

**ATTACHMENT G2
APPENDIX G2-E
DESIGN DRAWINGS
SHAFT SEALING SYSTEM
COMPLIANCE SUBMITTAL DESIGN REPORT**

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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

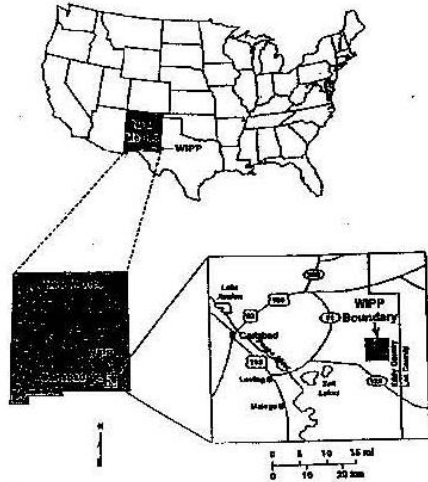
This is the second volume of a two-volume report describing a shaft sealing system design for the Waste Isolation Pilot Plant. This appendix contains detailed drawings of the shaft sealing system and its components.

WASTE ISOLATION PILOT PLANT

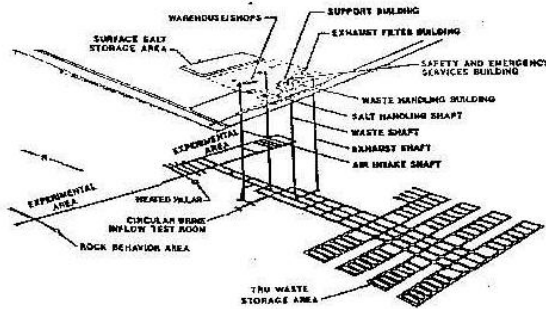
CARLSBAD, NM

SHAFT SEALING SYSTEM DESIGN

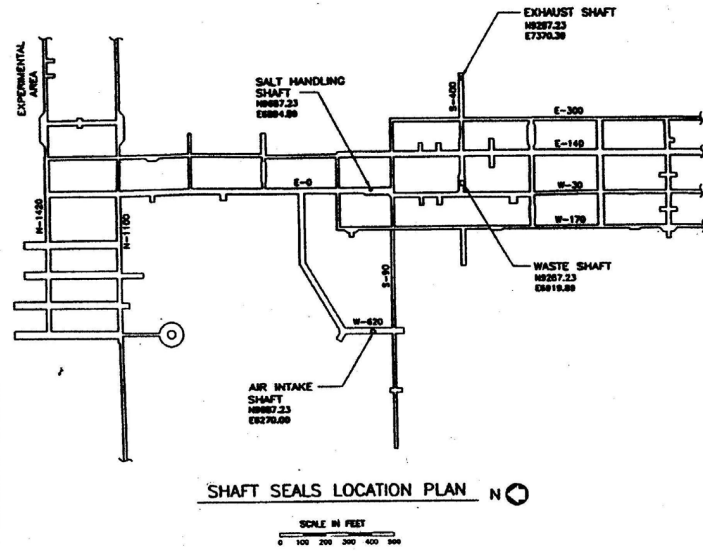
DESIGN DRAWINGS



WIPP LAYOUT



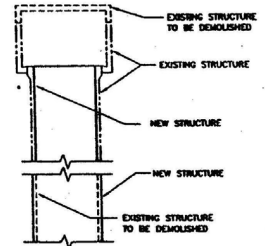
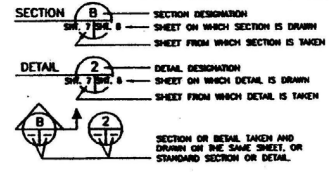
DRAWING NUMBER	TITLE	DRAWING NUMBER	TITLE	DRAWING NUMBER	TITLE
SNL-007 1 OF 28	WIPP SHAFT SEALING SYSTEM SHAFT LOCATION PLAN, ABBREVIATIONS, GENERAL NOTES AND LEGEND	SNL-007 10 OF 28	WIPP SHAFT SEALING SYSTEM SALADO FORMATION AIR INTAKE SHAFT STRATIGRAPHY & SEALING SUBSYSTEM PROFILE	SNL-007 19 OF 28	WIPP SHAFT SEALING SYSTEM NEAR-SURFACE/EXHAUST FORMATIONS SALT HANDLING SHAFT STRATIGRAPHY & SEALING SUBSYSTEM PROFILE
SNL-007 2 OF 28	WIPP SHAFT SEALING SYSTEM NEAR-SURFACE/EXHAUST FORMATIONS WASTE SHAFT STRATIGRAPHY & AS-BUILT ELEMENTS	SNL-007 13 OF 28	WIPP SHAFT SEALING SYSTEM NEAR-SURFACE/EXHAUST FORMATIONS AIR INTAKE SHAFT SHAFT STATION MONOLITH	SNL-007 20 OF 28	WIPP SHAFT SEALING SYSTEM SALADO FORMATION SALT HANDLING SHAFT STRATIGRAPHY & SEALING SUBSYSTEM PROFILE
SNL-007 3 OF 28	WIPP SHAFT SEALING SYSTEM SALADO FORMATION WASTE SHAFT STRATIGRAPHY & AS-BUILT ELEMENTS	SNL-007 12 OF 28	WIPP SHAFT SEALING SYSTEM NEAR-SURFACE/EXHAUST FORMATIONS EXHAUST SHAFT STRATIGRAPHY & AS-BUILT ELEMENTS	SNL-007 21 OF 28	WIPP SHAFT SEALING SYSTEM SALT HANDLING SHAFT SHAFT STATION MONOLITH
SNL-007 4 OF 28	WIPP SHAFT SEALING SYSTEM NEAR-SURFACE/EXHAUST FORMATIONS WASTE SHAFT STRATIGRAPHY & SEALING SUBSYSTEM PROFILE	SNL-007 13 OF 28	WIPP SHAFT SEALING SYSTEM SALADO FORMATION EXHAUST SHAFT STRATIGRAPHY & AS-BUILT ELEMENTS	SNL-007 22 OF 28	WIPP SHAFT SEALING SYSTEM CONCRETE-ASPHALT WATERSTOP 7M SALADO FORMATION
SNL-007 5 OF 28	WIPP SHAFT SEALING SYSTEM SALADO FORMATION WASTE SHAFT STRATIGRAPHY & SEALING SUBSYSTEM PROFILE	SNL-007 14 OF 28	WIPP SHAFT SEALING SYSTEM NEAR-SURFACE/EXHAUST FORMATIONS EXHAUST SHAFT STRATIGRAPHY & SEALING SUBSYSTEM PROFILE	SNL-007 23 OF 28	WIPP SHAFT SEALING SYSTEM ASPHALT COLUMN
SNL-007 6 OF 28	WIPP SHAFT SEALING SYSTEM WASTE SHAFT SHAFT STATION MONOLITH	SNL-007 15 OF 28	WIPP SHAFT SEALING SYSTEM SALADO FORMATION EXHAUST SHAFT STRATIGRAPHY & SEALING SUBSYSTEM PROFILE	SNL-007 24 OF 28	WIPP SHAFT SEALING SYSTEM UPPER AND LOWER SALADO COMPACTED CLAY COLLARS
SNL-007 7 OF 28	WIPP SHAFT SEALING SYSTEM NEAR-SURFACE/EXHAUST FORMATIONS AIR INTAKE SHAFT STRATIGRAPHY & AS-BUILT ELEMENTS	SNL-007 16 OF 28	WIPP SHAFT SEALING SYSTEM EXHAUST SHAFT SHAFT STATION MONOLITH	SNL-007 25 OF 28	WIPP SHAFT SEALING SYSTEM CONCRETE PILE
SNL-007 8 OF 28	WIPP SHAFT SEALING SYSTEM SALADO FORMATION AIR INTAKE SHAFT STRATIGRAPHY & AS-BUILT ELEMENTS	SNL-007 17 OF 28	WIPP SHAFT SEALING SYSTEM NEAR-SURFACE/EXHAUST FORMATIONS SALT HANDLING SHAFT CONCRETE PILE & AS-BUILT ELEMENTS	SNL-007 26 OF 28	WIPP SHAFT SEALING SYSTEM EXHAUST COMPACTED CLAY COLUMN
SNL-007 9 OF 28	WIPP SHAFT SEALING SYSTEM NEAR-SURFACE/EXHAUST FORMATIONS AIR INTAKE SHAFT STRATIGRAPHY & SEALING SUBSYSTEM PROFILE	SNL-007 18 OF 28	WIPP SHAFT SEALING SYSTEM SALADO FORMATION SALT HANDLING SHAFT STRATIGRAPHY & AS-BUILT ELEMENTS	SNL-007 28 OF 28	WIPP SHAFT SEALING SYSTEM COMPACTED EARTHEN FILL AND CONCRETE PILE



GENERAL NOTES:

1. THE GRID NUMBERING SYSTEM (E-300, S-400, ETC.) IS BASED ON THE DIRECTION AND NOMINAL DISTANCE IN FEET THE GRID IS FROM THE SALT HANDLING SHAFT'S DESIGNATED CENTERLINE LOCATION OF E-000. E-800, THE WIPP PLANT COORDINATE SYSTEM CENTERLINE LOCATION FOR THE SALT HANDLING SHAFT IS H0807.23, AND E804.08. THE PLANT COORDINATE SYSTEM IS DESCRIBED IN WESTINGHOUSE DRAWING NO. 51-W-100-01, UNDERGROUND EXCAVATIONS, ISSUED 4/15/92.
2. THE AS-BUILT DIMENSIONS AND DEPTHS AND/OR ELEVATIONS SHOWN IN THESE DRAWINGS ARE NOMINAL. IN TIME DIMENSIONS MAY CHANGE DUE TO LOCAL VARIANCE OF THE SUBSTRATUM, OPERATIONAL MODIFICATIONS MADE TO MEET THE CREEP CLOSURE OF THE SHAFT, AND OTHER OPERATIONAL REQUIREMENTS. THEREFORE THE AS-BUILT DIMENSIONS AND THE PERTINENT ELEVATIONS FOR SETTING 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:



