Waste Isolation Pilot Plant Shaft Sealing System Compliance Submittal Design Report
Volume 2 of 2: Appendix E

Repository Isolation Systems Department

Prepared by
Sandia National Laboratories
Albuquerque, New Mexico 87185 and Livermore, California 94550
for the United States Department of Energy
under Contract DE-AC04-94AL85000

Approved for public release; distribution is unlimited.

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED
DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.
### Design Drawings

<table>
<thead>
<tr>
<th>Drawing Number</th>
<th>Title</th>
<th>Drawing Number</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>SNL-007</td>
<td>WIPP Shaft Sealing System</td>
<td>19 OF 28</td>
<td>WIPP Shaft Sealing System</td>
</tr>
<tr>
<td>10 OF 28</td>
<td>Salado Formation</td>
<td></td>
<td>Near-Surface/Rustler Formations</td>
</tr>
<tr>
<td></td>
<td>Air Intake Shaft</td>
<td></td>
<td>Salt Handling Shaft</td>
</tr>
<tr>
<td></td>
<td>Stratigraphy &amp; Sealing Subsystem Profile</td>
<td></td>
<td>Stratigraphy &amp; Sealing Subsystem Profile</td>
</tr>
<tr>
<td></td>
<td>AFT Sealing System Design</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Design Drawings</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SNL-007</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>WIPP Shaft Sealing System</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 OF 28</td>
<td>Air Intake Shaft</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Shaft Station Honolith</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Design Drawings</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SNL-007</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 OF 28</td>
<td>WIPP Shaft Sealing System</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Near-Surface/Rustler Formations</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exhaust Shaft</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stratigraphy &amp; As-Built Elements</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Design Drawings</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SNL-007</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13 OF 28</td>
<td>WIPP Shaft Sealing System</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Salado Formation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exhaust Shaft</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stratigraphy &amp; As-Built Elements</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Design Drawings</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SNL-007</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14 OF 28</td>
<td>WIPP Shaft Sealing System</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Near-Surface/Rustler Formations</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exhaust Shaft</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stratigraphy &amp; Sealing Subsystem Profile</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Design Drawings</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SNL-007</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 OF 28</td>
<td>WIPP Shaft Sealing System</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Salado Formation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exhaust Shaft</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stratigraphy &amp; Sealing Subsystem Profile</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Design Drawings</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SNL-007</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16 OF 28</td>
<td>WIPP Shaft Sealing System</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exhaust Shaft</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Shaft Station Honolith</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Design Drawings</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SNL-007</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17 OF 28</td>
<td>WIPP Shaft Sealing System</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Near-Surface/Rustler Formations</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exhaust Shaft</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stratigraphy &amp; As-Built Elements</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Design Drawings</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SNL-007</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 OF 28</td>
<td>WIPP Shaft Sealing System</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Salado Formation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exhaust Shaft</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stratigraphy &amp; As-Built Elements</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Design Drawings</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
GENERAL NOTES:

1. The drift numbering system (E-300, S-400, etc.) is based on the direction and nominal distance in feet the drift is from the salt handling shaft's designated centerline location of N-000, E-000. The WIPP plant coordinate system centerline location for the salt handling shaft is N9887.23, and E6894.89. The plant coordinate system is described in Westinghouse drawing No. 51-W-108-W, underground excavations, dated 6/15/92.

2. The as-built dimensions and depths and/or elevations shown in these drawings are nominal in that dimensions may change due to local variance of the stratification, operational modifications made to suit the creep closure of the haute, and other operational requirements. Therefore the as-built dimensions and the pertinent elevations for siting the sealing system shall be verified by field surveying and exploratory core drilling during site preparation for the final construction.

3. Drawing numbers:
   For clarity on detail and section designations, and notes, only the sheet number is shown.

LEGEND FOR PROPOSED SHAFT SEALING SYSTEM:

- Section: Sheet on which section is drawn
- Sheet: Sheet from which section is taken
- Detail: Sheet on which detail is drawn
- Sheet: Sheet from which detail is taken
- Section or detail: Taken and drawn on the same sheet, or standard section or detail.

