

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25

**RENEWAL APPLICATION  
APPENDIX I2E**

**DESIGN DRAWINGS**

**SHAFT SEALING SYSTEM  
COMPLIANCE SUBMITTAL DESIGN REPORT**

Waste Isolation Pilot Plant  
Hazardous Waste Facility Permit  
Draft Renewal Application  
May 2009

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22

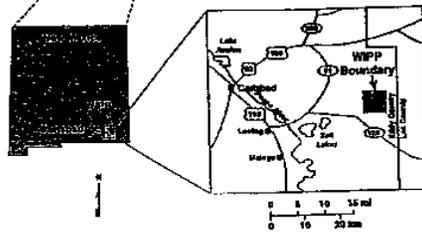
(This page intentionally blank)

# WASTE ISOLATION PILOT PLANT

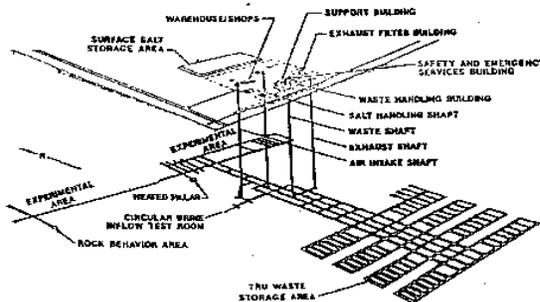
CARLSBAD, NM

## SHAFT SEALING SYSTEM DESIGN

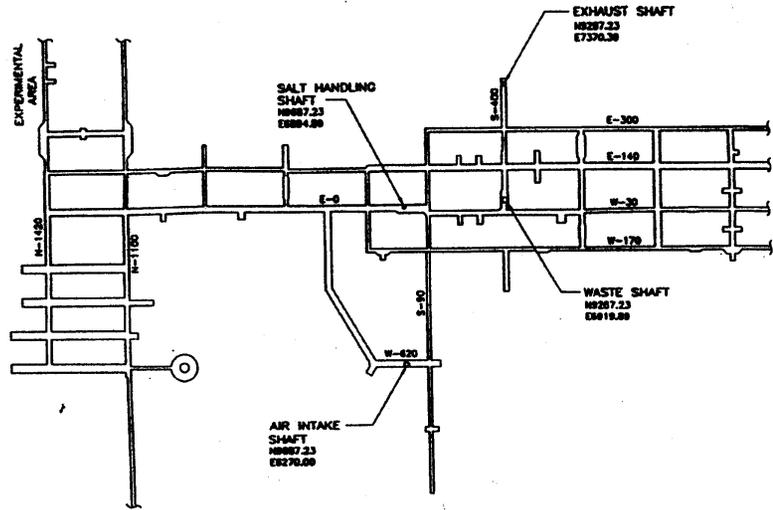
### DESIGN DRAWINGS



WIPP LAYOUT



| DRAWING NUMBER     | TITLE   | DRAWING NUMBER      | TITLE  | DRAWING NUMBER      | TITLE  |
|--------------------|---|---------------------|--|---------------------|--|
| SML-007<br>1 OF 28 | WIPP SHAFT SEALING SYSTEM<br>SHAFT LOCATION PLAN,<br>ABBREVIATIONS, GENERAL<br>NOTES AND LEGEND                                 | SML-007<br>10 OF 28 | WIPP SHAFT SEALING SYSTEM<br>SALADO FORMATION<br>AIR INTAKE SHAFT<br>STRATIGRAPHY & SEALING<br>SUBSYSTEM PROFILE             | SML-007<br>19 OF 28 | WIPP SHAFT SEALING SYSTEM<br>NEAR-SURFACE/RUSTLER FORMATIONS<br>SALT HANDLING SHAFT<br>STRATIGRAPHY & SEALING<br>SUBSYSTEM PROFILE |
| SML-007<br>2 OF 28 | WIPP SHAFT SEALING SYSTEM<br>NEAR-SURFACE/RUSTLER FORMATIONS<br>WASTE SHAFT<br>STRATIGRAPHY &<br>AS-BUILT ELEMENTS              | SML-007<br>13 OF 28 | WIPP SHAFT SEALING SYSTEM<br>AIR INTAKE SHAFT<br>SHAFT STATION MONOLITH  | SML-007<br>20 OF 28 | WIPP SHAFT SEALING SYSTEM<br>SALADO FORMATION<br>SALT HANDLING SHAFT<br>STRATIGRAPHY & SEALING<br>SUBSYSTEM PROFILE                |
| SML-007<br>3 OF 28 | WIPP SHAFT SEALING SYSTEM<br>SALADO FORMATION<br>WASTE SHAFT<br>STRATIGRAPHY &<br>AS-BUILT ELEMENTS                             | SML-007<br>12 OF 28 | WIPP SHAFT SEALING SYSTEM<br>NEAR-SURFACE/RUSTLER FORMATIONS<br>EXHAUST SHAFT<br>STRATIGRAPHY &<br>AS-BUILT ELEMENTS         | SML-007<br>21 OF 28 | WIPP SHAFT SEALING SYSTEM<br>SALT HANDLING SHAFT<br>SHAFT STATION MONOLITH   |
| SML-007<br>4 OF 28 | WIPP SHAFT SEALING SYSTEM<br>NEAR-SURFACE/RUSTLER FORMATIONS<br>WASTE SHAFT<br>STRATIGRAPHY & SEALING<br>SUBSYSTEM PROFILE      | SML-007<br>13 OF 28 | WIPP SHAFT SEALING SYSTEM<br>SALADO FORMATION<br>EXHAUST SHAFT<br>STRATIGRAPHY &<br>AS-BUILT ELEMENTS                        | SML-007<br>21 OF 28 | WIPP SHAFT SEALING SYSTEM<br>CONCRETE-ASPHALT WATERSTOP<br>IN SALADO FORMATION   |
| SML-007<br>5 OF 28 | WIPP SHAFT SEALING SYSTEM<br>SALADO FORMATION<br>WASTE SHAFT<br>STRATIGRAPHY & SEALING<br>SUBSYSTEM PROFILE                     | SML-007<br>14 OF 28 | WIPP SHAFT SEALING SYSTEM<br>NEAR-SURFACE/RUSTLER FORMATIONS<br>EXHAUST SHAFT<br>STRATIGRAPHY & SEALING<br>SUBSYSTEM PROFILE | SML-007<br>23 OF 28 | WIPP SHAFT SEALING SYSTEM<br>CONCRETE-ASPHALT WATERSTOP<br>IN SALADO FORMATION   |
| SML-007<br>6 OF 28 | WIPP SHAFT SEALING SYSTEM<br>WASTE SHAFT<br>SHAFT STATION MONOLITH  | SML-007<br>15 OF 28 | WIPP SHAFT SEALING SYSTEM<br>SALADO FORMATION<br>EXHAUST SHAFT<br>STRATIGRAPHY & SEALING<br>SUBSYSTEM PROFILE                | SML-007<br>24 OF 28 | WIPP SHAFT SEALING SYSTEM<br>UPPER AND LOWER SALADO<br>COMPACTED CLAY COLUMNS  |
| SML-007<br>7 OF 28 | WIPP SHAFT SEALING SYSTEM<br>NEAR-SURFACE/RUSTLER FORMATIONS<br>AIR INTAKE SHAFT<br>STRATIGRAPHY &<br>AS-BUILT ELEMENTS         | SML-007<br>16 OF 28 | WIPP SHAFT SEALING SYSTEM<br>EXHAUST SHAFT<br>SHAFT STATION MONOLITH   | SML-007<br>25 OF 28 | WIPP SHAFT SEALING SYSTEM<br>COMPACTED SALT COLUMN   |
| SML-007<br>8 OF 28 | WIPP SHAFT SEALING SYSTEM<br>SALADO FORMATION<br>AIR INTAKE SHAFT<br>STRATIGRAPHY &<br>AS-BUILT ELEMENTS                        | SML-007<br>17 OF 28 | WIPP SHAFT SEALING SYSTEM<br>NEAR-SURFACE/RUSTLER FORMATIONS<br>SALT HANDLING SHAFT<br>STRATIGRAPHY &<br>AS-BUILT ELEMENTS   | SML-007<br>26 OF 28 | WIPP SHAFT SEALING SYSTEM<br>CONCRETE FILL   |
| SML-007<br>9 OF 28 | WIPP SHAFT SEALING SYSTEM<br>NEAR-SURFACE/RUSTLER FORMATIONS<br>AIR INTAKE SHAFT<br>STRATIGRAPHY & SEALING<br>SUBSYSTEM PROFILE | SML-007<br>18 OF 28 | WIPP SHAFT SEALING SYSTEM<br>SALADO FORMATION<br>SALT HANDLING SHAFT<br>STRATIGRAPHY &<br>AS-BUILT ELEMENTS                  | SML-007<br>27 OF 28 | WIPP SHAFT SEALING SYSTEM<br>RUSTLER COMPACTED CLAY COLUMN   |
|                    |   |                     |  | SML-007<br>28 OF 28 | WIPP SHAFT SEALING SYSTEM<br>COMPACTED SAND/FILL<br>AND CONCRETE FILL  |



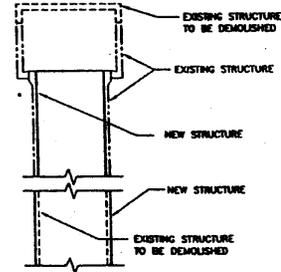
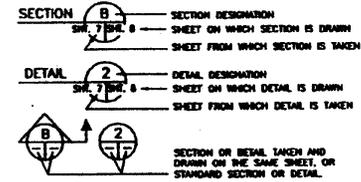
SHAFT SEALS LOCATION PLAN N

SCALE IN FEET  
 0 100 200 300 400 500

**GENERAL NOTES:**

1. THE SHFT NUMBERING SYSTEM (E-300, S-400, ETC.) IS BASED ON THE DIRECTION AND NOMINAL DISTANCE IN FEET THE SHFT IS FROM THE SALT HANDLING SHAFT'S DESIGNATED CENTERLINE LOCATION OF N-000, E-400. THE WIPP PLANT COORDINATE SYSTEM CENTERLINE LOCATION FOR THE SALT HANDLING SHAFT IS N8287.23, AND E8284.89. THE PLANT COORDINATE SYSTEM IS DESCRIBED IN WESTINGHOUSE DRAWING NO. 51-W-100-W, UNDERGROUND EXCAVATIONS, DATED 8/15/92.
2. THE AS-BUILT DIMENSIONS AND DEPTHS AND/OR ELEVATIONS SHOWN IN THESE DRAWINGS ARE NOMINAL. IN THIS DIMENSIONS MAY CHANGE DUE TO LOCAL VARIANCE OF THE STRUCTURAL OPERATIONAL MODIFICATIONS MADE TO SURF THE CRISP CLOSURE OF THE SHAFT, AND OTHER OPERATIONAL REQUIREMENTS. THEREFORE THE AS-BUILT DIMENSIONS AND THE PORTWELL ELEVATIONS FOR STRIP THE SEALING SYSTEM SHALL BE VERIFIED BY FIELD SURVEYS 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:**