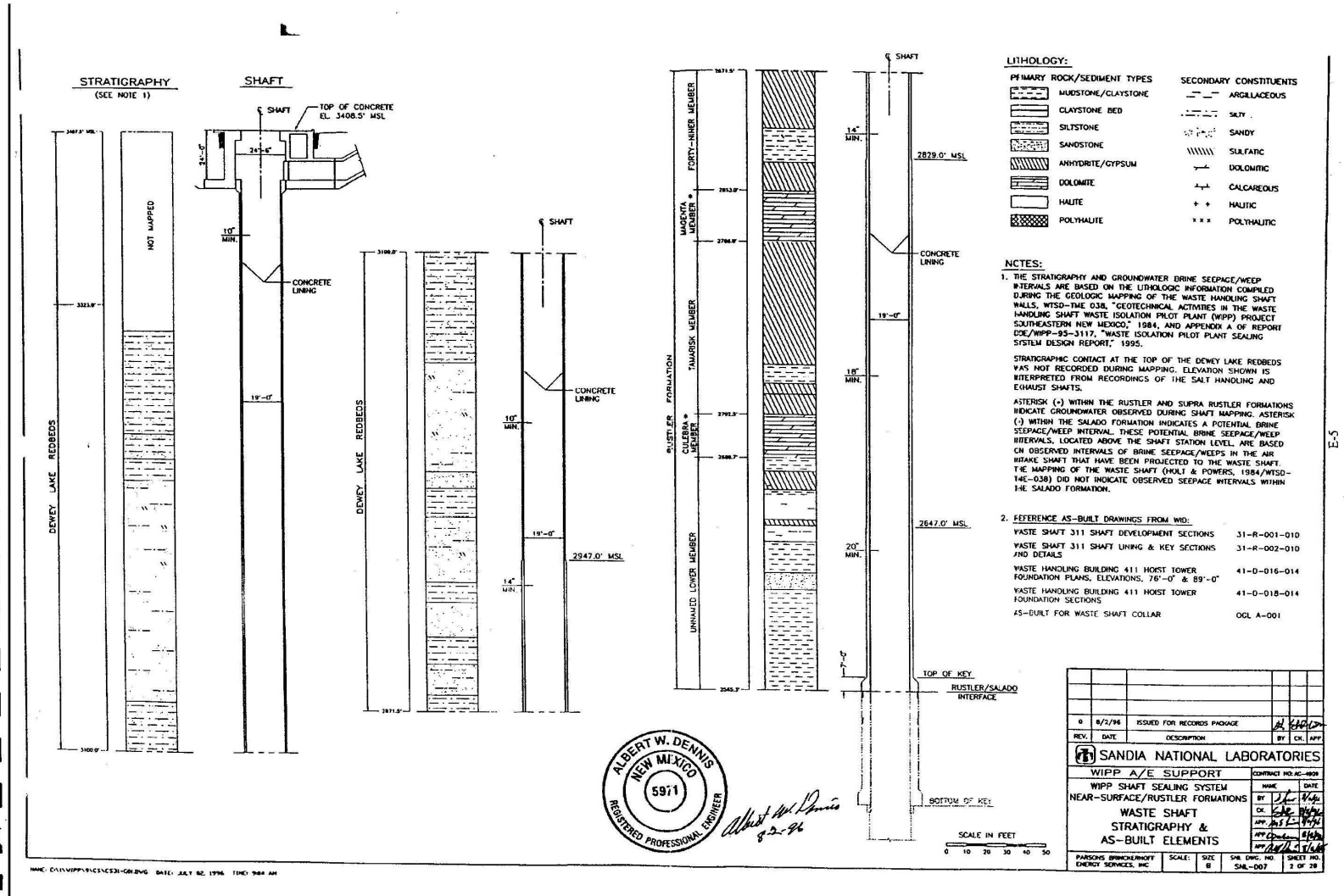
ABBREVIATIONS:

- E CENTERLINE
- APP. APPROXIMATE
- CMP CORRUGATED METAL PLATE
- CONC. CONCRETE
- DOE DEPARTMENT OF ENERGY
- DRG. DRAWING
- E EAST
- EL. ELEVATION
- EXIST. EXISTING
- FT. FOOT, FEET
- HT. HEIGHT
- I.D. INSIDE DIAMETER
- IN. INCHES
- MB MARKER BED
- MIN. MINIMUM
- MSL MEAN SEA LEVEL
- N NORTH
- NO. NUMBER
- R RADII
- S SOUTH
- SHT. SHEET NUMBER
- S/C SALADO MASS CONCRETE
- TYP. TYPICAL
- USGS UNITED STATES GEOLOGICAL SURVEY
- W WEST
- WBI WESTINGHOUSE WASTE ISOLATION DIVISION
- WPP WASTE ISOLATION PILOT PLANT

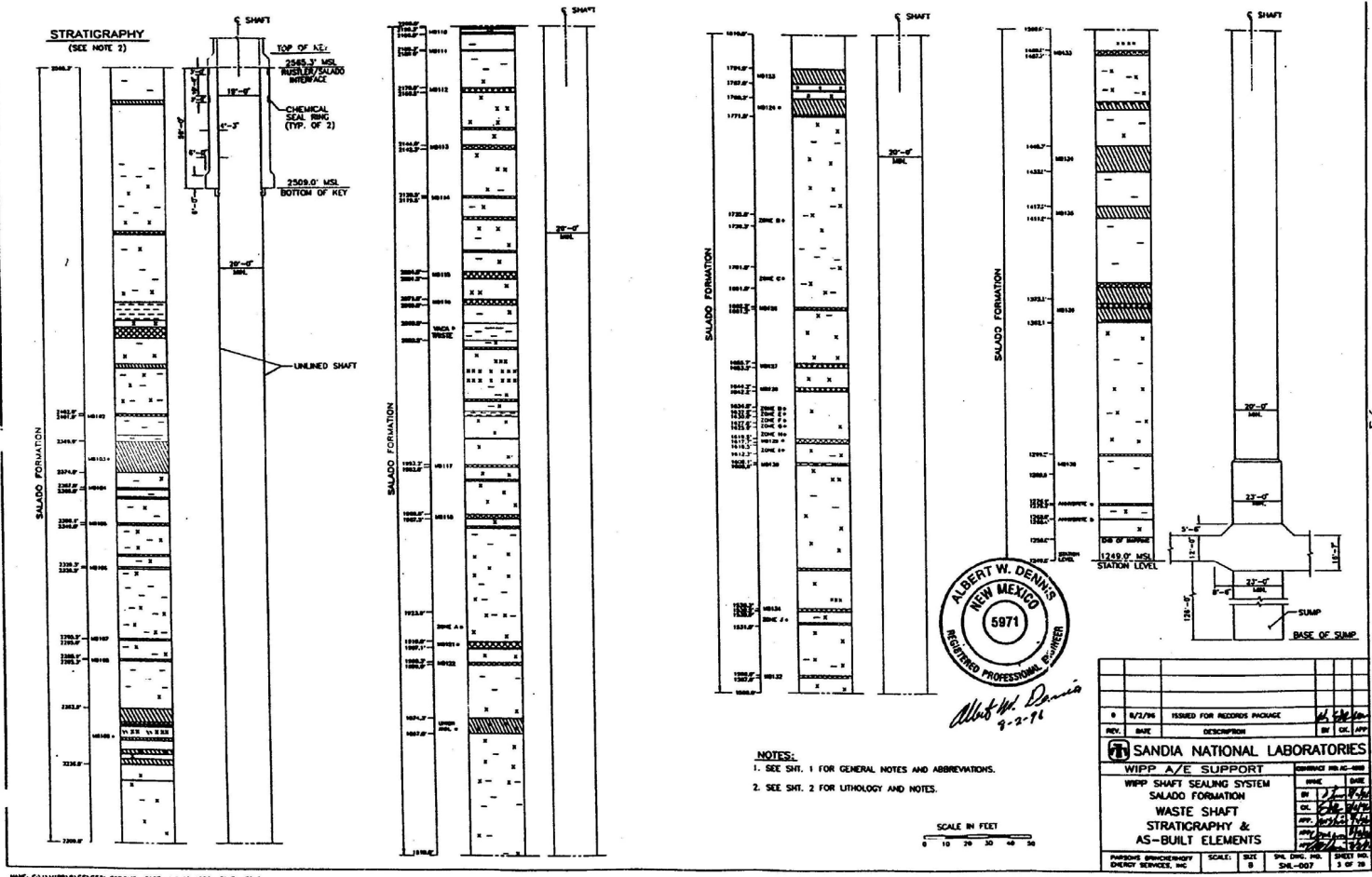


Albert W. Dennis
 8-2-96

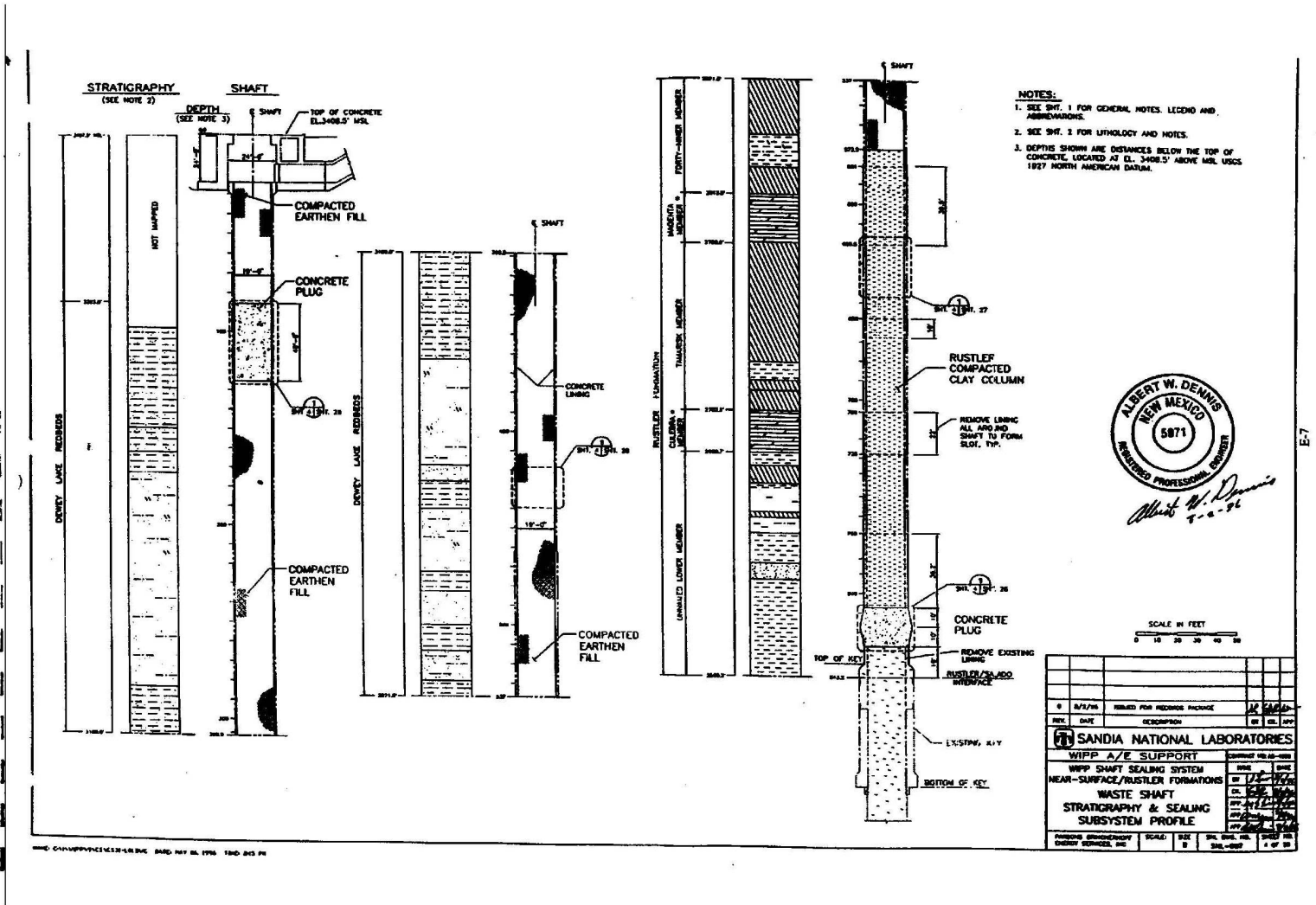
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SANDIA NATIONAL LABORATORIES			
WIPP A/E SUPPORT			
WIPP SHAFT SEALING SYSTEM		DATE	DATE
SHAFT LOCATION PLAN, ABBREVIATIONS, GENERAL NOTES AND LEGEND		BY: [Signature]	DATE: [Signature]
PROJECT: WIPP SHAFT SEALING SYSTEM		SCALE: 1/8" = 1'-0"	SHEET NO. 1 OF 28