Existing structure to be demolished
Existing structure
New structure
Existing structure
SHAFT SEALS LOCATION PLAN

SCALE IN FEET

0 100 200 300 400 500

EXHAUST SHAFT
N9287.23 E7370.39

SALT HANDLING SHAFT
N9687.23 E6994.89

WASTE SHAFT
N9287.23 E6919.89

AIR INTAKE SHAFT
N9687.23 E6270.00

EXPERIMENTAL AREA

SHAFT SEALS LOCATION PLAN
LITHOLOGY:

PRIMARY ROCK/SEDIMENT TYPES
- MUDSTONE/CLAYSTONE
- CLAYSTONE BED
- SILTSTONE
- SANDSTONE
- ANHYDRITE/GYPSUM
- DOLomite
- HALITE
- POLYHALITE

SECONDARY CONSTITUENTS
- ARGILLACEOUS
- SILTY
- SANDY
- SULFATIC
- DOLOMITIC
- CALCareOUS
- HALITIC
- POLYHALITIC

NOTES:


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/WEEN INTERVAL. THESE POTENTIAL BRINE SEEPAGE/WEEN 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
- WASTE SHAFT 311 SHAFT LINING & KEY SECTIONS AND DETAILS
- WASTE HANDLING BUILDING 411 HOIST TOWER FOUNDATION PLANS, ELEVATIONS, 76'-0" & 89'-0"
- WASTE HANDLING BUILDING 411 HOIST TOWER FOUNDATION SECTIONS
- AS-BUILT FOR WASTE SHAFT COLLAR

SANDIA NATIONAL LABORATORIES

WIPP A/E SUPPORT
NATIONAL LABORATORIES
WEAR-SURFACE/RUSTLER FORMATIONS
WASTE SHAFT
STRATIGRAPHY & AS--BUILT ELEMENTS
STRATIGRAPHY

(SEE NOTE 1)

SHAFT

TOP OF CONCRETE
EL. 3408.5' MSL

CONCRETE LINING

DEWEY LAKE REDBeds

3408.5' MSL

3351.5' MSL

NOT MAPPED

10' MIN.

CONCRETE LINING

DEWEY LAKE REDBeds

3100.0'

2871.5'

2871.5' MSL

10' MIN.

14' MIN.

2947.0' MSL
NOTES:
1. SEE SHEET 1 FOR GENERAL NOTES AND ABBREVIATIONS.
2. SEE SHEET 2 FOR LITHOLOGY AND NOTES.

SANDIA NATIONAL LABORATORIES
WIPP A/E SUPPORT
WIPP SHAFT SEALING SYSTEM
SALADO FORMATION
WASTE SHAFT
STRATIGRAPHY & AS-BUILT ELEMENTS

PARSONS BROOKHERR ENERGY SERVICES, INC
SCALE: B
SIZE
SHL Dwg. No.
SNL-007
SHEET NO.
3/38
STRAITIGRAPHY

(SEE NOTE 2)

STRATIGRAPHY

(SEE NOTE 2)

UNLINED SHAFT

TOP OF KEY

2500.0' MSL

BOTTOM OF KEY

RUSTLER/SALADO INTERFACE

CHEMICAL SEAL RING (TYP. OF 2)
NOTES:
1. SEE SHT. 1 FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS.
2. SEE SHT. 2 FOR LITHOLOGY AND NOTES.
3. DEPTHS SHOWN ARE DISTANCES BELOW THE TOP OF CONCRETE, LOCATED AT EL. 3408.5' ABOVE MSL USGS 1927 NORTH AMERICAN DATUM.
1. SEE SHT. 1 FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS.
2. SEE SHT. 2 FOR LITHOLOGY AND NOTES.
3. SEE NOTE 3 OF SHT. 4.
LITHOLOGY:

PRIMARY ROCK/SEDIMENT TYPES
- Mudstone/Claystone
- Claystone Bed
- Siltstone
- Sandstone
- Anhydrite/Gypsum
- Dolomite
- Halite
- Polylhalite

SECONDARY CONSTITUENTS
- Argillaceous
- Silty
- Sandy
- Sulfatic
- Dolomitic
- Calcareous
- Halitic
- Polylhalitic
- Langbeinite

