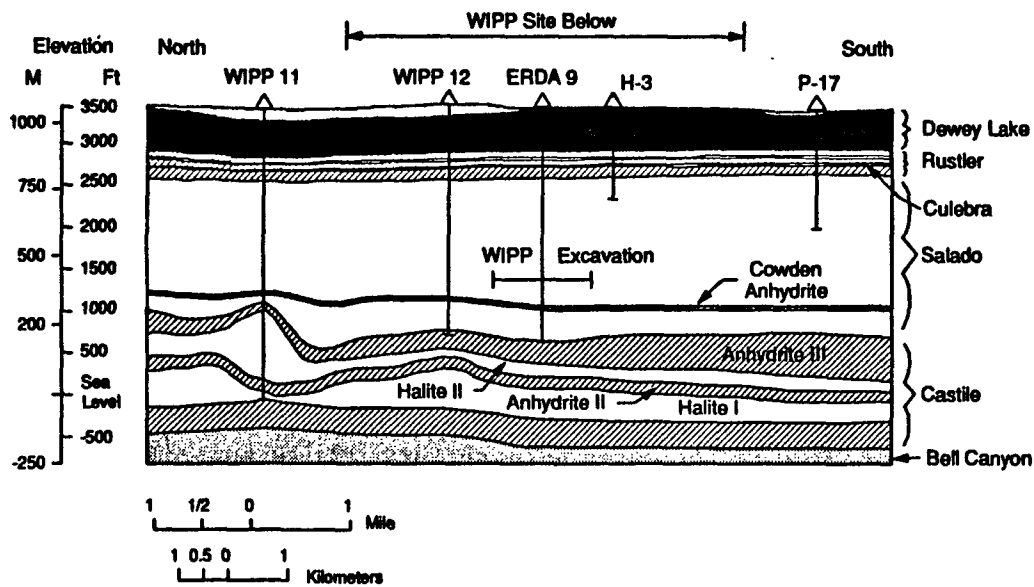
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Figure B-4. Generalized Distribution of the Castle and Salado Formations in the Delaware Basin, with Emphasis on Distribution of Halite (Lappin, 1989).

**Geologic Section North-South Through the Center of the WIPP Site**



**Extent of Halite Currently Present in Important Strata**