**ABBREVIATIONS:**

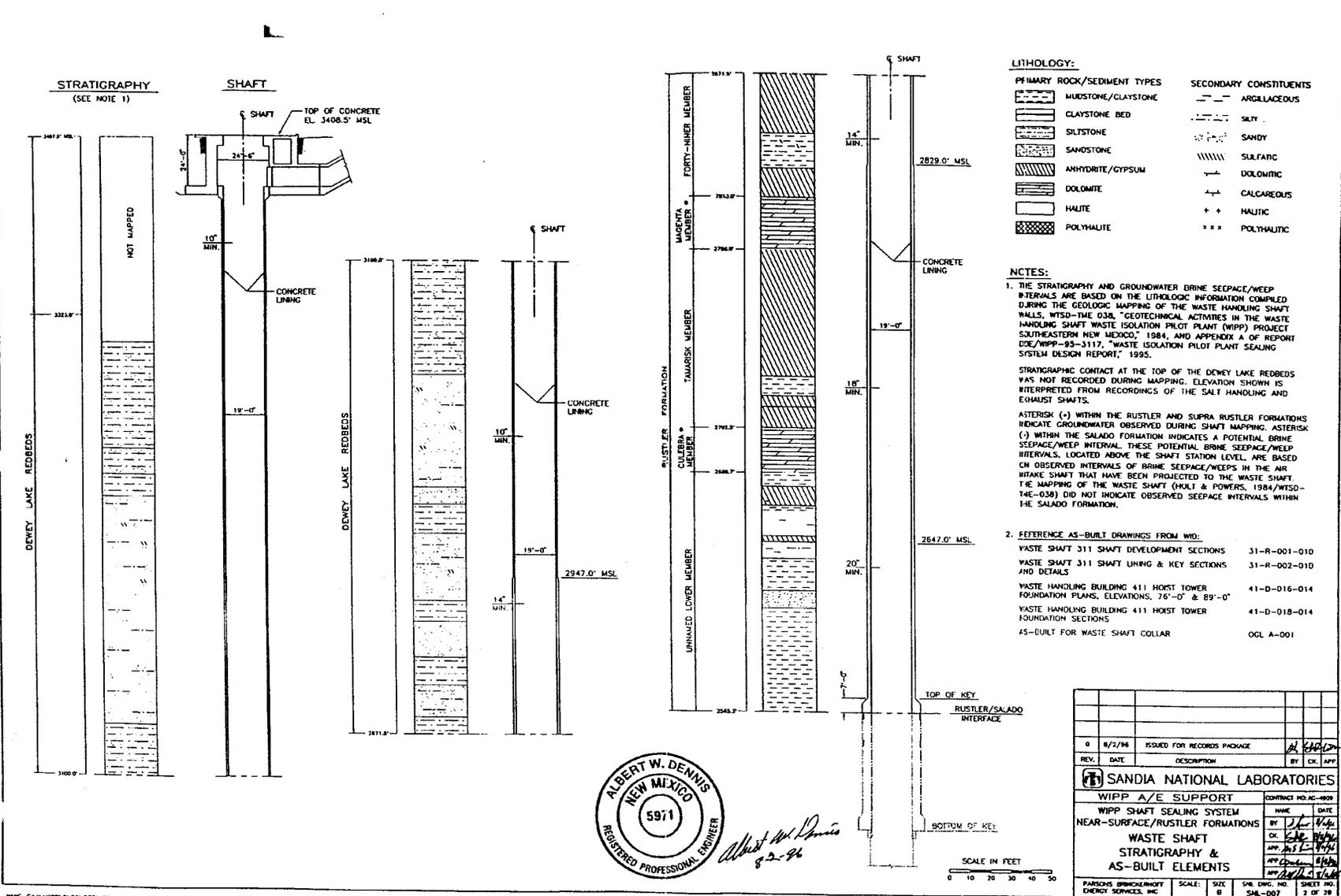
- C CENTERLINE
- ANL ANHONITE
- CMP CORRUGATED METAL PLATE
- CONC. CONCRETE
- DOE DEPARTMENT OF ENERGY
- DWG. DRAWING
- E EAST
- EL. ELEVATION
- EXIST. EXISTING
- FT. FOOT, FEET
- HT. HEIGHT
- I.D. INSIDE DIAMETER
- IN. INCHES
- MB MARKER BED
- MFL MERRIAM
- MSL MEAN SEA LEVEL
- N NORTH
- NO. NUMBER
- R RADIUS
- S SOUTH
- SHT. SHEET NUMBER
- SNC SALADO MASS CONCRETE
- TYP. TYPICAL
- USGS UNITED STATES GEOLOGICAL SURVEY
- W WEST
- WDI WESTINGHOUSE WASTE ISOLATION DIVISION
- WIPP WASTE ISOLATION PILOT PLANT



*Albert W. Dennis*  
 9-2-98

|  |        |                            |       |                 |            |
|--|--------|----------------------------|-------|-----------------|------------|
| REV.   | DATE   | DESCRIPTION                | BY    | CL              | APP        |
| 0  | 8/2/98 | ISSUED FOR RECORDS PACKAGE |       |                 |            |
| <b>SANDIA NATIONAL LABORATORIES</b>                          |        |                            |       |                 |            |
| <b>WIPP A/E SUPPORT</b>                                      |        |                            |       |                 |            |
| WIPP SHAFT SEALING SYSTEM                                    |        | DATE                       | DATE  |                 |            |
| SHAFT LOCATION PLAN, ABBREVIATIONS, GENERAL NOTES AND LEGEND |        | BY                         | DATE  |                 |            |
|  |        | CL                         | DATE  |                 |            |
|  |        | APP                        | DATE  |                 |            |
|  |        | DATE                       | DATE  |                 |            |
| PAPERWORK ENGINEERING ENERGY SERVICES, INC.                  |        | SCALE:                     | SIZE: | SPL. SHEET NO.: | SHEET NO.: |
|  |        |                            | B     | 281-007         | 1 OF 28    |

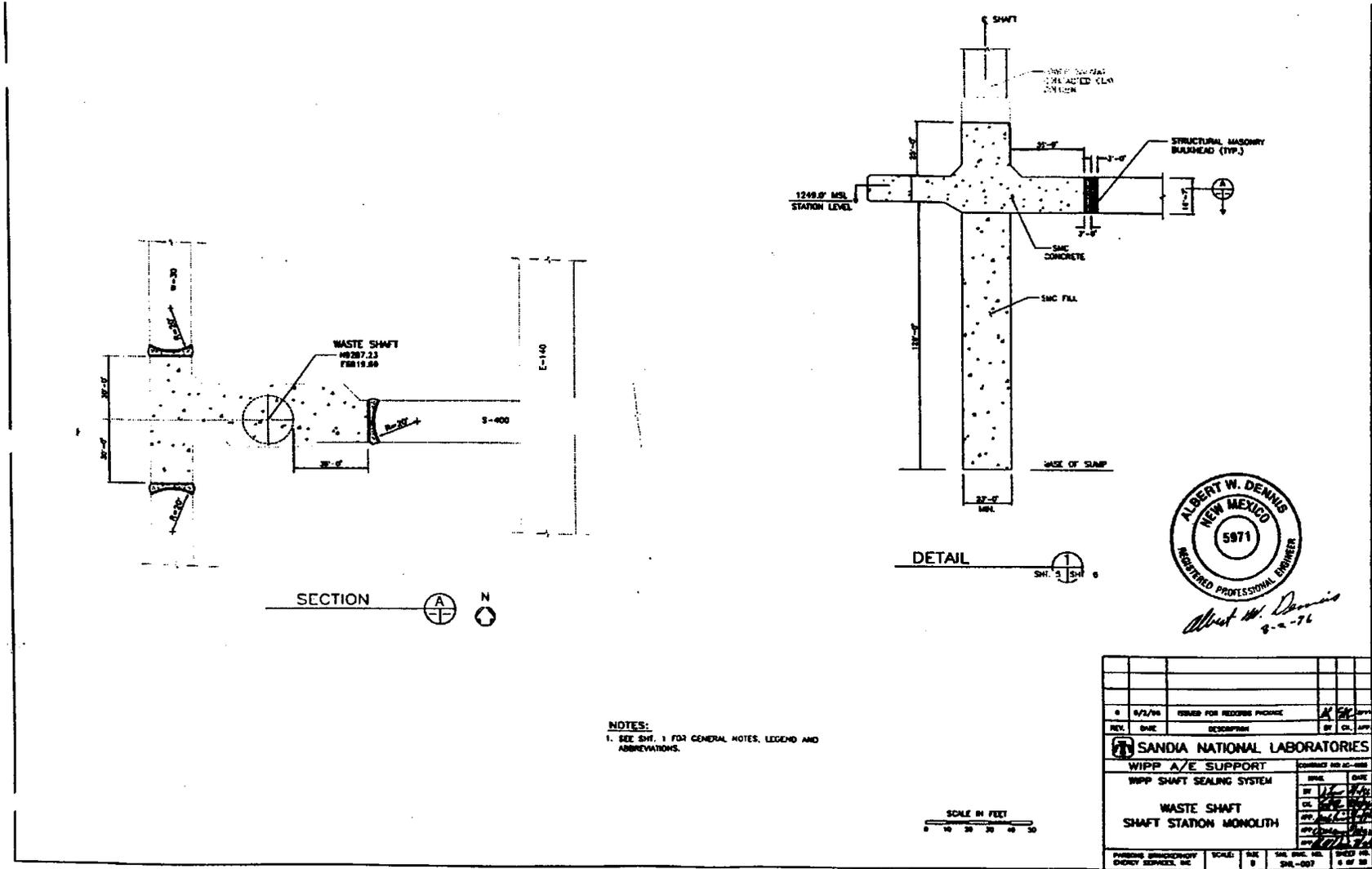
HW-001 WIPP FACILITY DESIGN - CRISP DATE: JULY 02, 1994 TRC 942 40