NOTES:

An asterisk (*) indicates groundwater (Rustler/Salado formations) or brine seepage/weeps (Salado formation) observed during the mapping of the air intake shaft. As of 1994, only M8103 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 WIPP:
- Air Intake Shaft 331 Shaft Collar / Air Intake Plenum, Sections and Details.
- Air Intake Shaft 331 Shaft Collar / Air Intake Platform Plan, Sections and Details.
- Air Intake Shaft 331 Structure Plan, Sections and Details.
- Air Intake Shaft 331 Shaft Key Plan, Sections and Details.
- Air Intake Shaft 331 Lining Details.
- Air Intake Shaft 331 Excavation As-Built.
- Air Intake Shaft 331 General Arrangement.
- Air Intake Shaft 331 Shaft Station Plan, Sections and Details.
STRATIGRAPHY
(SEE NOTE 1)

DUNE SAND AND MESAVER CAUCHE

GATUNA FORMATION

SANTA ROSA FORMATION

DEWEY LAKE REDBEDS

SHAFT

TOP OF CONC.
EL. 3410.0 MSL

1'-6"

24'-5"

1'-5"

1'-6"

LINER PLATE, TYP.
(SEE W/D Dwg.
33-D-009-W)

CONCRETE LINING

CONCRETE LINING

3070.0'

3078.5'

20'-3"

20'-5"
NOTES:
1. SEE SHT. 1 FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS
2. SEE SHT. 7 FOR LITHOLOGY AND NOTES.
3. SEE NOTE 3 OF SHT. 9.
NOTES:
1. SEE SHT. 1 FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS.
**LITHOLOGY:**

**PRIMARY ROCK/SEDIMENT TYPES**
- MUDSTONE/CLAYSTONE
- CLAYSTONE
- Siltstone
- SANDSTONE
- ANHYDRITE/GYPSUM
- DOLOMITE
- HALITE
- POLYHALITE
- CALCHE

**SECONDARY CONSTITUENTS**
- ARILLACEOUS
- SILTY
- SANDY
- DOLOMITIC
- SULFATIC
- CALCAREOUS
- HALITE
- POLYHALITE

**NOTE:**


   ASTERISK (*) WITHIN THE RUSTLER AND SUPRA RUSTLER FORMATIONS INDICATE GROUNDWATER OBSERVED DURING SHAFT MAPPING. ASTERISK (*) WITHIN THE SALADO FORMATION INDICATES A POTENTIAL BRINE SEEPAGE/WEEN INTERVAL. THESE POTENTIAL BRINE SEEPAGE/WEEN INTERVALS ARE BASED ON OBSERVED INTERVALS OF BRINE SEEPAGE /WEEN 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. REFERENCES AS-BUILT DRAWINGS FROM WID:
- EXHAUST SHAFT 351, SHAFT LINING AND KEY SECTION AND DETAILS
- EXHAUST SHAFT 351, GENERAL ARRANGEMENT, PLANS AND SECTIONS
- EXHAUST SHAFT WINE AND COLLAR LAYOUT - SHOWS PERMANENT COLLAR STRUCTURE
- EXHAUST SHAFT, SHAFT DEVELOPMENT, PLAN, SECTIONS AND DETAIL

**SCALE IN FEET**

0 10 20 30 40 50

**SANDIA NATIONAL LABORATORIES**

**WIPP A/E SUPPORT**

**WIPP SHAFT SEALING SYSTEM NEAR-SURFACE/RUSTLER FORMATIONS**

**EXHAUST SHAFT STRATIGRAPHY & AS-BUILT ELEMENTS**

PARSONS BRINCKERHOFF ENERGY SERVICES, INC
NOTES:
1. SEE SHT. 1 FOR GENERAL NOTES AND ABBREVIATIONS
2. SEE SHT. 12 FOR LITHOLOGY AND NOTES.

