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Condensed Listing of Surface Boreholes at the Waste Isolation Pilot Plant Project through 31 December 1995

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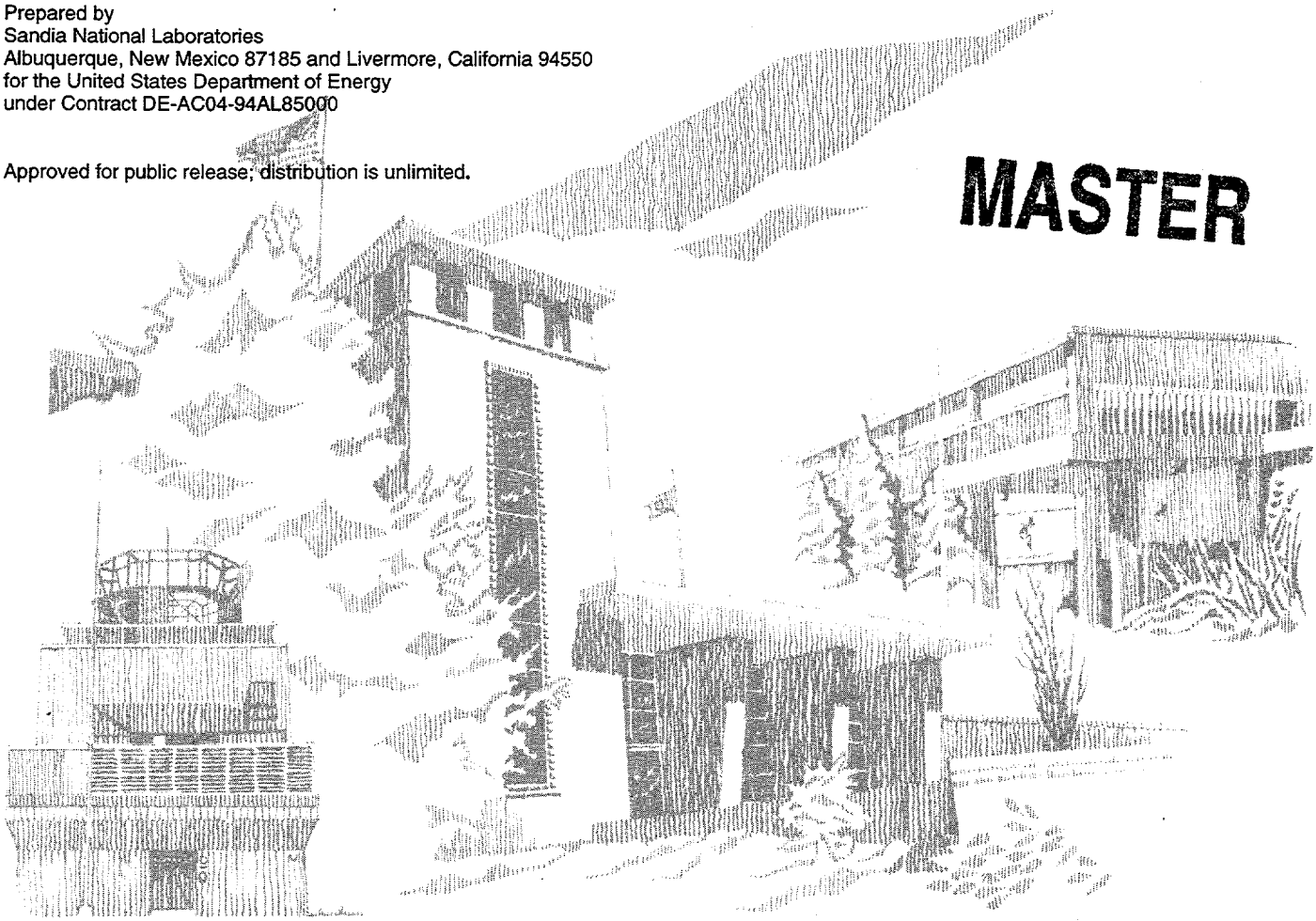

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ABSTRACT

This report contains a condensed listing of Waste Isolation Pilot Plant (WIPP) project surface boreholes drilled for the purpose of site selection and characterization through 31 December 1995. The US Department of Energy (DOE) sponsored the drilling activities, which were conducted primarily by Sandia National Laboratories. The listing provides physical attributes such as location (township, range, section, and state-plane coordinates), elevation, and total borehole depth, as well as the purpose for the borehole, drilling dates, and information about extracted cores. The report also presents the hole status (plugged, testing, monitoring, etc.) and includes salient findings and references. Maps with borehole locations and times-of-drilling charts are included.

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PREFACE

The data presented in this report were obtained primarily from published basic data reports and other Sandia-sponsored publications. The authors attempted to ensure the accuracy of the data reported herein; however, they do not assume responsibility for errors in previously published documents that are discussed here. Where discrepancies were encountered in data reported among the various data sources, the authors identified the source of these discrepancies, often examining original field data sheets and dayfiles to verify the data. Corrections and/or changes in previously published data are noted by footnotes on the spreadsheets. The principal data sources for this report were the published Sandia basic data reports for the various boreholes and hydropads, USGS-OFR 78-592 (Jones, 1978) for potash holes (P-1 through P-21), and SAND88-1065 (Gonzales, 1989) for borehole locations.

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BACKGROUND

The history of radioactive waste disposal programs in the United States, which led to development of the Waste Isolation Pilot Plant (WIPP) project in southeastern New Mexico, began in the 1950s. In 1957 the National Academy of Sciences selected salt as an appropriate medium for a nuclear waste repository (NAS, 1957). Among the reasons for the selection were: (1) salt deposits demonstrate isolation from circulating groundwaters for long periods of geologic time; (2) salt deformation occurs slowly over time and would therefore prevent the formation of fractures or heal openings that could otherwise allow the release of radioactivity to the biosphere; and (3) salt readily dissipates heat generated from nuclear wastes.

In 1974 the Atomic Energy Commission authorized a detailed evaluation of an area with extensive geologic salt deposits in the Delaware Basin of southeastern New Mexico, approximately 50 km east of Carlsbad. Results of the evaluation indicated that the area would be suitable for a nuclear waste repository (Powers et al., 1978). The area had low population density (fewer than 30 inhabitants within 16 km of the site), and land acquisition would be simplified by maximum use of federal, rather than state and private, land. The proposed site was evaluated for its suitability as a nuclear waste repository through extensive investigations that included exploratory drilling, hydrologic testing, and the use of geophysical techniques. In most cases, the exploratory boreholes had multiple purposes to aid in establishing the geologic and hydrologic characteristics of the WIPP site. The host medium selected for the underground repository was the Permian Age Salado Formation, composed of thick (more than 600-m) bedded salts. The repository was to be located about 656 m (2,150 ft) below the ground surface.

In 1976 the project was given its present name, and in 1979 the WIPP was established by the US Department of Energy (DOE) as a research and development facility for the purpose of demonstrating the safe geologic disposal of transuranic radioactive wastes resulting from our nation's defense activities. Specifically, the objective of the WIPP project was to address the technology associated with long-term isolation of defense-related nuclear wastes in the geologic medium of natural salt deposits. Public Law 96-164 (1979) authorized the DOE to proceed with the development of the WIPP facility.

Prior to October 1992, the land of the WIPP site was administered by the US Department of Interior, Bureau of Land Management. The WIPP site encompasses 4,145 hectares (10,240 acres); surrounding areas are used primarily for livestock grazing, some potash mining, and oil and gas production (US DOE, 1980). Congress transferred jurisdiction of the WIPP site to the Secretary of Energy on 30 October 1992, through the Waste Isolation Pilot Plant Land Withdrawal Act (LWA) of 1992 (Public Law 102-579).

The agency now known as the DOE has undergone three name changes since its inception as the Atomic Energy Commission in 1946; thus many of the WIPP boreholes were named in accordance with the current designation of the responsible agency at the time of drilling (e.g., AEC: Atomic Energy Commission, ERDA: Energy Research and Development Administration). Two of the exploratory boreholes, AEC 7 and AEC 8, were drilled by Oak Ridge National Laboratory in 1974, before Sandia National Laboratories assumed responsibility for the site characterization activities. AEC 7 and AEC 8 were eventually deepened for further evaluation. Borehole Cabin Baby #1 was acquired by DOE from a petroleum company and borehole D-268 was drilled by a potash mining company. These two boreholes were used by Sandia in site characterization work and thus are included in this report. The AEC, ERDA, DOE, and WIPP holes were drilled primarily to characterize the geology and stratigraphy of the WIPP site and its environs and to investigate the presence or absence of various geologic features or processes such as faulting, anticlinal structures, breccia pipes, and salt dissolution in the rocks near the proposed repository. The potash resource

evaluation boreholes (P-1 through P-21) were drilled under the management of Fenix & Scisson, Inc. These boreholes were logged and the stratigraphy and core were described by the US Geological Survey (USGS) Special Projects Division for DOE/Sandia to expand knowledge on the distribution, composition, and tonnage of potash resources in the WIPP site area (Jones, 1978).

WIPP 17, 20, 23, and 24 were planned but not drilled because the technical justifications for these holes were satisfied by data obtained from earlier boreholes. WIPP 25 through WIPP 30 were drilled specifically to define the geology and hydrology of the Nash Draw area, a broad, shallow topographic depression west of the WIPP site (Bachman, 1980).

Rock units comprising the Late Permian Rustler Formation overlying the Salado Formation were studied extensively because some units contain groundwater. The Rustler plays an integral role in the performance assessment of the WIPP. These rock units may influence the migration of radionuclides and gases released from the repository to the accessible environment in the event of inadvertent human intrusion. Many of the WIPP boreholes (vertical holes drilled from the ground surface), particularly H-1 through H-19, were drilled specifically to evaluate the hydrologic and geochemical properties of the Magenta and Culebra dolomite members of the Rustler Formation and the contact zone between the Rustler and Salado formations (borehole H-13 was not drilled). Boreholes H-19(b0) through H-19(b7), completed in 1995, were drilled for hydrologic and tracer-based flow testing (US DOE, 1995a).

Studies over the past two decades have determined that the Culebra Dolomite is the most transmissive rock unit above the proposed WIPP repository; it is thus considered to be the most probable pathway for radionuclide transport to the accessible environment if the repository is ever breached (US DOE, 1994). As part of the WIPP Water Quality Sampling Program (US DOE, 1995b), boreholes WQSP-1 through WQSP-6 were drilled for water quality monitoring and tracer tests in the Culebra Dolomite, and WQSP-6a was drilled for water quality monitoring in the Dewey Lake Red Beds above the Rustler.

DATA SOURCES

This report documents drilling activities performed in support of the WIPP Project. The listing summarizes the DOE's surface borehole drilling and testing activities through 31 December 1995 in spreadsheet format. This condensed listing of borehole data could be combined with other relevant WIPP project information to support the development of a Geographic Information System (GIS) (Aguilar et al., 1995). The data collected have been interpreted and published in a variety of documents, including basic data reports, hydrologic/hydraulic testing reports, potash resource test drilling reports, and other DOE, US Geological Survey, Sandia, and private industry reports. Some of these reports are listed among the references. Basic data reports were generally written as soon as possible after hole completion by the geologist who "rode" the hole.

A significant portion of the information presented here was obtained from basic data reports. The report by Seward (1982), which is an abridged surface borehole history for the WIPP site that included boreholes drilled to 30 September 1981, provided motivation to update the database. Compilation of borehole data for the site required extensive review of the literature coupled with personal contacts with Sandia WIPP personnel, Westinghouse Electric Corporation employees, and private contractors familiar with the history of surface borehole activities at the WIPP. The January 22, 1991 memo from J.W. Mercer of Sandia provided information regarding the current status of the boreholes (see Appendix A). The borehole data (Table 1) are followed by maps showing borehole locations within the WIPP complex and surrounding area (Figures 1, 2, and 3). The 16-section

controlled area of the WIPP, designated by the 1992 LWA, is outlined in these maps. Figures 4, 5, and 6 show the chronology of the drilling program.

BOREHOLE DATA

The following is a key describing the data presented in Table 1:

ID =

Borehole designation. The holes listed in Table 1 are grouped into four sections: (1) geologic evaluation, (2) hydrologic testing and monitoring, (3) resource evaluation, and (4) shaft construction. Within each section the holes are listed by hole alphanumeric identification number, except for the four shafts, which are listed chronologically.

Letters used as subdesignations for the hydrologic boreholes are based on the initial target horizon to be tested; for example, "a" and "b" represent completion to the Magenta and Culebra members of the Rustler Formation, respectively, and "c" represents completion to the Rustler/Salado contact.

The format used in naming the hydrologic boreholes varied somewhat over the 21-year period (1974–1995) because of individual labeling preferences by those responsible for the drilling activities. For example, multiple boreholes at a given hydropad were at times differentiated by uppercase letter subdesignations (e.g., H-4A, H-4B, H-4C). In contrast, boreholes at other hydropad sites were at times differentiated by the use of lowercase letters with or without parentheses; for example, H-2 (b1) and H-2 (b2) are two neighboring holes on pad H-2 drilled to the Culebra. In the case of the H-3 hydropad, a combination of these two labeling schemes resulted. The first three boreholes, H-3 (b1), H-3 (b2) and H-3 (b3), were completed to the Culebra Dolomite, whereas H-3D was completed to the Dewey Lake Red Beds overlying the Rustler Formation. Additionally, the H-3D borehole was drilled later than the other H-3 boreholes.

For consistency, the authors have chosen to use lower case letter designations without parentheses to differentiate among multiple hydropad boreholes.

Drilling Start/End Date =

Month/Day/Year surface borehole drilling commenced (spudded in) and Month/Day/Year drilling was completed. If spudded in and drill completion dates were unavailable, the start and completion dates of the borehole field operations were used.

Purpose =

Abbreviation of general purpose for surface borehole drilling.

BHP - Borehole plugging test.

BREC - Breccia pipe exploration hole, a subset of GEO.

GEO - Geologic evaluation hole.

GEOHYD - Geologic, hydrologic evaluation hole.

HYD - Hydrologic monitoring hole (measuring fluid level and taking samples).

STRAT - Stratigraphic hole.

MULTI - Borehole used for several different purposes (e.g., GEO, HYD, STRAT).

NDGEOHYD - Nash Draw geologic and hydrologic test holes.

POT - Potash resource assessment hole.

POTHYD - Potash resource assessment hole subsequently converted to a hydrologic hole.

RCHYD - Recompleted hydrologic hole.

HYDROCARBON - Borehole drilled by private industry for oil and/or gas exploration.

ENG - Borehole drilled for engineering activities associated with development of the WIPP repository.

Status =

Current condition of the borehole as of this printing. For example, a borehole may be described as plugged or in use as a hydrologic monitoring hole. Wherever possible, casing information is included. Most of this information was extracted from the January 22, 1991 memo from J.W. Mercer to W.D. Weart entitled "Test Holes Drilled in Support of Geotechnical Studies at the WIPP Site" (see Appendix A).

Township/Range/Section and Section X-Y Coordinates =

Township, Range, Section, and Section X-Y coordinates of the borehole location measured perpendicular from designated section lines (in feet). Most data were obtained from basic data reports and the "As-Built Surveys" for the boreholes reported in Table 3-5 of Gonzales (1989). For example, 1001 FNL, 50 FEL signifies that the hole is located at the intersection 1001 feet perpendicular to north section line and 50 feet perpendicular to east section line.

State-Plane X-Y Coordinates =

Most of the state-plane coordinates presented in Table 1 are taken from Table 3-6 of Gonzales (1989). State-plane coordinates for holes drilled after 1989 were extracted from recent data reports. The state-plane coordinates for each borehole were tied to surveyed distances from section lines by using known coordinates of the nearest NE section corner. An angle correction of 0.34° clockwise from the section line to the state coordinate system was used in the conversion because the two systems do not run parallel. Section corner coordinates were provided to Sandia by the USGS and are listed in Appendix D of Gonzales (1989).

The point of origin for the state-plane coordinate system of the New Mexico east grid zone is located at 31° 00′ N and 104° 20′ W. Origin values are arbitrarily set at 500,000 feet for the X coordinate and 0 feet for the Y coordinate. For example, borehole P-13, which is located 156,973 feet east and 509,039 feet north of the point of origin, has state-plane coordinates of 656,973 X and 509,039 Y

Elevation (ft) =

Surface elevation in feet above mean sea level. Elevations were taken from basic data reports and Gonzales (1989). When surface elevations were unavailable, monument elevations were employed.

Total Depth (Below Ground Surface) (ft) =

Total borehole depth in feet, rounded off to nearest foot using ground surface as the reference base. For boreholes where total depth was reported in basic data reports or other reference sources as depth from the top of the Kelly Bushing (KB), we have corrected to ground level reference base by *subtracting* the KB height above the ground surface from the total depth. These boreholes are indicated by an asterisk (*) following the reported depth. The KB height is given when available.

Depth of Cored Interval(s) and Core Diameter(s) =

Interval(s) within the boreholes where core-drilling equipment was used. Most cores listed in Table 1 are size NX (2 5/32 in. [54.8 mm]). Core diameters are given in the table when available. In cases where multiple core diameters are listed, deeper cores sometimes have larger diameters than shallower cores because the borehole was reamed to a larger diameter during subsequent drilling operations.

Reference(s) =

Report number, author(s), and date of publications containing information about the borehole; basic data reports were a key source.

Comments =

Purpose and objectives for the borehole. A brief statement on findings is included when available. It should be noted that findings resulting from initial basic interpretations may be changed by subsequent investigations.

The names of some geologic units—particularly the lower member of the Rustler Formation and the Dewey Lake Formation—have varied in the WIPP literature over the years. The former has been called either the "unnamed lower member" or the "lower member" of the Rustler, and a recent proposal recommends that the unit be informally named the Los Medaños Member (Holt and Powers, 1988); for brevity, this report uses the term "lower member." Names for the latter unit have also varied through the years. This report follows early usage and refers to the unit as the "Dewey Lake Red Beds."

UNITS OF MEASURE

All measurements related to the boreholes are reported in English units. These units are used to facilitate the comparison of original measurements by surveyors to establish the geographic coordinates of the boreholes, by drillers reporting sample and core depths, and by geophysical loggers in recording inhole variations in rock properties versus depth. If metric equivalents of the English units are desired, the following conversion factors should be used.

Multiply English unit	by	to obtain metric equivalent
foot	0.3048	meter
inch	25.4	millimeter
inch	2.54	centimeter
mile	1.6093	kilometer
acre	0.405	hectare

Table 1. DOE-Sponsored Surface Boreholes at the Waste Isolation Pilot Plant (continued)

ID	Drilling Start/End Date	Purpose	Status	Township/ Range/ Section	Section X & Y Coordinates	State-Plane Coord. X (ft)	State-Plane Coord. Y (ft)	Surface Elevation (ft)
Geologic Evaluation								
AEC 7	03/19/74 - 04/18/74	MULTI	Partially plugged/standby condition.	T21S, R32E, S31	2039 FNL, 2037 FEL	691,829	523,133	3656
AEC 7 (deepened)	02/27/79 - 05/06/79	RCHYD, BHP	Used as a hydrologic monitoring well.	T21S, R32E, S31	2039 FNL, 2037 FEL	691,829	523,133	3656
AEC 8	04/24/74 - 05/19/74	GEO	Partially plugged/standby condition.	T22S, R31E, S11	935 FNL, 1979 FWL	679,951	513,567	3532
AEC 8 (deepened)	06/28/76 - 08/05/76	RCHYD	Used as a hydrologic monitoring well.	T22S, R31E, S11	935 FNL, 1979 FWL	679,951	513,567	3532
B-25 (BECHTEL 25)	12/01/78 - 01/05/79	ENG, HYD, STRAT	Plugged	T22S, R31E, S20	796 FSL, 777 FEL	666,693	499,415	3408
DOE-1	07/14/82 - 07/28/82	STRAT, GEOHYD	Used as a hydrologic monitoring well.	T22S, R31E, S28	610 FEL, 182 FSL	672,206	493,563	3465
DOE-2	08/28/84 - 09/18/84	STRAT, GEOHYD	Partially plugged/ conditioned for deepening.	T22S, R31E, S8	704 FSL, 128 FEL	667,317	509,876	3418

Table 1. DOE-Sponsored Surface Boreholes at the Waste Isolation Pilot Plant (continued)

ID	Total Depth (ft)	Depth of Cored Interval(s) (ft) {Core Dia}	Reference(s)	Comments
Geologic Evaluation				
AEC 7	3906*	1028-3906 {4.2"}	SAND80-1375 (Christensen and Peterson,1981), SAND79-0268 (Sandia and D'Appolonia, 1983a), memo: 7/10/74 G.A. Dinwiddie to W.S. Twenhofel, USGS OFR 81-468 (Jones, 1981a)	Drilling directed by ORNL. Total depth reached the lower Castile. Evaluated lithology and stratigraphy of evaporite sequence for a radioactive waste repository. Hole completed in repeat section of Anhydrite II. Gas blowout on 04/19/74.
AEC 7 (deepened)	4720*	3914-4702 {4.2"}	SAND79-0268 (Sandia and D'Appolonia, 1983a), SAND79-0739 (Christensen, 1979), SAND80-1375 (Christensen and Peterson, 1981), SAND89-7056 (Stensrud et al., 1990)	Deepened from the lower Castile to the upper Bell Canyon to evaluate fluid-bearing zones of Bell Canyon and to test borehole plugging operations/materials. Well rehabilitated and casing perforated in April, 1988 for hydrologic testing in the Culebra Dolomite.
AEC 8	3019*	31-3019 {4.2"}	SAND79-0269 (Sandia and D'Appolonia, 1983b), SAND79-0739 (Christensen, 1979), USGS-WRI 79-98 (Mercer and Orr, 1979)	Drilling directed by ORNL. Preliminary site examination. Provided lithologic and stratigraphic information through the Salado Formation. Hole completed in Anhydrite III of Castile Formation.
AEC 8 (deepened)	4911*	4809-4863 {4.2"}	SAND79-0269 (Sandia and D'Appolonia, 1983b), SAND79-0739 (Christensen, 1979), USGS WRI 79-98 (Mercer and Orr, 1979)	Deepened from top of Castile into Ford Shale of Bell Canyon Formation. Established flow of salt in Castile halites. Drill stem tests run in Castile Formation show permeabilities to be in micro-darcies range.
B-25 (BECHTEL 25)	902	22-902 {2.2"}	Document No. 22-V-510-02 Bechtel National, Inc. (1979)	Drilled to determine lithology & stratigraphy for geologic correlation & shaft design input, determine in situ permeability characteristics of selected horizons, and acquire cores for lab rock testing. More than 60 shallow (generally less than 100') holes were drilled for Bechtel to provide information used in foundation design for surface facilities. Only B-25 was drilled to significant depth. Hydrologic testing included the Magenta, the Culebra, and the Rustler/Salado contact. Hole completed in upper unit of Salado Formation.
DOE-1	4057*	2135-2376 {4.2"} 3342-4057 {4.2"}	TME 3159 (Freeland, 1982), SAND85-7206 (Hydro Geo Chem, Inc., 1985), SAND86-7109 (Intera Technologies, Inc., 1986)	Drilled to acquire stratigraphic data and to investigate a seismically inferred structural anomaly (anticlinal) in Castile Formation and test for gas or fluids associated with anticlinal structures. No structural disruption in halite & anhydrite units observed; no brine or gas found. Hole bottomed in Anhydrite I of Castile Formation.
DOE-2	981	48-981 {2.2"}	SAND86-0611 (Mercer et al., 1987), SAND86-0954 (Mercer, 1987), SAND86-7166 (Saulnier et al., 1986)	Drilled to investigate a structural depression about two miles north of WIPP center. Halite is absent from the Forty-niner & Tamarisk Members; halite is present in the lower member of the Rustler Formation. Hole completed in upper Salado.