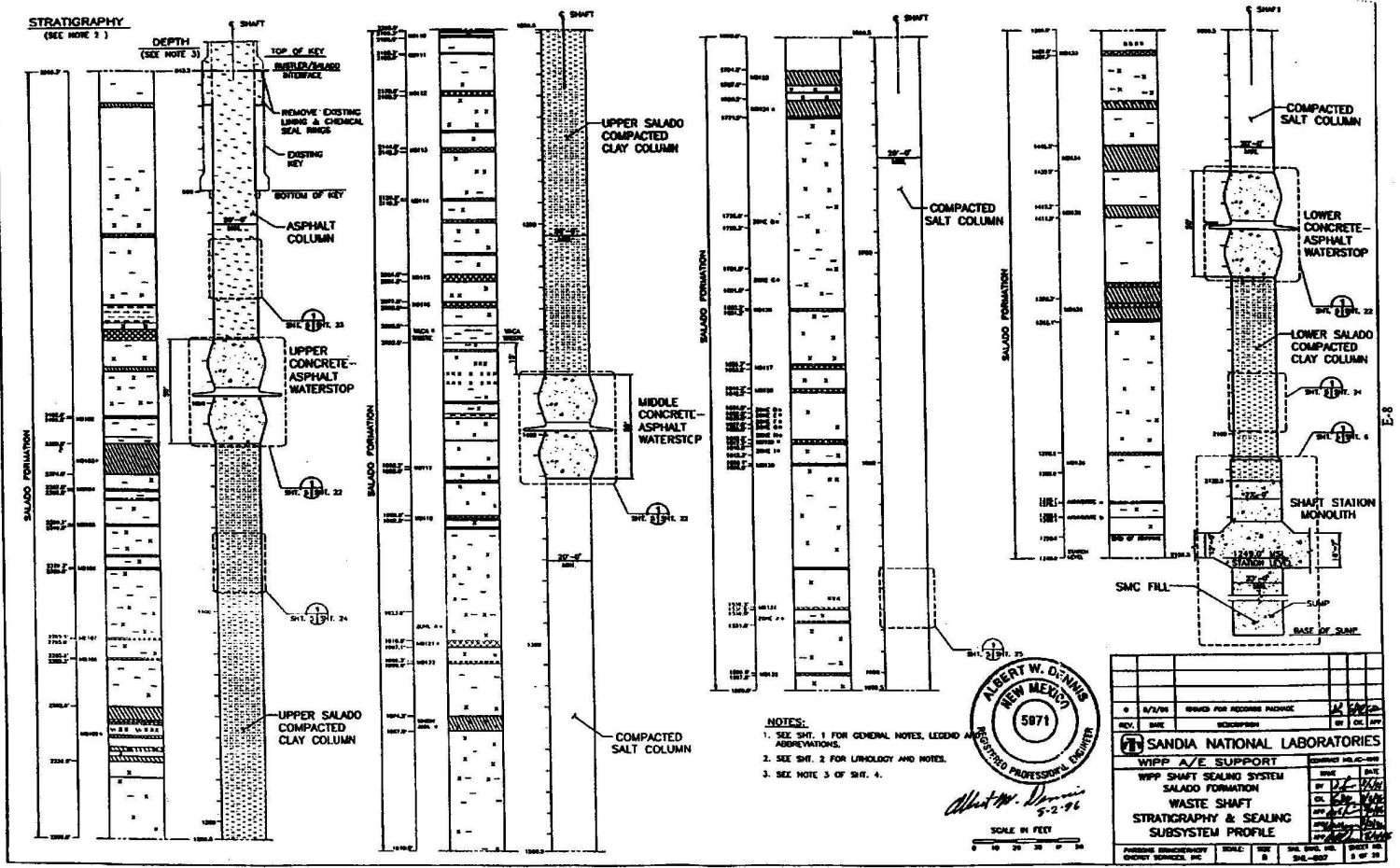
Near-Surface/Rustler Formations Waste Shaft Stratigraphy and AS-Built Elements



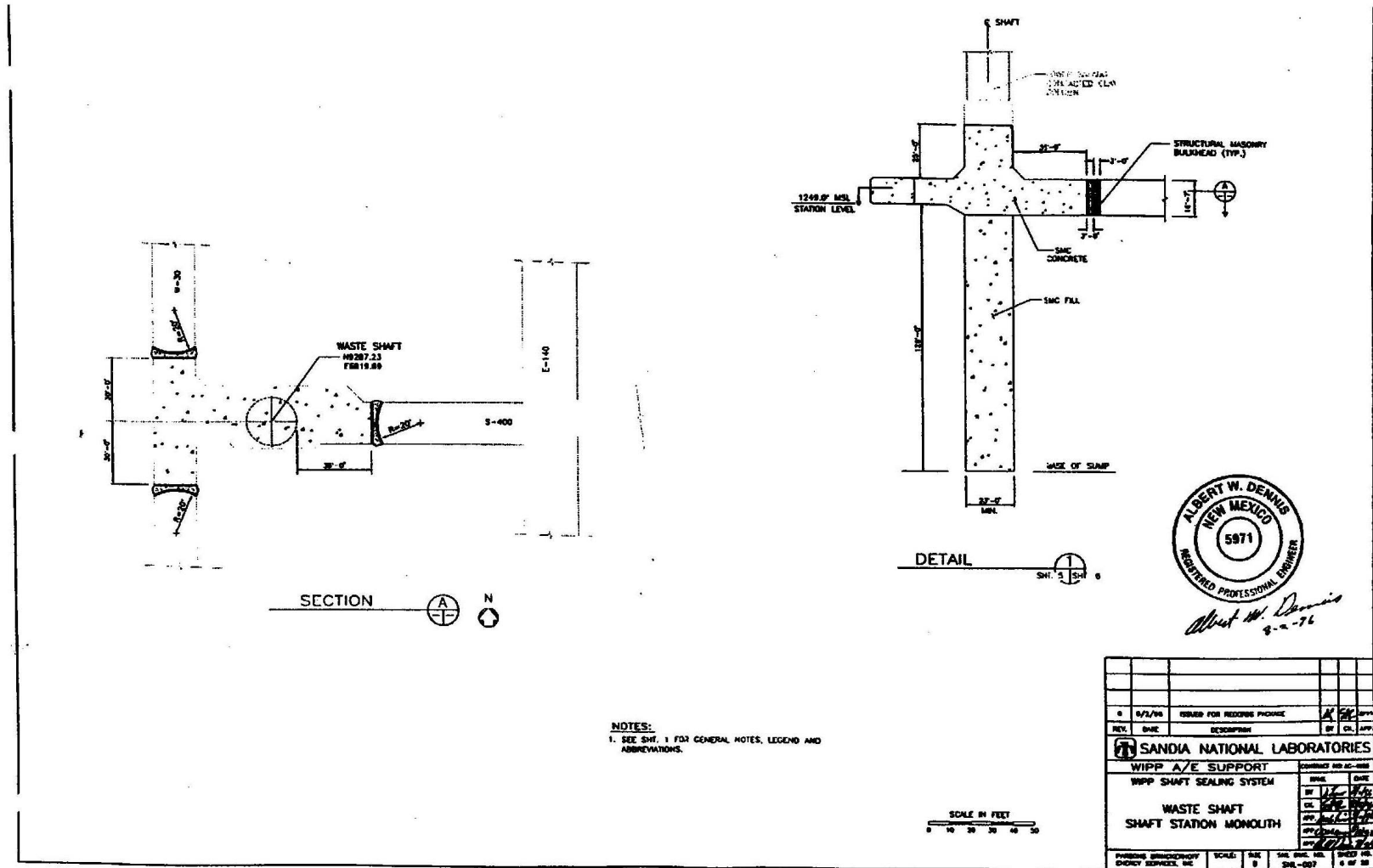
Salado Formation Waste Shaft Stratigraphy and AS-Built Elements



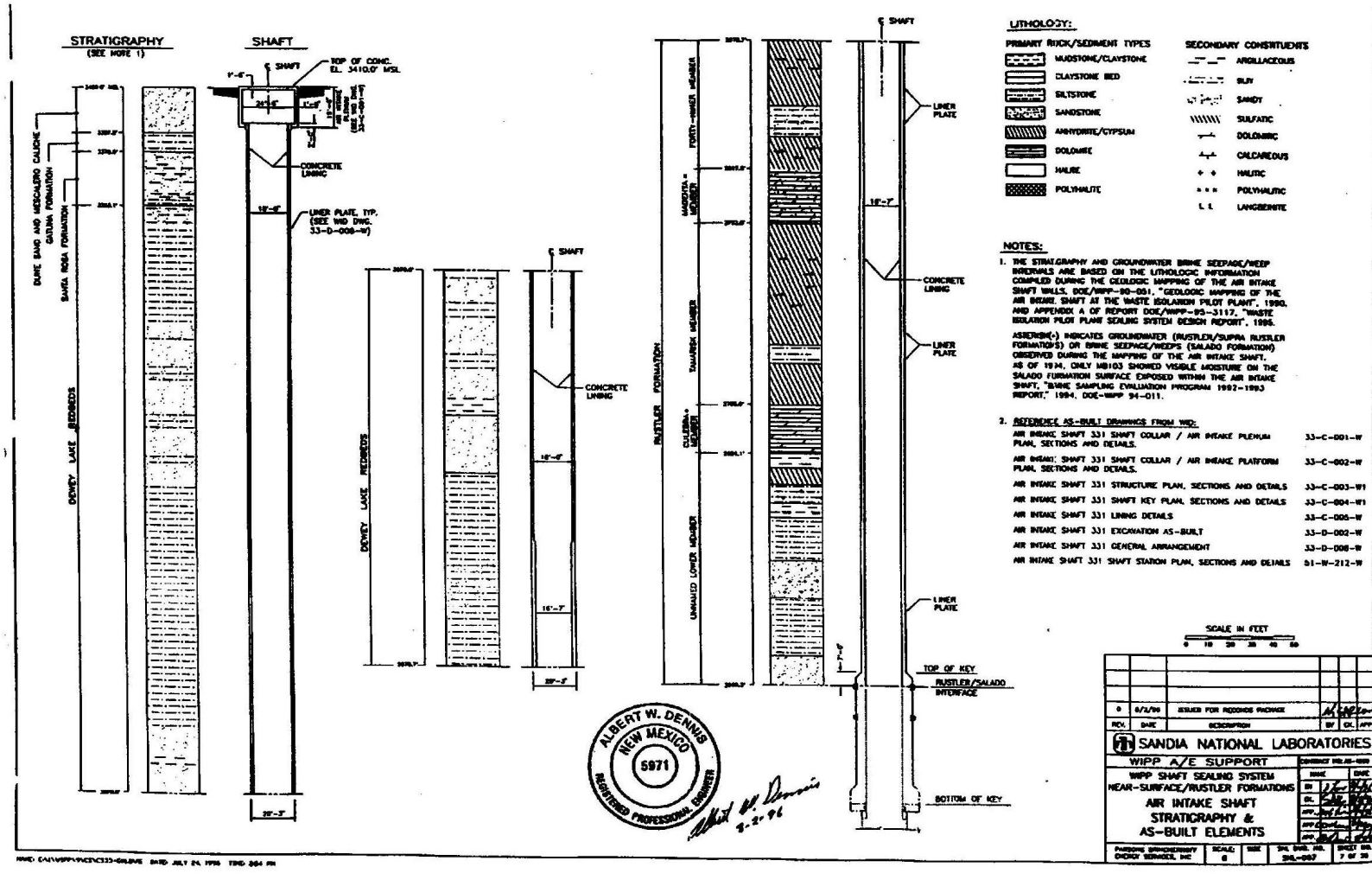
Near-Surface/Rustler Formations Waste Shaft Stratigraphy and Sealing Subsystem Profile