SANDIA NATIONAL LABORATORIES
WIPP A/E SUPPORT
WIPP SHAFT SEALING SYSTEM
SALADO FORMATION
EXHAUST SHAFT
STRATIGRAPHY & AS-BUILT ELEMENTS

PARSONS BRICKNERHOF
ENERGY SERVICES, INC

SCALE: 1" = 10' SHEET NO. SNL-007
SIZE: C SHEET 13 OF 28
NOTES:
1. SEE SHT. 1 FOR GENERAL NOTE, LEGEND AND ABBREVIATIONS.
2. SEE SHT. 12 FOR LITHOLOGY AND NOTES.
3. DEPTHS SHOWN ARE DISTANCES BELOW THE TOP OF CONCRETE, LOCATED AT EL. 3411.5' ABOVE MSL USGS 1927 NORTH AMERICAN DATUM.

- COMPACTED EARTHEN FILL
- REMOVE LINING ALL AROUND SHAFT TO FORM SLOT, TYP.
- RUSTLER COMPACTED CLAY COLUMN
- CONCRETE PLUG
- RUSTLER/SALADO INTERFACE
- REMOVE EXISTING LINING
- EXISTING KEY
- BOTTOM OF KEY
NOTES:
1. SEE SHT. 1 FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS.
2. SEE SHT. 12 FOR LITHOLOGY AND NOTES.
3. SEE NOTE 3 OF SHT. 14.
STRATIGRAPHY

(SEE NOTE 2)

DEPTH
(SEE NOTE 3)

TOP OF KEY

RUSSLER/SALADO INTERFACE

REMOVE EXISTING LINING & CHEMICAL SEAL RINGS

EXISTING KEY

BOTTOM OF KEY

ASPHALT COLUMN

15°-0'

SHT. 12
SHT. 23

UPPER CONCRETE- ASPHALT WATERSTOP

SHT. 12
SHT. 22

SALADO FORMATION

SALADO FORMATION

SALADO FORMATION

SALADO FORMATION

UPPER SALADO COMPACTED CLAY COLUMN

MIDDLE CONCRETE- ASPHALT WATERSTOP

COMPACTED SALT COLUMN

UPPER SALADO COMPACTED CLAY COLUMN

VACA TRUSTE

VACA TRUSTE

VACA TRUSTE

VACA TRUSTE

CONCRETE- ASPHALT WATERSTOP

15°-0'

MIN.

1793.0
1788.0
1783.0
1778.0
1773.0
1768.0
1763.0
1758.0
LITHOLOGY:

PRIMARY ROCK/SEDIMENT TYPES
- MUDDSTONE/CLAYSTONE
- CLAYSTONE BED
- SILTSTONE
- SANDSTONE
- ANHYDRITE/GYPSUM
- DOLOMITE
- HALITE
- POLYHALITE

SECONDARY CONSTITUENTS
- ARGILLACEOUS
- SILTY
- SANDY
- SULFATIC
- DOLOMITIC
- CALCAREOUS
- HALITIC
- POLYHALITIC

NOTES:

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

2. REFERENCE AS--BUILT DRAWINGS FROM WIPP:
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-0 DRIFT FROM N--9900 TO N--9580
WIPP EXHAUST SHAFT 120" I.D. CASING x 834'
FS--M3259--01
WIPP PROJECT 120" I.D. CASING LINER HOLE COMPLEX FS M3259--02


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'.

NOTES:

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

2. REFERENCE AS--BUILT DRAWINGS FROM WIPP:
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-0 DRIFT FROM N--9900 TO N--9580
WIPP EXHAUST SHAFT 120" I.D. CASING x 834'
FS--M3259--01
WIPP PROJECT 120" I.D. CASING LINER HOLE COMPLEX FS M3259--02


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'.

NOTES:

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

2. REFERENCE AS--BUILT DRAWINGS FROM WIPP:
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-0 DRIFT FROM N--9900 TO N--9580
WIPP EXHAUST SHAFT 120" I.D. CASING x 834'
FS--M3259--01
WIPP PROJECT 120" I.D. CASING LINER HOLE COMPLEX FS M3259--02


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'.