Table 1. DOE-Sponsored Surface Boreholes at the Waste Isolation Pilot Plant (continued)

ID	Drilling Start/End Date	Purpose	Status	Township/ Range/ Section	Section X & Y Coordinates	State-Plane Coord. X (ft)	State-Plane Coord. Y (ft)	Surface Elevation (ft)
DOE-2 (deepened)	04/29/85 - 06/08/85	RCHYD, STRAT	Used for hydrologic monitoring of Rustler Formation and is isolated by packer below base of Rustler.	T22S, R31E, S8	704 FSL, 128 FEL	667,317	509,876	3418
ERDA 6	06/13/75 - 09/18/75	MULTI	Plugged back 2773 to 2560 ft with 225 sacks cement.	T21S, R31E, S35	2152 FSL, 910 FEL	682,279	521,970	3540
ERDA 9	04/28/76 - 06/04/76	MULTI	Used as a hydrologic monitoring well.	T22S, R31E, S20	267 FSL, 177 FEL	667,301	498,887	3409
ERDA 10	08/18/77 - 10/14/77	GEO, BHP	Hole plugged to surface on 10/14/77.	T23S, R30E, S34	2327 FEL, 200 FNL	644,058	461,520	3371
WIPP 11	02/06/78 - 03/14/78	GEO, STRAT	Hole plugged and abandoned by DOE/Sandia.	T22S, R31E, S9	294 FWL, 709 FNL	667,700	513,751	3426
WIPP 12	11/09/78 - 12/07/78	GEO, STRAT	Partially plugged/standby condition.	T22S, R31E, S17	150 FSL, 80 FEL	667,371	504,068	3472
WIPP 12 (deepened)	11/17/81 - 01/01/82	GEO, GEOHYD	Used as a hydrologic monitoring well. Plugged back to monitor Culebra.	T22S, R31E, S17	150 FSL, 80 FEL	667,371	504,068	3472
WIPP 13	07/26/78 - 08/06/78	GEO, BREC	Used as a hydrologic monitoring well.	T22S, R31E, S17	'2567 FSL, 1729 FWL	663,885	506,464	3405
WIPP 13 (deepened)	08/26/79 - 10/05/79	GEO, STRAT, GEOHYD	Used as a hydrologic monitoring well.	T22S, R31E, S17	2567 FSL, 1729 FWL	663,885	506,464	3405

Table 1. DOE-Sponsored Surface Boreholes at the Waste Isolation Pilot Plant (continued)

ID	Total Depth (ft)	Depth of Cored Interval(s) (ft)	{Core Dia}	Reference(s)	Comments
DOE-2 (deepened)	4325	1011-4325	{4.2"}	SAND86-0611 (Mercer et al., 1987), SAND86-0954 (Mercer, 1987)	Hole deepened into the Bell Canyon to investigate deep dissolution throughout the Castile Formation. Evidence supporting deep dissolution not observed. Hole completed in Hays sandstone of Bell Canyon Formation.
ERDA 6	2775	166-171 212-217 499-504 693-695 835-2775	{2.0"} {2.0"} {2.0"} {2.0"} {2.0"}	SAND77-0946 (Griswold, 1977a), SAND79-0267 (Sandia and USGS, 1983a), USGS OFR 81-468 (Jones, 1981a), WTSD-TME-3153 (Popielak et al., 1983)	Drilled to evaluate stratigraphy at initial proposed WIPP site. Established pronounced anticlinal structure, salt flow, deformation & fracturing of Castile anhydrites. At 2711 ft, encountered pressurized brine and dissolved H_2S. After WIPP 12 encountered brine, ERDA 6 was re-entered (02/19/82 to 05/10/83) to test its brine reservoir. *The two reservoirs failed to respond to one another.*
ERDA 9	2877*	1065-2659	{4.2"}	SAND77-0946 (Griswold, 1977a), SAND80-7119 (Griswold and McWhirter, 1981), SAND79-0270 (Sandia and USGS, 1983b), SAND87-7125 (Stensrud et al., 1987), USGS OFR 81-469 (Jones, 1981b)	Centered on second proposed WIPP site southwest of ERDA 6. Confirmed satisfactory stratigraphy, lithology, and mineralogy. Drill stem tests showed *no significant amount of fluid within the Salado.* Hole bottomed 50 ft into the Castile Formation in Anhydrite III. Hole completed in Anhydrite III of Castile Formation.
ERDA 10	4417*	2082-4417	{4.2"}	SAND79-0271 (Sandia and D'Appolonia, 1983c)	Drilled to evaluate dissolution. Hole completed in Olds sandstone of Bell Canyon Formation.
WIPP 11	3570*	714-3521	{4.2"}	SAND79-0272 (Sandia and USGS, 1982)	Drilled to evaluate presence/absence of salt deformation. Confirmed an anticline in the Castile. No brine encountered. Salt present. Hole completed in Anhydrite I of Castile Formation.
WIPP 12	2776*	123-2759 (discontin-uous)	{4.2"}	SAND82-2336 (Sandia and D'Appolonia, 1982a)	Drilled to evaluate presence/absence of salt deformation. Stratigraphy confirmed to top of Castile, indicated thinning of lower Salado & more clay seams exist relative to ERDA 9. Hole completed in upper unit of Salado Formation.
WIPP 12 (deepened)	3928*	2776-3928	{4.2"}	TME 3148 (Black, 1982), SAND86-7166 (Saulnier et al., 1986), SAND87-7125 (Stensrud et al., 1987), SAND88-7014 (Stensrud et al., 1988b)	Deepened to: (1) investigate presence of anticlinal or domal structure & thickening of halite indicated by seismic reflection surveys, (2) determine the nature and extent of deformation in Castile Formation, and (3) characterize any fluid-bearing Castile zones. *Encountered pressurized brine in Castile.* Hole completed in Anhydrite I of Castile Formation.
WIPP 13	1025*	570-595 656-729 827-878	{4.2"}	SAND79-0273 (Sandia and USGS, 1979a), SAND87-7125 (Stensrud et al., 1987)	Drilled to evaluate resistivity anomaly. No evidence of dissolution breccia pipe. Hole completed in upper unit of Salado Formation.
WIPP 13 (deepened)	3850*	1023-3850	{4.2"}	SAND82-1880 (Sandia and D'Appolonia, 1982b), SAND87-7125 (Stensrud et al., 1987), SAND94-0991 (Powers, 1996)	Deepened to obtain structural information on deformation in Castile & lower Salado & obtain core/fluid samples to help determine age & origin of a presumed disturbed zone. Hole completed in Anhydrite I of Castile Formation.

Table 1. DOE-Sponsored Surface Boreholes at the Waste Isolation Pilot Plant (continued)

ID	Drilling Start/End Date	Purpose	Status	Township/ Range/ Section	Section X & Y Coordinates	State-Plane Coord. X (ft)	State-Plane Coord. Y (ft)	Surface Elevation (ft)
WIPP 14	05/01/81 - 06/08/81	GEO, STRAT	Plugged and abandoned by DOE.	T22S, R31E, S9	97 FSL, 2104 FEL	670,628[1]	509,285[1]	3429
WIPP 15	03/08/78 - 04/05/78	GEO, STRAT	Hole loaded with mud and temporarily capped pending further testing and/or plugging. Hole relinquished to land owner on 08/02/78 for use as water well.	T23S, R35E, S18	2426 FNL, 1973 FWL	785,854 (est)	475,695 (est)	3269
WIPP 16	01/11/80 - 02/08/80	BREC, GEO	Plugged and abandoned by DOE.	T21S, R30E, S5	2357 FSL, 139 FWL	630,443	548,609	3383
WIPP 18	03/14/78 - 03/30/78	STRAT, GEO	Cleaned out and cased hole 10/03/85 - 10/11/85. Hole currently used as a Culebra hydrologic monitoring well.	T22S, R31E, S20	984 FNL, 12 FEL	667,446	502,935	3456
WIPP 19	04/06/78 - 05/08/78	STRAT, GEO	Cleaned out and cased hole 09/28/85 - 10/02/85. Hole currently used as a Culebra hydrologic monitoring well.	T22S, R31E, S20	2287 FNL, 13 FEL	667,453	501,632	3433
WIPP 21	05/24/78 - 05/26/78	STRAT, GEO	Cleaned out and cased 09/18/85 - 10/06/85. Hole currently used as a Culebra hydrologic monitoring well.	T22S, R31E, S20	1451 FSL, 12 FEL	667,459	500,071	3417
WIPP 22	05/08/78 - 05/23/78	STRAT, GEO	Cleaned out and cased hole 09/23/85 - 10/08/85. Hole currently used as a Culebra hydrologic monitoring well.	T22S, R31E, S20	2545 FSL, 11 FEL	667,453	501,165	3426

Table 1. DOE-Sponsored Surface Boreholes at the Waste Isolation Pilot Plant (continued)

ID	Total Depth (ft)	Depth of Cored Interval(s) (ft)	{Core Dia}	Reference(s)	Comments
WIPP 14	1000	15-957	{2.2"}	SAND82-1783 (Sandia and D'Appolonia, 1982c)	Drilled in shallow surface depression (karst-like feature) centered on a negative gravity anomaly. Rustler Formation is less dense than in adjacent holes, but believed too deep to account for observed gravity anomaly. Dewey Lake stratigraphy normal. Hole completed in upper unit of Salado Formation.
WIPP 15	811	0-810	{2.0"}	SAND79-0274 (Sandia and University of New Mexico, 1981), SAND94-0991 (Powers, 1996)	Hole drilled to recover material for paleoclimate evaluation at San Simon sink. State-plane coordinates are estimated (Gonzales, 1989). Hole completed in Santa Rosa Formation.
WIPP 16	1300	123-1300	{2.2"}	USGS OFR 82-968 (Snyder and Gard, 1982), SAND94-0991 (Powers, 1996)	Drilled to depth of nearby Mississippi Chemical potash mine to characterize breccia pipe and to determine stratigraphic displacement of beds. Confirmed collapse of strata to lower Rustler, though stratigraphic order is maintained. Halite & anhydrite present within cores. Hole completed in rubble of lower member of Rustler Formation.
WIPP 18	1060	Not Cored		SAND79-0275 (Sandia and USGS, 1980a), SAND86-7166 (Saulnier et al., 1986)	Drilled to investigate possible fault in Rustler Formation or Dewey Lake Red Beds as interpreted from seismic reflection records. Flat, correlative beds above Salado Formation were indicated, contradicting previous seismic reflection data interpretations. Hole completed in upper member of Salado Formation.
WIPP 19	1038	8-1038	{2.0"}	SAND79-0276 (Sandia and USGS, 1980b), SAND86-7166 (Saulnier et al., 1986)	Drilled to investigate possible fault in Rustler Formation or Dewey Lake Red Beds interpreted from seismic reflection records. Flat, correlative beds above Salado Formation were indicated, contradicting previous seismic reflection data interpretations. Hole completed in upper member of Salado Formation.
WIPP 21	1045	Not Cored		SAND79-0277 (Sandia and USGS, 1980c), SAND86-7166 (Saulnier et al., 1986)	Drilled to investigate possible fault in Rustler Formation or Dewey Lake Red Beds interpreted from seismic reflection records. Flat, correlative beds above Salado Formation were indicated contradicting previous seismic reflection data interpretations. Hole completed in upper member of Salado Formation.
WIPP 22	1450	Not Cored		SAND79-0278 (Sandia and USGS, 1980d), SAND86-7166 (Saulnier et al., 1986)	Drilled to investigate possible fault in Rustler Formation or Dewey Lake Red Beds interpreted from seismic reflection records. Flat, correlative beds above Salado Formation were indicated, contradicting previous seismic reflection data interpretations. Hole completed in McNutt potash unit of Salado Formation.

Table 1. DOE-Sponsored Surface Boreholes at the Waste Isolation Pilot Plant (continued)

ID	Drilling Start/End Date	Purpose	Status	Township/ Range/ Section	Section X & Y Coordinates	State-Plane Coord. X (ft)	State-Plane Coord. Y (ft)	Surface Elevation (ft)
WIPP 25	08/28/78 - 09/07/78	GEO, GEOHYD	Used as a hydrologic monitoring well.	T22S, R30E, S15	1853 FSL, 2838 FEL	643,343	505,868	3213
WIPP 26	08/28/78 - 09/06/78	GEO, GEOHYD	Used as a hydrologic monitoring well.	T22S, R30E, S29	2232 FNL, 12 FEL	635,509	496,516	3152
WIPP 27	09/12/78 - 10/09/78	GEO, GEOHYD	Used as a hydrologic monitoring well.	T21S, R30E, S21	90 FNL, 1485 FWL	637,103	535,612	3177
WIPP 28	08/07/78 - 08/25/78	GEO, GEOHYD	Used as a hydrologic monitoring well.	T21S, R31E, S18	99 FNL, 2401 FEL	659,579	540,722	3347
WIPP 29	10/02/78 - 10/10/78	GEO, GEOHYD	Used as a hydrologic monitoring well.	T22S, R29E, S34	407 FSL, 1828 FEL	612,378	488,559	2977
WIPP 30	09/08/78 - 09/23/78	GEO, GEOHYD	Used as a hydrologic monitoring well.	T21S, R31E, S33	668 FNL, 177 FWL	667,536	524,337	3428
WIPP 31	09/18/78 - 10/04/78	GEO, BREC	Used as a monitoring well for two years. Plugged after deepened and tested.	T20S, R30E, S35	423 FSL, 1762 FWL	619,615[2]	554,620	3401
WIPP 31 (deepened)	07/18/80 - 09/29/80	BREC	Plugged and abandoned.	T20S, R30E, S35	423 FSL, 1762 FWL	619,615[2]	554,620	3401
WIPP 32	08/07/79 - 08/16/79	STRAT, GEO, BREC	Abandoned on 08/22/79. Hole plugged to surface with 500 ft^3 of cement.	T22S, R29E, S33	1673 FSL, 29 FEL	608,848	489,850	3023
WIPP 33	07/17/79 - 07/25/79	STRAT, GEO, BREC	Plugged and abandoned on 09/04/79.	T22S, R30E, S13	1762 FSL, 2427 FWL	653,981	505,790	3323
WIPP 34	08/16/79 - 09/01/79	GEO	Plugged and abandoned on 09/04/79.	T22S, R31E, S9[3]	202 FSL, 2000 FWL	669,449	509,375	3433

Table 1. DOE-Sponsored Surface Boreholes at the Waste Isolation Pilot Plant (continued)

ID	Total Depth (ft)	Depth of Cored Interval(s) (ft)	{Core Dia}	Reference(s)	Comments
WIPP 25	655	0 - 21 21 - 238 238 - 650	{2.9"} {2.4"} {4.0"}	SAND79-0279 (Sandia and USGS, 1979b)	Drilled to help define stratigraphy & hydraulics of Nash Draw, especially dissolution status. Hole completed in upper member of Salado Formation.
WIPP 26	503	0-10 10-222 222-503	{2.9"} {2.1"} {3.5"}	SAND79-0280 (Sandia and USGS, 1979c)	Drilled to help define stratigraphy & hydraulics of Nash Draw, especially dissolution status. Hole completed in upper member of Salado Formation.
WIPP 27	592	0-21 21-592	{2.9"} {4.0"}	SAND79-0281 (Sandia and USGS, 1979d)	Drilled to help define stratigraphy & hydraulics of Nash Draw, especially dissolution status. Hole completed in upper member of Salado Formation.
WIPP 28	801	0-10 10-21 21-801	{2.9"} {2.3"} {3.5"}	SAND79-0282 (Sandia and USGS, 1979e)	Drilled to help define stratigraphy & hydraulics of Nash Draw, especially dissolution status. Hole completed in upper member of Salado Formation.
WIPP 29	378	0-5 5-12 12-378	{2.9"} {2.1"} {2.2"}	SAND79-0283 (Sandia and USGS, 1979f)	Drilled to help define stratigraphy & hydraulics of Nash Draw, especially dissolution status. Hole completed in McNutt potash unit of Salado Formation.
WIPP 30	912	0-7 7-17 17-912	{2.9"} {2.0"} {3.5"}	SAND79-0284 (Sandia and USGS, 1980e), SAND88-7014 (Stensrud et al.,1988b)	Drilled to define changes in stratigraphy & hydrology between WIPP site and Nash Draw, especially dissolution status. Hole completed in upper member of Salado Formation.
WIPP 31	810	459-810	{3.5"}	WPO2732 (Statler, 1978)	Drilled to characterize breccia pipe. Intermittent coring to 810 ft in initial exploratory hole confirmed breccia to depths below top of halite in adjacent beds. Hole completed in a breccia material.
WIPP 31 (deepened)	1982	819-1982	{3.5"}	USGS OFR-82-968 (Snyder and Gard,1982), WPO7885 (Powers, 1980), SAND94-0991 (Powers, 1996)	Cored continuously from 810 ft to borehole total depth. Characterized breccia to depths below level of Yates Formation. Hole completed in breccia material.
WIPP 32	390	4-13 13-353	{1.5"} {2.4"}	SAND80-1102 (Sandia and USGS,1980f), WPO7885 (Powers, 1980), SAND94-0991 (Powers, 1996)	Drilled on local topographic high point in Nash Draw considered by some investigators as breccia pipe. Borehole characterized stratigraphy in upper Salado to TD. No evidence of breccia pipe. Hole completed in McNutt potash unit of Salado Formation.
WIPP 33	840	48-58 384-480 540-588 650-700	{3.5"} {3.5"} {3.5"} {3.5"}	SAND80-2011 (Sandia and USGS,1981a), SAND94-0991 (Powers, 1996)	Drilled to investigate the stratigraphy and structure of a small closed depression in the northwestern WIPP site area.
WIPP 34	1820	627-654 654-1793	{3.5"} {2.4"}	SAND81-2643 (Sandia and USGS,1981b)	Drilled to investigate slight syncline, interpreted as karst feature, in upper Salado/lower Rustler in disturbed zone. Drilling data indicated slight syncline; normal stratigraphy through McNutt potash zone. Hole completed in lower unit of Salado Formation.

Table 1. DOE-Sponsored Surface Boreholes at the Waste Isolation Pilot Plant (continued)

ID	Drilling Start/End Date	Purpose	Status	Township/ Range/ Section	Section X & Y Coordinates	State-Plane Coord. X (ft)	State-Plane Coord. Y (ft)	Surface Elevation (ft)
Hydrologic Testing and Monitoring								
H-1	05/20/76 - 06/09/76	HYD	Used as a hydrologic monitoring well.	T22S, R31E, S29	1083 FEL, 623 FNL	666,400	497,991	3403
H-2a	02/14/77- 02/19/77	HYD	Used as a hydrologic monitoring well.	T22S, R31E, S29	727 FNL, 1698 FWL	663,897	497,912	3377
H-2a (deepened)	07/12/83 - 07/17/83	HYD	Used as a hydrologic monitoring well.	T22S, R31E, S29	727 FNL, 1698 FWL	663,897	497,912	3377
H-2b1	02/07/77 - 02/14/77	HYD	Used as a hydrologic monitoring well.	T22S, R31E, S29	696 FNL, 1661 FWL	663,860	497, 943	3378
H-2b2	07/16/83 - 07/30/83	HYD	Used as a hydrologic monitoring well.	T22S, R31E, S29	701 FNL, 1691 FWL	663,890	497,938	3377
H-2c	01/28/77 - 02/05/77	HYD	Used as a hydrologic monitoring well.	T22S, R31E, S29	637 FNL, 1709 FWL	663,907	498,002	3377
H-3b1	07/25/76 - 08/12/76	HYD	Well used for hydrologic monitoring and tracer testing.	T22S, R31E, S29	2085 FSL, 138 FEL	667,377	495,440	3389

Table 1. DOE-Sponsored Surface Boreholes at the Waste Isolation Pilot Plant (continued)

ID	Total Depth (ft)	Depth of Cored Interval(s) (ft)	{Core Dia}	Reference(s)	Comments
Hydrologic Testing and Monitoring					
H-1	848*	731-842	{4.2"}	USGS-WRI 79-98 (Mercer and Orr, 1979), SAND87-7166 (Stensrud et al.,1988a)	Drilled for hydraulic testing & water level monitoring across the Magenta & Culebra Dolomites & the Rustler/Salado contact. Hole completed in upper member of Salado Formation to fully expose all three test intervals.
H-2a	563	513-563	{2.2"}	SAND85-7206 (Hydro Geo Chem, Inc., 1985), SAND85-7263 (Intera Technologies, Inc., and Hydro Geo Chem, Inc., 1985), SAND86-7166 (Saulnier et al., 1986), SAND87-7166 (Stensrud et al., 1988a), USGS-WRI 79-98 (Mercer and Orr, 1979)	Hole was initially completed in the Magenta Dolomite. Hole later deepened to Tamarisk member of Rustler Formation to expose a full section of the Magenta.
H-2a (deepened)	672	616-672	{2.2"}	SAND85-7206 (Hydro Geo Chem, Inc., 1985), SAND85-7263 (Intera Technologies, Inc., and Hydro Geo Chem, Inc., 1985), SAND86-7166 (Saulnier et al., 1986), SAND87-7166 (Stensrud et al., 1988a)	Drilled to provide oriented core for subsequent fracture orientation studies and for anhydrite/gypsum alteration studies. Other objective for this hole was to provide test intervals for groundwater studies. In April 1984 well was re-entered because it had degraded. Casing and screen assembly were installed to top of Culebra. Hole completed in lower member of Rustler Formation to expose a full section of the Culebra.
H-2b1	661	611-661	{2.2"}	SAND85-7263 (Intera Technologies, Inc., and Hydro Geo Chem, Inc., 1985), SAND86-7166 (Saulnier et al., 1986), SAND87-7166 (Stensrud et al., 1988a), SAND89-7056 (Stensrud et al., 1990)	Casing perforated in Magenta & Culebra Dolomites. Hole later completed in lower member of Rustler Formation.
H-2b2	660	450-660	{2.2"}	SAND85-7206 (Hydro Geo Chem, Inc., 1985), SAND85-7263 (Intera Technologies, Inc., and Hydro Geo Chem, Inc., 1985), SAND86-7166 (Saulnier et al., 1986), SAND87-7166 (Stensrud et al., 1988a)	Drilled for monitoring & testing groundwater in the Culebra Dolomite. Pumping and slug tests were conducted to characterize the hydraulic properties of the Culebra Dolomite & establish its hydraulic relationship with overlying/underlying water-bearing units. Hole completed in lower member of Rustler Formation.
H-2c	795	743-795	{2.2"}	SAND85-7263 (Intera Technologies, Inc., and Hydro Geo Chem, Inc., 1985), SAND86-7109 (Intera Technologies, Inc., 1986), SAND86-7166 (Saulnier et al., 1986), SAND87-7166 (Stensrud et al., 1988a), USGS WRI 79-98 (Mercer and Orr, 1979)	Hole is completed below the Rustler/Salado contact & perforated in the Culebra Dolomite.
H-3b1	902	Not Cored		SAND85-7206 (Hydro Geo Chem, Inc., 1985), SAND86-7109 (Intera Technologies, Inc., 1986), SAND86-7166 (Saulnier et al., 1986), SAND86-7177 (Pearson et al., 1987), SAND89-7056 (Stensrud et al., 1990)	Multi-completion hole where Magenta and Culebra Dolomite and Rustler/Salado contact were tested. Hole completed in upper member of Salado Formation.

Table 1. DOE-Sponsored Surface Boreholes at the Waste Isolation Pilot Plant (continued)

ID	Drilling Start/End Date	Purpose	Status	Township/ Range/ Section	Section X & Y Coordinates	State-Plane Coord. X (ft)	State-Plane Coord. Y (ft)	Surface Elevation (ft)
H-3b2	10/25/83 - 11/08/83	HYD	Well used for hydrologic monitoring and tracer testing.	T22S, R31E, S29	2122 FSL, 231 FEL	667,283	495,476	3389
H-3b3	11/15/83 - 12/16/83	HYD	Well used for hydrologic monitoring and tracer testing.	T22S, R31E, S29	2022 FSL, 217 FEL	667,298	495,376	3388
H-3d	03/31/87 - 04/22/87	HYD	Well used for hydrologic monitoring and tracer testing.	T22S, R31E, S29	2067 FSL, 164 FEL	667,350	495,421	3387
H-4a	04/30/78 - 05/22/78	HYD	Well used for hydrologic monitoring and tracer testing.	T23S, R31E, S5	546 FNL, 720 FWL	662,993	486,962	3333
H-4b	04/30/78 - 05/15/78	HYD	Well used for hydrologic monitoring and tracer testing.	T23S, R31E, S5	498 FNL, 633 FWL	662,906	487,554	3333
H-4c	04/30/78 - 05/09/78	HYD	Well used for hydrologic monitoring and tracer testing.	T23S, R31E, S5	446 FNL, 718 FWL	662,991	487,607	3334
H-5a	05/22/78 - 06/20/78	HYD	Used as a hydrologic monitoring well.	T22S, R31E, S15	1092 FNL, 185 FEL	677,828	508,111	3506
H-5b	05/22/78 - 06/13/78	HYD	Used as a hydrologic monitoring well.	T22S, R31E, S15	1008 FNL, 236 FEL	677,777	508,194	3506

Table 1. DOE-Sponsored Surface Boreholes at the Waste Isolation Pilot Plant (continued)

ID	Total Depth (ft)	Depth of Cored Interval(s) (ft)	{Core Dia}	Reference(s)	Comments
H-3b2	725	32-725	{2.2"}	SAND85-7206 (Hydro Geo Chem, Inc., 1985), SAND86-7109 (Intera Technologies, Inc., 1986), SAND86-7166 (Saulnier et al., 1986), SAND86-7177 (Pearson et al., 1987), SAND89-7056 (Stensrud et al., 1990), Appendix A[4]; Technical Memorandum (Mercer, 1994)	*Hole is completed in Culebra Dolomite for tracer and* cross hole testing.
H-3b3	730	34-730	{2.2"}	SAND85-7206 (Hydro Geo Chem, Inc., 1985), SAND86-7109 (Intera Technologies, Inc., 1986), SAND86-7166 (Saulnier et al., 1986), SAND86-7177 (Pearson et al., 1987), Appendix A[4]; Technical Memorandum (Mercer, 1994)	Hole is completed in Culebra Dolomite for tracer and cross hole testing.
H-3d	554	Not Cored		SAND85-7206 (Hydro Geo Chem, Inc., 1985), SAND86-7109 (Intera Technologies, Inc., 1986), SAND86-7166 (Saulnier et al., 1986), SAND86-7177 (Pearson et al., 1987), Sanchez and McCasland (1994), SAND89-7056 (Stensrud et al., 1990), Appendix A[4]; Technical Memorandum (Mercer, 1994)	Hole is open from bottom of surface casing at 39 ft. Hole completed to test Dewy Lake Formation and is used as a water level observation well. This borehole originally was called H-3b4.
H-4a	532	365-415	{2.2"}	SAND85-7206 (Hydro Geo Chem, Inc., 1985), SAND86-7166 (Saulnier et al., 1986), USGS-WRI 81-36 (Mercer et al., 1981)	Hole originally completed in the Magenta Dolomite, later deepened to the lower member of Rustler Formation.
H-4b	529	477-529	{2.2"}	USGS-WRI 81-36 (Mercer et al., 1981), SAND85-7206 (Hydro Geo Chem, Inc., 1985), SAND86-7109 (Intera Technologies, Inc., 1986), SAND86-7166 (Saulnier et al., 1986)	Completed in Culebra Dolomite. Hole bottomed in lower member of Rustler Formation.
H-4c	661	611-661	{2.2"}	SAND85-7206 (Hydro Geo Chem, Inc., 1985), SAND86-7166 (Saulnier et al., 1986), SAND87-7125 (Stensrud et al., 1987), USGS-WRI 81-36 (Mercer et al., 1981), USGS WRI 79-98 (Mercer and Orr, 1979)	Completed in the Rustler/Salado contact & the Culebra Dolomite. Hole bottomed in upper member of Salado Formation.
H-5a	930	775-824	{2.2"}	USGS-WRI 82-19 (Dennehy and Mercer, 1982), SAND82-0080 (Seward, 1982), SAND85-7206 (Hydro Geo Chem, Inc., 1985), SAND86-7166 (Saulnier et al., 1986)	Hole originally completed in the Magenta Dolomite, later deepened to the lower member of Rustler Formation.
H-5b	925	882-925	{2.2"}	USGS-WRI 82-19 (Dennehy and Mercer, 1982), SAND82-0080 (Seward, 1982), SAND85-7206 (Hydro Geo Chem, Inc., 1985), SAND86-7166 (Saulnier et al., 1986)	Hole is completed in the Culebra Dolomite. Hole bottomed in lower member of Rustler Formation.