Salado Formation Waste Shaft Stratigraphy and Sealing Subsystem Profile

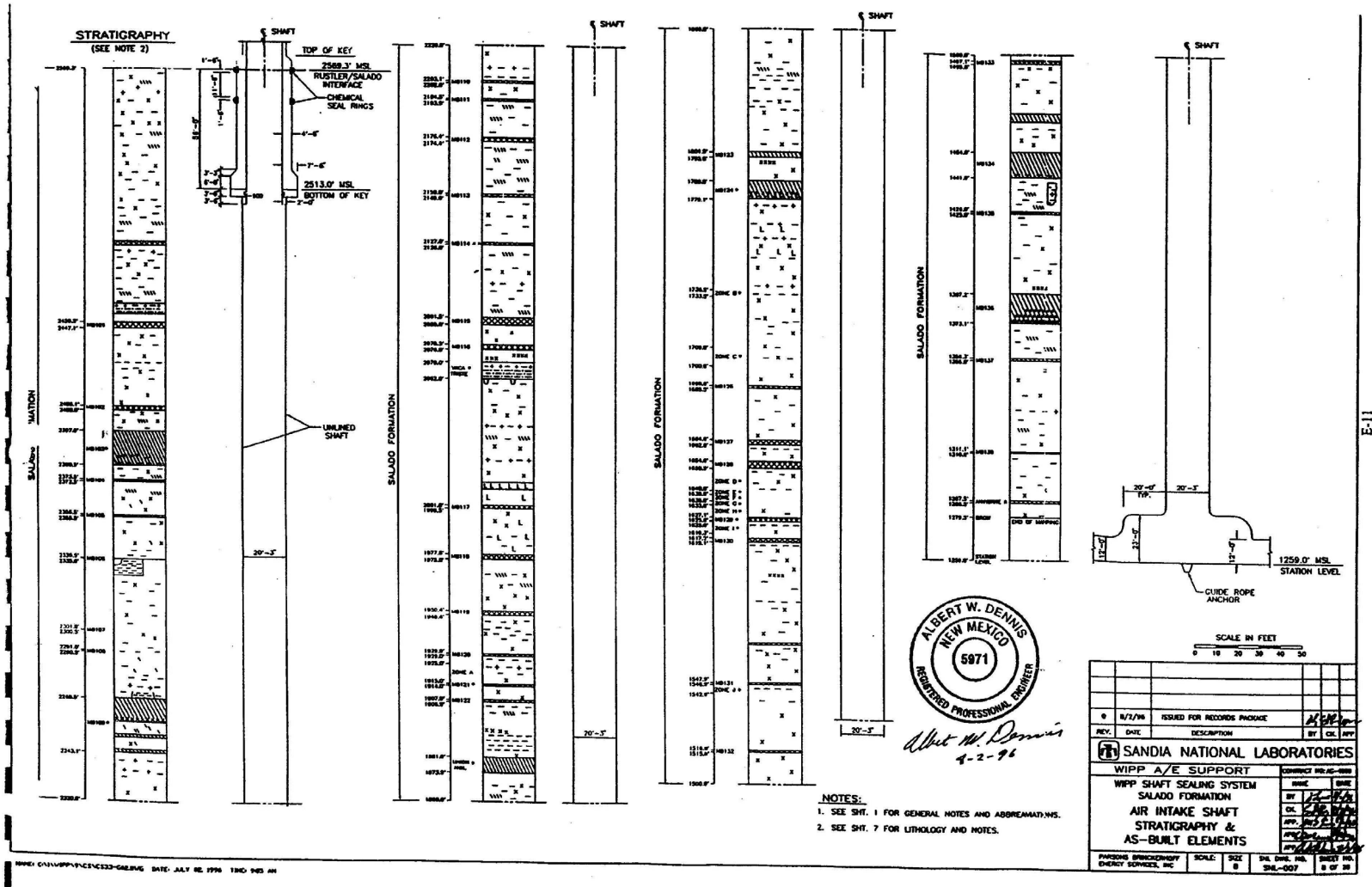


Waste Shaft Station Monolith

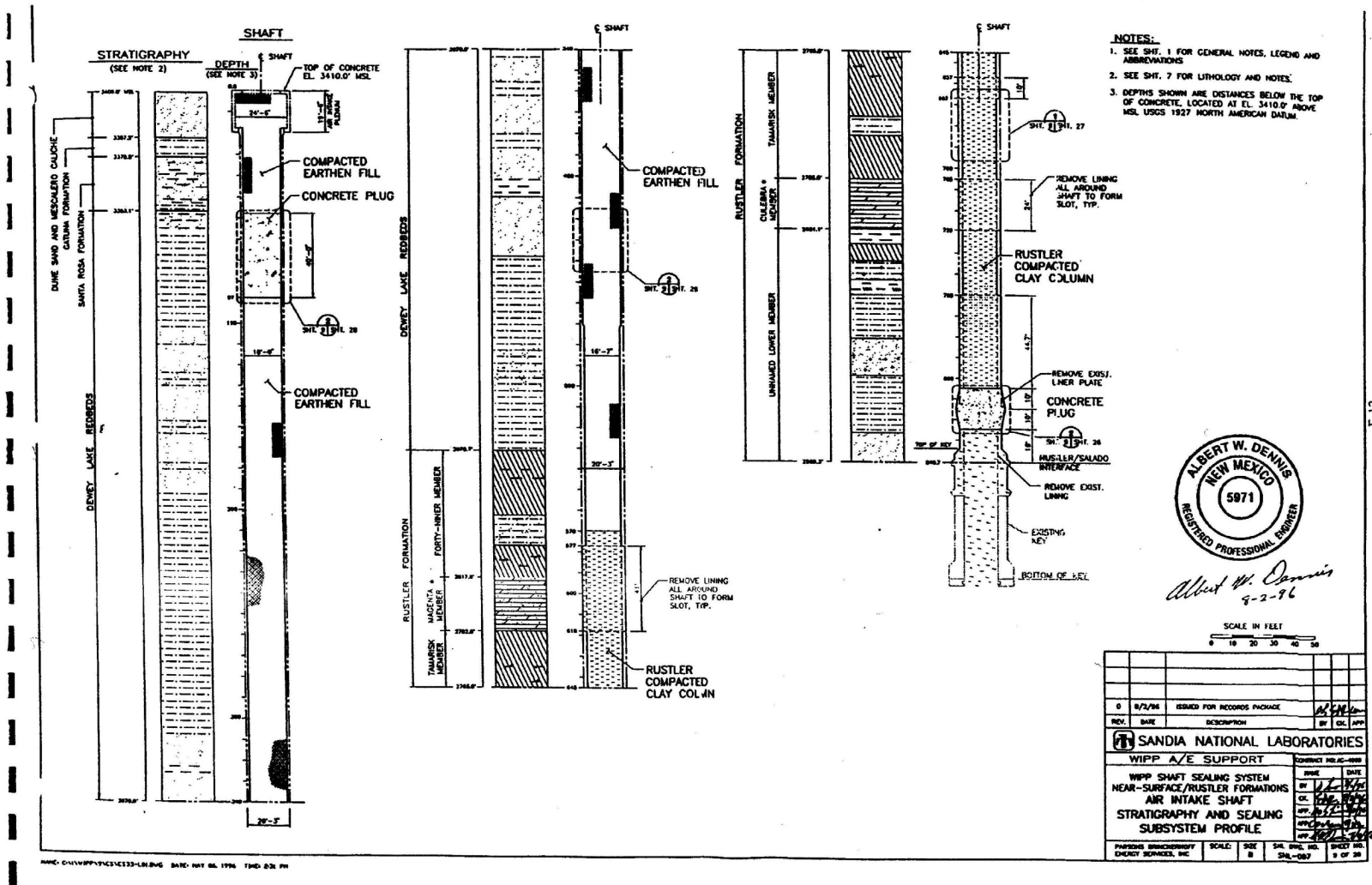


Near-Surface / Rustler Formations Air Intake Shaft Stratigraphy and AS-Built Elements

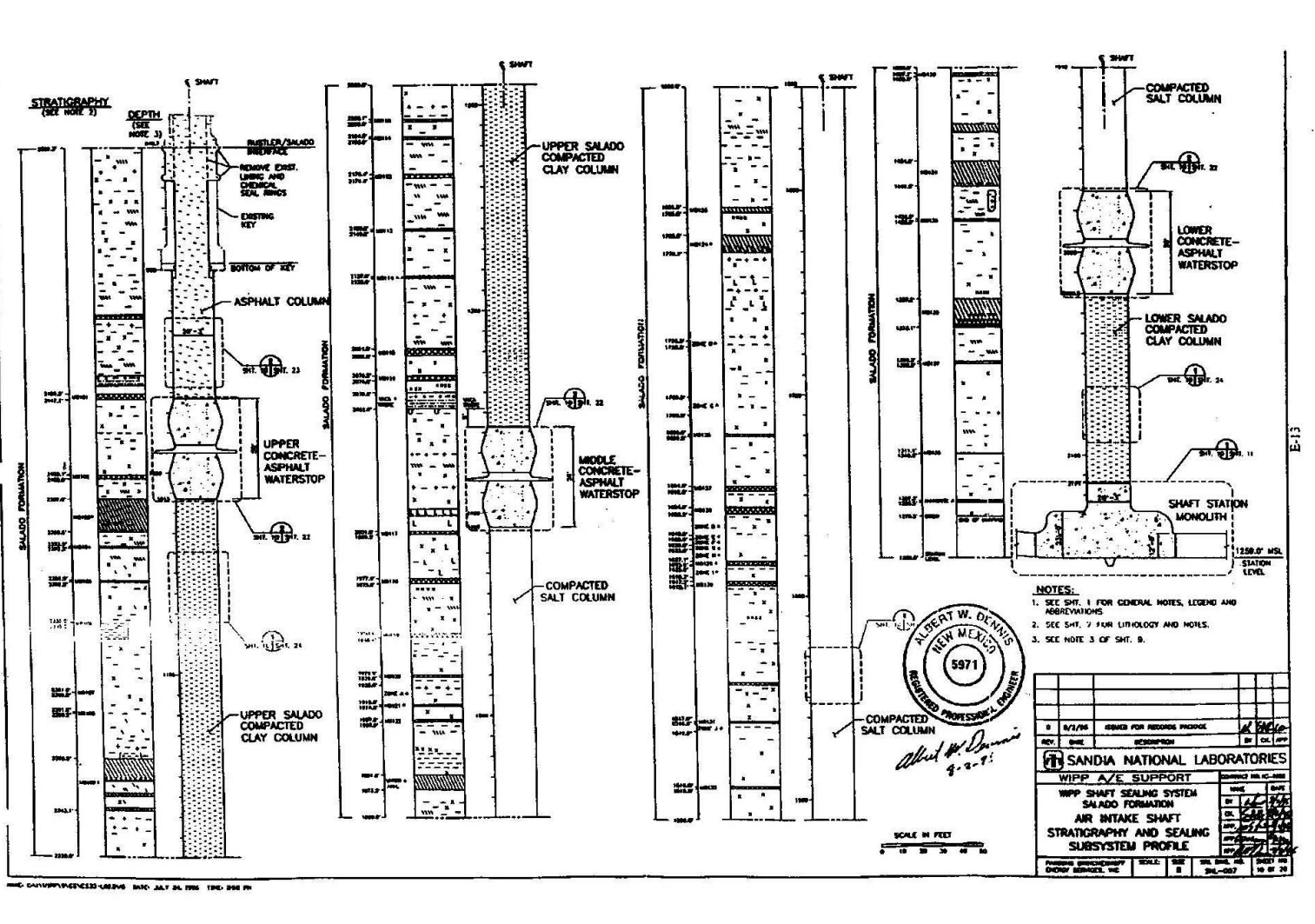
Waste Isolation Pilot Plant
 Hazardous Waste Facility Permit
 Attachment G2, Appendix G2-E
 August 15, 2023 Proposed Final Permit