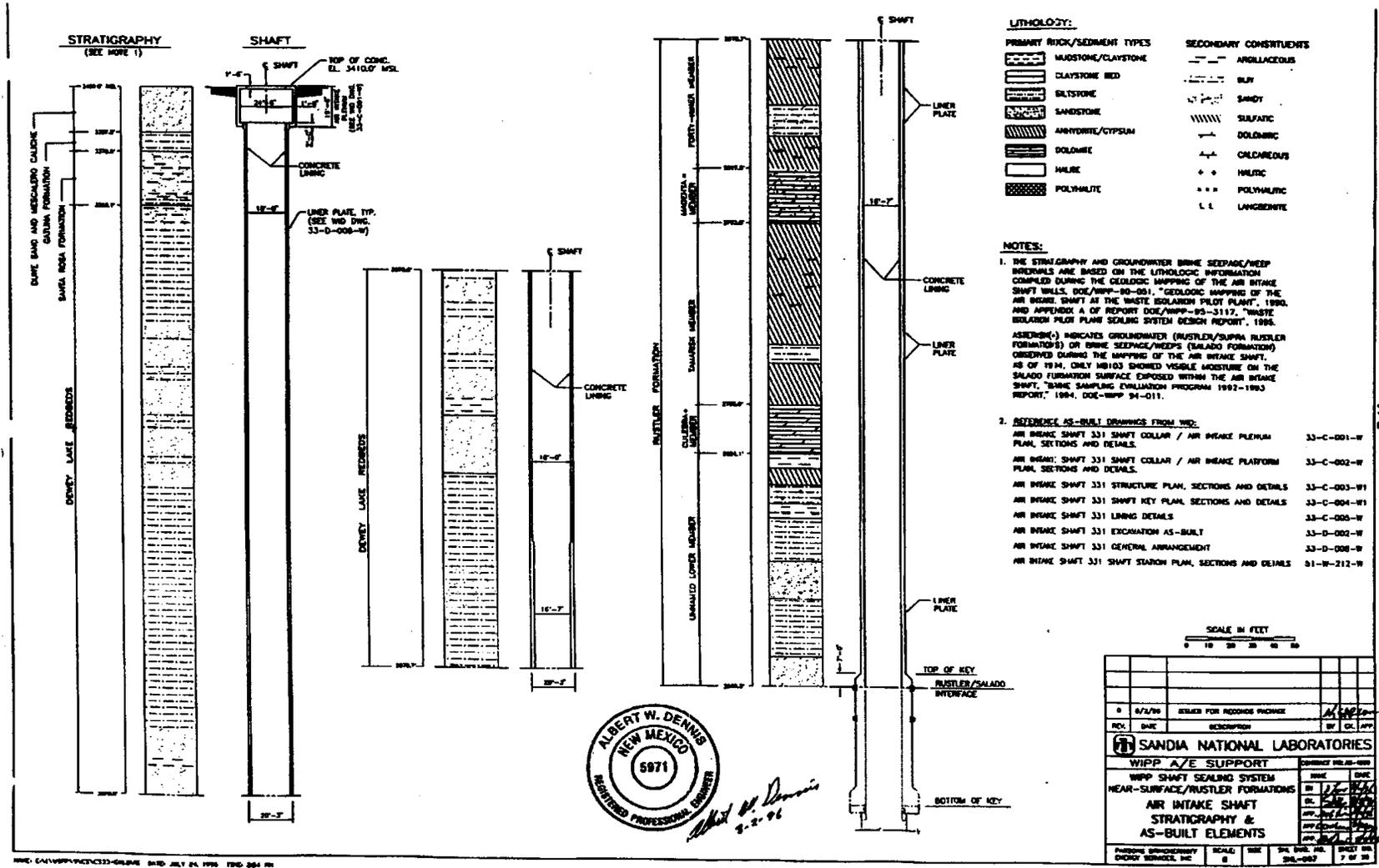














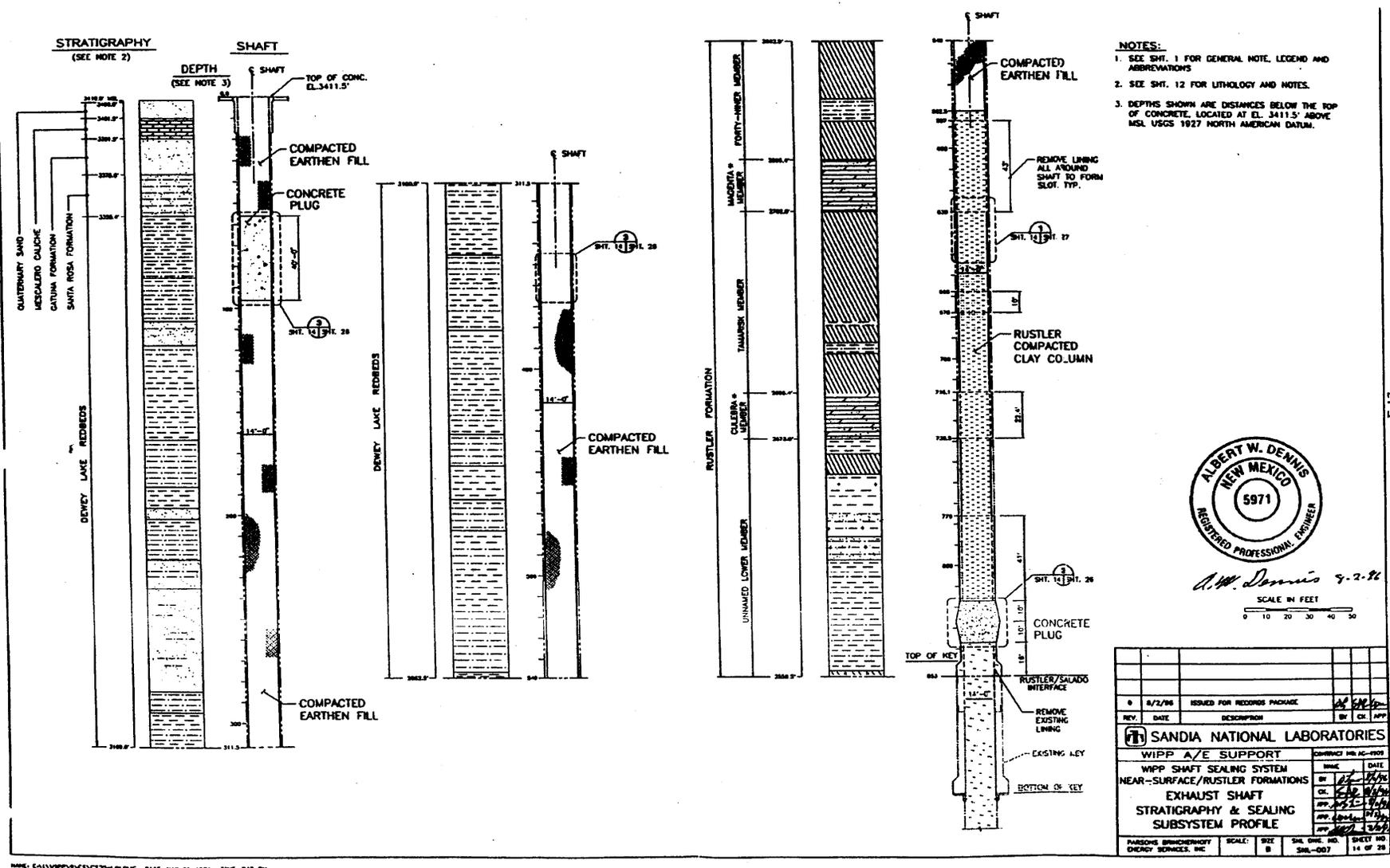


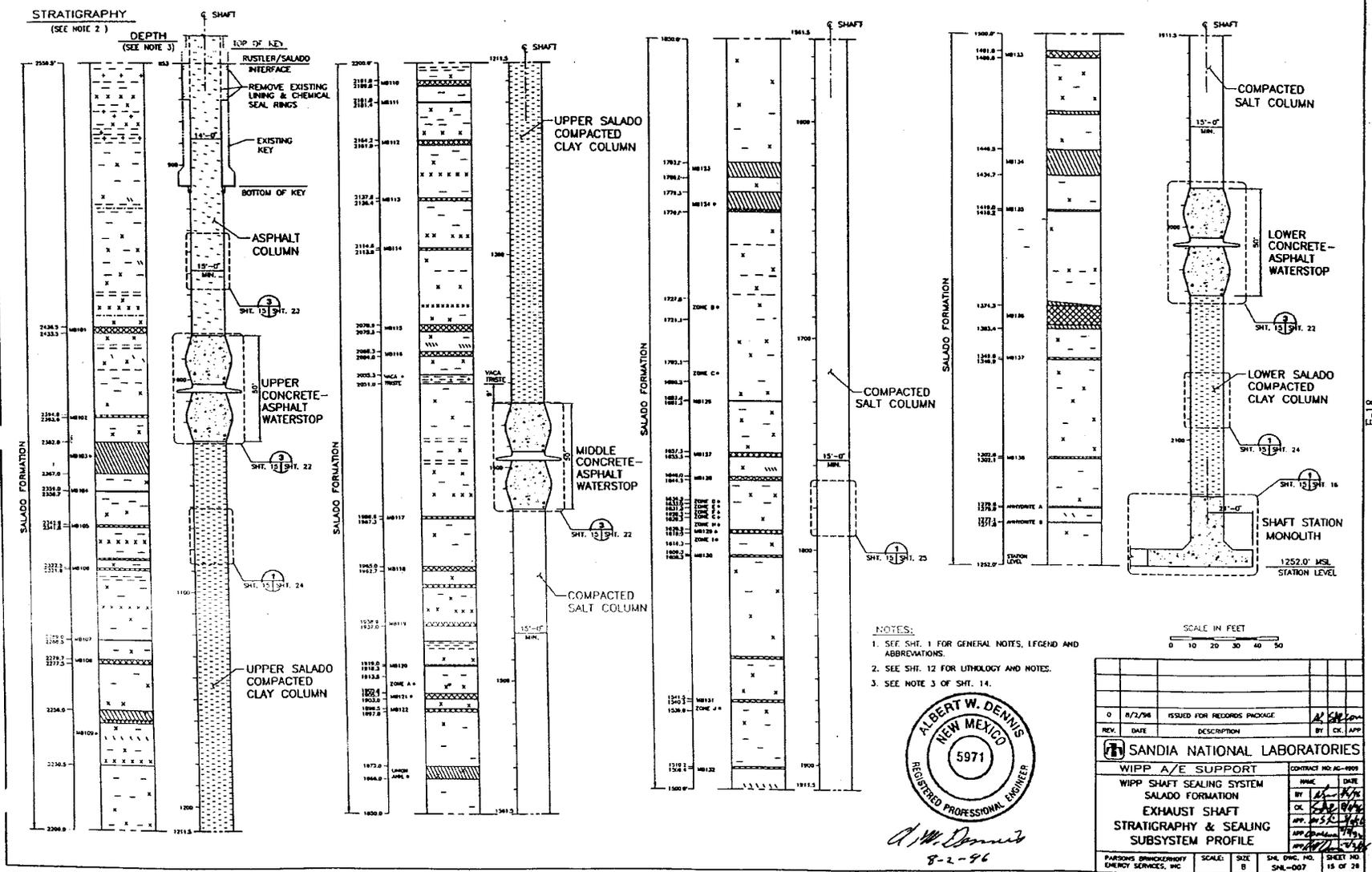


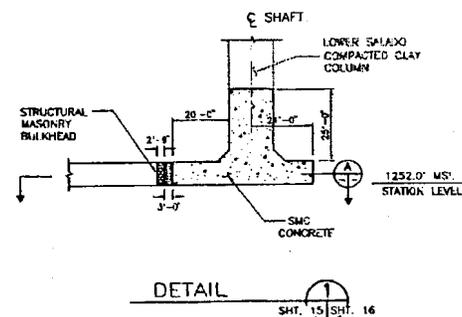
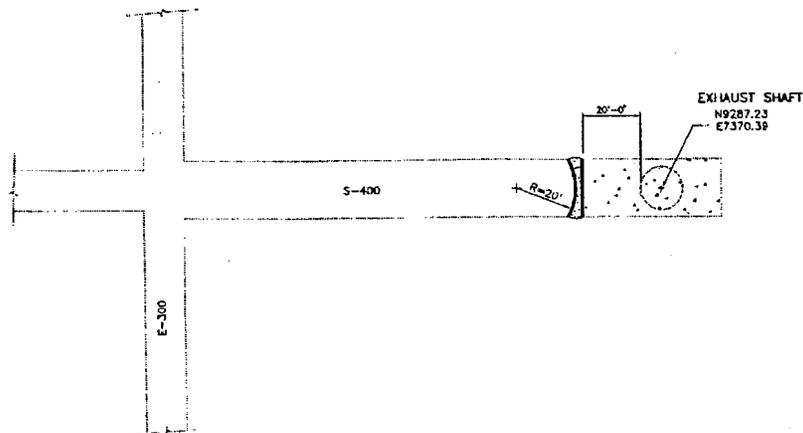