NOTES:

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

2. REFERENCE AS--BUILT DRAWINGS FROM WIPP:
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-0 DRIFT FROM N--9900 TO N--9580
WIPP EXHAUST SHAFT 120" I.D. CASING x 834'
FS--M3259--01
WIPP PROJECT 120" I.D. CASING LINER HOLE COMPLEX FS M3259--02


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'.
SHAFT

STRATIGRAPHY
(SEE NOTE 1)

6' SLAB

SHFT

TOP OF CONC.
3411.5' MSL

CONCRETE COLLAR

CMP CASING

1" OUTER STEEL CASING

STEEL LINING
(SEE TABLE 1)

CONCRETE GROUTED STEEL LINING

3315.5' MSL

BOTTOM OF OUTER STEEL CASING

DEWEY LAKE REDBEDS

NOT MAPPED

3410.5' MSL

3399.0'

3394.5'

3318.0'

3316.0'

DEWEY LAKE REDBEDS

NOT MAPPED

QUAR ternry Sand

Mesocnler Caliche

Gatunà Formation

Santa Rosa Formation

TABLE 1: STEEL LINING SCHEDULE
(SEE NOTE 4)

<table>
<thead>
<tr>
<th>THICKNESS (IN.)</th>
<th>TOP EL. MSL</th>
<th>BOT. EL. MSL</th>
<th>SECTION LENGTH (FT.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5/8</td>
<td>3411.5</td>
<td>3246</td>
<td>165.5</td>
</tr>
<tr>
<td>1</td>
<td>3246</td>
<td>2886</td>
<td>360</td>
</tr>
<tr>
<td>1/4</td>
<td>2886</td>
<td>2786</td>
<td>100</td>
</tr>
<tr>
<td>1/2</td>
<td>2786</td>
<td>2686</td>
<td>100</td>
</tr>
<tr>
<td>1/2 PETAL BASKET</td>
<td>2686</td>
<td>2586</td>
<td>13</td>
</tr>
</tbody>
</table>

TOTAL LENGTH 838.5

ALBERT W. DENNIS
REG. PROFESSIONAL ENGINEER

5971
NOTES:
1. SEE SHT. 1 FOR GENERAL NOTES AND ABBREVIATIONS
2. SEE SHT. 17 FOR LITHOLOGY AND NOTES.

ALBERT W. DENNIS
NEW MEXICO
REGISTERED PROFESSIONAL ENGINEER
5971

A. W. Dennis 8-2-96
NOTES:
1. SEE SHT. 1 FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS.
2. SEE SHT. 17 FOR LITHOLOGY AND NOTES.
3. DEPTHS SHOWN ARE DISTANCES BELOW THE TOP OF CONCRETE, LOCATED AT EL. 3411.5' ABOVE MSL USGS 1927 NORTH AMERICAN DATUM.
STRATIGRAPHY
(SEE NOTE 2)

---

W9.1′-2G3.1′-

pJ7s
m.4
m.3
Zw1l

1300
1500

F

UPPER SALADO
COMPACTED
CLAY COLUMN

15455′
1540.5′
1537.5′
1512.5′
1500.0′

F

LOWER SALADO
SALT COLUMN

NOTES:
1. SEE SHT. 1 FOR GENER.
ABBREVIATIONS.
2. SEE SHT. 17 FOR UTt
3. SEE NOTE 3 OF SHT. 1
DETAIL

SCALE IN FEET

SECTION

BASE OF SUMP

NOTES:
1. SEE SHT. 1 FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS.

SANDIA NATIONAL LABORATORIES

PARSONS BRINCKERHOFF
ENERGY SERVICES, INC.

ALBERT W. DENNIS
REGISTERED PROFESSIONAL ENGINEER
NEW MEXICO
5971

Albert W. Dennis
8-2-96

0 8/2/96 . ISSUED FOR RECORDS PACKAGE

SALT HANDLING SHAFT
SHAFT STATION MONOLITH

CONTRACT NO: AC-4909

WIPP SHAFT SEALING SYSTEM

WIPP A/E SUPPORT

REV. DATE DESCRIPTION BY APP

SHEET NO.
31 OF 28

SNL-007

SCALE: SIZE:
B

0 5 10 15 20

SCALE IN FEET

0 5 10 15 20

SCALE IN FEET
**Detail**

**Salt Handling Shaft**

- **Concrete Plug**
  - 2574.5' MSL
  - **Top of Key**
- **Rustler/Salado Interface**
- **Remove existing lining and chemical seal rings**
- **Existing Key**
- **Asphalt Column**
  - 2542.5' MSL
  - **Bottom of Key**
  - 2502.0' MSL
- **Asphalt Column**
  - 2432.0' MSL
  - **Upper concrete-asphalt waterstop**
  - 2436.0' MSL
  - **Upper concrete-asphalt waterstop**