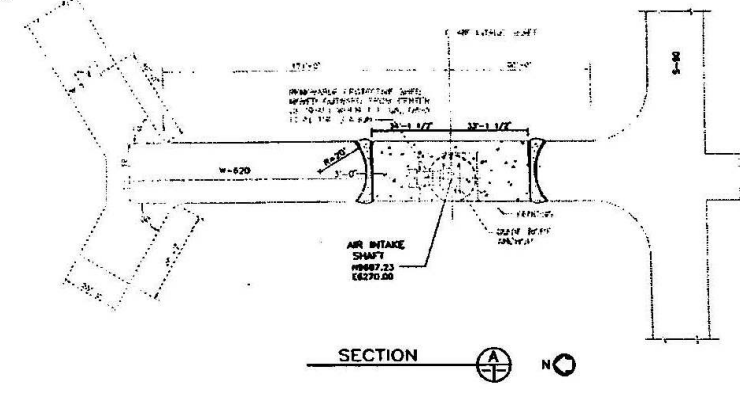
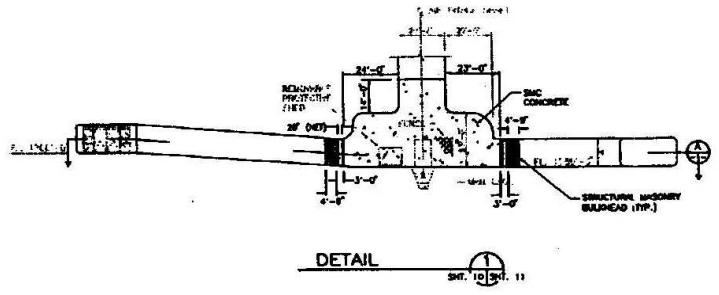
Salado Formation Air Intake Shaft Stratigraphy and AS-Built Elements



Near-Surface / Rustler Formations Air Intake Shaft Stratigraphy and Sealing Subsystem Profile



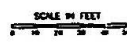
Salado Formation Air Intake Shaft Stratigraphy and Sealing Subsystem Profile



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



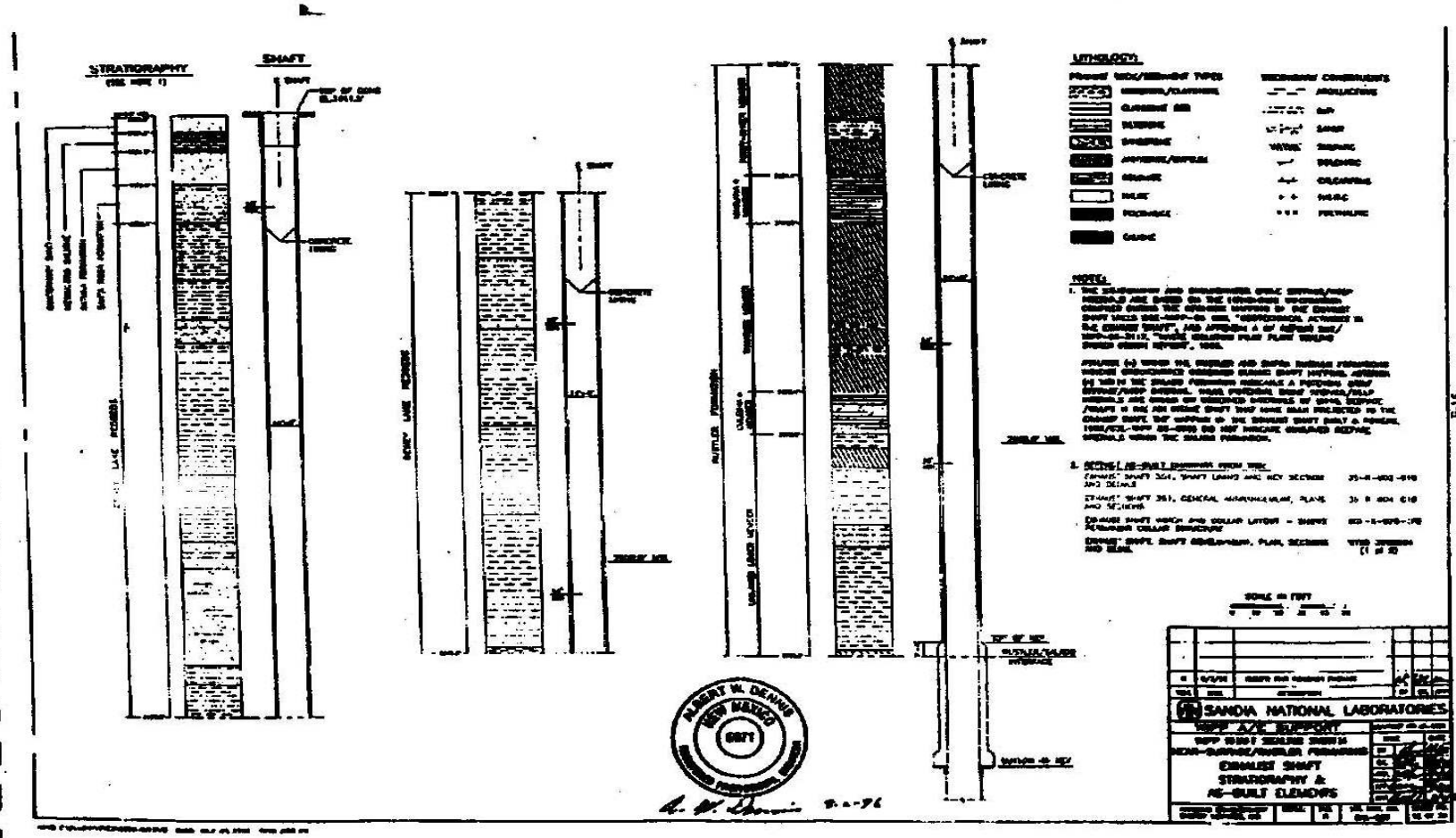
Albert W. Dennis
 9-2-96



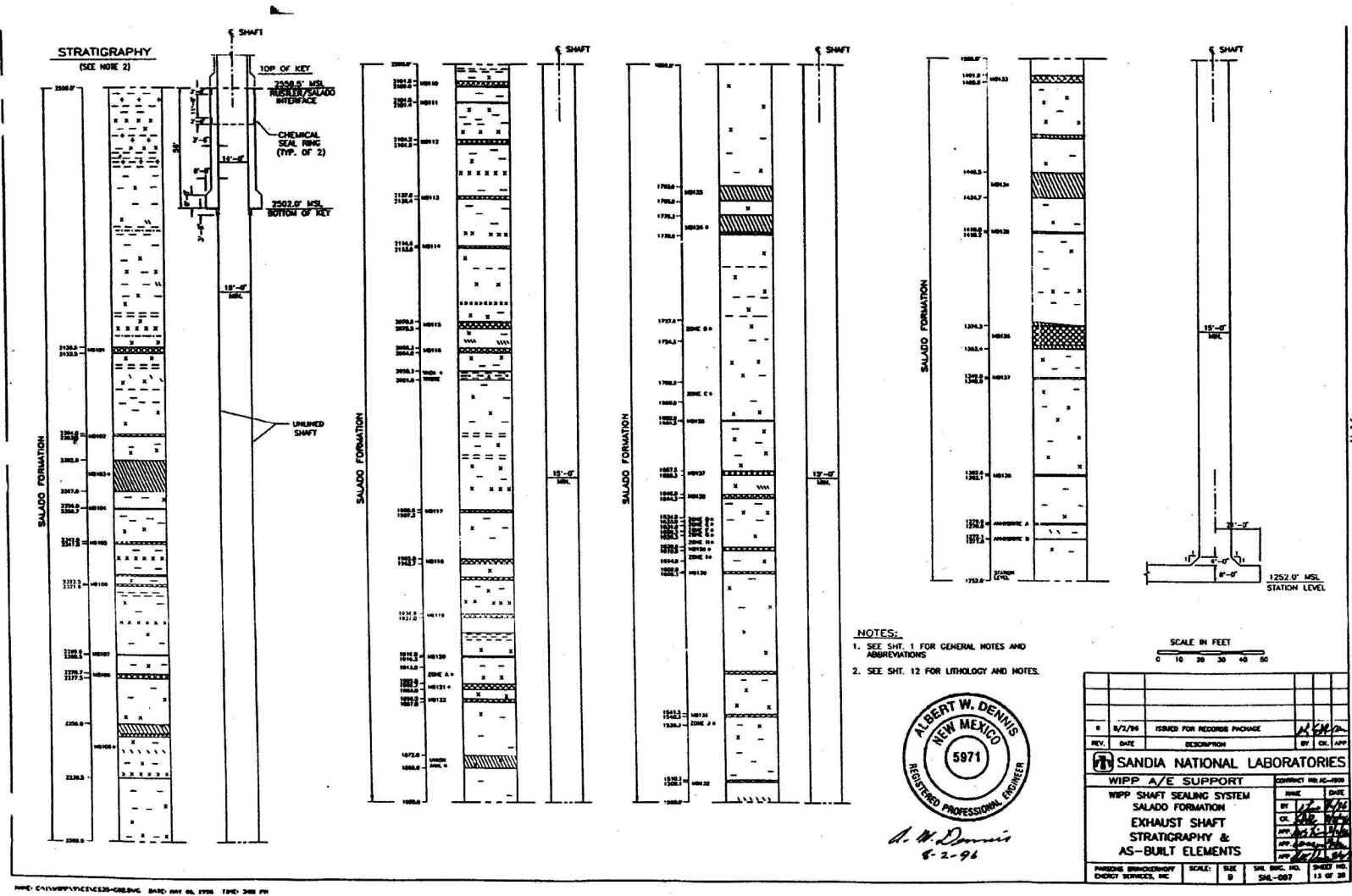
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Air Intake Shaft Station Monolith