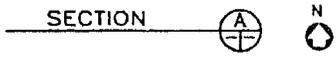






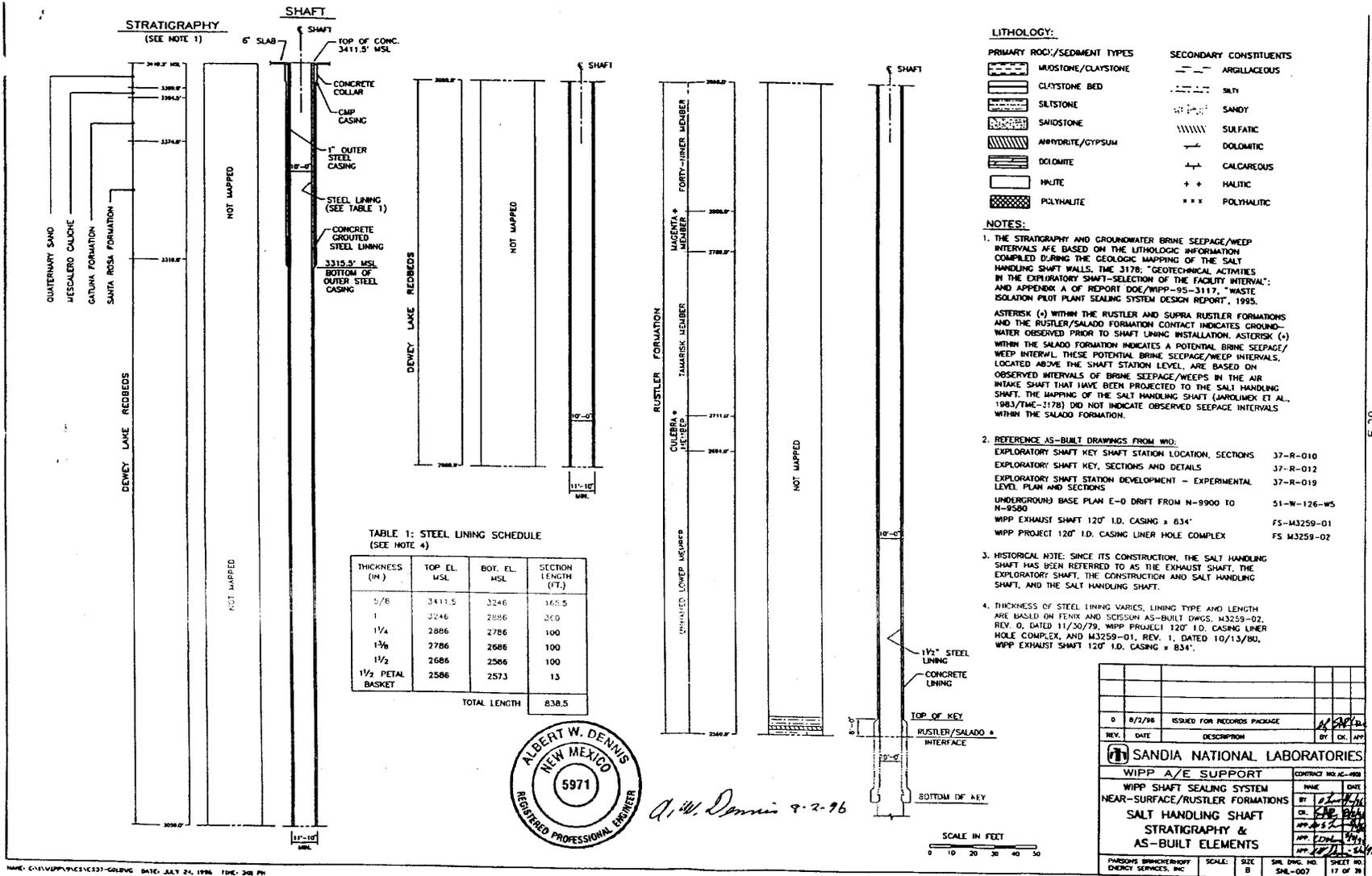


NOTES:  
 1. SEE SHT. 1 FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS.

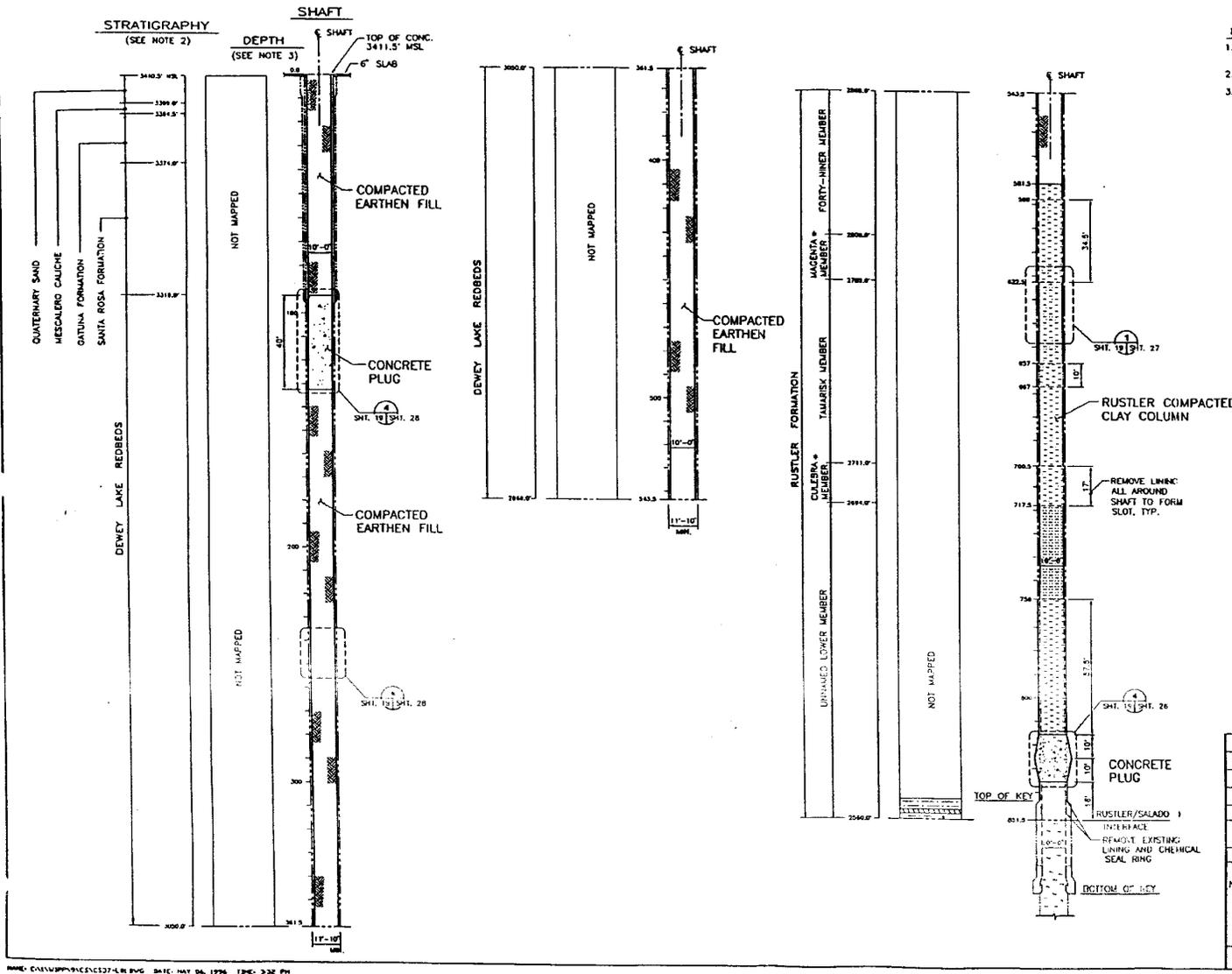


*A. W. Dennis* 8-2-96

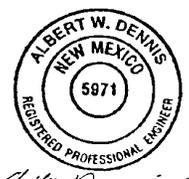
| REV.   | DATE   | DESCRIPTION                 | BY | CHK.                 | APP. |
|--|--------|-----------------------------|----|----------------------|------|
| 0  | 8/2/85 | ISSUED FROM NO-GEMS PACKAGE |    |                      |      |
| <b>SANDIA NATIONAL LABORATORIES</b><br>WIPP A/E SUPPORT<br>WIPP SHAFT SEALING SYSTEM |        |                             |    |                      |      |
|  |        |                             |    | CONTRACT NO. 46-8809 |      |
|  |        |                             |    | NAME                 | DATE |
|  |        |                             |    | BY                   |      |







- NOTES:**
- SEE SH. 1 FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS.
  - SEE SH. 17 FOR LITHOLOGY AND NOTES:
  - DEPTHS SHOWN ARE DISTANCES BELOW THE TOP OF CONCRETE, LOCATED AT EL. 3411.5' ABOVE MSL, USGS 1927 NORTH AMERICAN DATUM.

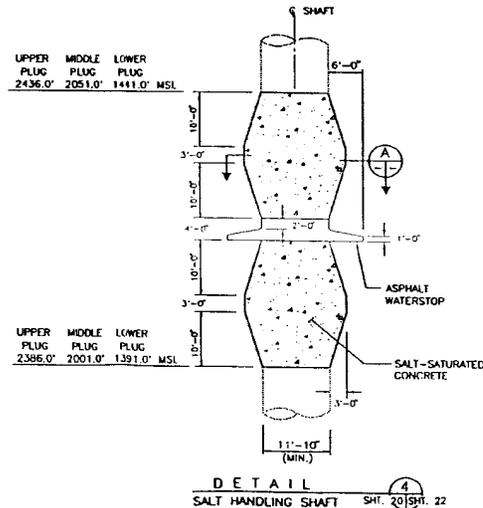
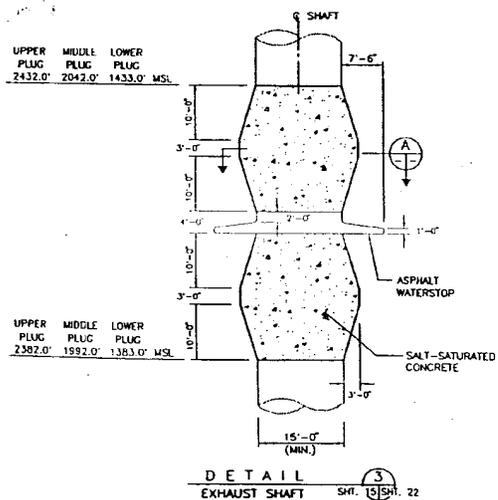
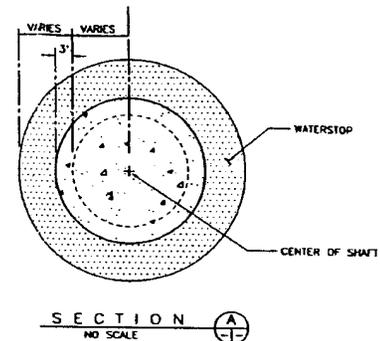
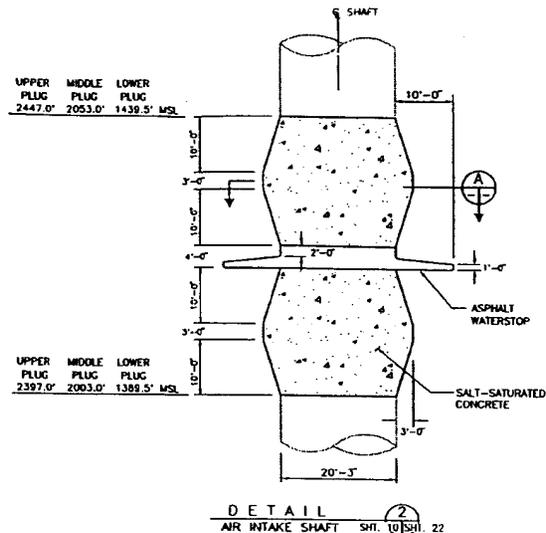
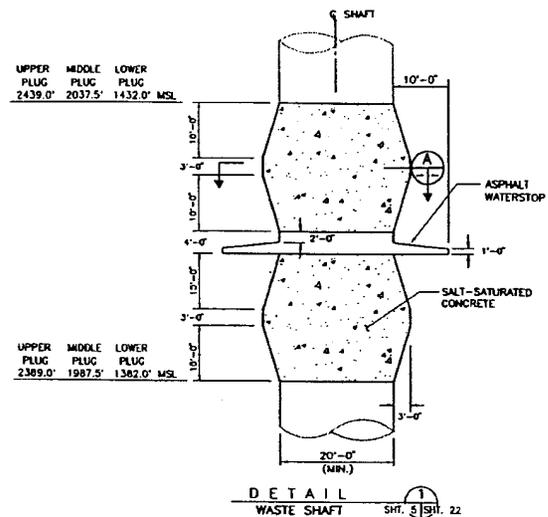