Table 1. DOE-Sponsored Surface Boreholes at the Waste Isolation Pilot Plant (continued)

ID	Drilling Start/End Date	Purpose	Status	Township/ Range/ Section	Section X & Y Coordinates	State-Plane Coord. X (ft)	State-Plane Coord. Y (ft)	Surface Elevation (ft)
H-5c	05/22/78 - 06/03/78	HYD	Used as a hydrologic monitoring well.	T22S, R31E, S15	1006 FNL, 135 FEL	677,878	508,198	3506
H-6a	07/06/78 - 07/11/78	HYD	Well used for hydrologic monitoring and tracer testing.	T22S, R31E, S18	274 FWL, 283 FNL	657,132	508,881	3347
H-6b	06/27/78 - 07/05/78	HYD	Well used for hydrologic monitoring and tracer testing.	T22S, R31E, S18	323 FWL, 196 FNL	657,180	508,969	3348
H-6c	06/20/78 - 06/26/78	HYD	Well used for hydrologic monitoring and tracer testing.	T22S, R31E, S18	374 FWL, 281 FNL	657,232	508,884	3348
H-7a	09/18/79 - 09/22/79	HYD	Used as a hydrologic monitoring well.	T23S, R30E, S14	2495 FNL, 2492 FWL	648,790	475,132	3164
H-7b1	09/13/79 - 09/18/79	HYD	Used as a hydrologic monitoring well.	T23S, R30E, S14	2566 FNL, 2563 FWL	648,862	475,061	3164
H-7b2	09/02/83 - 09/21/83	HYD	Used as a hydrologic monitoring well.	T23S, R30E, S14	2662 FNL, 2538 FWL	648,837	474,965	3164
H-7c	09/06/79 - 09/13/79	HYD	Used as a hydrologic monitoring well.	T23S, R30E, S14	2592 FNL, 2468 FWL	648,766	475,035	3163
H-8a	09/07/79 - 09/18/79	HYD	Used as a hydrologic monitoring well.	T24S, R30E, S23	1963 FNL, 1487 FEL	650,392	438,678	3433
H-8b	08/06/79 - 08/12/79	HYD	Used as a hydrologic monitoring well.	T24S, R30E, S23	1995 FNL, 1405 FEL	650,473	438,646	3433

Table 1. DOE-Sponsored Surface Boreholes at the Waste Isolation Pilot Plant (continued)

ID	Total Depth (ft)	Depth of Cored Interval(s) (ft)	{Core Dia}	Reference(s)	Comments
H-5c	1076	1026-1076	{2.2"}	USGS-WRI 82-19 (Dennehy and Mercer, 1982), SAND82-0080 (Seward, 1982), SAND85-7206 (Hydro Geo Chem, Inc., 1985), SAND86-7166 (Saulnier et al., 1986)	Hole is completed in the Rustler/Salado contact and the Culebra Dolomite. Hole bottomed in upper member of Salado Formation.
H-6a	637	475-525	{2.2"}	USGS-WRI 82-8 (Dennehy, 1982), SAND82-0080 (Seward, 1982), SAND85-7206 (Hydro Geo Chem, Inc., 1985), SAND86-7166 (Saulnier et al., 1986)	Hole originally completed in the Magenta Dolomite, later deepened to the lower member of Rustler Formation.
H-6b	640	592-640	{2.2"}	USGS-WRI 82-8 (Dennehy, 1982), SAND82-0080 (Seward, 1982), SAND85-7206 (Hydro Geo Chem, Inc., 1985), SAND86-7166 (Saulnier et al., 1986)	Hole is completed in Culebra Dolomite. Hole bottomed in lower member of Rustler Formation.
H-6c	741	700-741	{2.2"}	USGS-WRI 82-8 (Dennehy, 1982), SAND82-0080 (Seward, 1982), SAND85-7206 (Hydro Geo Chem, Inc., 1985), SAND86-7166 (Saulnier et al., 1986)	Hole is completed in Rustler/Salado contact & the Culebra Dolomite. Hole bottomed in upper member of Salado Formation.
H-7a	154	114-154	{3.5"}	USGS-WRI 82-38 (Drellack and Wells, 1982a), SAND86-7109 (Intera Technologies, Inc., 1986), SAND86-7166 (Saulnier et al., 1986)	Hole is completed in Magenta Dolomite. Hole bottomed in Tamarisk member of Rustler Formation.
H-7b1	286	234-286	{3.5"}	USGS-WRI 82-38 (Drellack and Wells, 1982a), SAND86-7109 (Intera Technologies, Inc., 1986), SAND86-7166 (Saulnier et al., 1986)	Hole is completed in Culebra Dolomite. Hole bottomed in lower member of Rustler Formation.
H-7b2	295	103-295	{3.5"}	SAND85-7206 (Hydro Geo Chem, Inc., 1985), SAND86-7109 (Intera Technologies, Inc., 1986, SAND86-7166 (Saulnier et al., 1986)	Hole is completed in Culebra Dolomite to provide data with which to evaluate transmissivity and, if possible, the storativity of the Culebra member at the H-7 hydropad. Hole bottomed in lower member of Rustler Formation.
H-7c	420	140-161 203-292 360-420	{3.5"} {3.5"} {3.5"}	USGS-WRI 82-38 (Drellack and Wells, 1982a), SAND86-7109 (Intera Technologies, Inc., 1986), SAND86-7166 (Saulnier et al., 1986)	Hole is completed in Rustler/Salado contact. Hole bottomed in upper member of Salado Formation.
H-8a	505	83-505	{3.5"}	USGS-WRI 82-4118 (Wells and Drellack, 1982), SAND86-7109 (Intera Technologies, Inc., 1986), SAND86-7166 (Saulnier et al., 1986)	Hole is completed in Magenta Dolomite. Hole bottomed in Tamarisk member of Rustler Formation.
H-8b	624	576-624	{3.5"}	USGS-WRI 82-4118 (Wells and Drellack, 1982), SAND86-7109 (Intera Technologies, Inc., 1986), SAND86-7166 (Saulnier et al., 1986)	Hole is completed in Culebra Dolomite. Hole bottomed in lower member of Rustler Formation.

Table 1. DOE-Sponsored Surface Boreholes at the Waste Isolation Pilot Plant (continued)

ID	Drilling Start/End Date	Purpose	Status	Township/ Range/ Section	Section X & Y Coordinates	State-Plane Coord. X (ft)	State-Plane Coord. Y (ft)	Surface Elevation (ft)
H-8c	07/27/79 - 08/06/79	HYD	Used as a hydrologic monitoring well.	T24S, R30E, S23	2059 FNL, 1470 FEL	650,409	438,581	3433
H-9a	07/09/79 - 09/05/79	HYD	Used as a hydrologic monitoring well.	T24S, R31E, S4	2392 FNL, 139 FWL	667,879	453,977	3405
H-9a (deepened)	07/21/83 - 07/27/83	HYD	Used as a hydrologic monitoring well.	T24S, R31E, S4	2392 FNL, 139 FWL	667,879	453,977	3405
H-9b	08/14/79 - 08/28/79	HYD	Used as a hydrologic monitoring well.	T24S, R31E, S4	2391 FNL, 239 FWL	667,979	453,978	3406
H-9c	08/01/79 - 08/24/79	HYD	Used as a hydrologic monitoring well.	T24S, R31E, S4	2479 FNL, 188 FWL	667,929	453,890	3406
H-10a	08/21/79 - 08/26/79	HYD	Used as a hydrologic monitoring well.	T23S, R32E, S20	433 FSL, 2069 FEL	697,463	467,561	3687
H-10b	10/07/79 - 10/13/79	HYD	Used as a hydrologic monitoring well.	T23S, R32E, S20	485 FSL, 1982 FEL	697,549	467,613	3687
H-10c	08/11/79 - 08/20/79	HYD	Used as a hydrologic monitoring well.	T23S, R32E, S20	385 FSL, 1982 FEL	697,550	467,513	3687
H-11b1	08/03/83 - 09/02/83	HYD, MULTI	Well used for hydrologic monitoring and tracer testing.	T22S, R31E, S33	1511 FSL, 174 FEL	672,647	489,617	3411

Table 1. DOE-Sponsored Surface Boreholes at the Waste Isolation Pilot Plant (continued)

ID	Total Depth (ft)	Depth of Cored Interval(s) (ft)	{Core Dia}	Reference(s)	Comments
H-8c	808	463-808	{3.5"}	USGS-WRI 82-4118 (Wells and Drellack, 1982), SAND86-7109 (Intera Technologies, Inc., 1986), SAND86-7166 (Saulnier et al., 1986)	Hole is completed in Rustler/Salado contact. Hole bottomed in upper member of Salado Formation.
H-9a	559	514-559	{3.5"}	USGS-WRI 82-4111 (Drellack and Wells, 1982b), SAND85-7206 (Hydro Geo Chem, Inc., 1985), SAND85-7263 (Intera Technologies, Inc., and Hydro Geo Chem, Inc., 1985)	Hole is completed in Magenta Dolomite. Hole bottomed in Tamarisk member of Rustler Formation.
H-9a (deepened)	692	616-689	{2.2"}	SAND85-7206 (Hydro Geo Chem, Inc., 1985), SAND85-7263 (Intera Technologies, Inc., and Hydro Geo Chem, Inc., 1985), SAND86-7166 (Saulnier et al., 1986)	Hole deepened and recompleted in Culebra. Hole bottomed in lower member of Rustler Formation.
H-9b	708	640-680	{3.5"}	USGS-WRI 82-4111 (Drellack and Wells, 1982b), SAND85-7206 (Hydro Geo Chem, Inc., 1985), SAND85-7263 (Intera Technologies, Inc., and Hydro Geo Chem, Inc., 1985), SAND86-7166 (Saulnier et al., 1986)	Hole is completed in Culebra Dolomite. Hole bottomed in lower member of Rustler Formation.
H-9c	816	505-562 620-681 789-816	{3.5"} {3.5"} {3.5"}	USGS-WRI 82-4111 (Drellack and Wells, 1982b), SAND85-7206 (Hydro Geo Chem, Inc., 1985), SAND85-7263 (Intera Technologies, Inc., and Hydro Geo Chem, Inc., 1985), SAND86-7166 (Saulnier et al., 1986)	Hole is completed in the Rustler/Salado contact and the Culebra Dolomite. Hole bottomed in upper member of Salado Formation.
H-10a	1318	1247-1287	{3.5"}	USGS-WRI 83-4124 (Wells and Drellack, 1983), SAND86-7166 (Saulnier et al., 1986)	Hole is completed in Magenta Dolomite. Hole bottomed in Tamarisk member of Rustler Formation.
H-10b	1398	639-659 1348-1398	{3.5"} {3.5"}	USGS-WRI 83-4124 (Wells and Drellack, 1983), SAND86-7166 (Saulnier et al., 1986)	Hole is completed in Culebra Dolomite. Hole bottomed in lower member of Rustler Formation.
H-10c	1538*	1230-1281 1346-1394 1489-1518	{3.5"} {3.5"} {3.5"}	USGS-WRI 83-4124 (Wells and Drellack, 1983), SAND86-7166 (Saulnier et al., 1986)	Hole is completed in the Rustler/Salado contact. Hole bottomed in upper member of Salado Formation.
H-11b1	785	210-785	{2.2"}	SAND85-7206 (Hydro Geo Chem, Inc., 1985), SAND85-7263 (Intera Technologies, Inc., and Hydro Geo Chem, Inc., 1985), SAND86-7166 (Saulnier et al., 1986), SAND89-0200 (Mercer and Snyder, 1990a), SAND89-7056 (Stensrud et al., 1990), Sanchez and McCasland (1994)	Drilled to investigate stratigraphy and hydrology of the Culebra. Evaluations in 1983 indicated no evidence of groundwater movement along the contact of the Rustler Formation with the overlying Dewey Lake Red Beds. Halite deposits 20 ft below base of Culebra. Hole bottomed in lower member of the Rustler Formation.

Table 1. DOE-Sponsored Surface Boreholes at the Waste Isolation Pilot Plant (continued)

ID	Drilling Start/End Date	Purpose	Status	Township/ Range/ Section	Section X & Y Coordinates	State-Plane Coord. X (ft)	State-Plane Coord. Y (ft)	Surface Elevation (ft)
H-11b2	10/01/83 - 11/28/83	HYD, MULTI	Well used for hydrologic monitoring and tracer testing.	T22S, R31E, S33	1436 FSL, 169 FEL	672,653	489,542	3411
H-11b3	12/01/83 - 01/04/84	HYD, MULTI	Well used for hydrologic monitoring and tracer testing.	T22S, R31E, S33	1502 FSL, 105 FEL	672,716	489,608	3412
H-11b4	02/23/88 - 03/15/88	HYD, MULTI	Well used for hydrologic monitoring and tracer testing.	T22S, R31E, S33	1515 FSL, 320 FEL	672,501	489,620	3410
H-12	10/04/83 - 10/18/83	HYD	Used as a hydrologic monitoring well.	T23S, R31E, S15	23 FNL, 92 FEL	678,079	477,535	3426
H-14	09/25/86 - 10/23/86	HYD	Used as a hydrologic monitoring well.	T22S, R31E, S29	372 FSL, 562 FWL	662,815	493,697	3346
H-15	10/24/86 - 11/14/86	HYD	Used as a hydrologic monitoring well.	T22S, 31E, S28	89 FNL, 174 FEL	672,606	498,572	3480
H-16	07/13/87 - 08/18/87	HYD	Used as a hydrologic monitoring well.	T22S, R31E, S20	1113 FSL, 1241 FEL	666,231	499,726	3410

Table 1. DOE-Sponsored Surface Boreholes at the Waste Isolation Pilot Plant (continued)

ID	Total Depth (ft)	Depth of Cored Interval(s) (ft)	{Core Dia}	Reference(s)	Comments
H-11b2	776	50-75 145-220 420-721	{2.2"} {2.2"} {2.2"}	SAND85-7206 (Hydro Geo Chem, Inc., 1985), SAND85-7263 (Intera Technologies, Inc., and Hydro Geo Chem, Inc., 1985), SAND86-7166 (Saulnier et al., 1986), SAND89-0200 (Mercer and Snyder, 1990a), SAND89-7056 (Stensrud et al., 1990). Sanchez and McCasland (1994)	Drilled to investigate stratigraphy and hydrology of the Culebra. Evaluations in 1983 indicated no evidence of groundwater movement along the contact of the Rustler Formation with the overlying Dewey Lake Red Beds. Halite deposits 20 ft below base of Culebra. Hole bottomed in lower member of Rustler Formation.
H-11b3	789	60-789	{2.2"}	SAND85-7263 (Intera Technologies, Inc., and Hydro Geo Chem, Inc., 1985), SAND86-7109 (Intera Technologies, Inc., 1986), SAND86-7166 (Saulnier et al., 1986), SAND89-0200 (Mercer and Snyder, 1990a), SAND89-7056 (Stensrud et al., 1990), Sanchez and McCasland (1994)	Drilled to investigate stratigraphy and hydrology of the Culebra. Evaluations in 1983 indicated no evidence of groundwater movement along the contact of the Rustler Formation with the overlying Dewey Lake Red Beds. Halite deposits 20 ft below base of Culebra. Hole bottomed in lower member of Rustler Formation.
H-11b4	765	715-765	{2.2"}	SAND85-7263 (Intera Technologies, Inc., and Hydro Geo Chem, Inc., 1985), SAND86-7166 (Saulnier et al., 1986), SAND88-7014 (Stensrud et al., 1988b), SAND89-0200 (Mercer and Snyder, 1990a), SAND 89-0536 (Beauheim, 1989), SAND89-7056 (Stensrud et al., 1990), Sanchez and McCasland (1994)	Drilled to provide additional stratigraphic info on Dewey Lake Red Beds & upper four members of Rustler Formation, to provide hydraulic-property data on Culebra Dolomite, & also to provide site for long-term monitoring of Culebra response to ongoing hydrologic testing. Hole bottomed in lower member of Rustler Formation.
H-12	1001	129-154, 274-314, 630-1,001	{2.2"} {2.2"} {2.2"}	SAND85-7206 (Hydro Geo Chem, Inc., 1985), SAND85-7263 (Intera Technologies, Inc., and Hydro Geo Chem, Inc., 1985), SAND87-7166 (Stensrud et al., 1988), SAND89-0201 (Mercer and Snyder, 1990b)	Drilled to refine and quantify the hydrologic model for Rustler Formation & investigate the extent of solution of halite in Rustler Formation. Hole bottomed in upper member of Salado Formation.
H-14	589	422-451 535-574	{2.2"} {2.2"}	SAND87-7125 (Stensrud et al., 1987), SAND89-0202 (Mercer and Snyder, 1990c), Sanchez and McCasland (1994)	Continuous cores taken through Magenta & Culebra members of Rustler & across their upper & lower contacts. Hole bottomed in lower member of Rustler Formation.
H-15	900	744-774 855-891	{2.2"} {2.2"}	SAND87-7125 (Stensrud et al., 1987), SAND89-0202 (Mercer and Snyder, 1990c)	Continuous cores taken through Magenta & Culebra Dolomites & across upper & lower contacts. No halite observed in Rustler Formation cores & cuttings. Culebra Member not fractured. Hole bottomed in lower member of Rustler Formation.
H-16	851	474-851	{2.2"}	SAND87-7166 (Stensrud et al., 1988a), SAND89-0203 (Mercer and Snyder, 1990d)	Drilled to assess pre- & post-mining hydrology associated with fourth shaft (air-intake) at WIPP. Intervals in Rustler Formation were cored & hydraulically tested. Hole bottomed in upper member of the Salado Formation.

Table 1. DOE-Sponsored Surface Boreholes at the Waste Isolation Pilot Plant (continued)

ID	Drilling Start/End Date	Purpose	Status	Township/ Range/ Section	Section X & Y Coordinates	State-Plane Coord. X (ft)	State-Plane Coord. Y (ft)	Surface Elevation (ft)
H-17	09/21/87 - 11/04/87	HYD	Used as a hydrologic monitoring well.	T23S, R31E, S3	1466 FSL, 994 FWL	673,837	484,304	3384
H-18	09/29/87 - 11/18/87	HYD	Used as a hydrologic monitoring well.	T22S, R31E, S20	965 FNL, 446 FWL	662,621	502,926	3413
H-19b0	03/28/95 - 04/23/95	HYD	Monitoring hydrologic tracer tests.	T22S, R31E, S28	1485 FSL, 2460 FWL	669,964	494,836	3417
H-19b1	02/13/95 - 03/21/95	HYD	Plugged	T22S, R31E, S28	1535 FSL, 2461 FWL	669,964	494,886	3417
H-19b2	05/10/95 - 05/20/95	HYD	Monitoring hydrologic tracer tests.	T22S, R31E, S28	1434 FSL, 2460 FWL	669,963	494,786	3417
H-19b3	04/23/95 - 05/09/95	HYD	Monitoring hydrologic tracer tests.	T22S, R31E, S28	1509 FSL, 2504 FWL	670007	494,861	3417
H-19b4	05/20/95 - 06/05/95	HYD	Monitoring hydrologic tracer tests.	T22S, R31E, S28	1511 FSL, 2417 FWL	669,920	494,861	3416

Table 1. DOE-Sponsored Surface Boreholes at the Waste Isolation Pilot Plant (continued)

ID	Total Depth (ft)	Depth of Cored Interval(s) (ft)	{Core Dia}	Reference(s)	Comments
H-17	880	510-870	{2.2"}	SAND87-7166 (Stensrud et al., 1988a), SAND89-0204 (Mercer and Snyder, 1990e)	Drilled to assess uncertainties in site hydrologic parameters & serve as monitoring points for planned hydrologic tests. Halite above & below Culebra Dolomite Member of Rustler. Hole bottomed in upper member of Salado Formation.
H-18	840	40-830	{2.2"}	SAND87-7166 (Stensrud et al., 1988a), SAND88-7014 (Stensrud et al., 1988b), SAND89-0204 (Mercer and Snyder, 1990e)	Drilled to perform hydrologic tests on Culebra Dolomite Member, Rustler Formation. First halite beds were encountered below Culebra. Hole bottomed in upper member of Salado Formation.
H-19b0	779	741-779	{5.9"}	Appendix A[4]; Technical Memorandum (Mercer, 1996)	Drilled to conduct tracer tests to define the nature of solute transport in the Culebra Dolomite & provide quantitative estimates of transport parameters needed for Performance Assessment calculations. Geologic & geophysical data were also obtained. Hole bottomed in lower member of Rustler Formation.
H-19b1	733	37-733	{3.3"}	Appendix A[4]; Technical Memorandum (Mercer, 1996)	Drilled to conduct tracer tests to define the nature of solute transport in the Culebra Dolomite & provide quantitative estimates of transport parameters needed for Performance Assessment calculations. Geologic & geophysical data were also obtained. Tools dropped in hole; thus, hole was abandoned. Hole bottomed in Tamarisk member of Rustler Formation.
H-19b2	785	736-765	{3.3"}	Appendix A[4]; Technical Memorandum (Mercer, 1996)	Drilled to conduct tracer tests to define the nature of solute transport in the Culebra Dolomite & provide quantitative estimates of transport parameters needed for Performance Assessment calculations. Geologic & geophysical data were also obtained. Hole bottomed in lower member of Rustler Formation.
H-19b3	785	735-768	{3.3"}	Appendix A[4]; Technical Memorandum (Mercer, 1996)	Drilled to conduct tracer tests to define the nature of solute transport in the Culebra Dolomite & provide quantitative estimates of transport parameters needed for Performance Assessment calculations. Geologic & geophysical data were also obtained. Hole bottomed in lower member of Rustler Formation.
H-19b4	782	736-782	{3.3"}	Appendix A[4]; Technical Memorandum (Mercer, 1996)	Drilled to conduct tracer tests to define the nature of solute transport in the Culebra Dolomite & provide quantitative estimates of transport parameters needed for Performance Assessment calculations. Geologic & geophysical data were also obtained. Hole bottomed in lower member of Rustler Formation.