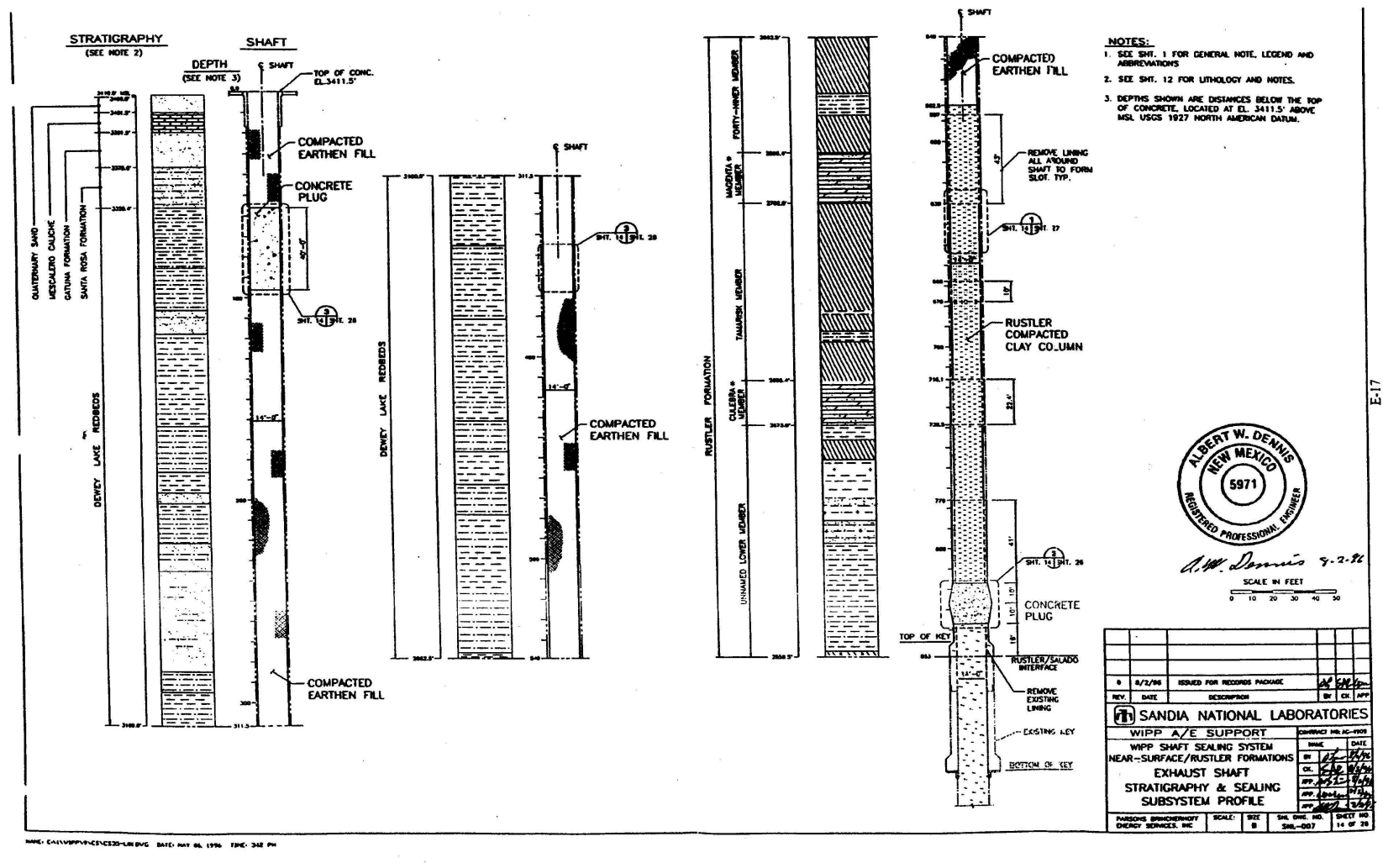
Sheet 11 of 28



Near-Surface / Rustler Formations Exhaust Shaft Stratigraphy and AS-Built Elements Sheet 12 of 28

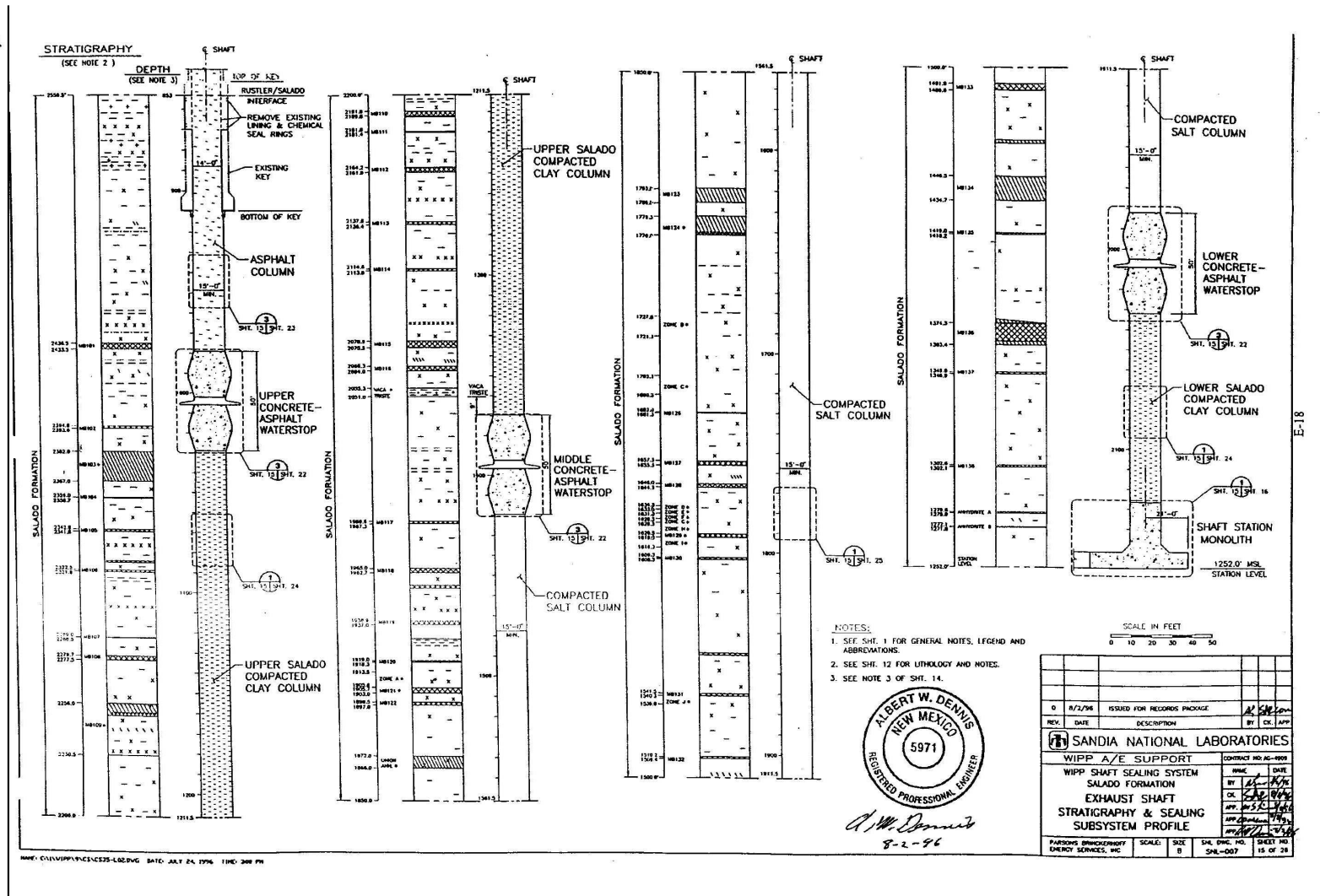


Salado Formation Exhaust Shaft Stratigraphy and AS-Built Elements

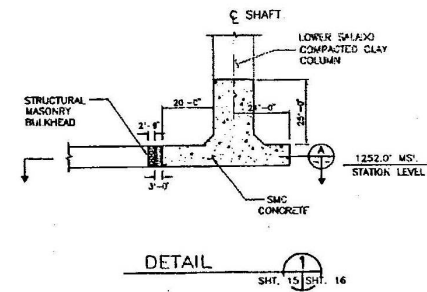
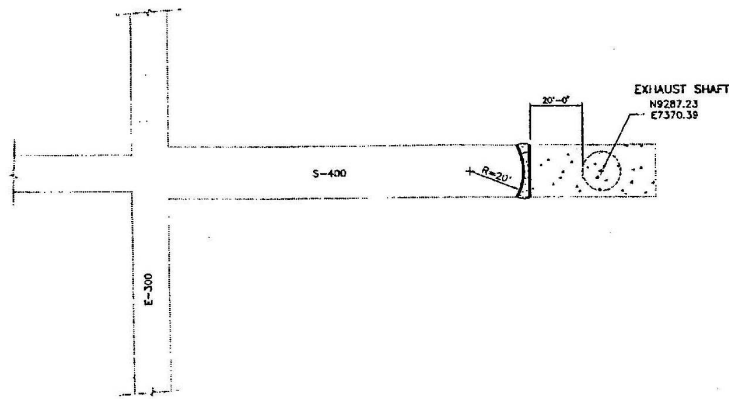


Near-Surface / Rustler Formations Exhaust Shaft Stratigraphy and Sealing Subsystem Profile Sheet 14 of 28

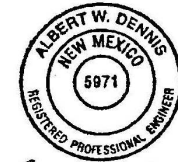
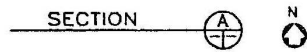
Waste Isolation Pilot Plant
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 Attachment G2, Appendix G2-E
 August 15, 2023 Proposed Final Permit



Salado Formation Exhaust Shaft Stratigraphy and Sealing Subsystem Profile



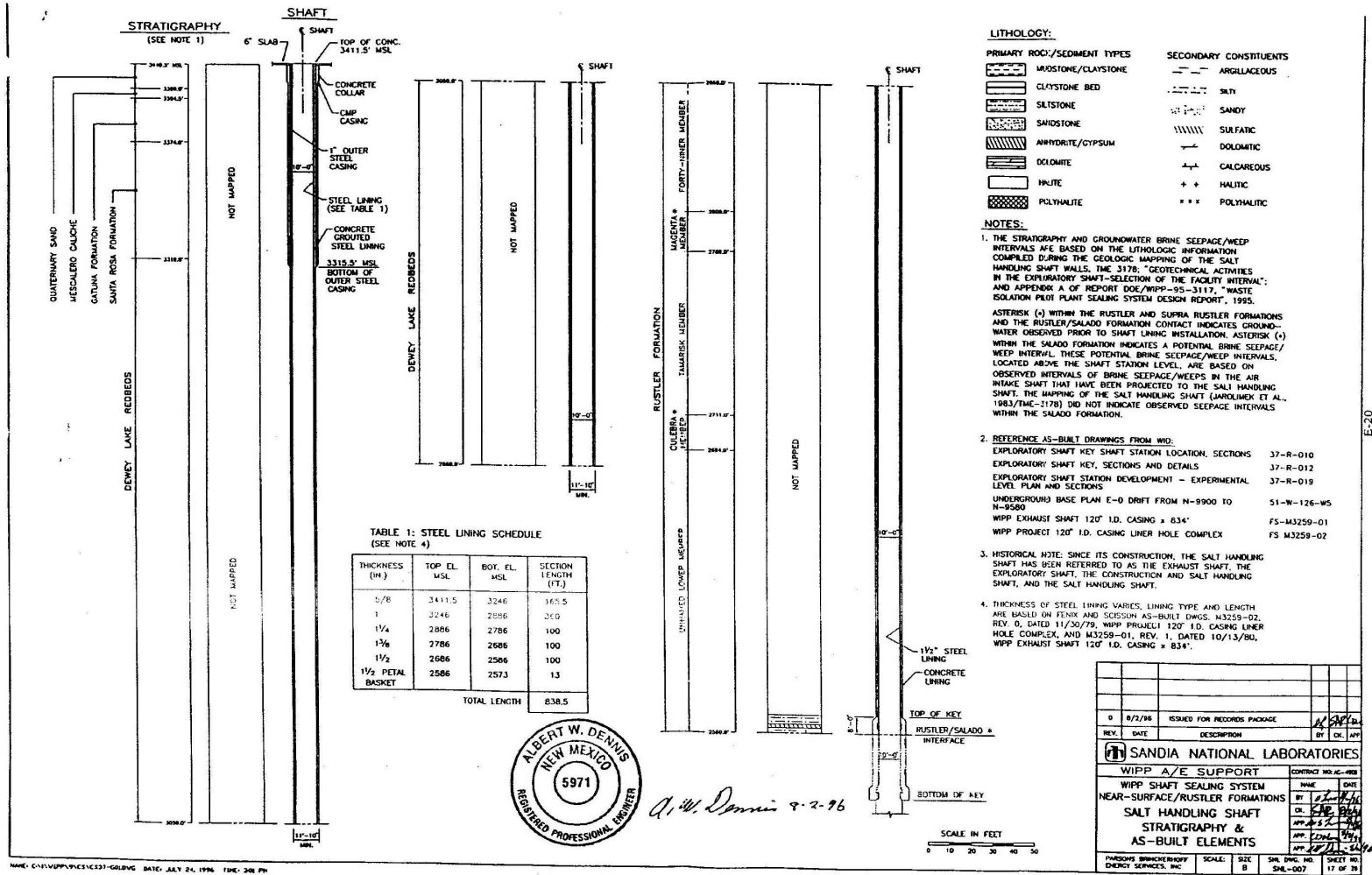
NOTES:
 1. SEE SHT. 1 FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS.