*Albert W. Dennis 9-2-96*  
 SCALE IN FEET  
 0 10 20 30 40 50

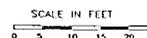
|  |               |                            |               |                                     |
|--|---------------|----------------------------|---------------|-------------------------------------|
| 0  | 8/2/96        | ISSUED FOR RECORDS PACKAGE | BY: <i>AS</i> | DATE: <i>8/2/96</i>                 |
| REV.                                       | DATE          | DESCRIPTION                | BY            | CHK. APP.                           |
| <b>SANDIA NATIONAL LABORATORIES</b>        |               |                            |               |                                     |
| WIPP A/E SUPPORT                           |               |                            |               | CONTRACT NO. AC-4908                |
| WIPP SHAFT SEALING SYSTEM                  |               |                            |               | NAME: <i>AS</i> DATE: <i>8/2/96</i> |
| NEAR-SURFACE/RUSTLER FORMATIONS            |               |                            |               | BY: <i>AS</i>                       |
| SALT HANDLING SHAFT                        |               |                            |               | CHK: <i>AS</i>                      |
| STRATIGRAPHY & SEALING                     |               |                            |               | APP: <i>AS</i>                      |
| SUBSYSTEM PROFILE                          |               |                            |               | APP: <i>AS</i>                      |
| PARSONS BRINCKERHOFF ENERGY SERVICES, INC. | SCALE: SIZE B | SAL. ENG. NO. SAL-007      | SHEET NO. 18  | OF 28                               |



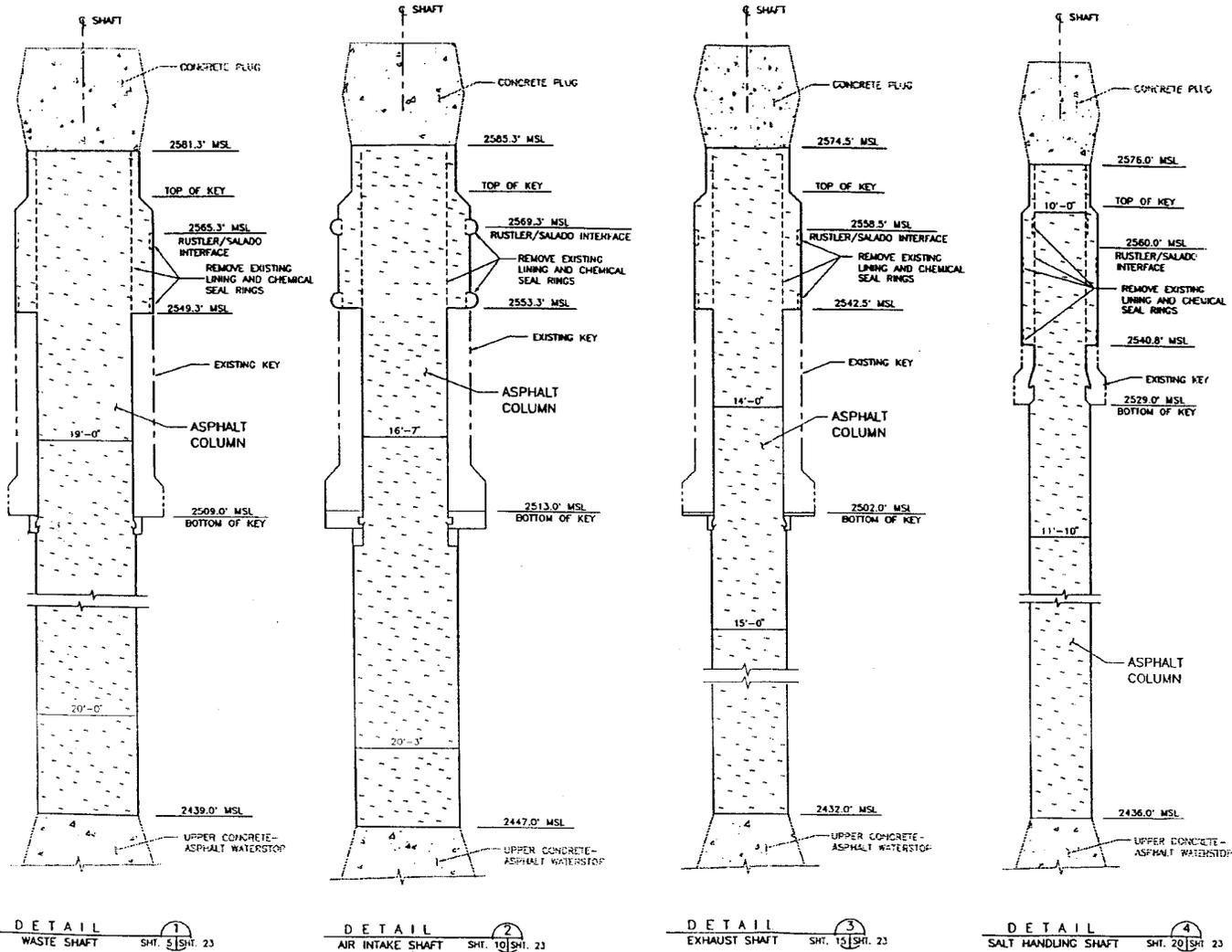




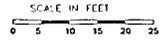
*Albert W. Dennis*  
 1-2-96



|  |          |                            |                      |          |                    |
|--|----------|----------------------------|----------------------|----------|--------------------|
| REV.   | DATE     | ISSUED FOR RECORDS PACKAGE | BY                   | CHK.     | APP.               |
| 0  | 10/22/96 | ISSUED FOR RECORDS PACKAGE | SAE                  | SAE      | APP                |
| <b>SANDIA NATIONAL LABORATORIES</b>            |          |                            |                      |          |                    |
| WIPP A/E SUPPORT                               |          |                            | CONTRACT NO. AC-4803 |          |                    |
| WIPP SHAFT SEALING SYSTEM                      |          |                            | NAME                 | DATE     |                    |
| CONCRETE-ASPHALT WATERSTOP IN SALADO FORMATION |          |                            | BY                   | 10/22/96 |                    |
|  |          |                            | CHK.                 | SAE      |                    |
|  |          |                            | APP.                 | SAE      |                    |
|  |          |                            | APP.                 | SAE      |                    |
| PARSONS BRINCKERHOFF ENERGY SERVICES, INC.     |          |                            | SCALE:               | SIZE:    | S&E DWG. NO.:      |
|  |          |                            | B                    | 8        | S&E-007            |
|  |          |                            |                      |          | SHEET NO. 22 OF 79 |

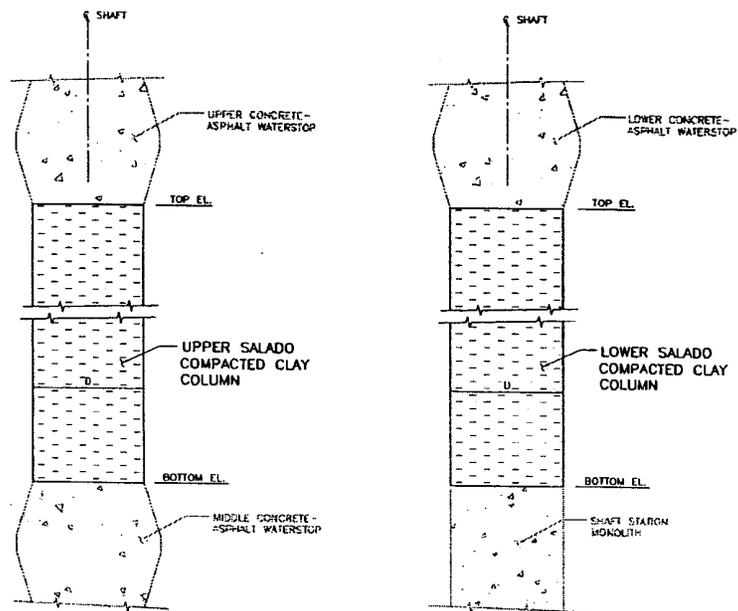


*Albert W. Dennis*  
 8-2-96



|  |        |                            |                      |              |       |
|--|--------|----------------------------|----------------------|--------------|-------|
|  |        |                            |                      |              |       |
| 0  | 8/2/96 | ISSUED FOR RECORDS PACKAGE |                      |              |       |
| REV.                                       | DATE   | DESCRIPTION                | BY                   | CHK.         | APP.  |
| <b>SANDIA NATIONAL LABORATORIES</b>        |        |                            |                      |              |       |
| WIPP A/E SUPPORT                           |        |                            | CONTRACT NO. AC-8809 | NAME         | DATE  |
| WIPP SHAFT SEALING SYSTEM                  |        |                            | BY                   |              |       |
| ASPHALT COLUMN                             |        |                            | CHK.                 |              |       |
|  |        |                            | APP.                 |              |       |
|  |        |                            |                      |              |       |
| PARSONS BRINCKERHOFF ENERGY SERVICES, INC. | SCALE: | 9/7 B                      | SHE DWG. NO. SHL-007 | SHEET NO. 23 | OF 28 |

NAME: C:\WPV\PROJECTS\8809\8809.DWG DATE: MAY 06 1996 TIME: 4:09 PM



**DETAIL**  
 SEE TABLE 1 FOR DETAILS  
 NO SCALE

SHT. 5 | SHI. 24  
 SHI. 10  
 SHI. 15  
 SHI. 20

TABLE 1

| SHAFT         | NOMINAL SHAFT DIAMETER D | UPPER SALADO COMPACTED CLAY COLUMN |                      |                 | LOWER SALADO COMPACTED CLAY COLUMN |                      |                 |
|---------------|--------------------------|------------------------------------|----------------------|-----------------|------------------------------------|----------------------|-----------------|
|               |                          | TOP EL. (FT. MSL)                  | BOTTOM EL. (FT. MSL) | TOTAL HT. (FT.) | TOP EL. (FT. MSL)                  | BOTTOM EL. (FT. MSL) | TOTAL HT. (FT.) |
| WASTE         | 20'-0"                   | 2389.0                             | 2037.5               | 351.5           | 1382.0                             | 1286.0               | 96.0            |
| AIR INTAKE    | 20'-3"                   | 2397.0                             | 2053.0               | 344.0           | 1389.5                             | 1296.0               | 93.5            |
| EXHAUST       | 15'-0"                   | 2382.0                             | 2042.0               | 340.0           | 1383.0                             | 1285.0               | 98.0            |
| SALT HANDLING | 11'-10"                  | 2386.0                             | 2051.0               | 335.0           | 1391.0                             | 1284.0               | 107.0           |