Table 1. DOE-Sponsored Surface Boreholes at the Waste Isolation Pilot Plant (continued)

ID	Drilling Start/End Date	Purpose	Status	Township/ Range/ Section	Section X & Y Coordinates	State-Plane Coord. X (ft)	State-Plane Coord. Y (ft)	Surface Elevation (ft)
H-19b5	06/11/95 - 07/06/95	HYD	Monitoring hydrologic tracer tests.	T22S, R31E, S28	1466 FSL, 2420 FWL	669,924	494,817	3417
H-19b5 (deepened)	08/25/95 - 08/26/95	HYD	Monitoring hydrologic tracer tests.	T22S, R31E, S28	1466 FSL, 2420 FWL	669,924	494,817	3417
H-19b6	07/10/95 - 07/26/95	HYD	Monitoring hydrologic tracer tests.	T22S, R31E, S28	1554 FSL, 2473 FWL	669,975	494,906	3417
H-19b6 (deepened)	08/23/95 - 08/24/95	HYD	Monitoring hydrologic tracer tests.	T22S, R31E, S28	1554 FSL, 2473 FWL	669,975	494,906	3417
H-19b7	07/26/95 - 08/18/95	HYD	Monitoring hydrologic tracer tests.	T22S, R31E, S28	1456 FSL, 2464 FWL	669,967	494,807	3417
WQSP-1	09/13/94 - 09/16/94	HYD	Monitoring water quality.	T22S, R31E, S16	115 FNL, 1404 FWL	663,594	503,787	3417
WQSP-2	09/06/94 - 09/10/94	HYD	Monitoring water quality.	T22S, R31E, S16	1611 FSL, 118 FWL	667,580	505,540	3461
WQSP-3	10/20/94 - 10/26/94	HYD	Monitoring water quality.	T22S, R31E, S16	54 FSL, 2208 FEL	670,574	503,993	3477

Table 1. DOE-Sponsored Surface Boreholes at the Waste Isolation Pilot Plant (continued)

ID	Total Depth (ft)	Depth of Cored Interval(s) (ft)	{Core Dia}	Reference(s)	Comments
H-19b5	736	Not Cored		Appendix A[4]; Technical Memorandum (Mercer, 1996)	Drilled to conduct tracer tests to define the nature of solute transport in the Culebra Dolomite & provide quantitative estimates of transport parameters needed for Performance Assessment calculations. Geologic & geophysical data were also obtained. Hole bottomed in Tamarisk member of Rustler Formation.
H-19b5 (deepened)	786	736-786	{3.3"}	Appendix A[4]; Technical Memorandum (Mercer, 1996)	Drilled to conduct tracer tests to define the nature of solute transport in the Culebra Dolomite & provide quantitative estimates of transport parameters needed for Performance Assessment calculations. Geologic & geophysical data were also obtained. Hole bottomed in lower member of Rustler Formation.
H-19b6	736	Not Cored		Appendix A[4]; Technical Memorandum (Mercer, 1996)	Drilled to conduct tracer tests to define the nature of solute transport in the Culebra Dolomite & provide quantitative estimates of transport parameters needed for Performance Assessment calculations. Geologic & geophysical data were also obtained. Hole bottomed in Tamarisk member of Rustler Formation.
H-19b6 (deepened)	788	737-788	{3.3"}	Appendix A[4]; Technical Memorandum (Mercer, 1996)	Drilled to conduct tracer tests to define the nature of solute transport in the Culebra Dolomite & provide quantitative estimates of transport parameters needed for Performance Assessment calculations. Geologic & geophysical data were also obtained. Hole bottomed in lower member of Rustler Formation.
H-19b7	785	679- 735 736-783	{3.3"} {3.3"}	Appendix A[4]; Technical Memorandum (Mercer, 1996)	Drilled to conduct tracer tests to define the nature of solute transport in the Culebra Dolomite & provide quantitative estimates of transport parameters needed for Performance Assessment calculations. Geologic & geophysical data were also obtained. Hole bottomed in lower member of Rustler Formation.
WQSP-1	737	696-737	{4.0"}	DOE/WIPP-95-2154 (U.S. Department of Energy, 1995b)	Drilled by Westinghouse to study the chemical characteristics (TDS, volatile organics, and metal concentrations) of groundwater in the Culebra Dolomite. Well was built (without iron-casing) to minimize well casing effects on brine chemistry.
WQSP-2	846	800-846	{4.0"}	DOE/WIPP-95-2154 (U.S. Department of Energy, 1995b)	Drilled by Westinghouse to study the chemical characteristics (TDS, volatile organics, and metal concentrations) of groundwater in the Culebra Dolomite. Well was built (without iron-casing) to minimize well casing effects on brine chemistry.
WQSP-3	879	833-879	{4.0"}	DOE/WIPP-95-2154 (U.S. Department of Energy, 1995b)	Drilled by Westinghouse to study the chemical characteristics (TDS, volatile organics, and metal concentrations) of groundwater in the Culebra Dolomite. Well was built (without iron-casing) to minimize well casing effects on brine chemistry.

Table 1. DOE-Sponsored Surface Boreholes at the Waste Isolation Pilot Plant (continued)

ID	Drilling Start/End Date	Purpose	Status	Township/ Range/ Section	Section X & Y Coordinates	State-Plane Coord. X (ft)	State-Plane Coord. Y (ft)	Surface Elevation (ft)
WQSP-4	10/05/94 - 10/07/94	HYD	Monitoring water quality.	T22S, R31E, S28	1618 FSL, 2181 FEL	670,644	494,986	3430
WQSP-5	10/12/94 - 10/13/94	HYD	Monitoring water quality.	T22S, R31E, S29	304 FSL, 371 FEL	667,163	493,665	3382
WQSP-6	09/22/94 - 09/30/94	HYD	Monitoring water quality.	T22S, R31E, S29	1616 FSL, 1416 FWL	663,678	494,949	3362
WQSP-6a	10/28/94 - 10/31/94	HYD	Monitoring water quality.	T22S, R31E, S29	1643 FSL, 1350 FWL	663,612	494,976	3361
Resource Evaluation								
CB-1 (CABIN BABY FED. NO. 1)	05/31/74 - 02/08/75	HYDRO-CARBON	Dry petroleum hole.	T23S, R31E, S5	1980 FNL, 1980 FEL	665,559	486,111	3320
CB-1 (CABIN BABY FED. NO. 1) (deepened)	08/12/83 - 08/28/83	HYD	Used as a hydrologic monitoring well.	T23S, R31E, S5	1980 FNL,1980 FEL	665,559	486,111	3320
D-268	1984 (specific dates unknown)	POTHYD	Plugged back to 493 ft. Used by Sandia as a hydrologic monitoring hole.	T22S, R30E, S35	720 FSL, 763 FEL	650,843	488,920	3279
P-1	08/23/76 - 09/02/76	POT	Casing pulled and plugged to surface. Abandoned on 09/02/76.	T22S, R31E, S29	327 FSL, 551 FWL	662,804	493,651	3345
P-2	08/25/76 - 09/03/76	POT	Casing pulled, plugged to surface. Abandoned on 09/03/76.	T22S, R31E, S28	125 FNL, 172 FEL	672,609	498,536	3478
P-3	08/26/76 - 09/08/76	POT	Casing pulled, plugged to surface. Abandoned on 09/08/76.	T22S, R31E, S20	103 FSL, 3122 FEL	664,351	498,747	3382

Table 1. DOE-Sponsored Surface Boreholes at the Waste Isolation Pilot Plant (continued)

ID	Total Depth (ft)	Depth of Cored Interval(s) (ft)	{Core Dia}	Reference(s)	Comments
WQSP-4	800	740-798	{4.0"}	DOE/WIPP-95-2154 (U.S. Department of Energy, 1995b)	Drilled by Westinghouse to study the chemical characteristics (TDS, volatile organics, and metal concentrations) of groundwater in the Culebra Dolomite. Well was built (without iron-casing) to minimize well casing effects on brine chemistry.
WQSP-5	681	648-676	{4.0"}	DOE/WIPP-95-2154 (U.S. Department of Energy, 1995b)	Drilled by Westinghouse to study the chemical characteristics (TDS, volatile organics, and metal concentrations) of groundwater in the Culebra Dolomite. Well was built (without iron-casing) to minimize well casing effects on brine chemistry.
WQSP-6	617	568-617	{4.0"}	DOE/WIPP-95-2154 (U.S. Department of Energy, 1995b)	Drilled by Westinghouse to study the chemical characteristics (TDS, volatile organics, and metal concentrations) of groundwater in the Culebra Dolomite. Well was built (without iron-casing) to minimize well casing effects on brine chemistry.
WQSP-6a	225	160-220	{4.0"}	DOE/WIPP-95-2154 (U.S. Department of Energy, 1995b)	Drilled by Westinghouse to study the chemical characteristics (TDS, volatile organics, and metal concentrations) of groundwater in the Dewey Lake Red Beds. Well was built (without iron-casing) to minimize well casing effects on brine chemistry.
Resource Evaluation					
CB-1 (CABIN BABY FED. NO. 1)	4151*	Not Cored		Private Oil Company	Drilled initially as a hydrocarbon well, control was turned over to the DOE after it was found to be a "dry hole."
CB-1 (CABIN BABY FED. NO. 1) (deepened)	4291*	4151-4291	{4.0"}	WTSD-TME-020 (Beauheim et al., 1983), SAND87-7125 (Stensrud et al., 1987)	Re-entered in 1983 to provide data on hydrologic properties (including hydrostatic head) and provide fluid samples from selected permeable zones in Bell Canyon Formation and further define upper Bell Canyon stratigraphy.
D-268	1411	528-1411	{?}	SAND89-7056 (Stensrud et al., 1990)	Drilled by Duval Mining Co. as a potash exploration well. Sandia later developed the well (4/12/88) to provide test data to estimate the Culebra's hydraulic properties and evaluate hydraulic responses. Slug injection & water quality tests conducted.
P-1	1591	1200-1591	{2.2"}	SAND77-1217 (Griswold, 1977b), USGS OFR 78-592 (Jones, 1978)	Evaluations in 1976 indicated low-grade langbeinite mineralization in ore zone 5. Hole bottomed immediately below McNutt potash zone of Salado Formation.
P-2	1895	1500-1895	{2.2"}	SAND77-1217 (Griswold, 1977b), USGS OFR 78-592 (Jones, 1978)	Evaluations in 1976 indicated lease-grade langbeinite mineralization in ore zone 10. Low-grade langbeinite mineralization in zones 4 & 2. Hole bottomed immediately below McNutt potash zone of Salado Formation.
P-3	1676	1300-1676	{2.2"}	SAND77-1217 (Griswold, 1977b), USGS OFR 78-592 (Jones, 1978)	Evaluations in 1976 indicated low-grade langbeinite mineralization in ore zone 4. Hole bottomed immediately below McNutt potash zone of Salado Formation.

Table 1. DOE-Sponsored Surface Boreholes at the Waste Isolation Pilot Plant (continued)

ID	Drilling Start/End Date	Purpose	Status	Township/ Range/ Section	Section X & Y Coordinates	State-Plane Coord. X (ft)	State-Plane Coord. Y (ft)	Surface Elevation (ft)
P-4	08/27/76 - 09/07/76	POT	Casing pulled, plugged to surface. Abandoned on 09/07/76.	T22S, R31E, S28	146 FSL, 1487 FEL	671,327	493,521	3441
P-5	09/10/76 - 09/22/76	POT	Casing pulled, plugged to surface. Abandoned on 09/22/76.	T22S, R31E, S17	202 FSL, 165 FEL	667,286	504,120	3472
P-6	09/03/76 - 09/17/76	POT	Casing pulled, plugged to surface. Plugged and abandoned on 09/17/76.	T22S, R31E, S30	2767 FSL, 199 FWL	657,144	496,090	3354
P-7	09/04/76 - 09/22/76	POT	Casing pulled, plugged to surface. Abandoned on 09/22/76.	T23S, R31E, S5	513 FNL, 396 FWL	662,669	487,090	3332
P-8	09/08/76 - 09/15/76	POT	Casing pulled, plugged to surface. Abandoned on 09/15/76.	T23S, R31E, S4	642 FNL, 96 FWL	667,664	487,471	3336
P-9	09/16/76 - 09/26/76	POT	Casing pulled, plugged to surface. Plugged and abandoned on 09/26/76.	T22S, R31E, S33	1493 FSL, 143 FEL	672,678	489,599	3409
P-10	09/24/76 - 10/17/76	POT	Casing pulled, plugged to surface. Abandoned on 10/17/76.	T22S, R31E, S26	2315 FNL, 339 FWL	678,410	496,383	3508
P-11	09/24/76 - 10/16/76	POT	Casing pulled, plugged to surface. Abandoned on 10/18/76.	T22S, R31E, S23	175 FNL, 177 FWL	678,217	503,781	3506
P-12	09/17/76 - 10/20/76	POT	Casing pulled, plugged to surface. Abandoned on 10/23/76.	T22S, R30E, S24	167 FNL, 195 FEL	656,692	503,896	3376
P-13	09/17/76 - 09/23/76	POT	Casing pulled, plugged to surface. Abandoned on 09/24/76.	T22S, R31E, S18	125 FNL, 116 FWL	656,973	509,039	3345

Table 1. DOE-Sponsored Surface Boreholes at the Waste Isolation Pilot Plant (continued)

ID	Total Depth (ft)	Depth of Cored Interval(s) (ft) {Core Dia}	Reference(s)	Comments
P-4	1857	1460-1857 {2.2"}	SAND77-1217 (Griswold, 1977b), USGS OFR 78-592 (Jones, 1978)	Evaluations in 1976 indicated lease-grade sylvite in ore zone 10. Hole bottomed immediately below McNutt potash zone of Salado Formation.
P-5	1830	1510-1830 {2.2"}	SAND77-1217 (Griswold, 1977b), USGS OFR 78-592 (Jones, 1978)	Evaluations in 1976 indicated lease-grade sylvite in ore zone 10. Hole bottomed immediately below McNutt potash zone of Salado Formation.
P-6	1573	1150-1573 {2.2"}	SAND77-1217 (Griswold, 1977b), USGS OFR 78-592 (Jones, 1978)	Evaluations in 1976 indicated marginal langbeinite in ore zones 4 & 2. Hole bottomed immediately below McNutt potash zone of Salado Formation.
P-7	1574	1264-1574 {2.2"}	SAND77-1217 (Griswold, 1977b), USGS OFR 78-592 (Jones, 1978)	Evaluations in 1976 indicated low-grade langbeinite in ore zone 4. Hole bottomed immediately below McNutt potash zone of Salado Formation.
P-8	1660	1240-1660 {2.2"}	SAND77-1217 (Griswold, 1977b), USGS OFR 78-592 (Jones, 1978)	Evaluations in 1976 indicated lease-grade mixed ore in ore zone 10. Hole bottomed immediately below McNutt potash zone of Salado Formation.
P-9	1796	1410-1796 {2.2"}	SAND77-1217 (Griswold, 1977b), USGS OFR 78-592 (Jones, 1978), Sanchez and McCasland (1994)	Evaluations in 1976 indicated lease-grade mixed ores in ore zone 10. Borehole log suggested perched water-bearing zone in the Dewey Lake Red Beds Formation. Hole bottomed immediately below McNutt potash zone of Salado Formation.
P-10	2009	1620-2009 {2.2"}	SAND77-1217 (Griswold, 1977b), USGS OFR 78-592 (Jones, 1978)	Evaluations in 1976 indicated low-grade sylvite in ore zone 11. Hole bottomed immediately below McNutt potash zone of Salado Formation.
P-11	1940	1580-1940 {2.2"}	SAND77-1217 (Griswold, 1977b), USGS OFR 78-592 (Jones, 1978)	Evaluations in 1976 indicated lease-grade langbeinite in ore zone 2. Low grade mineralization in zones 11, 10, & 4. Lease grade sylvite in ore zone 9. Hole bottomed immediately below McNutt potash zone of Salado Formation.
P-12	1598	1280-1598 {2.2"}	SAND77-1217 (Griswold, 1977b), USGS OFR 78-592 (Jones, 1978)	Evaluations in 1976 indicated lease-grade sylvite in ore zone 10. Mixed ore in zone 4. Hole bottomed immediately below McNutt potash zone of Salado Formation.
P-13	1576	1220-1576 {2.2"}	SAND77-1217 (Griswold, 1977b), USGS OFR 78-592 (Jones, 1978)	Evaluations in 1976 indicated lease-grade sylvite in ore zone 10. Low grade mineralization in zones 9, 8, 4, & 3. Hole bottomed immediately below McNutt potash zone of Salado Formation.

Table 1. DOE-Sponsored Surface Boreholes at the Waste Isolation Pilot Plant (continued)

ID	Drilling Start/End Date	Purpose	Status	Township/ Range/ Section	Section X & Y Coordinates	State-Plane Coord. X (ft)	State-Plane Coord. Y (ft)	Surface Elevation (ft)
P-14	09/24/76 - 10/03/76	POTHYD	Plugged from 1545 to 759 ft. Used as hydrologic monitoring well. Cased from 0-775 ft.	T22S, R30E, S24	312 FSL, 613 FWL	652,159	499,082	3358
P-15	10/04/76 - 10/14/76	POTHYD	Plugged from 1465 620 ft. Used as hydrologic monitoring well. Cased from 0 - 635 ft.	T22S, R31E, S31	411 FSL, 192 FWL	657,148	488,426	3310
P-16	09/27/76 - 10/05/76	POT	Casing pulled, plugged to surface. Abandoned on 10/06/76.	T23S, R31E, S5	951 FSL, 1629 FWL	663,914	483,737	3323
P-17	10/18/76 - 10/26/76	POTHYD	Hole plugged from 1660 - 731 ft. Used as hydrologic monitoring well. Hole cased from 0 - 751 ft.	T23S, R31E, S4	1351 FSL, 395 FWL	667,955	484,185	3340
P-18	10/19/76 - 11/05/76	POTHYD	Hole plugged from 1998 - 1125. Used as hydrologic monitoring well. Hole cased from 0 - 1138 ft.	T22S, R31E, S26	134 FSL, 797 FEL	682,589	493,556	3478
P-19	10/19/76 - 11/04/76	POT	Casing pulled, plugged to surface. Abandoned on 11/04/76.	T22S, R31E, S23	1652 FSL, 2330 FWL	680,377	500,362	3546
P-20	10/06/76 - 10/14/76	POT	Casing pulled, plugged to surface. Abandoned on 10/15/76.	T22S, R31E, S14	794 FSL, 103 FEL	683,197	504,767	3553
P-21	10/15/76 - 10/26/76	POT	Casing pulled, plugged to surface. Abandoned on 10/27/76.	T22S, R31E, S15	852 FNL, 150 FEL	677,862	508,351	3510

Table 1. DOE-Sponsored Surface Boreholes at the Waste Isolation Pilot Plant (continued)

ID	Total Depth (ft)	Depth of Cored Interval(s) (ft)	{Core Dia}	Reference(s)	Comments
P-14	1545	1188-1545	{2.2"}	SAND77-1217 (Griswold, 1977b), USGS OFR 78-592 (Jones, 1978), SAND89-7056 (Stensrud et al., 1990), USGS-WRI 79-98 (Mercer and Orr, 1979)	Evaluations in 1976 indicated lease-grade sylvite in ore zone 10. Casing perforated for hydrologic monitoring in the Culebra Dolomite & Rustler/Salado contact. Hole bottomed immediately below McNutt potash zone of Salado Formation.
P-15	1465	515-600 1038-1465	{2.2"} {2.2"}	SAND77-1217 (Griswold, 1977b), USGS OFR 78-592 (Jones, 1978), SAND87-7166 (Stensrud et al., 1988a), Sanchez and McCasland (1994), USGS-WRI 79-98 (Mercer and Orr, 1979)	Evaluations in 1976 indicated low-grade langbeinite in ore zones 4 & 2. Casing perforated for hydrologic monitoring in the Culebra Dolomite & Rustler/Salado contact. Hole bottomed immediately below McNutt potash zone of Salado Formation.
P-16	1585	1190-1585	{2.2"}	SAND77-1217 (Griswold, 1977b), USGS OFR 78-592 (Jones, 1978)	Evaluations in 1976 indicated lease-grade langbeinite in ore zone 4. Hole bottomed immediately below McNutt potash zone of Salado Formation.
P-17	1660	1220-1660	{2.2"}	SAND77-1217 (Griswold, 1977b), USGS OFR 78-592 (Jones, 1978), Sanchez and McCasland (1994), USGS WRI 79-98 (Mercer and Orr, 1979), SAND87-7125 (Stensrud et al., 1987)	Evaluations in 1976 indicated lease-grade langbeinite in ore zone 4. Low grade langbeinite in zone 2. Casing perforated for monitoring the Culebra Dolomite & Rustler/Salado contact. Hole bottomed immediately below McNutt potash zone of Salado Formation.
P-18	1998	1630-1998	{2.2"}	SAND77-1217 (Griswold, 1977b), USGS OFR 78-592 (Jones, 1978), USGS-WRI 79-98 (Mercer and Orr, 1979), SAND88-7014 (Stensrud et al., 1988b)	Evaluations in 1976 indicated low-grade mixed ores in ore zone 10. Casing perforated for hydrologic monitoring in the Culebra Dolomite & Rustler/Salado contact. Hole bottomed immediately below McNutt potash zone of Salado Formation.
P-19	2000	1635-2000	{2.2"}	SAND77-1217 (Griswold, 1977b), USGS OFR 78-592 (Jones, 1978)	Evaluations in 1976 indicated lease-grade langbeinite in ore zone 10; lower grade langbeinite in zones 4 & 2. Hole bottomed in lower part of McNutt potash zone of Salado Formation.
P-20	1995	1620-1995	{2.2"}	SAND77-1217 (Griswold, 1977b), USGS OFR 78-592 (Jones, 1978)	Evaluations in 1976 indicated lease-grade sylvite in ore zone 10; langbeinite in zone 4. Hole bottomed immediately below McNutt potash zone of Salado Formation.
P-21	1915	1510-1915	{2.2"}	SAND77-1217 (Griswold, 1977b), USGS OFR 78-592 (Jones, 1978)	Evaluations in 1976 indicated lease-grade sylvite in ore zones 10 & 8. Langbeinite in zone 4. Hole bottomed immediately below McNutt potash zone of Salado Formation.

Table 1. DOE-Sponsored Surface Boreholes at the Waste Isolation Pilot Plant (continued)

ID	Drilling Start/End Date	Purpose	Status	Township/ Range/ Section	Section X & Y Coordinates	State-Plane Coord. X (ft)	State-Plane Coord. Y (ft)	Surface Elevation (ft)
Shaft Construction								
Salt Handling (Exploratory) Shaft	07/04/81 - 12/20/81	Designed with loading pocket for transport of mined salt. Also used for personnel transport.	Open-In Use	T22S, R31E, S20	1070 FSL, 599 FEL[5]	666,895	499,687	3411
Waste Shaft	12/24/81 - 03/10/82	Transport of materials and personnel; eventual waste handling shaft for the facility.	Open-In Use	T22S, R31E, S20	670 FSL, 576 FEL[5]	666,920	499,287	3409
Exhaust Shaft	09/22/83 - 02/10/84	Air exhaust shaft for the facility.	Open-In Use	T22S, R31E, S20	668 FSL, 126 FEL[5]	667,370	499,287	3410
Air Intake Shaft	12/04/87 - 08/25/88	Air intake source for the facility.	Open-In Use	T22S, R31E, S20	1074 FSL, 1224 FEL[5]	666,270	499,687	3410

Table 1. DOE-Sponsored Surface Boreholes at the Waste Isolation Pilot Plant (continued)

ID	Total Depth (ft)	Depth of Cored Interval(s) (ft) {Core Dia}	Reference(s)	Comments
Shaft Construction				
Salt Handling (Exploratory) Shaft	2276 (including sump)	Samples collected during mapping of shaft.	TME 3178 (Jarolimek et al., 1983), Appendix B[6]; As-built WIPP Shaft drawings (No. 09-CS-37-G01 and 09-CS-37-G02)	Originally called Exploratory Shaft, later named the Construction & Salt Handling Shaft, now shortened to Salt Handling Shaft. Fitted with a 10 ft inside diameter steel liner to a depth of 845 ft, just below the Rustler/Salado contact. Completed in lower unit of Salado Formation.
Waste Shaft	2286 (including sump)	Samples collected during mapping of shaft.	WTSD-TME-038 (Holt and Powers, 1984), Appendix B[6]; As-built WIPP Shaft drawings (No. 09-CS-31-G01 and 09-CS-31-G02), SAND87-7166 *(Stensrud et al., 1988a)*	Originally drilled to a diameter of 6 ft and known as the Site Preliminary Design Validation (SPDV) Ventilation Shaft. Enlarged to present 20 ft diameter by down slashing in 1983 to function as the Waste Handling Shaft (shortened to Waste Shaft). Lined with concrete to a depth of 900 ft and *supported with wire mesh from there to the bottom.* Completed in lower unit of Salado Formation.
Exhaust Shaft	2158 (no sump)	Samples collected during mapping of shaft.	DOE/WIPP-86-008 (Holt and Powers, 1986), Appendix B[6]; As-built WIPP Shaft drawings (No. 09-CS-35-G01 and 09-CS-35-G02)	Shaft was up-reamed and down-slashed to a diameter of 15 ft, then lined with concrete to a depth of 907 ft. Walls are supported with steel mesh below the lining.
Air Intake Shaft	2150 (no sump)	Samples collected during mapping of shaft.	DOE/WIPP 90-051 (Holt and Powers, 1990), SAND89-7056 (Stensrud et al., 1990), SAND94-1311 (Munson et al., 1995), Appendix B[6]; As-built WIPP Shaft drawings (No. 09-CS-33-G01 and 09-CS-33-G02)	Shaft was excavated with a 20.25 ft diameter raise-boring head and lined with concrete to a depth of 914 ft. Walls are supported intermittently with steel mesh *below the lining.*

Footnotes:

[1] State-Plane Coordinates (both X &Y) for WIPP 14 listed in Table 3-6 of SAND88-1065 (Gonzales, 1989) were in error and have been corrected according to the original survey data reported in SAND82-1783 (Sandia and D'Appolonia, 1982c). In Table 3-6 the coordinates were incorrectly reported as X = 665,336 and Y = 509,260. Correct values are: X=670,628 and Y=509,285.

[2] State-Plane Coordinate X for WIPP 31 listed in Table 3-6 of SAND88-1065 (Gonzales, 1989) is in error and has been corrected based on recalculated data from Appendices C and D of the same report. In Table 3-6 the X coordinate was incorrectly reported as X = 679,527. Correct value is X=619,615.

[3] The section number for WIPP 34 listed in Table 3-5 of SAND88-1065 (Gonzales, 1989) is in error and has been corrected based on the Survey Monument "As-Built" information in Appendix C of the same report. The section number was incorrectly reported as Section 8; it is actually Section 9.

[4] Appendix A, found in SAND96-1960

[5] Section X & Y coordinates were calculated from state-plane coordinates using methods consistent with those reported in Gonzales (1989).