**Scale in Feet**

- 0
- 5
- 10
- 15
- 20
- 25

**Issued For Records Package**

- 8/2/96

**Description**

- Remove existing lining and chemical seal rings

**Sandia National Laboratories**

**WIPP A/E Support**

**WIPP Shaft Sealing System**

**Asphalt Column**
<table>
<thead>
<tr>
<th>SHAFT</th>
<th>NOMINAL SHAFT DIAMETER D</th>
<th>UPPER SALADO COMPACTED CLAY COLUMN</th>
<th>LOWER SALADO COMPACTED CLAY COLUMN</th>
</tr>
</thead>
<tbody>
<tr>
<td>WASTE</td>
<td>20'–0&quot;</td>
<td>2389.0 2037.5 351.5</td>
<td>1382.0 1286.0 96.0</td>
</tr>
<tr>
<td>AIR INTAKE</td>
<td>20'–3&quot;</td>
<td>2397.0 2053.0 344.0</td>
<td>1389.5 1296.0 93.5</td>
</tr>
<tr>
<td>EXHAUST</td>
<td>15'–0&quot;</td>
<td>2382.0 2042.0 340.0</td>
<td>1383.0 1285.0 98.0</td>
</tr>
<tr>
<td>ALT HANDLING</td>
<td>11'–10&quot;</td>
<td>2386.0 2051.0 335.0</td>
<td>1391.0 1284.0 107.0</td>
</tr>
</tbody>
</table>
DETAIL
SEE TABLE 1 FOR DETAILS
NO SCALE
SHT. 5
SHT. 10
SHT. 15
SHT. 20
SHT. 24
<table>
<thead>
<tr>
<th>HAFT</th>
<th>NOMINAL SHAFT DIAMETER D</th>
<th>COMPACTED SALT COLUMN</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>TOP EL. (FT. MSL)</td>
<td>BOTTOM EL. (FT. MSL)</td>
</tr>
<tr>
<td>ASTE</td>
<td>20'-0&quot;</td>
<td>1987.5</td>
<td>1432.0</td>
</tr>
<tr>
<td>AIR ITAKE</td>
<td>20'-3&quot;</td>
<td>2003.0</td>
<td>1439.5</td>
</tr>
<tr>
<td>HAUST</td>
<td>15'-0&quot;</td>
<td>1992.0</td>
<td>1433.0</td>
</tr>
<tr>
<td>ALTNDLING</td>
<td>11'-10&quot;</td>
<td>2001.0</td>
<td>1441.0</td>
</tr>
</tbody>
</table>
COMPACTED SALT COLUMN

MIDDLE CONCRETE-ASPHALT WATERSTOP

TOP EL.

COMPACTED SALT COLUMN

BOTTOM EL.

LOWER CONCRETE-ASPHALT WATERSTOP

DETAIL

SEE TABLE 1 FOR DETAILS

NO SCALE

SHT. 5  SHT. 10  SHT. 15  SHT. 20

SHT. 25
DETAIL 1
WASTE SHAFT  SH. 4 SH. 26

DETAIL 2
AIR INTAKE SHAFT  SH. 9 SH. 26

CONCRETE PLUG

EXISTING LINER PLATE TO BE REMOVED

ASPHALT COLUMN

TOP OF KEY

RUSTLER/SALADO INTERFACE

CONCRETE PLUG

ASPHALT COLUMN

TOP OF KEY

RUSTLER/SALADO INTERFACE

VARIES 1'-6"