*Albert W. Dennis*  
 4-2-96

|   |        |                            |  |                     |                    |
|---|--------|----------------------------|--|---------------------|--------------------|
| 0   | 8/2/96 | ISSUED FOR RECORDS PACKAGE | JL   | CK                  | APP                |
| REV.  | DATE   | DESCRIPTION                | BY   | CK                  | APP                |
| SANDIA NATIONAL LABORATORIES<br>WIPP A/E SUPPORT<br>WIPP SHAFT SEALING SYSTEM |        |                            |  |                     |                    |
| UPPER AND LOWER SALADO COMPACTED CLAY COLUMNS                                 |        |                            | CONTRACT NO. AC-0095<br>DATE: 11/11/95<br>BY: SA<br>CK: SA<br>APP: SA<br>APP: SA |                     |                    |
| PARSONS BRINCKERHOFF ENERGY SERVICES, INC.                                    |        | SCALE: B                   | SIZE: B  | SAL. DATE: 11/11/95 | SHEET NO: 24 OF 28 |

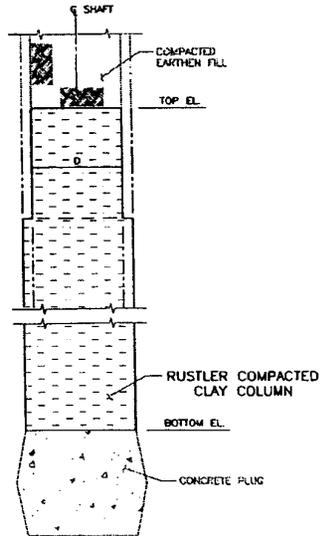
NAME: C:\SWP\PROJECTS\WIPP\SSA\SSA.DWG DATE: MAY 06, 1996 11:02:43Z PM

E-27



**WIPP Shaft Sealing System Concrete Plug**

Drawing SNL 007 26 of 28 not currently available. Drawing is not displayed in the Permit.



DETAIL  
 SEE TABLE 1 FOR DETAILS  
 NO SCALE

|        |        |
|--------|--------|
| SH. 4  | SH. 27 |
| SH. 9  |        |
| SH. 14 |        |
| SH. 19 |        |

TABLE 1

| SHAFT         | NOMINAL SHAFT DIAMETER D | RUSTLER COMPACTED CLAY COLUMN |                      |                 |
|---------------|--------------------------|-------------------------------|----------------------|-----------------|
|               |                          | TOP EL. (FT. MSL)             | BOTTOM EL. (FT. MSL) | TOTAL HT. (FT.) |
| WASTE         | 19'-0"                   | 2836.0                        | 2601.3               | 234.7           |
| AIR INTAKE    | 16'-7"                   | 2840.0                        | 2605.3               | 234.7           |
| EXHAUST       | 14'-0"                   | 2829.0                        | 2594.5               | 234.5           |
| SALT HANDLING | 10'-0"                   | 2830.0                        | 2596.0               | 234.0           |

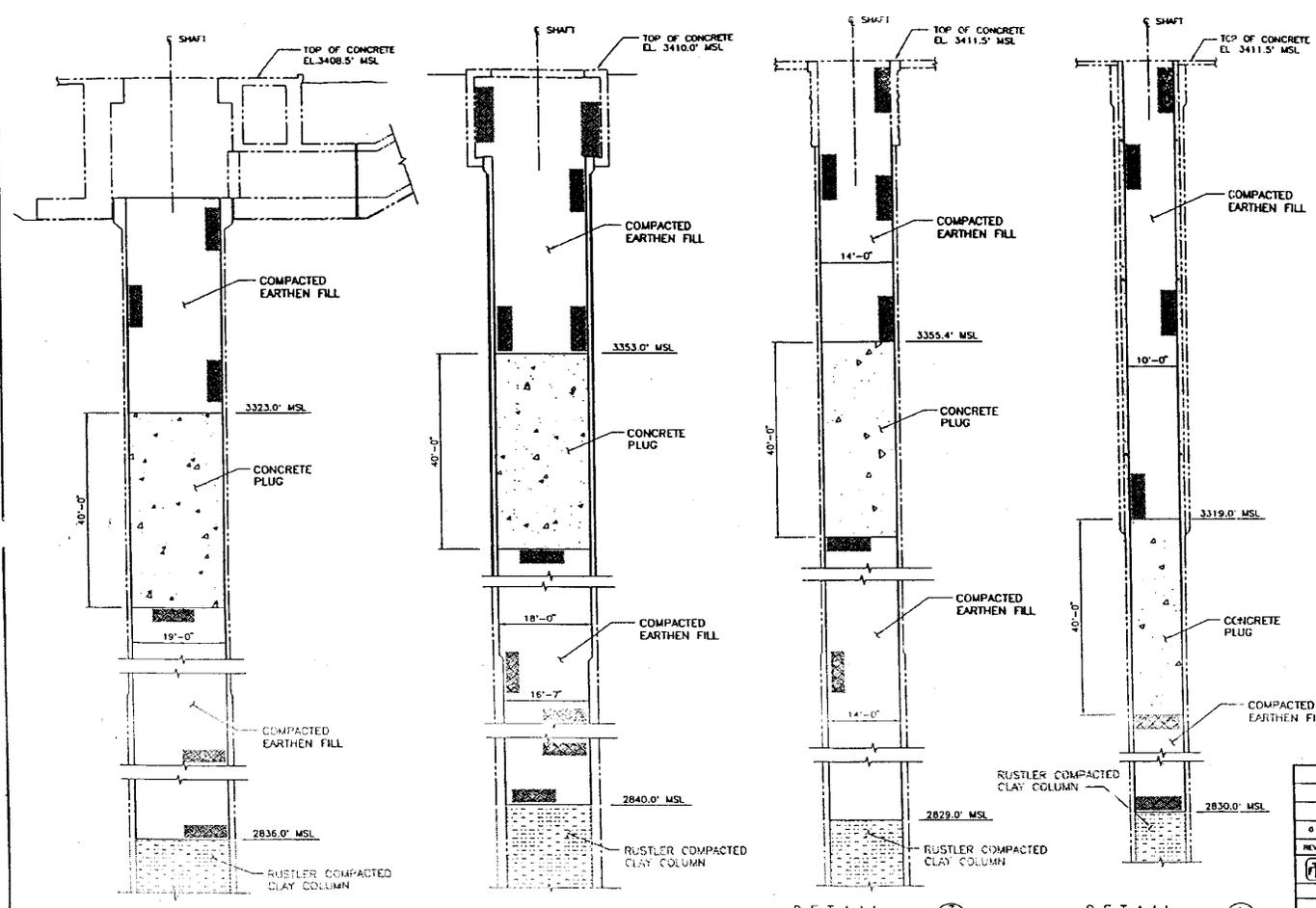


*Albert W. Dennis*  
 9-2-96

|  |        |                            |       |                                    |              |
|--|--------|----------------------------|-------|------------------------------------|--------------|
| REV.                                       | DATE   | DESCRIPTION                | BY    | CHK.                               | APP.         |
| 0  | 8/2/96 | ISSUED FOR RECORDS PACKAGE |       |                                    |              |
| <b>SANDIA NATIONAL LABORATORIES</b>        |        |                            |       |                                    |              |
| WIPP A/E SUPPORT                           |        |                            |       | CONFERENCE NO. AC-1000             |              |
| WIPP SHAFT SEALING SYSTEM                  |        |                            |       | NAME DATE                          |              |
| RUSTLER COMPACTED CLAY COLUMN              |        |                            |       | BY: <i>[Signature]</i> 8/2/96      |              |
|  |        |                            |       | CHECKED: <i>[Signature]</i> 8/2/96 |              |
|  |        |                            |       | APP. <i>[Signature]</i> 8/2/96     |              |
|  |        |                            |       | APP. <i>[Signature]</i> 8/2/96     |              |
| PARSONS BRINCKERHOFF ENERGY SERVICES, INC. |        | SCALE:                     | SIZE: | SHEET NO.:                         | SHEET TOTAL: |
|  |        |                            | B     | 27                                 | 28           |

E-30

NAME: D:\WIPP\PROJECTS\G08-187\DWG DATE: MAY 06, 1996 TIME: 04:21 PM



DETAIL 1  
 WASTE SHAFT SH. 4 | SH. 28

DETAIL 2  
 AIR INTAKE SHAFT SH. 9 | SH. 28

DETAIL 3  
 EXHAUST SHAFT SH. 14 | SH. 28

DETAIL 4  
 SALT HANDLING SHAFT SH. 19 | SH. 28



*Albert W. Dennis*  
 9-2-96

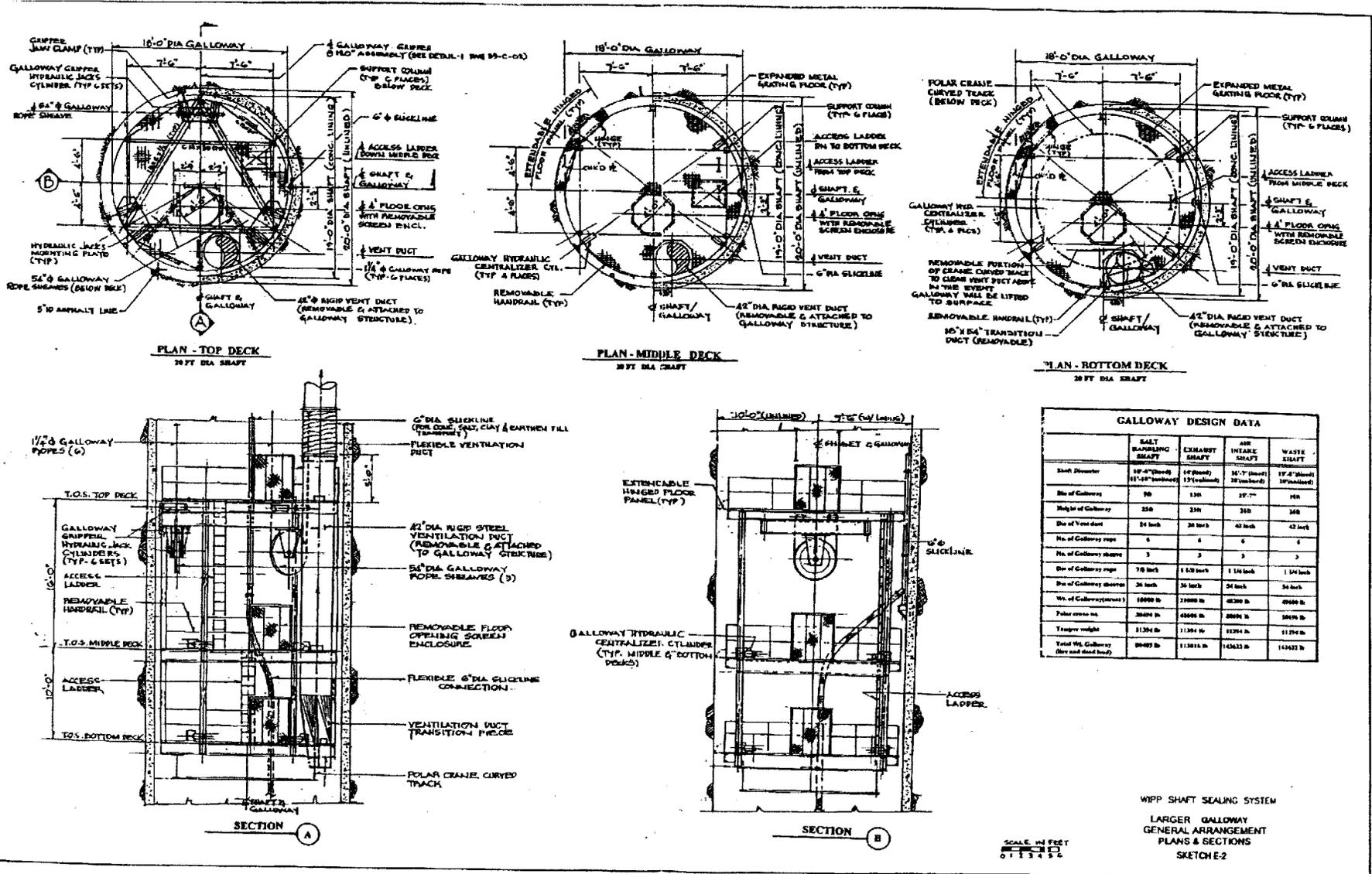
|  |        |                            |              |           |      |
|--|--------|----------------------------|--------------|-----------|------|
| 0  | 8/2/96 | ISSUED FOR RECORDS PACKAGE | AL           | SH        | 28   |
| REV.   | DATE   | DESCRIPTION                | BY           | CHK.      | APP. |
| SANDIA NATIONAL LABORATORIES<br>WIPP A/E SUPPORT |        |                            |              |           |      |
| WIPP SHAFT SEALING SYSTEM                        |        | CONTRACT NO. AC-4999       |              |           |      |
| COMPACTED EARTHEN FILL AND CONCRETE PLUG         |        | NAME                       | DATE         |           |      |
|  |        | BY                         | DATE         |           |      |
|  |        | CHK.                       | DATE         |           |      |
|  |        | APP.                       | DATE         |           |      |
|  |        | APP.                       | DATE         |           |      |
| PARSONS BRINCKERHOFF ENERGY SERVICES, INC.       | SCALE  | SIZE                       | S&L DWG. NO. | SHEET NO. |      |
|  |        | B                          | S&L-007      | 28 OF 28  |      |