[6] Appendix B, found in SAND96-1960

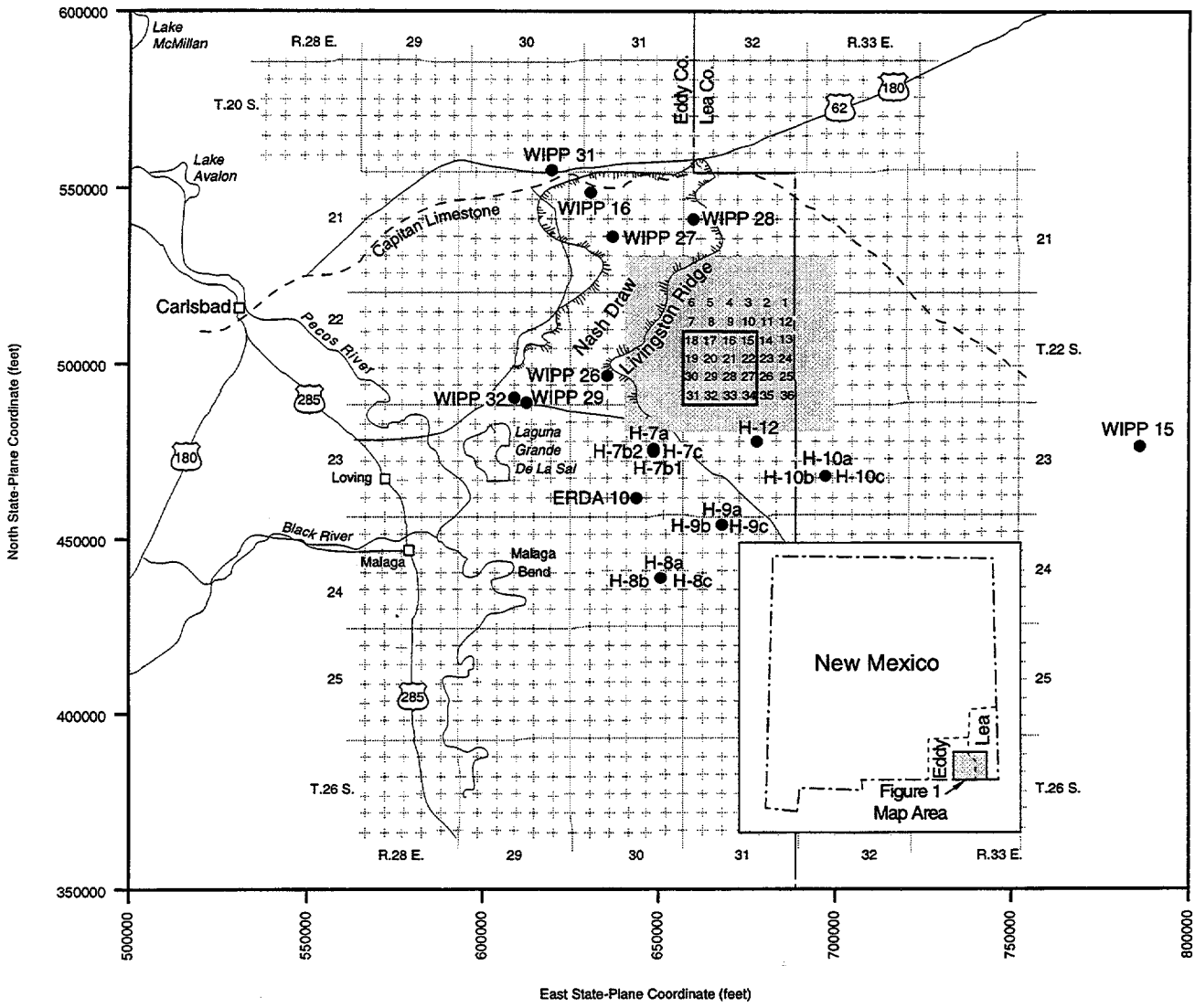

Figure 1. Area of the Waste Isolation Pilot Plant—regional scale.

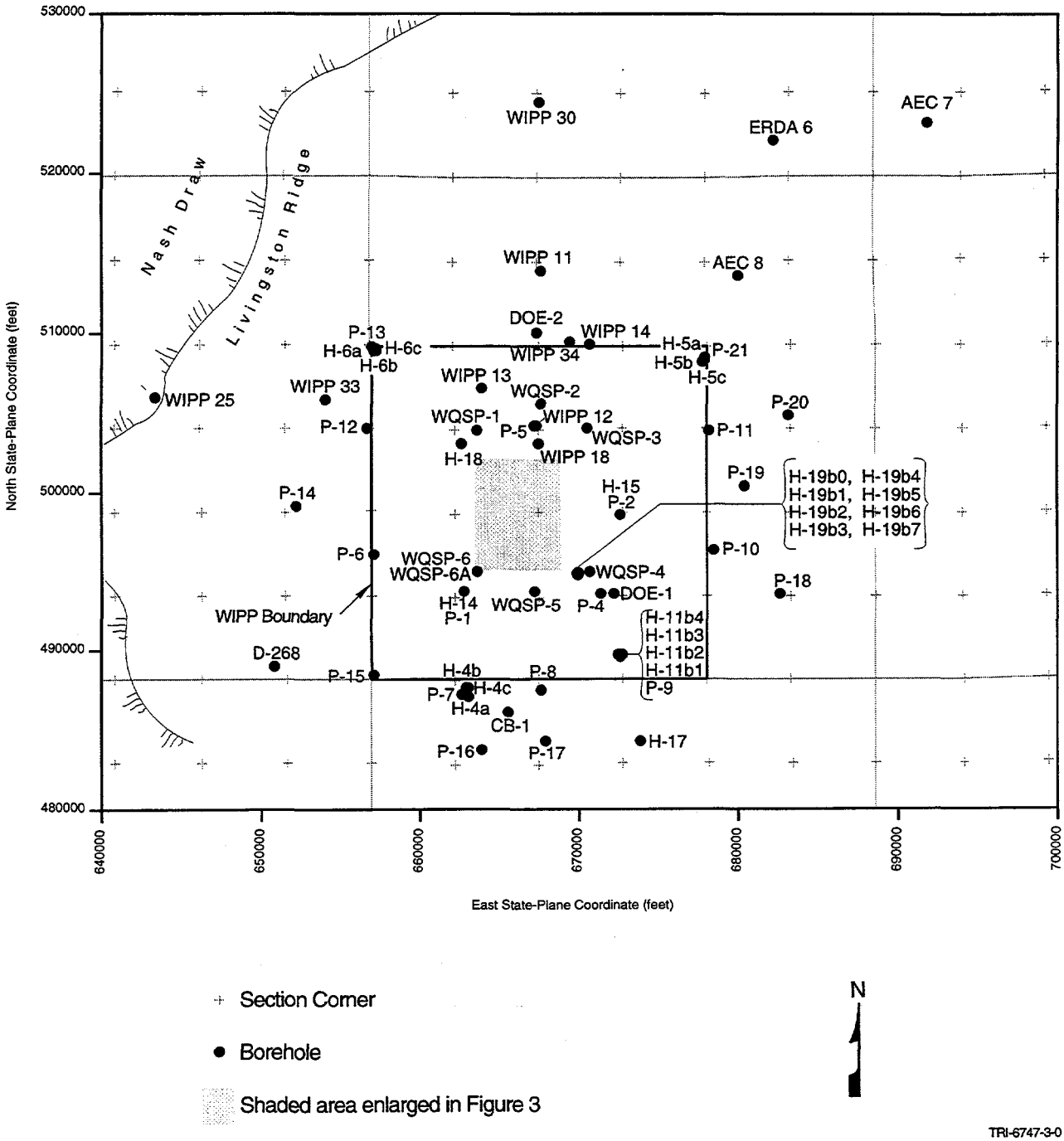

Figure 2. Area of the Waste Isolation Pilot Plant—immediate boundary scale.

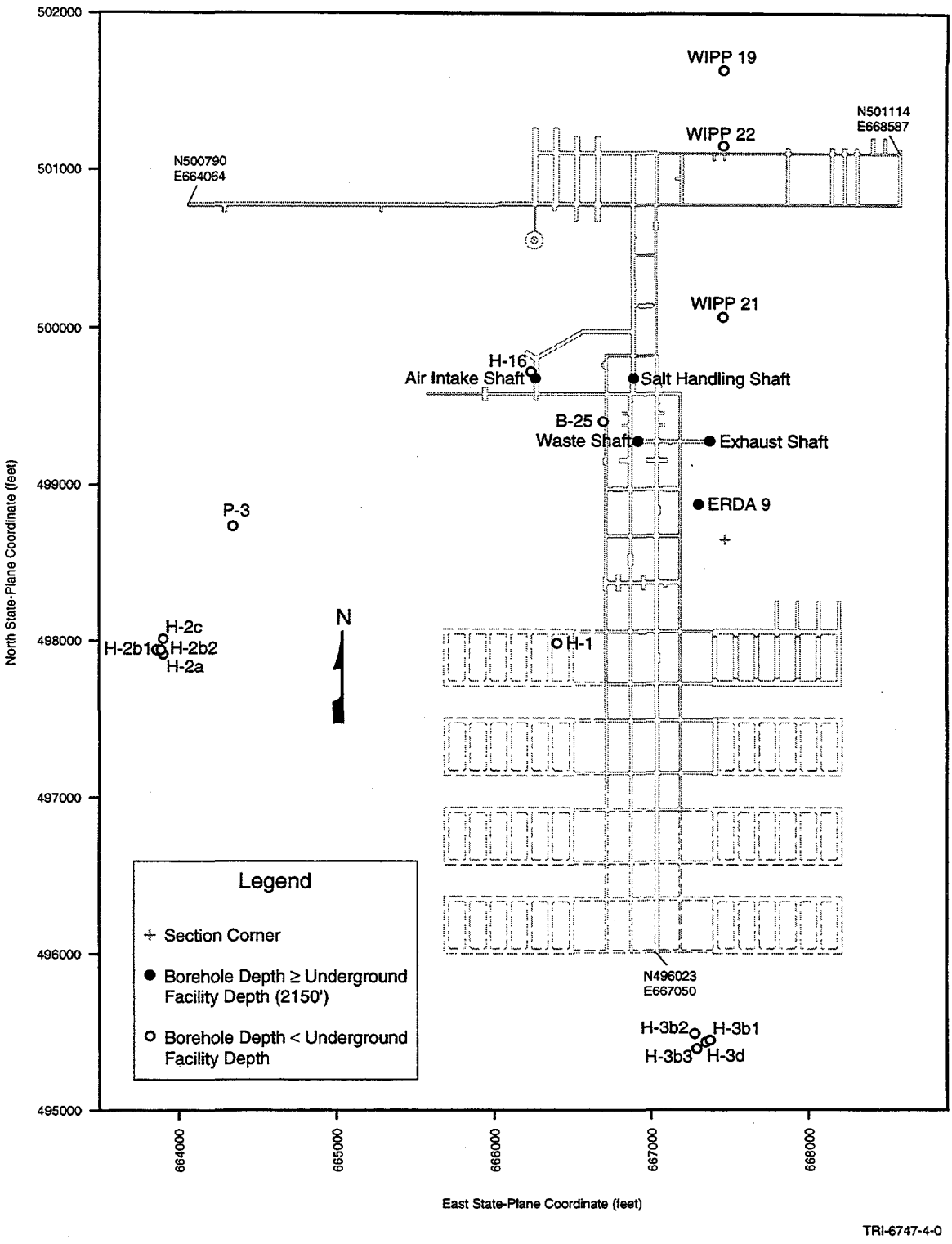

Figure 3. Area of the Waste Isolation Pilot Plant—underground repository scale.

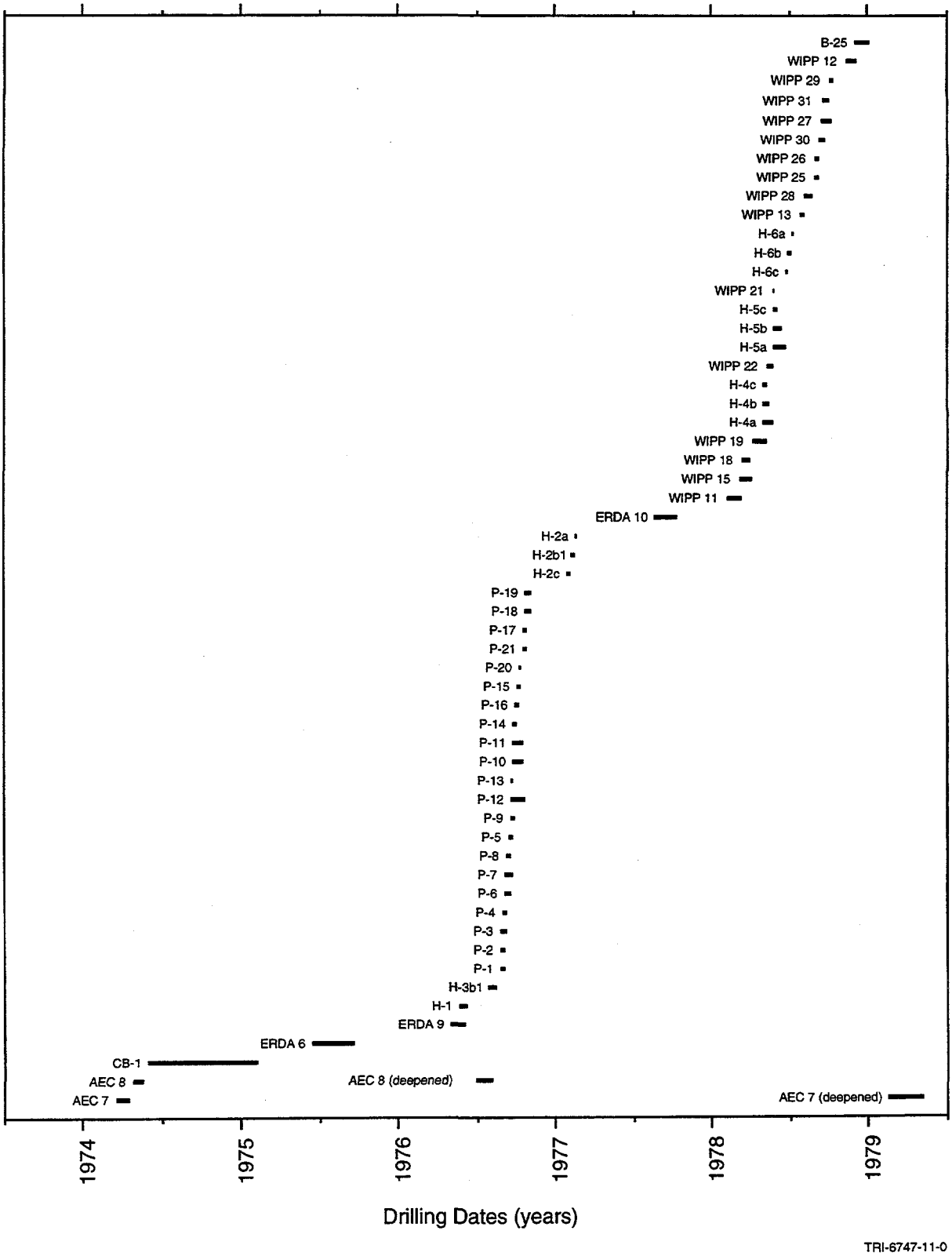

Figure 4. Borehole drilling—time chart, 1974 to 1979.

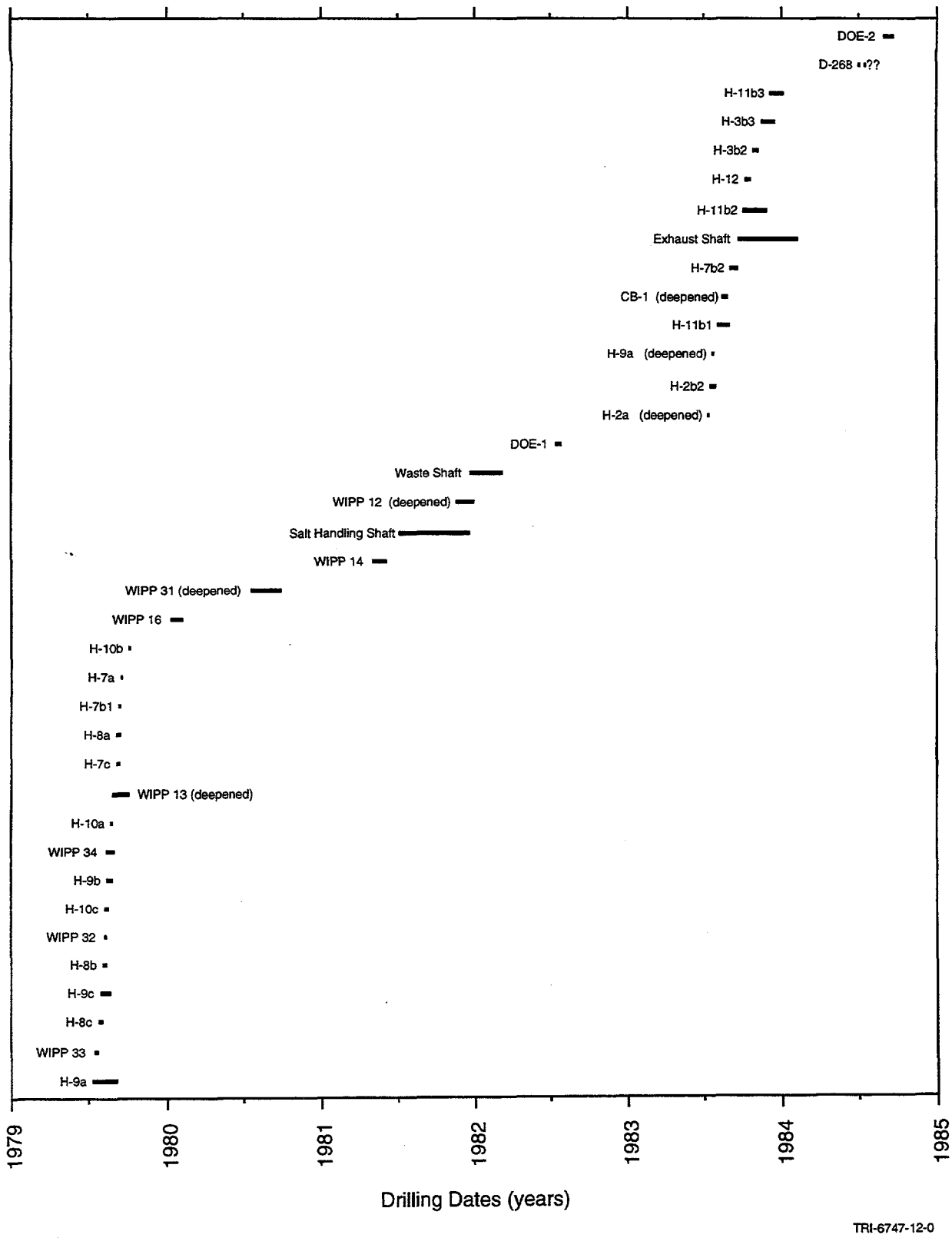

Figure 5. Borehole drilling—time chart, 1979 to 1985.

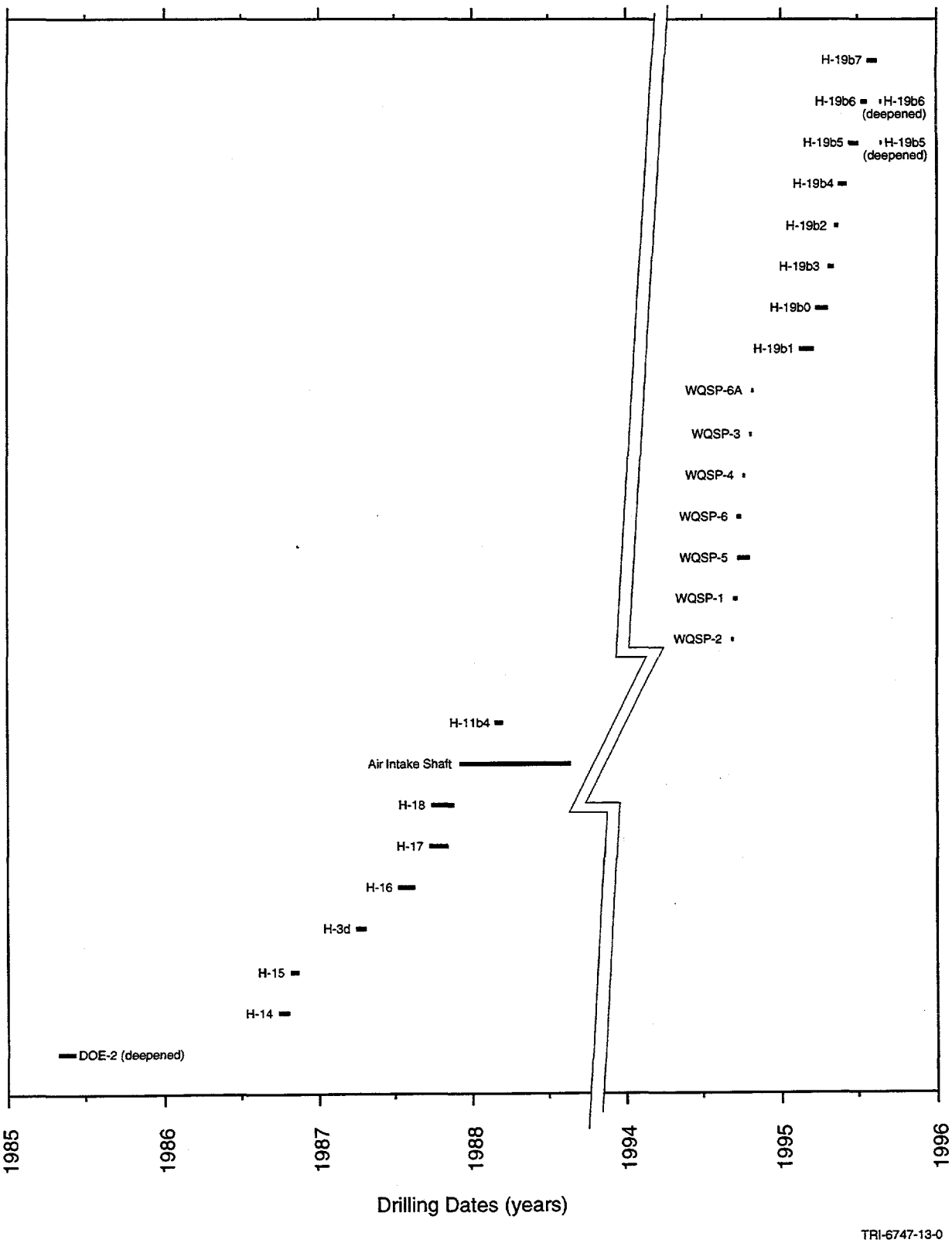

Figure 6. Borehole drilling—time chart, 1985 to 1996.

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APPENDIX A: MEMORANDA REGARDING REFERENCED DATA

Referenced Memoranda

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Date: January 22, 1991

To: Wendell D. Weart, 6340

From: Jerry W. Mercer, 9333

Subject: Test Holes Drilled in Support of Geotechnical Studies at the WIPP Site

This memo is written concerning the ultimate disposition of the "permitted" test holes that have been drilled in support of the geotechnical evaluation of the WIPP site. The concern comes primarily in the area of the "ownership" of these test holes, herein called the legal operator. This is the term used in the documents that cover the permitting of these wells. As you know, permitting of these test holes requires either a drilling permit from the U.S. Geological Survey as was done in the potash drilling program, or a drilling permit from the State Engineers Office (SEO), as was done for those holes drilled for geologic exploration and hydrologic testing. All of these wells have been drilled in the Carlsbad Closed Groundwater Basin, closed to un-permitted drilling some years ago by the New Mexico SEO. In addition to a drilling permit, most of these test holes were drilled on land under the control of the Bureau of Land Management, which also requires a land use permit.

When Sandia acquired these permits to drill these test holes, there were certain legal obligations that went along with the permit. These obligations for the drilling permits require keeping the well in good condition during use and providing assurance that the water producing zones are kept properly isolated. The additional requirement of proper plugging during abandonment is also the obligation of the legal operator. I realize that most of these wells presently in use will be kept for "long-term monitoring," but the legal obligations are still Sandia's. The legal requirements placed on restoration of the well access roads and drilling locations in most cases are also Sandia's. These requirements include restoring the roads and locations back to the pre-drilling conditions. It should be noted that for some of the abandoned wells this has already been done.

I believe we need to evaluate these wells that fall under these requirements and determine the direction we want to take. I would suggest that we discuss this with Rick Beauheim and others that may have direct involvement and get their opinions. May be at such time as Sandia is no longer in need of these wells (or control as the case may be), Sandia could eventually transfer the legal responsibility to the DOE. At least we should let them know that restoration of these wells at some future time will have to be done. This not only is a legal obligation, but from Sandia's standpoint, could be an economic one as plugging and abandoning these well sites could be very expensive.

I think we should also consider providing the SEO and the Bureau of Land Management a letter that would tell them that we intend to use these wells for an extended time as monitoring wells (if that is the case). Some of these wells have

been in this status for almost 15 years and I don't think any follow up paper work has been sent concerning this issue.

I have included, as an attachment, a table of the wells drilled at the WIPP site and adjacent areas that the current hole status (as I know it to be), permit number, and "ownership" status. Perhaps we can sit down sometime and discuss this matter. At this time I do not see an extreme urgency, but it should be done in the near future.

Additional Distribution:
6344 R. L. Beauheim
9333 O. L. Burchett

Borehole I.D	Drill Date - Start/End	Purpose for Drilling	Total Depth (ft)	# Cores Extracted	Cored Interval(s)	References	Comments
H-3b2	10/25/83 - 11/04/83	Hydro-monitoring	725	32	32-725	SAND86-7177, Pearson et al. 1987	Hole completed in the Culebra Dolomite of the Rustler Fm for future tracer test.
H-3b3	11/15/83 - 01/30/84	Hydro-monitoring	730	44	34-730	SAND86-7177, Pearson et al. 1987	Hole completed in the Culebra Dolomite of the Rustler Fm for future tracer test.
H-3d	03/31/87 - 04/22/87	Hydro-monitoring	554	N/A; none	N/A; none	SAND86-7177, Pearson et al. 1987	Hole is open from bottom of surface casing at 39 feet. Hole is completed to test Dewy Lake Redbeds Fm and is used as a water level observation well. This borehole was originally called H-3 (b4).