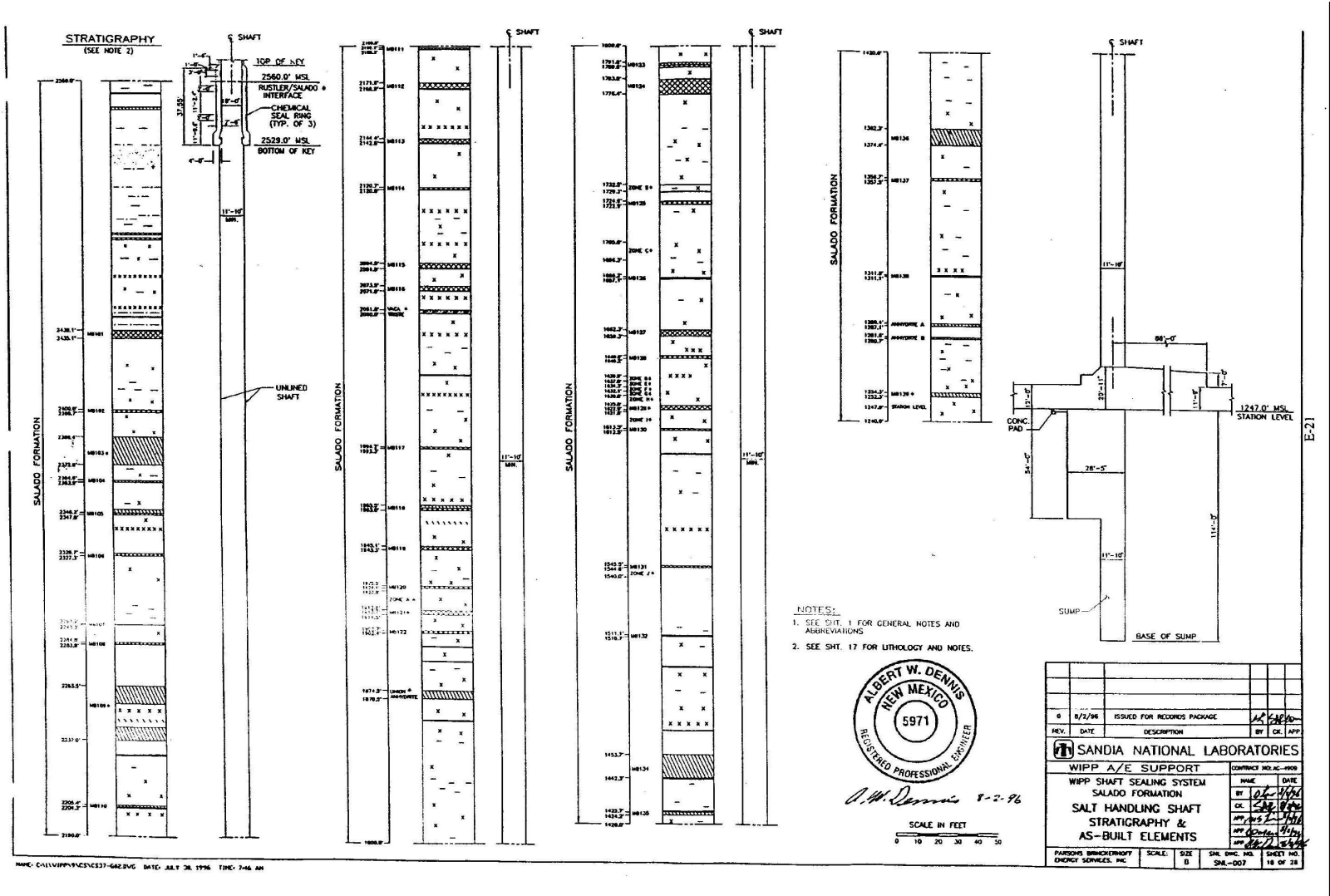
A. W. Dennis 8-2-86

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				DATE	DATE
				BY	DATE

15-19

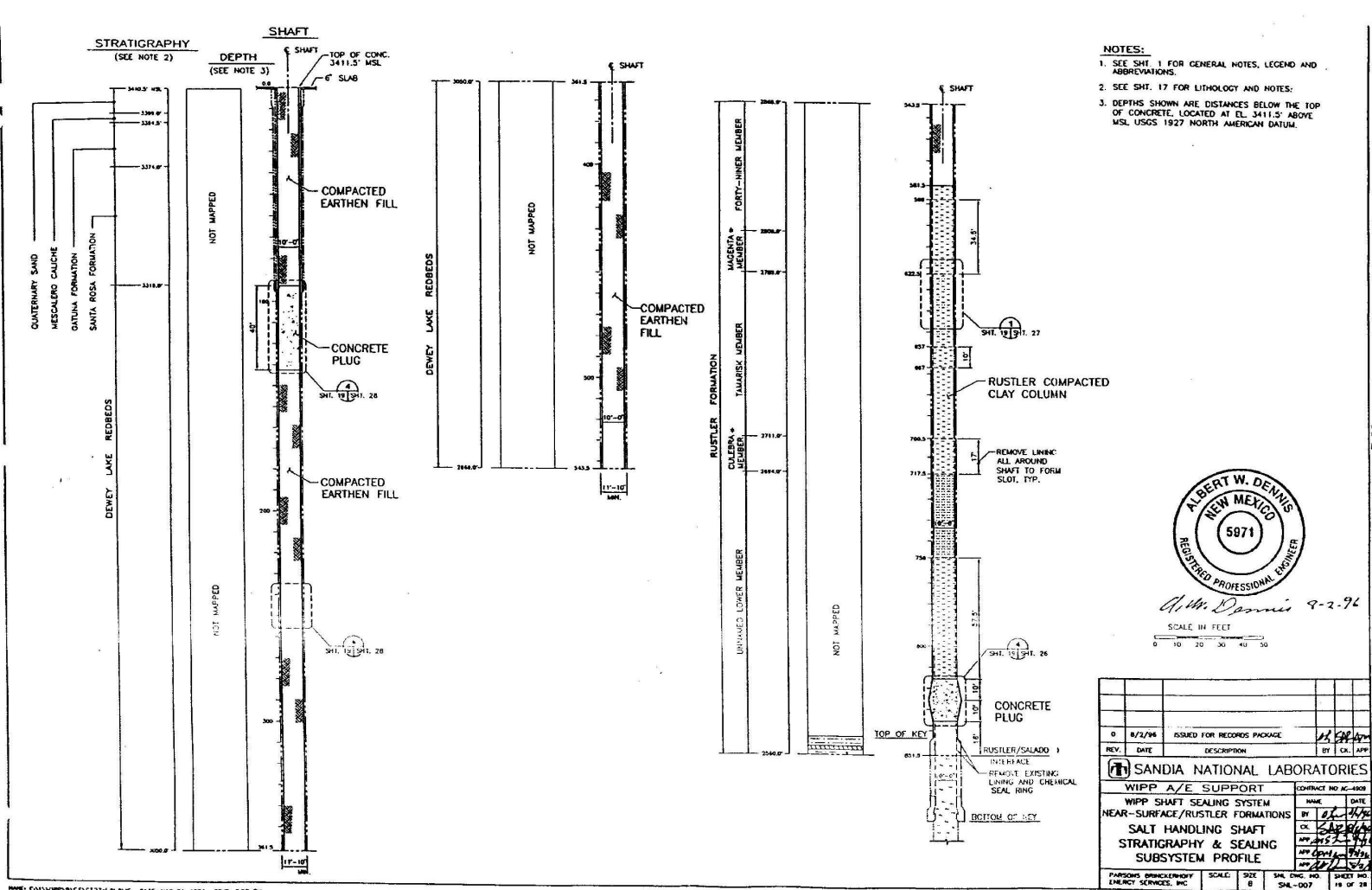


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Salado Formation Salt Handling Shaft Stratigraphy and AS-Built Elements

Waste Isolation Pilot Plant
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 August 15, 2023 Proposed Final Permit