HWPC-CALVPP/PCS/ENCL-500-SUB-BING DATE: MAY 04 1996 FDC: 423 PH

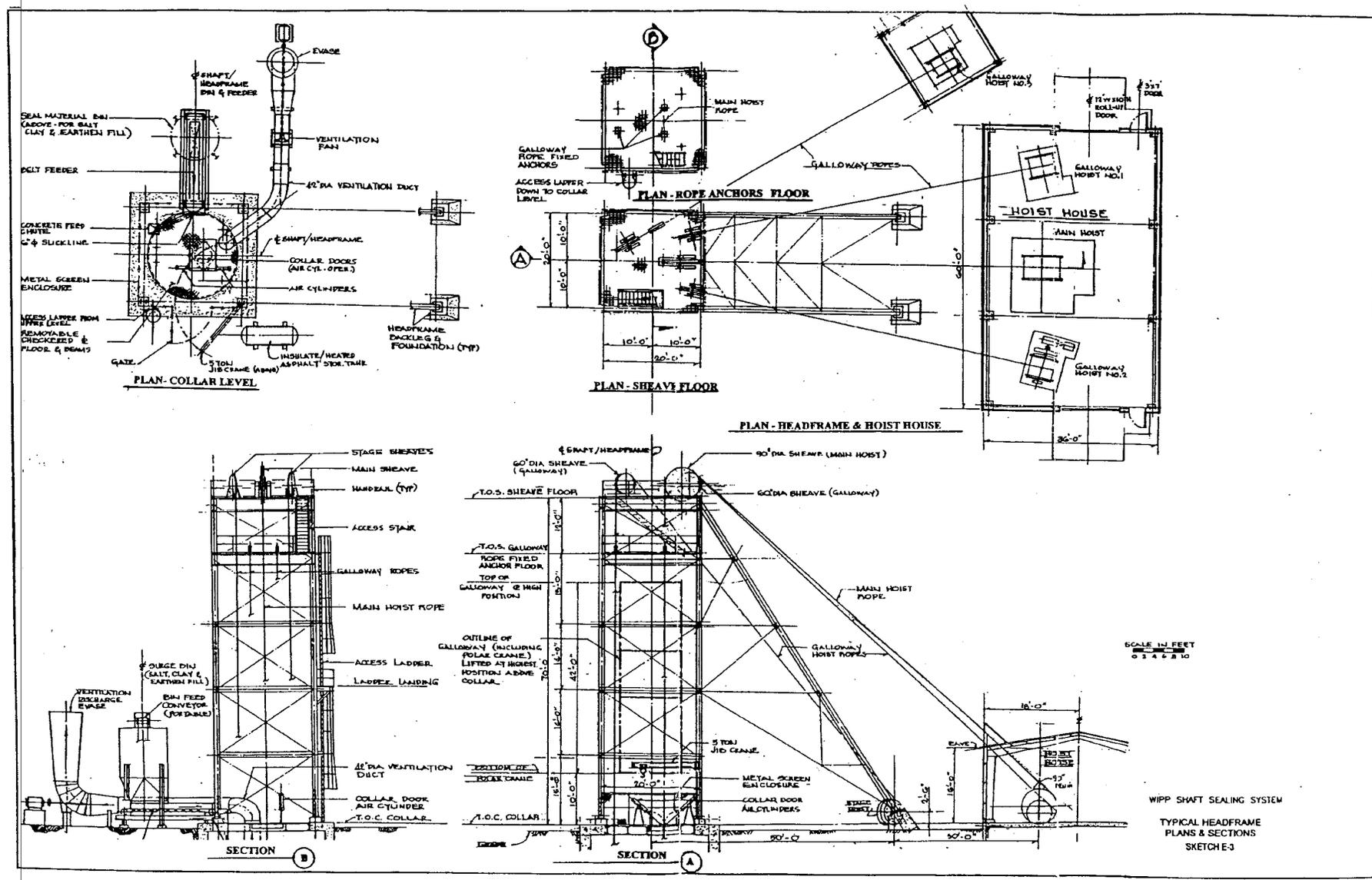
WASTE ISOLATION PILOT PLANT  
CARLSBAD, NM  
SHAFT SEALING SYSTEM DESIGN  
EQUIPMENT AND CONSTRUCTION SKETCHES

| DRAWING NUMBER | TITLE   |
|----------------|---|
| SKETCH E-1     | WIPP SHAFT SEALING SYSTEM<br>SMALLER GALLOWAY GENERAL<br>ARRANGEMENT PLANS AND SECTIONS |
| SKETCH E-2     | WIPP SHAFT SEALING SYSTEM<br>LARGER GALLOWAY GENERAL<br>ARRANGEMENT PLANS AND SECTIONS  |
| SKETCH E-3     | WIPP SHAFT SEALING SYSTEM<br>TYPICAL HEADFRAME<br>PLANS AND SECTIONS                    |
| SKETCH E-4     | WIPP SHAFT SEALING SYSTEM<br>PERSPECTIVE HEADFRAME AND<br>ASSOCIATED SURFACE FACILITIES |



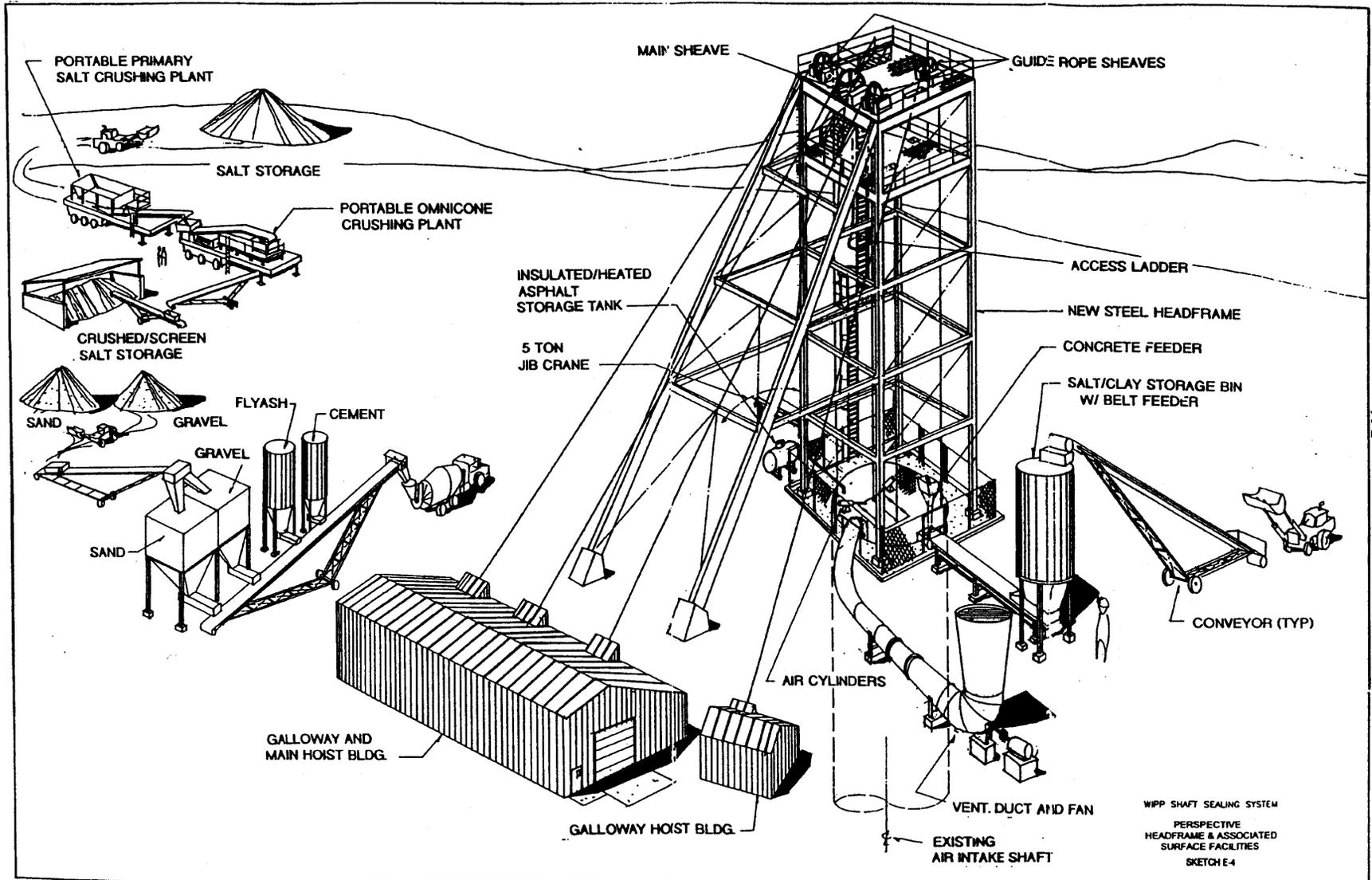


WIPP Shaft Sealing System Larger Galloway General Arrangement Plans and Sections



E-35

WIPP Shaft Sealing System Typical Headframe Plans and Sections



WIPP Shaft Sealing System Typical Headframe and Associated Surface Facilities

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. Pary  
 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)  
 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. Rominc, 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