Attachment 1:

TABLE OF WIPP HOLE STATUS AS OF JANUARY 10, 1991:

Legend:

Underlined hole No. as well as double star (**) indicates well that is currently being used as a monitoring well.

Legal operator: (SNL)--Sandia National Laboratories
(Westin.)--Westinghouse
(DOE)--Department of Energy

Star (*) by location and elevation of well indicates the monument location and elevation, not of the well itself.

Permit No. (SEO) stands for State Engineers Office, (USGS) stands for the U. S. Geological Survey. Date of permit included.

Hole Purpose: (GE)--Geologic Exploration
(HTH)--Hydrologic Test Hole
(PE)--Potash Evaluation

Hole Status: (PA)--Plugged and abandoned with date
(HSC)--Hole or part of hole in standby condition
(HMW)--Hydrologic monitoring well

Hole No.	LOCATION & DATE OF COMPLETION	Elevation	Legal Operator	Total Depth	Permit No.(SEO)	Hole Purpose	Hole Status
P-1	T22S R31E Sec 29 327 FSL, 551 FWL (9/02/76)	3344.8	SNL	1591	USGS 8/18/76	PE	PA (y) 9/2/76
P-2	T22S R31E Sec 28 125 FNL, 172 FEL (9/03/76)	3477.7	SNL	1895	USGS 8/18/76	PE	PA (y) 9/3/76
P-3	T22S R31E Sec 20 103 FSL, 3122 FEL (9/08/76)	3382.3	SNL	1676	USGS 8/18/76	PE	PA (y) 9/8/76
P-4	T22S R31E Sec 28 146 FSL, 1487 FEL (9/07/76)	3441.2	SNL	1857	USGS 8/18/76	PE	PA (y) 9/7/76
P-5	T22S R31E Sec 17 202 FSL, 165 FEL (9/22/76)	3471.8	SNL	1830	USGS 8/18/76	PE	PA (y) 9/22/76
P-6	T22S R31E Sec 30 2767 FSL, 199 FWL (9/17/76)	3353.5	SNL	1573	USGS 8/18/76	PE	PA (y) 9/17/76
P-7	T22S R31E Sec 5 513 FNL, 396 FWL (9/22/76)	3331.7	SNL	1574	USGS 8/18/76	PE	PA (y) 9/22/76

Hole No.	LOCATION & DATE OF COMPLETION	Elevation	Legal Operator	Total Depth	Permit No.(SEO)	Hole Purpose	Hole Status
P-8	T22S R31E Sec 4 642 FNL, 96 FWL (9/15/76)	3336.4	SNL	1660	USGS 8/18/76	PE	PA (y) 9/15/76
P-9	T22S R31E Sec 33 1493 FSL, 143 FEL (9/26/76)	3408.6	SNL	1796	USGS 8/18/76	PE	PA (y) 9/26/76
P-10	T22S R31E Sec 26 2315 FNL, 339 FWL (10/17/76)	3508.6	SNL	2009	USGS 8/18/76	PE	PA (y) 10/17/76
P-11	T22S R31E Sec 23 175 FNL, 177 FWL (10/18/76)	3505.8	SNL	1940	USGS 8/18/76	PE	PA (y) 10/18/76
P-12	T22S R30E Sec 24 167 FNL, 195 FWL (10/23/76)	3376.0	SNL	1598	USGS 8/18/76	PE	PA (y) 10/23/76
P-13	T22S R31E Sec 18 125 FNL, 116 FWL (9/24/76)	3345.4	SNL	1576	USGS 8/18/76	PE	PA (y) 9/17/76
P-14 **	T22S R30E Sec 24 * 306.6 FSL, 611.8 FWL (10/04/76)	3359.76 *	SNL	1545	USGS 8/18/76	PE	PA to (y) 759 (HMW)
P-15 **	T22S R31E Sec 31 * 409.47 FSL, 188.34 FWL (10/15/76)	3309.84 *	SNL	1465	USGS 8/18/76	PE	PA to (y) 620 (HMW)
P-16	T23S R31E Sec 5 951 FSL, 1629 FWL (10/06/76)	3322.8	SNL	1585	USGS 8/18/76	PE	PA (y) 10/6/76
P-17 **	T23S R31E Sec 4 * 1371.9 FSL, 397.7 FWL (10/28/76)	3335.77 *	SNL	1660	USGS 8/18/76	PE	PA to (y) 731 (HMW)
P-18 **	T22S R31E Sec 26 * 136.7 FSL, 736.5 FEL (11/06/76)	3477.30 *	SNL	1998	USGS 8/18/76	PE	PA to (y) 1120(HMW
P-19	T22S R31E Sec 23 1652 FSL, 2330 FEL (11/04/76)	3546.3	SNL	2000	USGS 8/18/76	PE	PA (y) 11/4/76
P-20	T22S R31E Sec 14 794 FSL, 103 FEL (10/15/76)	3552.9	SNL	1995	USGS 8/18/76	PE	PA (y) 10/15/76

Hole No.	LOCATION & DATE OF COMPLETION	Elevation	Legal Operator	Total Depth	Permit No.(SEO)	Hole Purpose	Hole Status
P-21	T22S R31E Sec 15 852 FNL, 150 FEL (10/27/76)	3510.2	SNL	1915	USGS 8/18/76	PE	PA (y) 10/27/76
AEC-7 **	T21S R32E Sec 31 * 2038.97 FNL, 2037.26 FEL (4/19/80)	3655.54 *	SNL	4734	USGS 1/12/79 & SEO # 0.08.1323	GE	HSC & HMW
AEC-8 **	T22S R31E Sec 11 935 FNL, 1979 FWL (8/05/76)	3532	SNL	4911	?	GE	HSC & HMW
ERDA-6	T21S R31E Sec 35 2152 FSL, 910 FEL (12/16/81)	3540	SNL(?)	?	?	GE	PA by WESTING.
ERDA-9 **	T21S R31E Sec 20 * 265.32 FSL, 180.40 FEL (6/26/76)	3408.86 *	SNL	2875	USGS 2/27/76 SEO 6/21/76	GE	HSC & HMW
ERDA-10	T23S R30E Sec 34 200 FNL, 2327 FEL (10/14/77)	3371.2	SNL	4418	?	GE	PA (y) 10/14/77
CABIN ** BABY-1	T23S R31E Sec 5 * 1993 FNL, 2011 FEL (8/30/83)	3327.27 *	DOE	4291	?	Oil & Gas Well	HSC & HMW
D-268 **	T22S R30E Sec 35 * 716.5 FSL, 766.1 FEL (8/29/84)	3278.54 *	SNL	?	?	Potash Test	HMW
DOE-1 **	T22S R31E Sec 28 * 179.1 FSL, 610.5 FEL (7/28/82)	3465.09 *	WEST.	4057	?	GE & HTH	HSC & HMW
DOE-2 **	T22S R31E Sec 8 * 697.71 FSL, 121.83 FEL (6/14/85)	3418.35 *	SNL	4325	SEO # 0.08.1467 6/14/84	GE & HTH	HSC & HMW
WIPP-11	T22S R31E Sec 9 * 708.89 FNL, 297.96 FWL (3/14/78)	3426.07 *	SNL	3580	SEO # 0.08.994 12/15/77	GE	PA by DOE?
WIPP-12 **	T22S R31E Sec 27 * 147.9 FSL, 83.9 FEL (1/01/82)	3471.30 *	WEST.?	3927	?	GE	HSC & HMW
WIPP-13 **	T22S R31E Sec 17 * 2563.67 FSL, 1727.36 FWL (10/05/79)	3405.43 *	SNL	3856	SEO # 0.08.1182 7/17/79	GE	HSC & HMW

Hole No.	LOCATION & DATE OF COMPLETION	Elevation	Legal Operator	Total Depth	Permit No.(SEO)	Hole Purpose	Hole Status
WIPP-14	T22S R31E Sec 9 * 95.4 FSL, 2110.6 FEL (6/08/81)	3428.36 *	SNL	1090	SEO # 0.08.1458 4/6/81	GE	PA by DOE?
WIPP-15	T22S R31E Sec 18 * 2426 FNL, 1793 FWL (4/04/78)	3269.2 *	SNL(1)	811	SEO # 0.13.00 2/10/78	GE	Transf. to owner 8/2/78
WIPP-16	T21S R30E Sec 5 * 2352.4 FSL, 141.4 FWL (2/08/80)	3383.40 *	SNL	1330	SEO # 0.08.1290 7/17/79 & 0.08.1182 (reentry)	GE	PA by DOE
WIPP-18 **	T22S R31E Sec 20 * 985.85 FNL, 15.97 FEL (4/03/78)	3456.47 *	SNL	1050	SEO # 0.08.1123	GE & HTH	HMW
WIPP-19 **	T22S R31E Sec 20 * 2985.88 FSL, 16.40 FEL (5/08/78)	3433.13 *	SNL	1038	SEO # 0.08.1124 3/2/78	GE & HTH	HMW
WIPP-21 **	T22S R31E Sec 20 * 1449.17 FSL, 15.37 FEL (5/27/78)	3417.00 *	SNL	1045	SEO # 0.08.1126 3/2/78	GE & HTH	HMW
WIPP-22 **	T22S R31E Sec 20 * 2542.70 FSL, 15.19 FEL (5/24/78)	3425.83 *	SNL	1450	SEO # 0.08.1127 3/2/78	GE & HTH	HMW
WIPP-25 **	T22S R31E Sec 15 * 1851.71 FSL, 2842.37 FEL (9/12/78)	3212.15 *	SNL	650	SEO # 0.08.1172 6/22/78 USGS 6/20/78	GE & HTH	HMW
WIPP-26 **	T22S R31E Sec 29 * 2233.72 FNL, 14.42 FEL (9/11/78)	3151.91 *	SNL	505	SEO # 0.08.1173 6/22/78 USGS 6/20/78	GE & HTH	HMW
WIPP-27 **	T22S R30E Sec 21 * 90.67 FNL, 1483.69 (10/09/78)	3177.17 *	SNL	592	SEO # 0.08.1174 6/22/78 USGS 6/20/78	GE & HTH	HMW
WIPP-28 **	T22S R31E Sec 18 * 99.45 FNL, 2403.69 FEL (8/28/78)	3346.76 *	SNL	802	SEO # 0.08.1175 6/22/78 USGS 6/20/78	GE & HTH	HMW

Hole No.	LOCATION & DATE OF COMPLETION	Elevation	Legal Operator	Total Depth	Permit No.(SEO)	Hole Purpose	Hole Status
WIPP-29 **	T22S R29E Sec 34 * 404.18 FSL, 1828.44 FEL (10/10/78)	2976.99 *	SNL	377	SEO # 0.08.1176 USGS 6/20/78	GE & HTH	HMW
WIPP-30 **	T21S R31E Sec 33 668.79 FNL, 173.63 FWL (10/02/78)	3427.54 *	SNL	913	SEO # 0.08.1177 USGS 6/20/78	GE & HTH	HMW
WIPP-31	T20S R30E Sec 35 * 420.31 FSL, 1758.80 FWL (7/18/80)	3401.43 *	SNL	1981	?	GE	PA
WIPP-32	T22S R29E Sec 33 * 1669.26 FSL, 25.18 FEL (8/23/79)	3023.26 *	SNL	390	SEO 4/25/79 USGS 10/15/79	GE	PA (y) 8/22/79
WIPP-33	T22S R30E Sec 13 * 1758.96 FSL, 2430.20 FWL (7/26/79)	3323.23 *	SNL	840	SEO # 4/25/79	GE	PA (y) 9/4/79
WIPP-34	T22S R31E Sec 9 * 197.89 FSL, 2003.76 FWL (9/04/79)	3432.74 *	SNL ?	1820	SEO # 0.08.1291 0.08.1195 (reentry) 7/27/79	GE	PA (n) 9/4/79
H-1 **	T22S R31E Sec 29 * 624.33 FNL, 1086.41 FEL (6/10/76)	3397.71 *	SNL	848	SEO # 0.08.979 8/18/78	HTH	HMW
H-2a **	T22S R31E Sec 29 * 724.12 FNL, 1695.59 FWL (7/26/83)	3377.85 *	SNL	672	SEO # 0.08.990 8/18/78	HTH	HMW
H-2b1 **	T22S R31E Sec 29 * 695.78 FNL, 1656.68 FWL (2/14/76)	3377.68 *	SNL	661	SEO # 0.08.990 8/18/78	HTH	HMW
H-2b2 **	T22S R31E Sec 29 * 703.0 FNL, 1687.5 FWL (8/06/83)	3377.61 *	SNL	660	SEO # 0.08.990? 8/18/78	HTH	HMW
H-2c **	T22S R31E Sec 29 * 637.33 FNL, 1705.02 FWL (2/05/77)	3377.75 *	SNL	795	SEO # 0.08.990 8/18/78	HTH	HMW
H-3b1 **	T22S R31E Sec 29 * 2084.16 FSL, 141.93 FEL (8/12/76)	3389.48 *	SNL	894	USGS 6/15/76 SEO # 0.08.991 8/18/78	HTH	HMW

ɔle No.	LOCATION & DATE OF COMPLETION	Elevation	Legal Operator	Total Depth	Permit No.(SEO)	Hole Purpose	Hole Status
H-3b2 **	T22S R31E Sec 29 * 2122.09 FSL, 231.36 FEL (11/11/83)	3389.33 *	SNL	725	SEO # 0.08.991? 8/18/78	HTH	HMW
H-3b3 **	T22S R31E Sec 29 * ? (1/30/84)	3388.17 *	SNL	730	SEO # 0.08.991? 8/18/78	HTH	HMW
H-3d ** (H-3b4)	T22S R31E Sec 29 * 2063.5 FSL, 161.1 FEL (4/15/87)	3387.18 *	SNL	554	SEO # 0.08.991? 8/18/78	HTH	HMW
H-4a **	T23S R31E Sec 5 * 547.60 FNL, 716.28 FWL (5/23/78)	3332.91 *	SNL	532	SEO # 0.08.1153 4/24/78	HTH	HMW
H-4b **	T23S R31E Sec 5 * 500.58 FNL, 629.14 FWL (5/15/78)	3332.76 *	SNL	529	SEO # 0.08.1154 4/24/78	HTH	HMW
H-4c **	T23S R31E Sec 5 * 447.09 FNL, 714.11 FWL (5/09/78)	3333.54 *	SNL	661	SEO # 0.08.1152 4/24/78	HTH	HMW
H-5a **	T22S R31E Sec 15 * 1095.30 FNL, 187.52 FEL (6/20/78)	3506.15 *	SNL	930	SEO # 0.08.1159 5/11/78	HTH	HMW
H-5b **	T22S R31E Sec 15 * 1010.03 FNL, 240.05 FEL (6/13/78)	3505.97 *	SNL	925	SEO # 0.08.1160 5/11/78	HTH	HMW
H-5c **	T22S R31E Sec 15 * 1006.82 FNL, 138.21 FEL (6/03/78)	3506.37 *	SNL	1076	SEO # 0.08.1161 5/11/78	HTH	HMW
H-6a **	T22S R31E Sec 18 * 285.10 FNL, 270.55 FWL (7/11/78)	3347.16 *	SNL	637	SEO # 0.08.1162 4/11/78	HTH	HMW
H-6b **	T22S R31E Sec 18 * 197.40 FNL, 319.10 FWL (7/05/78)	3347.57 *	SNL	640	SEO # 0.08.1163 4/11/78	HTH	HMW
H-6c **	T22S R31E Sec 18 * 282.65 FNL, 370.69 FWL (6/20/78)	3347.93 *	SNL	741	SEO # 0.08.1164 4/11/78	HTH	HMW
H-7a **	T23S R30E Sec 14 * 2498.62 FNL, 2495.84 FWL (10/18/79)	3163.55 *	SNL	154	SEO # 0.08.1271 6/20/79	HTH	HMW
H-7b **	T23S R31E Sec 14 * 2568.75 FNL, 2567.49 FWL (9/18/78)	3163.63 *	SNL	286	SEO # 0.08.1272 6/20/79	HTH	HMW

Hole No.	LOCATION & DATE OF COMPLETION	Elevation	Legal Operator	Total Depth	Permit No.(SEO)	Hole Purpose	Hole Status
H-7b2 **	T23S R31E Sec 14 * ? (9/23/83)	3163.95 *	SNL	295	SEO # ?	HTH	HMW
H-7c **	T23S R31E Sec 14 * 2595.47 FNL, 2471.05 FWL (11/02/79)	3163.48 *	SNL	420	SEO # 0.08.1273 6/20/79	HTH	HMW
H-8a **	T24S R30E Sec 23 * 1963.43 FNL, 1481.66 FEL (9/18/79)	3433.0 *	SNL	505	SEO # 0.08.1274 6/20/79	HTH	HMW
H-8b **	T24S R30E Sec 23 * 1998.17 FNL, 1401.76 FEL (8/12/79)	3433.8 *	SNL(1)	624	SEO # 0.08.1275 6/20/79	HTH	Transf. to owner
H-8c **	T24S R30E Sec 23 * 2062.22 FNL, 1466.04 FEL (8/06/79)	3433.00 *	SNL	808	SEO # 0.08.1276 6/20/79	HTH	HMW
H-9a **	T24S R31E Sec 4 * 2395.58 FNL, 142.55 FWL (4/23/84)	3405.4 *	SNL	692	SEO # 0.08.1277 6/20/79	HTH	HMW
H-9b **	T24S R31E Sec 4 * 2395.58 FNL, 242.55 FWL (8/28/79)	3405.6 *	SNL	708	SEO # 0.08.1278 6/20/79	HTH	HMW
H-9c **	T24S R31E Sec 4 * 2482.18 FNL, 192.55 FWL (9/24/79)	3405.9 *	SNL	816	SEO # 0.08.1279 6/20/79	HTH	HMW
H-10a **	T24S R31E Sec 20 * 431.0 FSL, 2064.9 FEL (8/26/79)	3686.52 *	SNL	1318	SEO # 0.08.1280 6/20/79	HTH	HMW
H-10b **	T24S R31E Sec 20 * 481.0 FSL, 1978.3 FEL (10/13/79)	3687.01 *	SNL	1398	SEO # 0.08.1281 6/20/79	HTH	HMW
H-10c **	T24S R31E Sec 20 * 381.0 FSL, 1978.3 FEL (8/20/79)	3686.88 *	SNL	1550	SEO # 0.08.1282 6/20/79	HTH	HMW
H-11b1 **	T22S R31E Sec 33 * 1510.69 FSL, 173.91 FEL (9/2/83)	3411.0	SNL	785	SEO # 0.08.1462 11/21/83	HTH	HMW
H-11b2 **	T22S R31E Sec 33 * 1436.16 FSL, 168.62 FEL (11/28/83)	3411.2	SNL	776	SEO # 0.08.1462 11/21/83	HTH	HMW
H-11b3 **	T22S R31E Sec 33 * 1499.2 FSL, 106.6 FEL (1/10/84)	3412.07 *	SNL	789	SEO # 0.08.1462 11/21/83	HTH	HMW

Hole No.	LOCATION & DATE OF COMPLETION	Elevation	Legal Operator	Total Depth	Permit No.(SEO)	Hole Purpose	Hole Status
H-11b4 **	T22S R31E Sec 33 * 1516.5 FSL, 315.2 FEL (3/17/88)	3410.1 *	SNL	765	SEO # 0.08.1474 12/29/87	HTH	HMW
H-12 **	T23S R31E Sec 15 * 26.5 FNL, 94.4 FEL (10/31/83)	3425.98 *	SNL	1001	SEO # 0.08.1463 1/21/83	HTH	HMW
H-14 **	T22S R31E Sec 29 * 369.5 FSL, 564.7 FWL (10/23/86)	3345.48 *	SNL	589	SEO # 0.08.1469 9/12/86	HTH	HMW
H-15 **	T22S R31E Sec 28 * 92.6 FNL, 170.6 FEL (11/14/86)	3480.2 *	SNL	900	SEO # 0.08.1470 9/12/86	HTH	HMW
H-16 **	T22S R31E Sec 20 * 1109.3 FSL, 1234.0 FEL (8/18/87)	3409.6 *	SNL	851	SEO # 0.08.1471 6/26/87	HTH	HMW
H-17 **	T23S R31E Sec 3 * 1463.2 FSL, 991.8 FWL (11/04/87)	3384.01 *	SNL	880	SEO # 0.08.1472 8/28/87	HTH	HMW
H-18 **	T22S R31E Sec 20 * 968.4 FNL, 447.5 FWL (11/18/87)	3413.36 *	SNL	840	SEO # 0.08.1473 8/28/87	HTH	HMW

Sandia National Laboratories

Albuquerque, New Mexico 87185-1326

date: October 26, 1994

to: Leslie R. Hill, MS-1341

from: Jerry W. Mercer, Dept. 9333, MS-1156

subject: WIPP Surface Boreholes - H-3 Hydropad

The H-3b2 and H-3b3 surface boreholes were drilled for hydrologic studies in the Culebra Member of the Rustler and the H-3d borehole was drilled for hydrologic evaluation of the overlying Dewey Lake Redbeds. Your difficulties in obtaining the drilling information you are requesting stem from the fact that standard SNL basic data reports were not completed for these boreholes. Attached is a summary of information regarding these boreholes from field notes I compiled during the drilling activities. Additional information can be found in: *Pearson et al. 1987, "Preliminary Design for a Sorbing Tracer Test in the Culebra Dolomite at the H-3 Hydropad at the Waste Isolation Pilot Plant (WIPP) Site," SAND86-7177.*

Please feel free to contact me if you have additional questions about these boreholes or if I might be of further assistance in any other issue arising during the completion of your report.

cc: Richard Aguilar, MS-1326

Sandia National Laboratories

Albuquerque, New Mexico 87185-1326

date: July 18, 1996

to: Leslie R. Hill, MS-1341

from: Jerry W. Mercer, Dept. 9333, MS-1156

subject: H-19 Hydropad Borehole Information

I have reviewed the information on the H-19 hydropad boreholes (H-19b0, H-19b1, H-19b2, H-19b3, H-19b4, H-19b5, H-19b5 [deepened], H-19b6, H-19b6 [deepened], and H-19b7) outlined in pages 24 through 27 of the July 1, 1996 draft of the report entitled: "Condensed Listing of Surface Boreholes at the Waste Isolation Pilot Plant Project through 31 December 1995"; authors: Hill, L. R., R. Aguilar, J. W. Mercer, and G. Newman. All of the H-19 hydropad borehole information listed in the report, including borehole ID, drilling start/end dates, purpose, status, township/range/section, section X & Y coordinates, X & Y state-plane coordinates, surface elevation, total depth, core diameters, sampling intervals, and comments, is accurate and consistent with the information recorded in my data log books and field notes. These data are not subject to future change because they are factual data. Furthermore, all of this information is consistent with the data presented in our draft report for the H-19 hydropad drilling activities. This draft report is currently in the final review process for publication in the form of a SAND report.

cc: Richard Aguilar, MS-1326
Gretchen Newman, GRAM, Inc.
Richard Thompson, MS-1341
Mel Marietta, MS-1395

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APPENDIX B: AS-BUILT ELEMENTS OF THE FOUR WIPP SHAFTS

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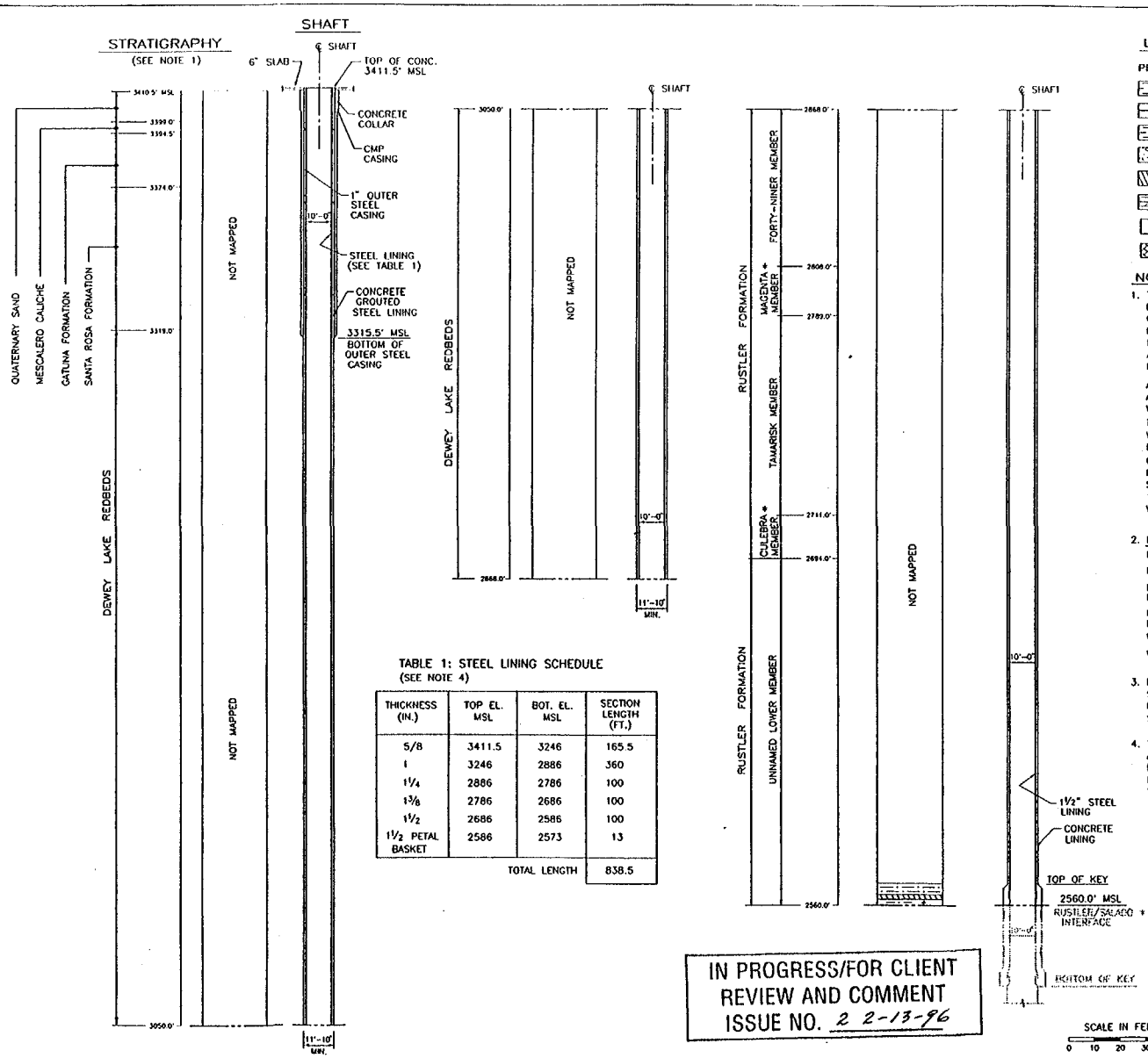


TABLE 1: STEEL LINING SCHEDULE
(SEE NOTE 4)

THICKNESS (IN.)	TOP EL. MSL	BOT. EL. MSL	SECTION LENGTH (FT.)
5/8	3411.5	3246	165.5
1	3246	2886	360
1¼	2886	2786	100
1⅜	2786	2686	100
1½	2686	2586	100
1½ PETAL BASKET	2586	2573	13
		TOTAL LENGTH	838.5

IN PROGRESS/FOR CLIENT REVIEW AND COMMENT ISSUE NO. 2 2-13-96

SCALE IN FEET
0 10 20 30 40 50

LITHOLOGY:

PRIMARY ROCK/SEDIMENT TYPES		SECONDARY CONSTITUENTS	
	MUDSTONE/CLAYSTONE		ARGILLACEOUS
	CLAYSTONE BED		SILTY
	SILTSTONE		SANDY
	SANDSTONE	\\\\\\	SULFATIC
	ANHYDRITE/GYPSUM		DOLOMITIC
	DOLOMITE		CALCAREOUS
	HALITE	+ +	HALITIC
	POLYHALITE	× × ×	POLYHALITIC

NOTES:

1. THE STRATIGRAPHY AND GROUNDWATER BRINE SEEPAGE/WEEP INTERVALS ARE BASED ON THE LITHOLOGIC INFORMATION COMPILED DURING THE GEOLOGIC MAPPING OF THE SALT HANDLING SHAFT WALLS, TME 3178; "GEOTECHNICAL ACTIVITIES IN THE EXPLORATORY SHAFT-SELECTION OF THE FACILITY INTERVAL"; AND APPENDIX A OF REPORT DOE/WIPP-95-3117, "WASTE ISOLATION PILOT PLANT SEALING SYSTEM DESIGN REPORT", 1995.