CENTER OF SHAFT

SECTION
NO SCALE
<table>
<thead>
<tr>
<th>SHAFT</th>
<th>NOMINAL SHAFT DIAMETER D</th>
<th>RUSTLER COMPACTED CLAY COLUMN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>TOP EL. (FT. MSL)</td>
</tr>
<tr>
<td>WASTE</td>
<td>19'-0&quot;</td>
<td>2836.0</td>
</tr>
<tr>
<td>AIR INTAKE</td>
<td>16'-7&quot;</td>
<td>2840.0</td>
</tr>
<tr>
<td>EXHAUST</td>
<td>14'-0&quot;</td>
<td>2829.0</td>
</tr>
<tr>
<td>SALT HANDLING</td>
<td>10'-0&quot;</td>
<td>2830.0</td>
</tr>
</tbody>
</table>
DETAIL

SEE TABLE 1 FOR DETAILS

NO SCALE

SHT. 4 SHT. 27
SHT. 9
SHT. 14
SHT. 19
SHAFT

COMPACTED EARTHEN FILL

TOP OF CONCRETE EL 3408.5' MSL

3323.0' MSL

CONCRETE PLUG

2836.0' MSL

RUSTLER COMPACTED CLAY COLUMN

16'-7"'

18'-0"

3353.0' MSL

COMPACTED EARTHEN FILL

CONCRETE PLUG

2840.0' MSL

RUSTLER COMPACTED CLAY COLUMN

DE DETAIL

DETAIL

WASTE SHAFT

SHT. 4

SHT. 28

DETAIL

AIR INTAKE SHAFT

SHT. 9

SHT. 28

NAME: CALWIPPVAC/C500-008.BWG DATED MAY 05, 1996 TIME: 4:23 PM
LOT PLANT

M

ITEM DESIGN

SECTION SKETCHES

SYSTEM

GENERAL

AND SECTIONS

SYSTEM

GENERAL

AND SECTIONS

SYSTEM

SYSTEM

AME AND

FACILITIES
<table>
<thead>
<tr>
<th>DRAWING NUMBER</th>
<th>TITLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SKETCH E-1</td>
<td>WIPP SHAFT SEALING SMALLER GALLOW ARRANGEMENT PLAN</td>
</tr>
<tr>
<td>SKETCH E-2</td>
<td>WIPP SHAFT SEALING LARGER GALLOW ARRANGEMENT PLAN</td>
</tr>
<tr>
<td>SKETCH E-3</td>
<td>WIPP SHAFT SEALING TYPICAL HEADFRAMES PLANS AND SECTIONS</td>
</tr>
<tr>
<td>SKETCH E-4</td>
<td>WIPP SHAFT SEALING PERSPECTIVE HEADFRAMES ASSOCIATED SURFACES</td>
</tr>
</tbody>
</table>
WIPP SHAFT SEALING SYSTEM

SMALLER GALLOWAY
GENERAL ARRANGEMENT
PLANS & SECTIONS
SKETCH E-1
Environmental Evaluation Group (3)
Attn: Library
7007 Wyoming NE, Suite F-2
Albuquerque, NM 87109

Metropolitan Water District of Southern Calif.
Attn: J. Narvaiz
P.O. Box 54153
Los Angeles, CA 90071-3123

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
P.O. Box 3090
Carlsbad, NM 88221

Laboratories/Corporations

Battelle Pacific Northwest Laboratories (2)
Attn: R. E. Westerman
R. Romine, MS P8-38
P.O. Box 999
900 Battelle Blvd.
Richland, WA 99352

Brookhaven National Laboratory
Attn: P. D. Moskowitz
Environmental & Waste Technology Center
Building 830
Upton, NY 11973

Harnischfeger Corp.
Phonex Engineering Services
Attn: R. Luebke
2969 S. Chase Avenue
Milwaukee, WI 53207-6408

Ian Clelland
6656 N. Amdahl Dr.
Tucson, AZ 85704

INTERA, Inc.
Attn: G. A. Freeze
1650 University Blvd. NE, Suite 300
Albuquerque, NM 87102

INTERA, Inc. (6)
Attn: J. F. Pickens
V. Kelley
M. Reeves
W. Statham
J. Beach
D. Fryar
INTERA WIPP Library
6850 Austin Center Blvd., Suite 300
Austin, TX 78731