Jan 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: J. Lee, YMP PA Dept.  
 1261 Town Center Drive  
 Las Vegas, NV 89134

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. Lim  
 303 Second Street  
 Suite 850 North  
 San Francisco, CA 94107

Distribution - 1

Waste Isolation Pilot Plant  
Hazardous Waste Facility Permit  
Draft Renewal Application  
May 2009

Parsons Brinckerhoff International, Inc.  
Attn: Mary Ann Novak  
700 11th Street, NW, Suite 710  
Washington, DC 20001

Phillips Mining, Geotechnical & Grouting  
Attn: Stephen Phillips  
8640 North Glenhurst Place  
Tucson, AZ 85704

RE/SPEC, Inc. (5)  
Attn: L. Van Sambeek (3)  
G. Callahan  
M. Loken  
J. Ratigan  
T. Pfeifle  
3824 Jet Drive  
P.O. Box 725  
Rapid City, SD 57709

RE/SPEC, Inc.  
Attn: Angus Robb  
4775 Indian School NE, Suite 300  
Albuquerque, NM 87110-3927

Science Applications International Corp.  
Attn: W. Thompson  
15000 W. 6th Avenue, Suite 202  
Golden, CO 80401

Tech Keys, Inc. (3)  
Attn: J. Chapman (1)  
L. Robledo (2)  
5000 Marble NE, Suite 222  
Albuquerque, NM 87110

Westinghouse Electric Corporation (5)  
Attn: Library  
J. Epstein  
J. Lee  
B. A. Howard  
R. Kehman  
P.O. Box 2078  
Carlsbad, NM 88221

S. Cohen & Associates  
Attn: Bill Thurber  
1355 Beverly Road  
McLean, VA 22101

National Academy of Sciences,  
WIPP Panel

Howard Adler  
Oxyrase, Incorporated  
7327 Oak Ridge Highway  
Knoxville, TN 37931

Bob Andrews  
Board of Radioactive Waste Management  
GF456  
2101 Constitution Ave.  
Washington, DC 20418

Rodney C. Ewing  
Department of Geology  
University of New Mexico  
Albuquerque, NM 87131

Charles Fairhurst  
Department of Civil  
and Mineral Engineering  
University of Minnesota  
500 Pillsbury Dr. SE  
Minneapolis, MN 55455-0220

B. John Garrick  
PLG Incorporated  
4590 MacArthur Blvd., Suite 400  
Newport Beach, CA 92660-2027

Leonard F. Konikow  
US Geological Survey  
431 National Center  
Reston, VA 22092

Carl A. Anderson, Director  
Board of Radioactive Waste Management  
National Research Council  
HA 456  
2101 Constitution Ave. NW  
Washington, DC 20418

Christopher G. Whipple  
ICF Kaiser Engineers  
1800 Harrison St., 7th Floor  
Oakland, CA 94612-3430

John O. Blomeke  
720 Clubhouse Way  
Knoxville, TN 37909

Sue B. Clark  
University of Georgia  
Savannah River Ecology Lab  
P.O. Drawer E  
Aiken, SC 29802

Konrad B. Krauskopf  
Department of Geology  
Stanford University  
Stanford, CA 94305-2115

Della Roy  
Pennsylvania State University  
217 Materials Research Lab  
Hazings Road  
University Park, PA 16802

David A. Waite  
CH<sub>2</sub> M Hill  
P.O. Box 91500  
Bellevue, WA 98009-2050

Thomas A. Zordan  
Zordan Associates, Inc.  
3807 Edinburg Drive  
Murrysville, PA 15668

Universities

Harvey Mudd College  
Attn: M. Cardenas  
Department of Engineering  
Claremont, CA 91711

New Mexico State University  
Waste-management Education & Research  
Corporation.  
Attn: R. Bhada  
P.O. Box 3001  
Las Cruces, NM 88003-8001

University of California  
Department of Mechanical and Environmental  
Engineering  
Attn: E. Marschall  
University of California  
Santa Barbara, CA 93106

University of Nevada-Reno  
Department of Mining Engineering  
Mackay School of Mines  
Attn: J. Deamen  
Reno, NV 89557

University of New Mexico  
Center for Radioactive Waste Management  
Attn: W. Lutze  
209 Faris Engineering Building  
Albuquerque, NM 87131-1341

University of New Mexico  
Department of Civil Engineering  
Attn: J. C. Stormont  
Albuquerque, NM 87131-1351

University of New Mexico  
Geology Department  
Attn: Library  
141 Northrop Hall  
Albuquerque, NM 87131

University of Washington  
College of Ocean & Fishery Sciences  
Attn: G. R. Heath  
583 Henderson Hall, HN-15  
Seattle, WA 98195

Libraries

Thomas Brannigan Library  
Attn: D. Dresp  
106 W. Hadley St.  
Las Cruces, NM 88001

Government Publications Department  
Zimmerman Library  
University of New Mexico  
Albuquerque, NM 87131

New Mexico Junior College  
Pannell Library  
Attn: R. Hill  
Lovington Highway  
Hobbs, NM 88240

New Mexico State Library  
Attn: N. McCallan  
325 Don Gaspar  
Santa Fe, NM 87503

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

WIPP Public Reading Room  
Carlsbad Public Library  
101 S. Halagueno St.  
Carlsbad, NM 88220

Foreign Addresses

Atomic Energy Canada Ltd. (5)  
Whiteshell Laboratory  
Attn: Neil Chandler  
Glenn McCrank  
B. Goodwin  
Malcolm Gray  
Maria Onefrei  
Pinawa Manitoba, CANADA ROE 1L0

Distribution - 2

Francois Chenevier (2)  
 ANDRA  
 Route de Panorama Robert Schumann  
 U. P. 38  
 92266 Fontenay-aux-Roses, Cedex  
 FRANCE

Claude Sombret  
 Centre d'Etudes Nucleaires  
 de la Vallee Rhone  
 CEN/VALRIIO  
 S.D.H.A. B.P. 171  
 30205 Bagnols-Sur-Ceze, FRANCE

Commissariat a L'Energie Atomique  
 Attn: D. Alexandre  
 Centre d'Etudes de Cadarache  
 13108 Saint Paul Lez Durance Cedex  
 FRANCE

Bundesaanstalt für Geowissenschaften und  
 Kohstoffe (2)  
 Attn: M. Langer  
 M. Wallner

Postfach 510 153  
 D-30631 Hannover, GERMANY

Bundesministerium für Forschung und  
 Technologie  
 Postfach 200 706  
 5300 Bonn 2, GERMANY

Forschungszentrum Karlsruhe GmbH  
 Institut für Nukleare Entsorgungstechnik  
 Attn: E. Kortbaas  
 Postfach 3640, D-76021 Karlsruhe  
 Bundesrepublik Deutschland  
 GERMANY

Gesellschaft für Anlagen und Reaktorsicherheit  
 (GRS)  
 Attn: B. Bakes  
 Schwertnergasse 1  
 D-50667 Cologne, GERMANY

Grundbau Und Felsbau GmbH  
 Attn: W. Wittke  
 Henricstraße 50  
 52072 Aachen, GERMANY

Institut Für Gebirgsmechanik  
 Attn: W. Minkley  
 Friederikensstraße 60  
 04279 Leipzig, GERMANY

Institut Für Tieflagerung  
 Attn: K. Kuhn  
 Theodor-Heuss-Strasse 4  
 D-3300 Braunschweig, GERMANY  
 Shingo Tashiro  
 Japan Atomic Energy Research Institute  
 Tokai-Mura, Ibaraki-Ken, 319-11  
 JAPAN

Netherlands Energy Research Foundation ECN  
 Attn: J. Prij  
 3 Westerdijkweg  
 P.O. Box 1  
 1753 ZG Petten  
 THE NETHERLANDS

Universiteit Utrecht  
 Department of Geology (HPT-lab)  
 Attn: C. J. Spiers  
 PO Box 80021  
 NL-3508 TA Utrecht  
 Budapestlaan 4  
 THE NETHERLANDS

Svensk Kärnbränsleforsörjning AB  
 Attn: F. Karlsson  
 Project KBS (Kärnbränslesäkerhet)  
 Box 5864  
 S-102 48 Stockholm  
 SWEDEN

Nationale Genossenschaft für die Lagerung  
 Radioaktiver Abfälle (2)  
 Attn: S. Vomvoris  
 P. Zuidema  
 Hardstrasse 73  
 CH-5430 Wettingen  
 SWITZERLAND

AEA Technology  
 Attn: J. H. Rees  
 D5W/29 Culham Laboratory  
 Abington, Oxfordshire OX14 3DB  
 UNITED KINGDOM

AEA Technology  
 Attn: W. R. Rodwell  
 044/A31 Winfrith Technical Centre  
 Dorchester, Dorset DT2 8DH  
 UNITED KINGDOM

AEA Technology  
 Attn: J. E. Tinson  
 B4244 Harwell Laboratory  
 Didcot, Oxfordshire OX11 0RA  
 UNITED KINGDOM

|      |          | MS   | Org. |
|------|----------|--|------|
|      | Internal |  |      |
| 0483 | 5165     | R. E. Stinebaugh                             |      |
| 0706 | 6113     | J. K. Linn                                   |      |
| 1320 | 6719     | E. J. Nowak                                  |      |
| 1322 | 6121     | J. R. Tillerson (10)                         |      |
| 1322 | 6121     | E. H. Ahrens (2)                             |      |
| 1322 | 6121     | A. W. Dennis (10)                            |      |
| 1322 | 6121     | F. D. Hansen                                 |      |
| 1322 | 6121     | L. D. Hurtado                                |      |
| 1322 | 6121     | M. K. Knowles                                |      |
| 1324 | 6115     | P. B. Davies                                 |      |
| 1325 | 6852     | L. S. Costin                                 |      |
| 1325 | 6852     | R. E. Finley                                 |      |
| 1328 | 6749     | D. R. Anderson                               |      |
| 1328 | 6741     | H. N. Jow                                    |      |
| 1328 | 6849     | M. F. Fewell                                 |      |
| 1328 | 6849     | P. Vaughn                                    |      |
| 1335 | 6705     | M. Chu                                       |      |
| 1341 | 6748     | J. T. Holmes                                 |      |
| 1395 | 6800     | L. Shephard                                  |      |
| 1395 | 6707     | M. Marietta                                  |      |
| 1395 | 6841     | V. H. Slaboszewicz                           |      |
| 1330 | 6752     | B. J. Pierson (2)                            |      |
| 1330 | 6752     | NWM Library (100)                            |      |
| 9018 | 8523-2   | Central Technical Files                      |      |
| 0899 | 4414     | Technical Library (5)                        |      |
| 0619 | 12630    | Review and Approval Desk,<br>For DOEOSTI (2) |      |

Waste Isolation Pilot Plant  
Hazardous Waste Facility Permit  
Draft Renewal Application  
May 2009

SAND96-1326/2  
Unlimited Release  
Printed August 1996

Distribution  
Category UC-721

**Waste Isolation Pilot Plant  
Shaft Sealing System  
Compliance Submittal Design Report**

**Volume 2 of 2:  
Appendix E**

Repository Isolation Systems Department  
Sandia National Laboratories  
Albuquerque, NM 87185

**ABSTRACT**

This is the second volume of a two-volume report describing a shaft sealing system design for the Waste Isolation Pilot Plant. This appendix contains detailed drawings of the shaft sealing system and its components.