   ASTERISK (*) WITHIN THE RUSTLER AND SUPRA RUSTLER FORMATIONS AND THE RUSTLER/SALADO FORMATION CONTACT INDICATES GROUNDWATER OBSERVED DURING SHAFT MAPPING. ASTERISK (*) WITHIN THE SALADO FORMATION INDICATES A POTENTIAL BRINE SEEPAGE/WEEP INTERVAL. THESE POTENTIAL BRINE SEEPAGE/WEEP INTERVALS, LOCATED ABOVE THE SHAFT STATION LEVEL, ARE BASED ON OBSERVED INTERVALS OF BRINE SEEPAGE/WEEPS IN THE AIR INTAKE SHAFT THAT HAVE BEEN PROJECTED TO THE SALT HANDLING SHAFT. THE MAPPING OF THE SALT HANDLING SHAFT (JAROLIMEK ET AL., 1983/TME-3178) DID NOT INDICATE OBSERVED SEEPAGE INTERVALS WITHIN THE SALADO FORMATION.

2. REFERENCE AS-BUILT DRAWINGS FROM WID:

EXPLORATORY SHAFT KEY SHAFT STATION LOCATION, SECTIONS	37-R-010
EXPLORATORY SHAFT KEY, SECTIONS AND DETAILS	37-R-012
EXPLORATORY SHAFT STATION DEVELOPMENT - EXPERIMENTAL LEVEL PLAN AND SECTIONS	37-R-019
UNDERGROUND BASE PLAN E-O DRIFT FROM N-9900 TO N-9580	51-W-126-W5
WIPP EXHAUST SHAFT 120" I.D. CASING x 834'	FS-M3259-01
WIPP PROJECT 120" I.D. CASING LINER HOLE COMPLEX	FS M3259-02

3. HISTORICAL NOTE: SINCE ITS CONSTRUCTION, THE EXPLORATORY SHAFT HAS BEEN REFERRED TO AS THE EXHAUST SHAFT, THE EXPLORATORY SHAFT, THE CONSTRUCTION AND SALT HANDLING SHAFT, AND THE SALT HANDLING SHAFT.

4. THICKNESS OF STEEL LINING VARIES, LINING TYPE AND LENGTH ARE BASED ON FENIX AND SCISSON AS-BUILT DWGS. M3259-02, REV. 0, DATED 11/30/79, WIPP PROJECT 120" I.D. CASING LINER HOLE COMPLEX, AND M3259-01, REV. 1, DATED 10/13/80, WIPP EXHAUST SHAFT 120" I.D. CASING x 834'.

REV.	DATE	DESCRIPTION	BY	CK.	APP.

SANDIA NATIONAL LABORATORIES

WIPP A/E SUPPORT — CONTRACT NO: AC-4909

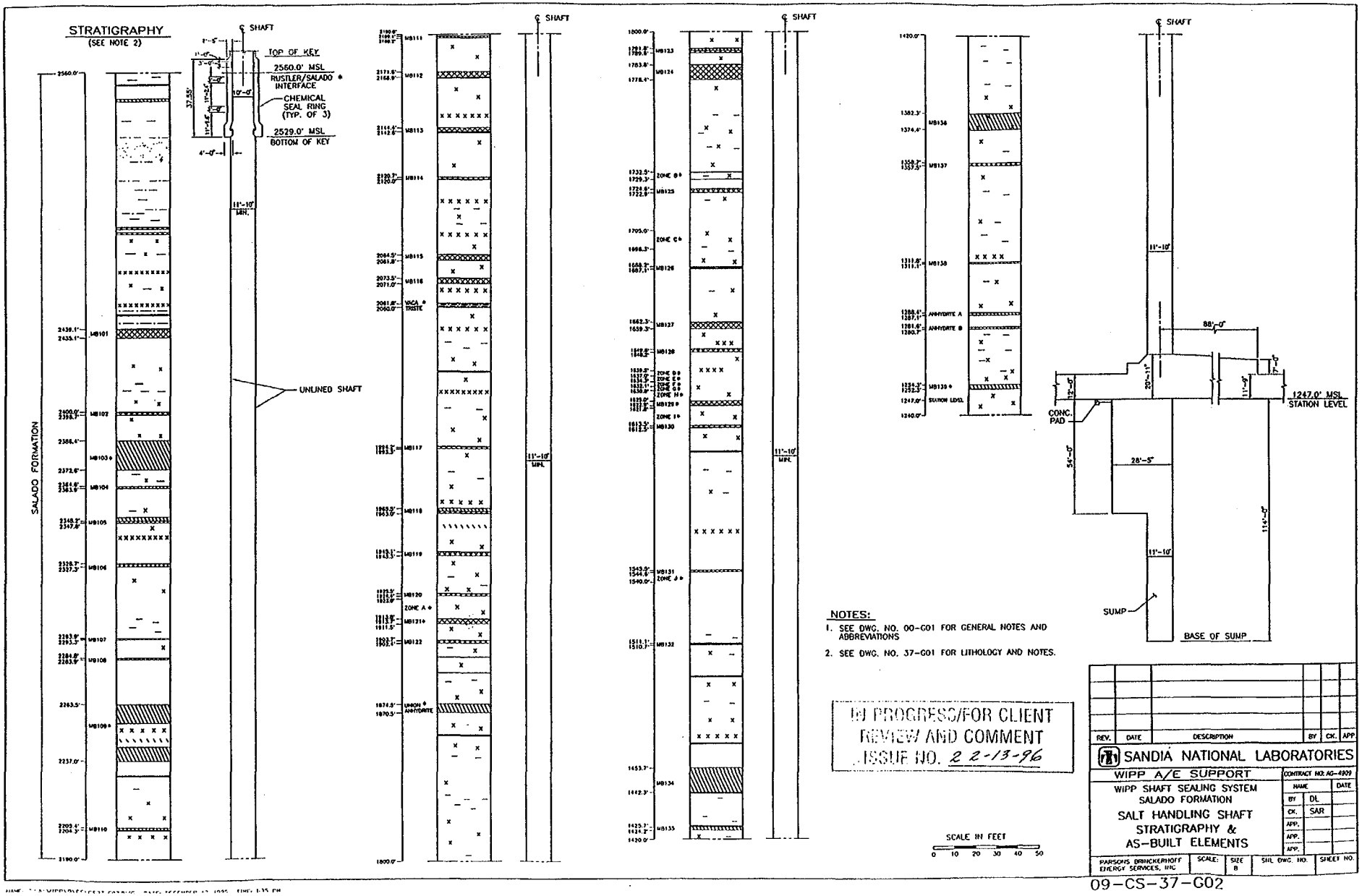
WIPP SHAFT SEALING SYSTEM
NEAR-SURFACE/RUSTLER FORMATIONS
SALT HANDLING SHAFT
STRATIGRAPHY &
AS-BUILT ELEMENTS

	NAME	DATE
BY	DL	
CK.	SAR	
APP.		
APP.		
APP.		

PARSONS BRINCKERHOFF ENERGY SERVICES, INC | SCALE: | SIZE B | SML DWG. NO | SHEET NO.

NAME: C:\A\WIPP\09\CS\CS37-G01.DVG DATE: DECEMBER 12, 1995 TIME: 2:07 PM

09-CS-37-G01



NOTES:

1. SEE DWG. NO. 00-G01 FOR GENERAL NOTES AND ABBREVIATIONS
2. SEE DWG. NO. 37-G01 FOR LITHOLOGY AND NOTES.

IN PROGRESS/FOR CLIENT REVIEW AND COMMENT
ISSUE NO. 2 2-13-96

SCALE IN FEET
0 10 20 30 40 50

REV.	DATE	DESCRIPTION	BY	CK.	APP.

SANDIA NATIONAL LABORATORIES

WIPP A/E SUPPORT

CONTRACT NO. AC-4909

WIPP SHAFT SEALING SYSTEM
SALADO FORMATION
SALT HANDLING SHAFT
STRATIGRAPHY &
AS-BUILT ELEMENTS

	NAME	DATE
BY	DL	
CK.	SAR	
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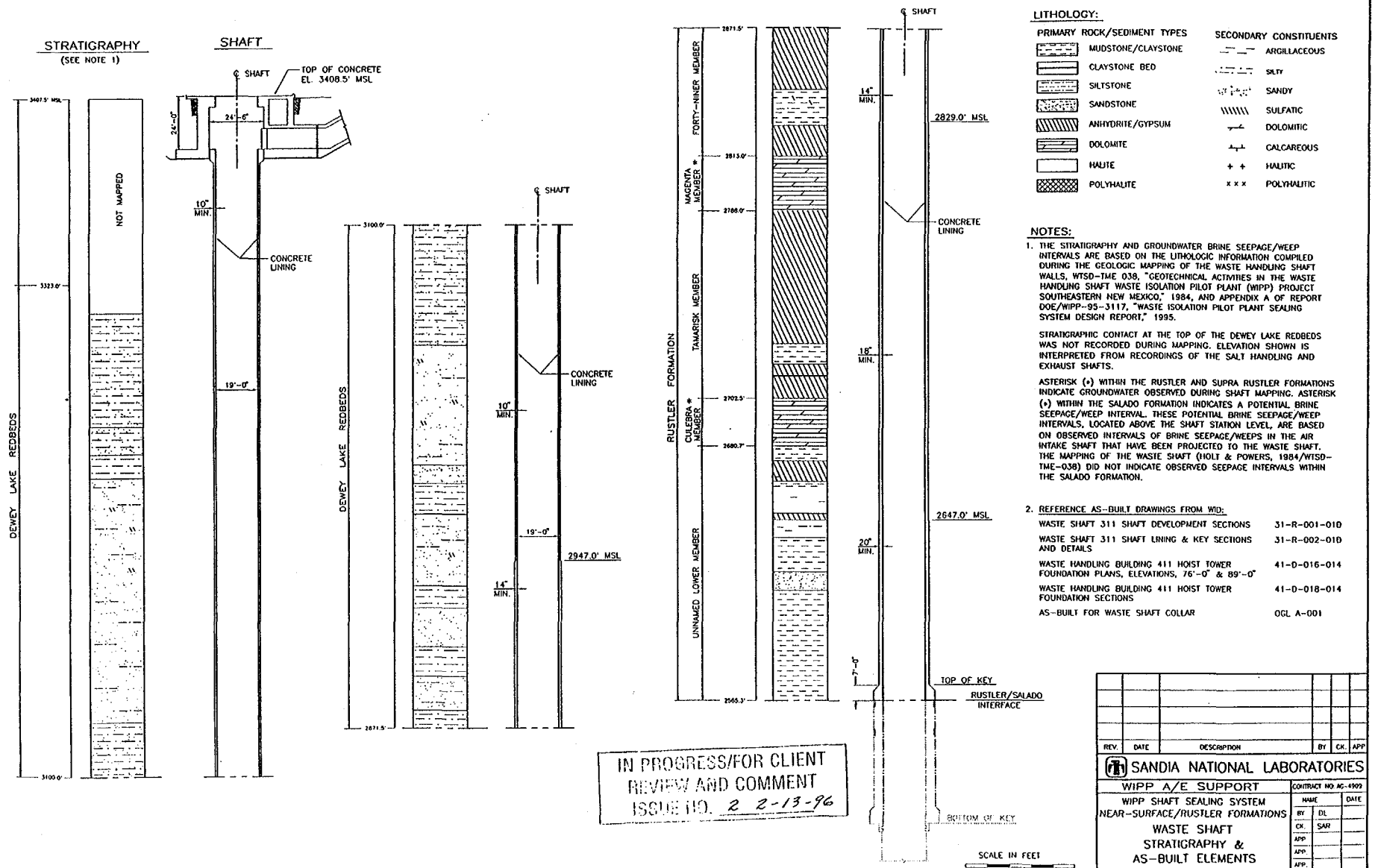
PARSONS BRINCKERHOFF ENERGY SERVICES, INC | SCALE: | SIZE B | SHL DWG. NO. | SHEET NO.

09-CS-37-G02



LITHOLOGY:

PRIMARY ROCK/SEDIMENT TYPES	SECONDARY CONSTITUENTS
MUDSTONE/CLAYSTONE	ARGILLACEOUS
CLAYSTONE BED	SILTY
SILTSTONE	SANDY
SANDSTONE	SULFATIC
ANHYDRITE/GYPSUM	DOLOMITIC
DOLOMITE	CALCAREOUS
HALITE	HALITIC
POLYHALITE	POLYHALITIC

NOTES:

1. THE STRATIGRAPHY AND GROUNDWATER BRINE SEEPAGE/WEEP INTERVALS ARE BASED ON THE LITHOLOGIC INFORMATION COMPILED DURING THE GEOLOGIC MAPPING OF THE WASTE HANDLING SHAFT WALLS, WTSD-TME 038, "GEOTECHNICAL ACTIVITIES IN THE WASTE HANDLING SHAFT WASTE ISOLATION PILOT PLANT (WIPP) PROJECT SOUTHEASTERN NEW MEXICO," 1984, AND APPENDIX A OF REPORT DOE/WIPP-95-3117, "WASTE ISOLATION PILOT PLANT SEALING SYSTEM DESIGN REPORT," 1995.

   STRATIGRAPHIC CONTACT AT THE TOP OF THE DEWEY LAKE REDBEDS WAS NOT RECORDED DURING MAPPING. ELEVATION SHOWN IS INTERPRETED FROM RECORDINGS OF THE SALT HANDLING AND EXHAUST SHAFTS.

   ASTERISK (*) WITHIN THE RUSTLER AND SUPRA RUSTLER FORMATIONS INDICATE GROUNDWATER OBSERVED DURING SHAFT MAPPING. ASTERISK (*) WITHIN THE SALADO FORMATION INDICATES A POTENTIAL BRINE SEEPAGE/WEEP INTERVAL. THESE POTENTIAL BRINE SEEPAGE/WEEP INTERVALS, LOCATED ABOVE THE SHAFT STATION LEVEL, ARE BASED ON OBSERVED INTERVALS OF BRINE SEEPAGE/WEEPS IN THE AIR INTAKE SHAFT THAT HAVE BEEN PROJECTED TO THE WASTE SHAFT. THE MAPPING OF THE WASTE SHAFT (HOLT & POWERS, 1984/WTSD-TME-038) DID NOT INDICATE OBSERVED SEEPAGE INTERVALS WITHIN THE SALADO FORMATION.

2. REFERENCE AS-BUILT DRAWINGS FROM WID:

WASTE SHAFT 311 SHAFT DEVELOPMENT SECTIONS	31-R-001-010
WASTE SHAFT 311 SHAFT LINING & KEY SECTIONS AND DETAILS	31-R-002-010
WASTE HANDLING BUILDING 411 HOIST TOWER FOUNDATION PLANS, ELEVATIONS, 76'-0" & 89'-0"	41-D-016-014
WASTE HANDLING BUILDING 411 HOIST TOWER FOUNDATION SECTIONS	41-D-018-014
AS-BUILT FOR WASTE SHAFT COLLAR	OGL A-001

IN PROGRESS/FOR CLIENT REVIEW AND COMMENT
ISSUE NO. 2 2-13-96

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SANDIA NATIONAL LABORATORIES

WIPP A/E SUPPORT — CONTRACT NO AC-4909

WIPP SHAFT SEALING SYSTEM
NEAR-SURFACE/RUSTLER FORMATIONS
WASTE SHAFT
STRATIGRAPHY &
AS-BUILT ELEMENTS

	NAME	DATE
BY	DL	
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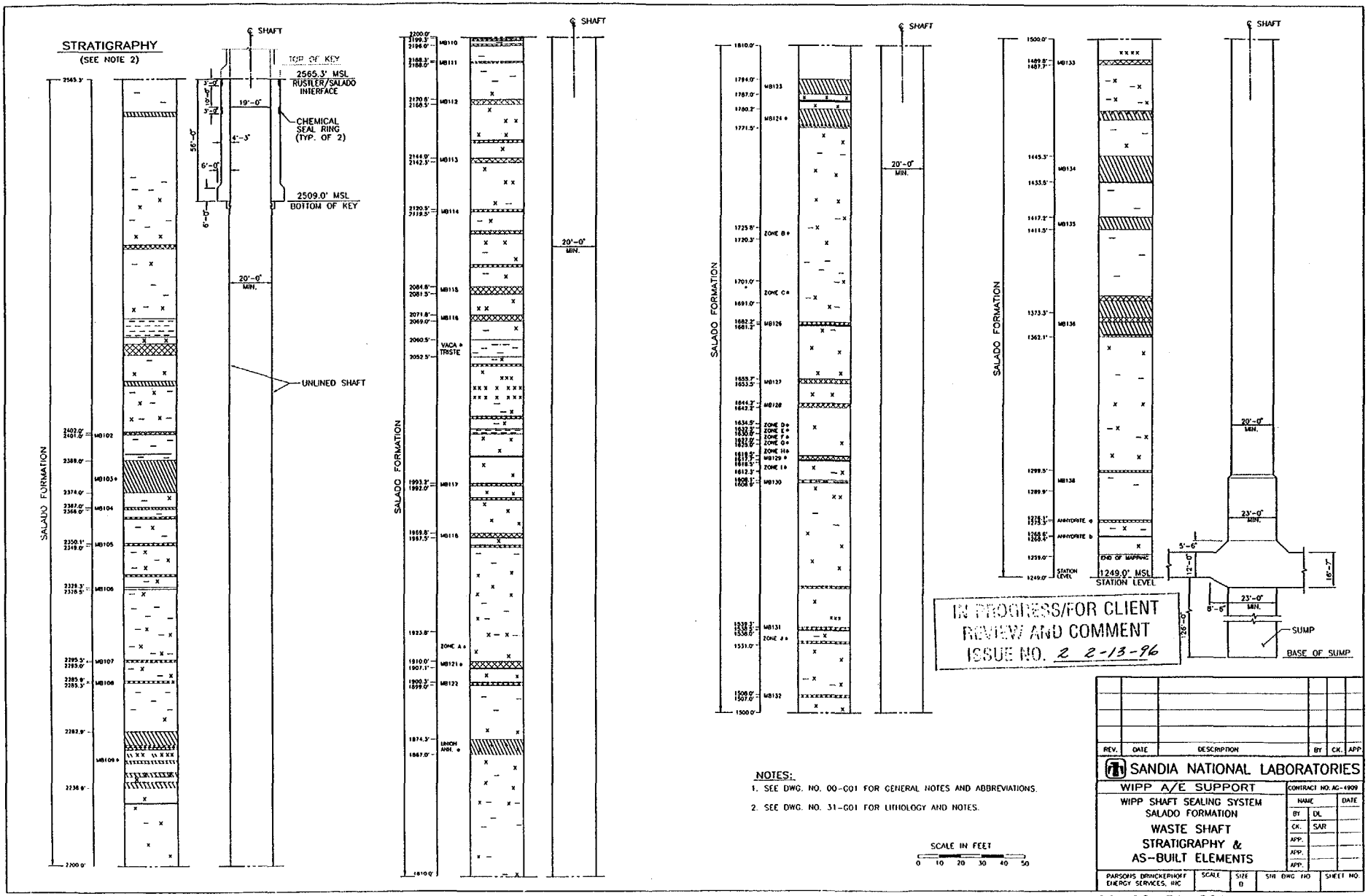
PARSONS BRINCKERHOFF ENERGY SERVICES, INC. | SCALE | SIZE D | SNL DWG. NO | SHEET NO.

09-CS-31-G01



NOTES:

1. SEE DWG. NO. 00-G01 FOR GENERAL NOTES AND ABBREVIATIONS.
2. SEE DWG. NO. 31-G01 FOR LITHOLOGY AND NOTES.

SCALE IN FEET
0 10 20 30 40 50

REV.	DATE	DESCRIPTION	BY	CK.	APP.

SANDIA NATIONAL LABORATORIES

WIPP A/E SUPPORT

CONTRACT NO. AG-4909

WIPP SHAFT SEALING SYSTEM
SALADO FORMATION
WASTE SHAFT
STRATIGRAPHY &
AS-BUILT ELEMENTS

	NAME	DATE
BY	DL	
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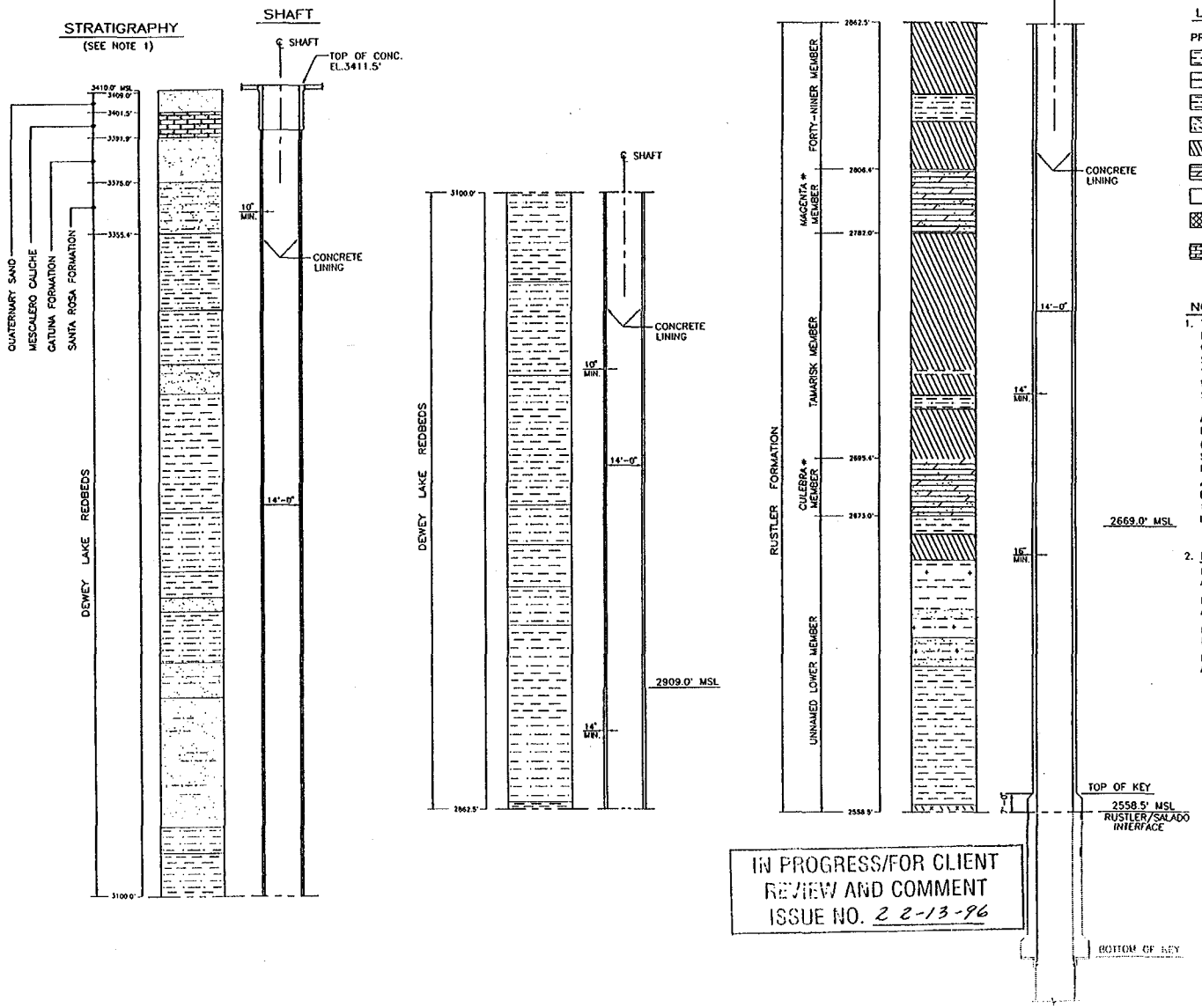
PARSONS BRINCKERHOFF ENERGY SERVICES, INC	SCALE	SIZE B	SHI DWG NO	SHEET NO

09-CS-31-G02



LITHOLOGY:

PRIMARY ROCK/SEDIMENT TYPES	SECONDARY CONSTITUENTS
MUDSTONE/CLAYSTONE	ARGILLACEOUS
CLAYSTONE BED	SILTY
SILTSTONE	SANDY
SANDSTONE	SULFATIC
ANHYDRITE/GYPSUM	DOLOMITIC
DOLOMITE	CALCAREOUS
HALITE	HALITIC
POLYHALITE	POLYHALITIC
CAUCHE	

NOTE:

1. THE STRATIGRAPHY AND GROUNDWATER BRINE SEEPAGE/WEEP INTERVALS ARE BASED ON THE LITHOLOGIC INFORMATION COMPILED DURING THE GEOLOGIC MAPPING OF THE EXHAUST SHAFT WALLS DOE-WIPP-86-008, "GEOTECHNICAL ACTIVITIES IN THE EXHAUST SHAFT", AND APPENDIX A OF REPORT DOE/WIPP-95-3117, "WASTE ISOLATION PILOT PLANT SEALING SYSTEM DESIGN REPORT", 1995.