INTERA, Inc.
Attn: W. Stensrud
P.O. Box 2123
Carlsbad, NM 88221

Istasca Consulting Group, Inc.
Attn: John Tinucci
Thresher Square East
708 South Third Street, Suite 310
Minneapolis, MI 55415

Los Alamos National Laboratory
Attn: B. Erdal, INC-12
P.O. Box 1663
Los Alamos, NM 87544

Morton International, Morton Salt
Attn: H. W. Diamond
Morton International Building
100 N. Riverside Plaza,
Randolph Street at the River
Chicago, IL 60606-1597

Parsons Brinckerhoff Energy Services, Inc.
Attn: W. S. Roman
One Penn Plaza
New York, NY 10119

Parsons Brinckerhoff Energy Services, Inc. (2)
Attn: B. W. Lawerance
C. D. Mann
M. S. Lin
303 Second Street
Suite 850 North
San Francisco, CA 94107
WIPP
UC721 Distribution List

Federal Agencies

US Department of Energy (4)
Office of Civilian Radioactive Waste Mgmt.
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 (2)
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 (8)
Carlsbad Area Office
Attn: G. Dials
D. Galbraith (3)
M. Matthews
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
<table>
<thead>
<tr>
<th>MS</th>
<th>Org.</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>0483</td>
<td>5165</td>
<td>R. E. Stinebaugh</td>
</tr>
<tr>
<td>0706</td>
<td>6113</td>
<td>J. K. Linn</td>
</tr>
<tr>
<td>1320</td>
<td>6719</td>
<td>E. J. Nowak</td>
</tr>
<tr>
<td>1322</td>
<td>6121</td>
<td>J. R. Tillerson (10)</td>
</tr>
<tr>
<td>1322</td>
<td>6121</td>
<td>E. H. Ahrens (2)</td>
</tr>
<tr>
<td>1322</td>
<td>6121</td>
<td>A. W. Dennis (10)</td>
</tr>
<tr>
<td>1322</td>
<td>6121</td>
<td>F. D. Hansen</td>
</tr>
<tr>
<td>1322</td>
<td>6121</td>
<td>L. D. Hurtado</td>
</tr>
<tr>
<td>1322</td>
<td>6121</td>
<td>M. K. Knowles</td>
</tr>
<tr>
<td>1324</td>
<td>6115</td>
<td>P. B. Davies</td>
</tr>
<tr>
<td>1325</td>
<td>6852</td>
<td>L. S. Costin</td>
</tr>
<tr>
<td>1325</td>
<td>6852</td>
<td>R. E. Finley</td>
</tr>
<tr>
<td>1328</td>
<td>6749</td>
<td>D. R. Anderson</td>
</tr>
<tr>
<td>1328</td>
<td>6741</td>
<td>H. N. Jow</td>
</tr>
<tr>
<td>1328</td>
<td>6849</td>
<td>M. F. Fewell</td>
</tr>
<tr>
<td>1328</td>
<td>6849</td>
<td>P. Vaughn</td>
</tr>
<tr>
<td>1335</td>
<td>6705</td>
<td>M. Chu</td>
</tr>
<tr>
<td>1341</td>
<td>6748</td>
<td>J. T. Holmes</td>
</tr>
<tr>
<td>1395</td>
<td>6800</td>
<td>L. Shephard</td>
</tr>
<tr>
<td>1395</td>
<td>6707</td>
<td>M. Marietta</td>
</tr>
<tr>
<td>1395</td>
<td>6841</td>
<td>V. H. Slaboszewicz</td>
</tr>
<tr>
<td>1330</td>
<td>6752</td>
<td>B. J. Pierson (2)</td>
</tr>
<tr>
<td>1330</td>
<td>6752</td>
<td>NWM Library (100)</td>
</tr>
<tr>
<td>9018</td>
<td>8523-2</td>
<td>Central Technical Files</td>
</tr>
<tr>
<td>0899</td>
<td>4414</td>
<td>Technical Library (5)</td>
</tr>
<tr>
<td>0619</td>
<td>12630</td>
<td>Review and Approval Desk,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>For DOE/OSTI (2)</td>
</tr>
</tbody>
</table>