   ASTERISK (*) WITHIN THE RUSTLER AND SUPRA RUSTLER FORMATIONS INDICATE GROUNDWATER OBSERVED DURING SHAFT MAPPING. ASTERISK (*) WITHIN THE SALADO FORMATION INDICATES A POTENTIAL BRINE SEEPAGE/WEEP INTERVAL. THESE POTENTIAL BRINE SEEPAGE/WEEP INTERVALS ARE BASED ON OBSERVED INTERVALS OF BRINE SEEPAGE /WEEPS IN THE AIR INTAKE SHAFT THAT HAVE BEEN PROJECTED TO THE EXHAUST SHAFT. THE MAPPING OF THE EXHAUST SHAFT (HOLT & POWERS, 1986/DOE-WIPP 86-008) DID NOT INDICATE OBSERVED SEEPAGE INTERVALS WITHIN THE SALADO FORMATION.

2. REFENCE AS-BUILT DRAWINGS FROM WID:

EXHAUST SHAFT 351, SHAFT LINING AND KEY SECTION AND DETAILS	35-R-002-010
EXHAUST SHAFT 351, GENERAL ARRRANGEMENT, PLANS AND SECTIONS	35-R-004-010
EXHAUST SHAFT WINCH AND COLLAR LAYOUT - SHOWS PERMANENT COLLAR STRUCTURE	OGL-S-020-1FB
EXHAUST SHAFT, SHAFT DEVELOPMENT, PLAN, SECTIONS AND DETAIL	WTSD 390D064 (1 of 2)

SCALE IN FEET
0 10 20 30 40 50

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SANDIA NATIONAL LABORATORIES

WIPP A/E SUPPORT — CONTRACT NO. AG-4909

WIPP SHAFT SEALING SYSTEM
NEAR-SURFACE/RUSTLER FORMATIONS
EXHAUST SHAFT
STRATIGRAPHY &
AS-BUILT ELEMENTS

	NAME	DATE
BY	DL	
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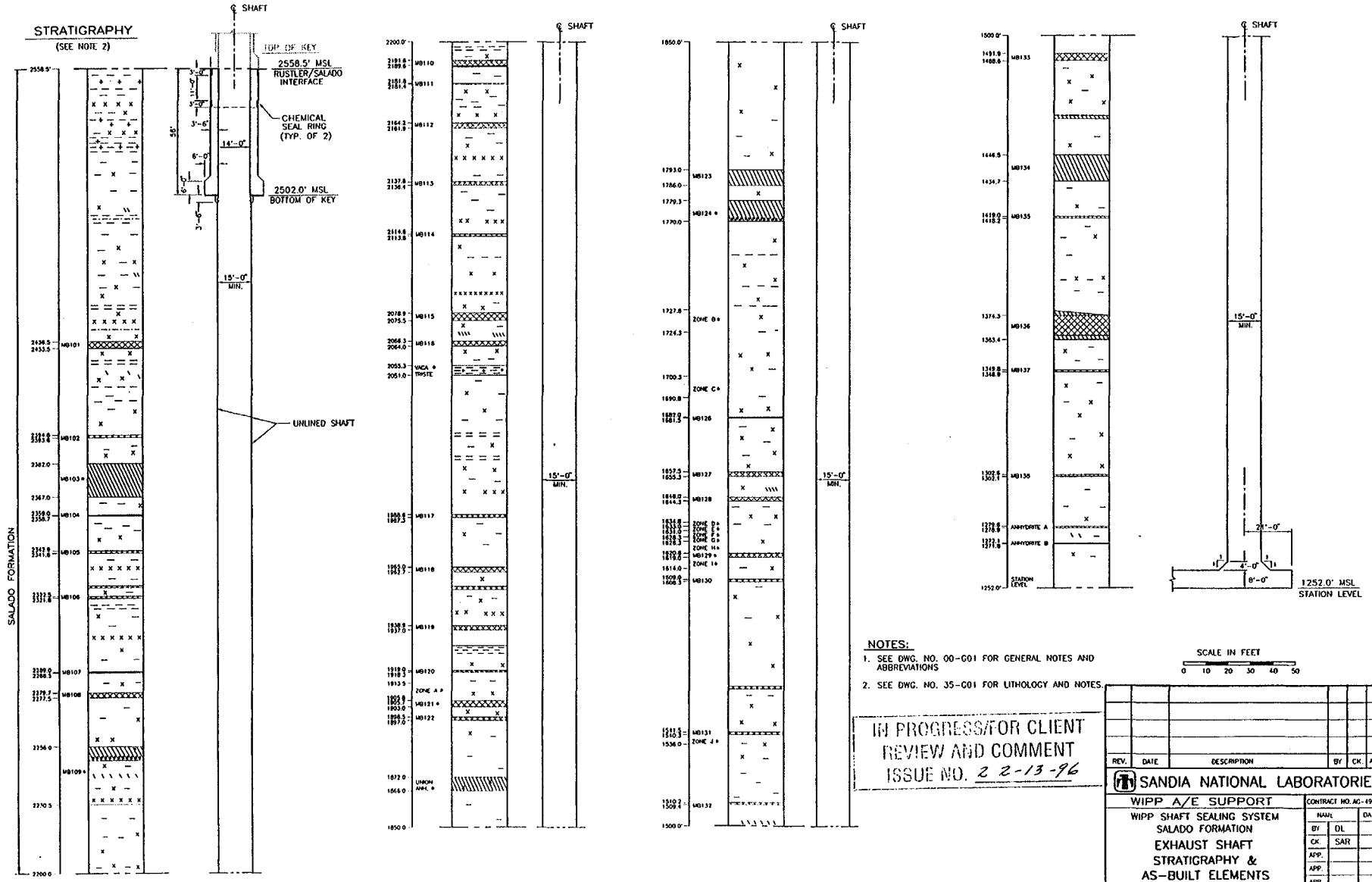
PARSONS BRINCKERHOFF ENERGY SERVICES, INC | SCALE: | SIZE: D | SNL DWG. NO | SHEET NO

09-CS-35-G01



B-8

NOTES:

1. SEE DWG. NO. 00-G01 FOR GENERAL NOTES AND ABBREVIATIONS
2. SEE DWG. NO. 35-G01 FOR LITHOLOGY AND NOTES.

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IN PROGRESS/FOR CLIENT REVIEW AND COMMENT
ISSUE NO. 2 2-13-96

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SANDIA NATIONAL LABORATORIES

WIPP A/E SUPPORT

CONTRACT NO. AG-4909

WIPP SHAFT SEALING SYSTEM
SALADO FORMATION
EXHAUST SHAFT
STRATIGRAPHY &
AS-BUILT ELEMENTS

	NAME	DATE
BY	DL	
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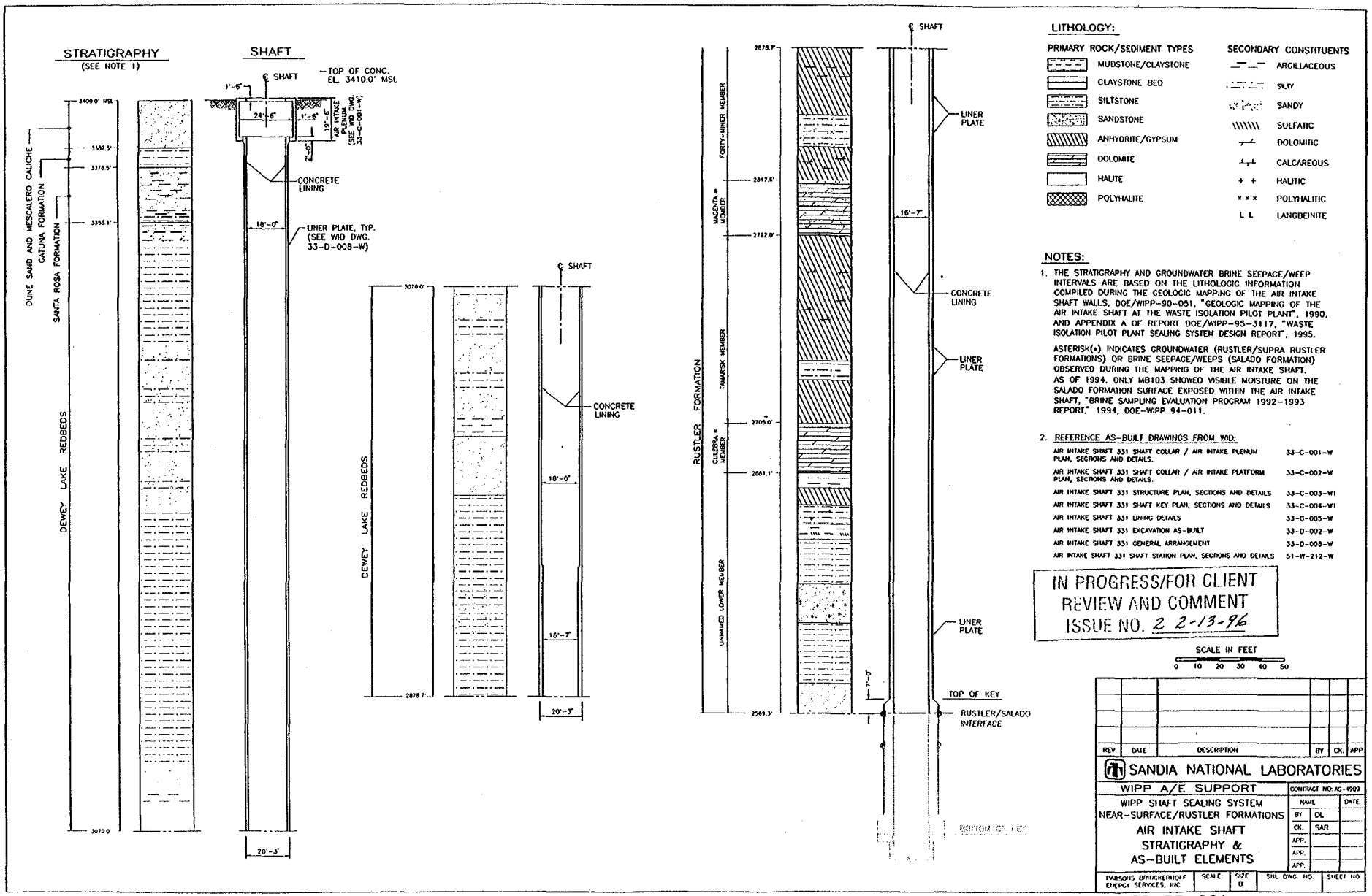
PARSONS BRINCKERHOFF ENERGY SERVICES, INC | SCALE: | SIZE: D | SNL DWG. NO | SHEET NO

09-CS-35-G02



LITHOLOGY:

PRIMARY ROCK/SEDIMENT TYPES	SECONDARY CONSTITUENTS
MUDSTONE/CLAYSTONE	ARGILLACEOUS
CLAYSTONE BED	SILTY
SILTSTONE	SANDY
SANDSTONE	SULFATIC
ANHYDRITE/GYPSUM	DOLOMITIC
DOLOMITE	CALCAREOUS
HALITE	HALITIC
POLYHALITE	POLYHALITIC
	LANGBEINITE

NOTES:

1. THE STRATIGRAPHY AND GROUNDWATER BRINE SEEPAGE/WEEP INTERVALS ARE BASED ON THE LITHOLOGIC INFORMATION COMPILED DURING THE GEOLOGIC MAPPING OF THE AIR INTAKE SHAFT WALLS, DOE/WIPP-90-051, "GEOLOGIC MAPPING OF THE AIR INTAKE SHAFT AT THE WASTE ISOLATION PILOT PLANT", 1990, AND APPENDIX A OF REPORT DOE/WIPP-95-3117, "WASTE ISOLATION PILOT PLANT SEALING SYSTEM DESIGN REPORT", 1995.

   ASTERISK(*) INDICATES GROUNDWATER (RUSTLER/SUPRA RUSTLER FORMATIONS) OR BRINE SEEPAGE/WEEPS (SALADO FORMATION) OBSERVED DURING THE MAPPING OF THE AIR INTAKE SHAFT. AS OF 1994, ONLY MB103 SHOWED VISIBLE MOISTURE ON THE SALADO FORMATION SURFACE EXPOSED WITHIN THE AIR INTAKE SHAFT. "BRINE SAMPLING EVALUATION PROGRAM 1992-1993 REPORT," 1994, DOE-WIPP 94-011.

2. REFERENCE AS-BUILT DRAWINGS FROM WID:

AIR INTAKE SHAFT 331 SHAFT COLLAR / AIR INTAKE PLENUM PLAN, SECTIONS AND DETAILS.	33-C-001-W
AIR INTAKE SHAFT 331 SHAFT COLLAR / AIR INTAKE PLATFORM PLAN, SECTIONS AND DETAILS.	33-C-002-W
AIR INTAKE SHAFT 331 STRUCTURE PLAN, SECTIONS AND DETAILS	33-C-003-W1
AIR INTAKE SHAFT 331 SHAFT KEY PLAN, SECTIONS AND DETAILS	33-C-004-W1
AIR INTAKE SHAFT 331 LINING DETAILS	33-C-005-W
AIR INTAKE SHAFT 331 EXCAVATION AS-BUILT	33-D-002-W
AIR INTAKE SHAFT 331 GENERAL ARRANGEMENT	33-D-008-W
AIR INTAKE SHAFT 331 SHAFT STATION PLAN, SECTIONS AND DETAILS	51-W-212-W

IN PROGRESS/FOR CLIENT REVIEW AND COMMENT
ISSUE NO. 2 2-13-96

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REV.	DATE	DESCRIPTION	BY	CK.	APP

SANDIA NATIONAL LABORATORIES

WIPP A/E SUPPORT — CONTRACT NO: AC-4909

WIPP SHAFT SEALING SYSTEM
NEAR-SURFACE/RUSTLER FORMATIONS
AIR INTAKE SHAFT
STRATIGRAPHY &
AS-BUILT ELEMENTS

	NAME	DATE
BY	DL	
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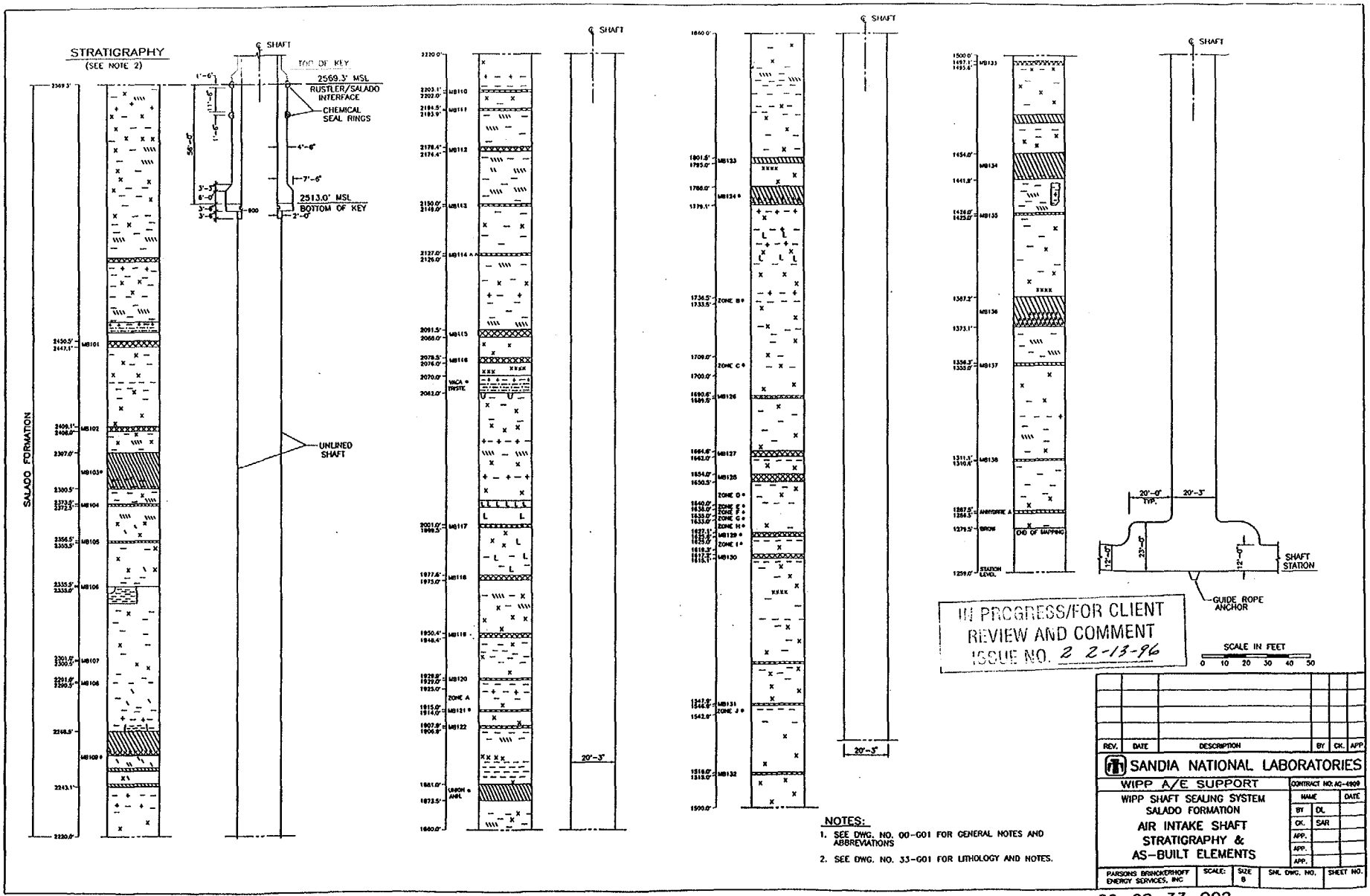
PARSONS BRINCKERHOFF ENERGY SERVICES, INC | SCALE: | SIZE: B | SNL DWG NO. | SHEET NO

09-CS-33-G01



NOTES:

1. SEE DWG. NO. 00-G01 FOR GENERAL NOTES AND ABBREVIATIONS
2. SEE DWG. NO. 33-G01 FOR LITHOLOGY AND NOTES.

REV.	DATE	DESCRIPTION	BY	CK.	APP.

SANDIA NATIONAL LABORATORIES

WIPP A/E SUPPORT — CONTRACT NO: AC-4909

WIPP SHAFT SEALING SYSTEM
SALADO FORMATION
AIR INTAKE SHAFT
STRATIGRAPHY &
AS-BUILT ELEMENTS

	NAME	DATE
BY	DL	
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PARSONS BRINCKERHOFF ENERGY SERVICES, INC. | SCALE: | SIZE B | SHL DWG. NO. | SHEET NO.

09-CS-33-G02

NAME: C:\A\WIPP\9\CS\CS33-G02.DVG DATE: DECEMBER 11, 1995 TIME: 9:56 AM

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Attn: Deputy Director, RW-2
Acting Director, RW-10
Office of Human Resources & Admin.
Director, RW-30
Office of Program Mgmt. & Integ.
Director, RW-40
Office of Waste Accept., Stor., & Tran.
Forrestal Building
Washington, DC 20585

Attn: Project Director
Yucca Mountain Site Characterization Office
Director, RW-3
Office of Quality Assurance
101 Convention Center Drive, Suite #P-110
Las Vegas, NV 89109

US Department of Energy
Albuquerque Operations Office
Attn: National Atomic Museum Library
P.O. Box 5400
Albuquerque, NM 87185-5400

US Department of Energy
Research & Waste Management Division
Attn: Director
P.O. Box E
Oak Ridge, TN 37831

US Department of Energy (5)
Carlsbad Area Office
Attn: G. Dials
D. Galbraith
M. McFadden
R. Lark
J. A. Mewhinney
P.O. Box 3090
Carlsbad, NM 88221-3090

US Department of Energy
Office of Environmental Restoration and
Waste Management
Attn: J. Lytle, EM-30
Forrestal Building
Washington, DC 20585-0002

US Department of Energy (3)
Office of Environmental Restoration and
Waste Management
Attn: M. Frei, EM-34, Trevion II
Washington, DC 20585-0002

US Department of Energy
Office of Environmental Restoration and
Waste Management
Attn: S. Schneider, EM-342, Trevion II
Washington, DC 20585-0002

US Department of Energy (2)
Office of Environment, Safety & Health
Attn: C. Borgstrom, EH-25
R. Pelletier, EH-231
Washington, DC 20585

US Department of Energy (2)
Idaho Operations Office
Fuel Processing & Waste Mgmt. Division
785 DOE Place
Idaho Falls, ID 83402

US Environmental Protection Agency (2)
Radiation Protection Programs
Attn: M. Oge
ANR-460
Washington, DC 20460

Boards

Defense Nuclear Facilities Safety Board
Attn: D. Winters
625 Indiana Ave. NW, Suite 700
Washington, DC 20004

Nuclear Waste Technical Review Board (2)
Attn: Chairman
S. J. S. Parry
1100 Wilson Blvd., Suite 910
Arlington, VA 22209-2297

State Agencies

Attorney General of New Mexico
P.O. Drawer 1508
Santa Fe, NM 87504-1508

Environmental Evaluation Group (3)
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7007 Wyoming NE
Suite F-2
Albuquerque, NM 87109

NM Energy, Minerals, and Natural
Resources Department
Attn: Library
2040 S. Pacheco
Santa Fe, NM 87505

NM Environment Department (3)
Secretary of the Environment
Attn: Mark Weidler
1190 St. Francis Drive
Santa Fe, NM 87503-0968

NM Bureau of Mines & Mineral Resources
Socorro, NM 87801

NM Environment Department
WIPP Project Site
Attn: P. McCasland
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Carlsbad, NM 88221

Laboratories/Corporations

Battelle Pacific Northwest Laboratories
Attn: R. E. Westerman, MSIN P8-44
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Richland, WA 99352

INTERA, Inc.
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Albuquerque, NM 87102

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6850 Austin Center Blvd., Suite 300
Austin, TX 78731

INTERA, Inc.
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Carlsbad, NM 88221

Los Alamos National Laboratory
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P.O. Box 1663
Los Alamos, NM 87544

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4775 Indian School NE, Suite 300
Albuquerque, NM 87110-3927

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B. A. Howard
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1355 Beverly Road
McLean, VA 22101

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Aiken, SC 29802

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217 Materials Research Lab
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CH_2 M Hill
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Bellevue, WA 98009-2050

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3807 Edinburg Drive
Murrysville, PA 15668

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University of Washington
College of Ocean & Fishery Sciences
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583 Henderson Hall, HN-15
Seattle, WA 98195

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325 Don Gaspar
Santa Fe, NM 87503

New Mexico Tech
Martin Speere Memorial Library
Campus Street
Socorro, NM 87810

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Carlsbad Public Library
101 S. Halagueno St.
Carlsbad, NM 88220

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Bundesministerium fur Forschung und
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5300 Bonn 2, GERMANY

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Anthony, TX 79821

Dr. George B. Griswold
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Las Cruces, NM 88005

Robert D. Statler
P.O. Box 1556
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9604 Merion Cir. NE
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