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



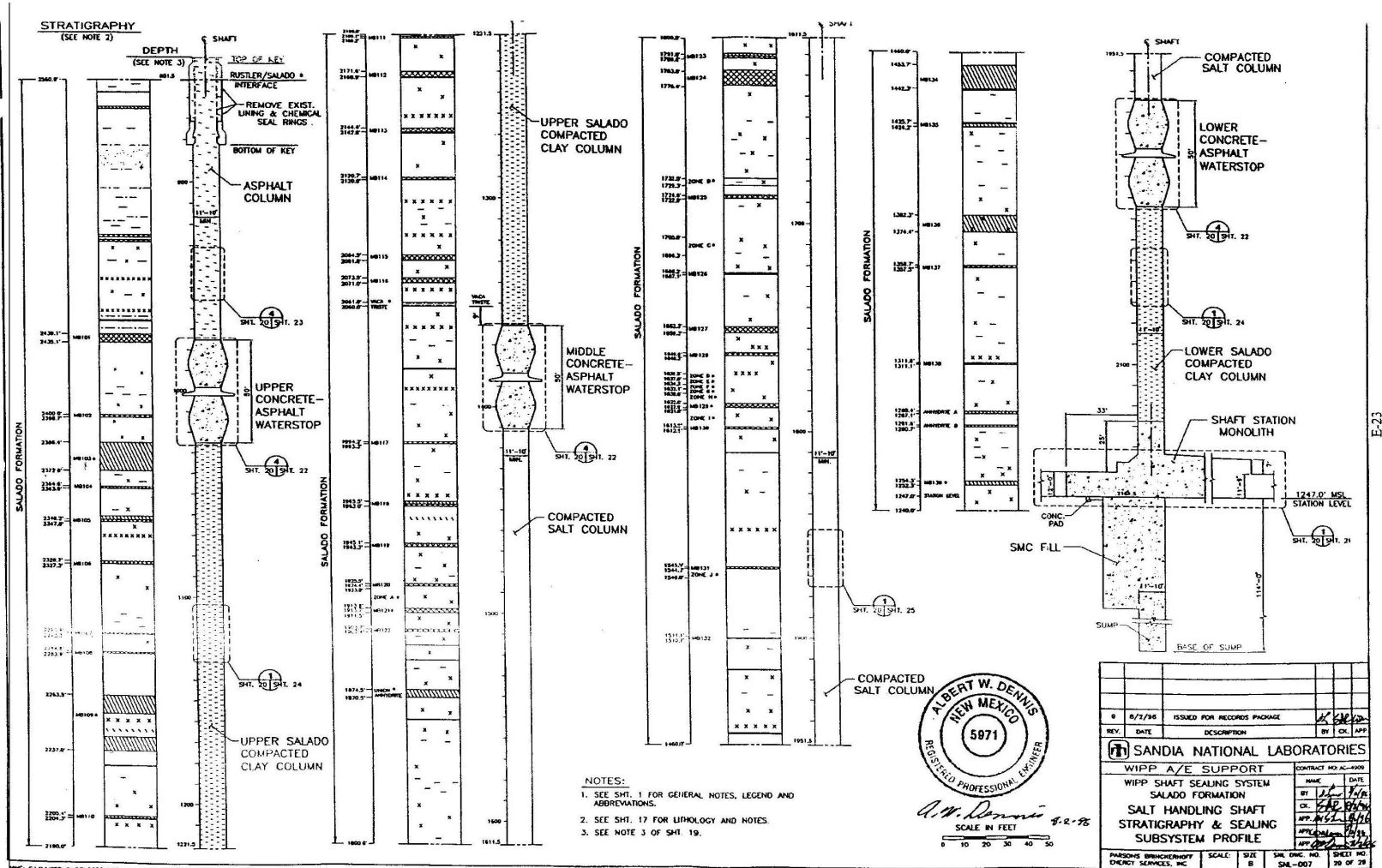
Albert W. Dennis 9-2-94

SCALE: 1/4" = 1' FEET

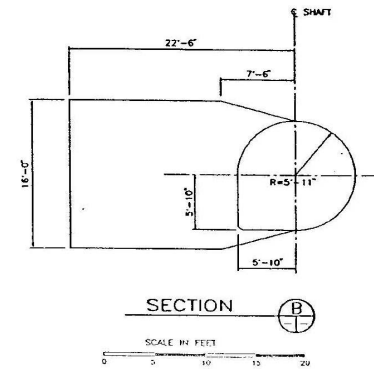
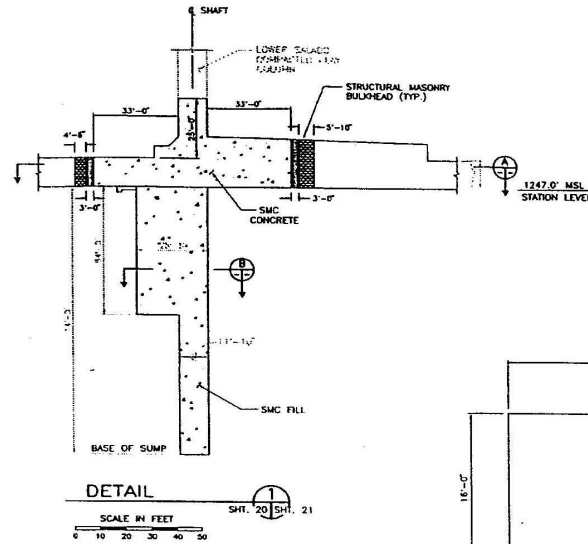
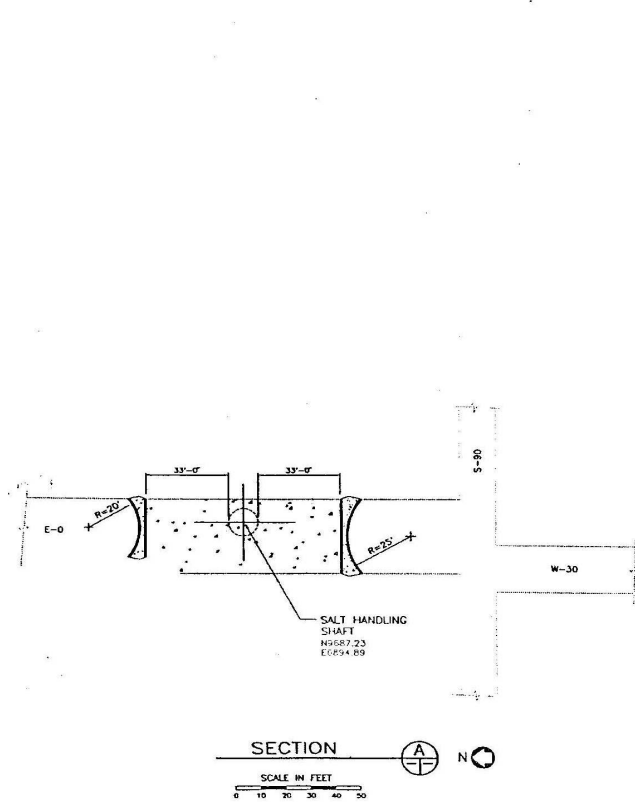
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NAME: _____ DATE: _____ BY: <i>AWD</i> CK: <i>AWD</i> APP: <i>AWD</i> APP: <i>AWD</i>		CONTRACT NO. AC-4908 SHEET NO. 19 OF 28		

Near-Surface / Rustler Formations Salt Handling Shaft Stratigraphy and Sealing Subsystem Profile Sheet 19 of 28

Waste Isolation Pilot Plant
 Hazardous Waste Facility Permit
 Attachment G2, Appendix G2-E
 August 15, 2023 Proposed Final Permit



Salado Formation Salt Handling Shaft Stratigraphy and Sealing Subsystem Profile



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



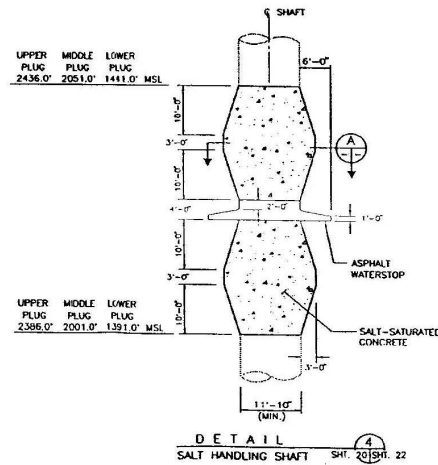
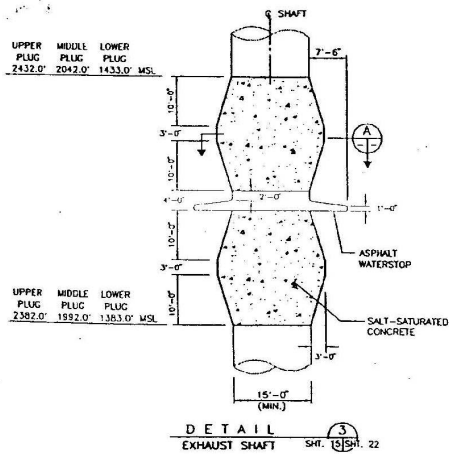
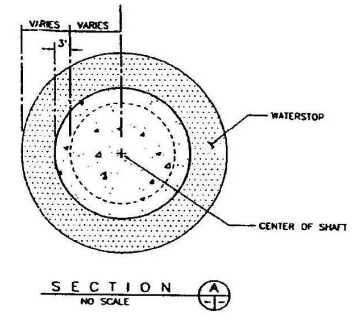
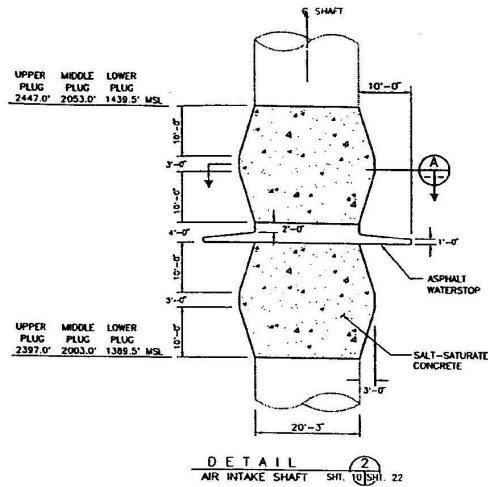
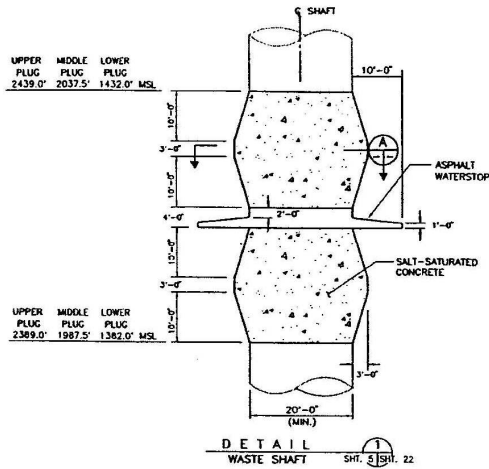
Albert W. Dennis
 8-22-16

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Salt Handling Shaft Shaft Station Monolith

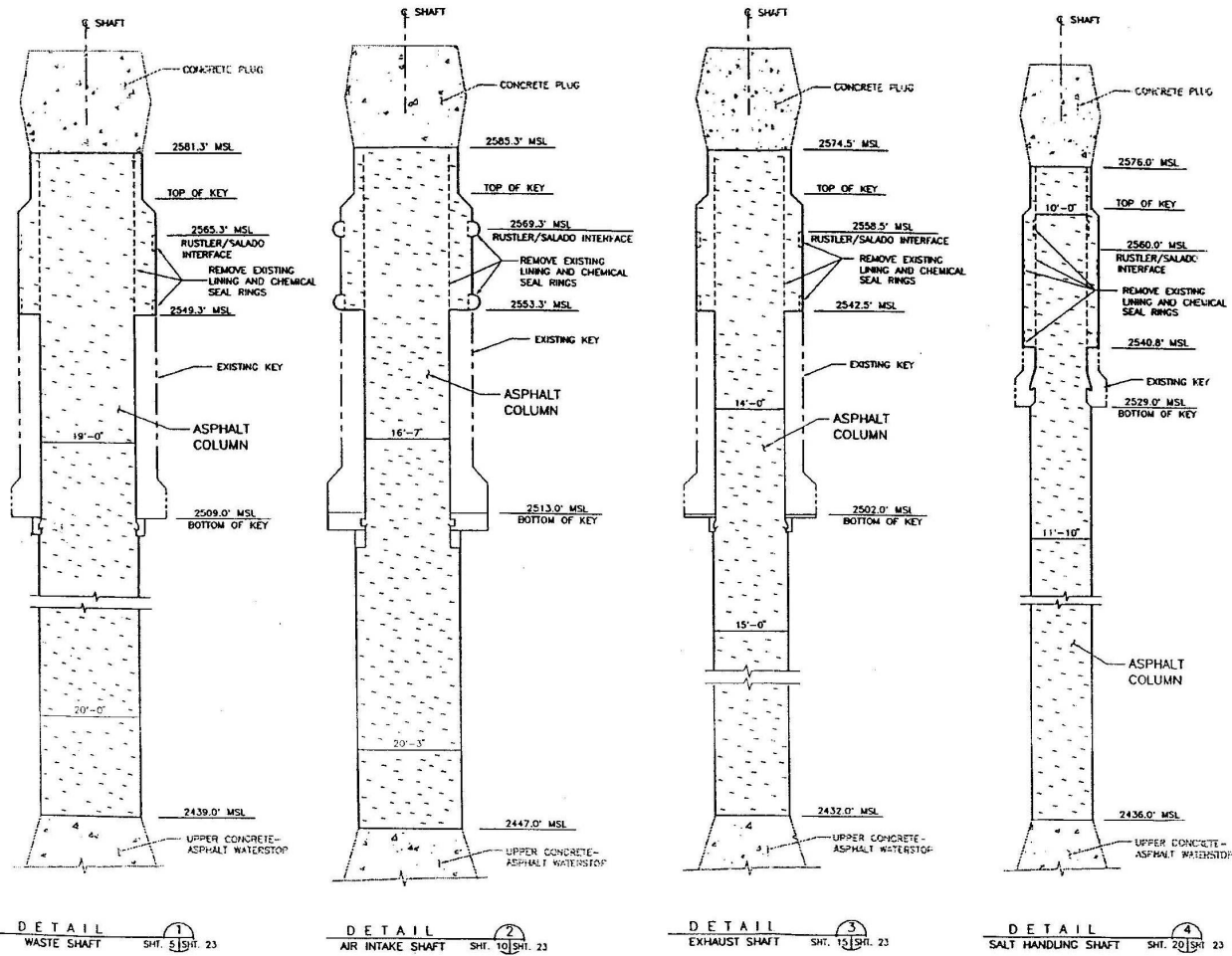
Sheet 21 of 28



Albert W. Dennis
 1-2-96

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Albert W. Dennis
 8-2-96

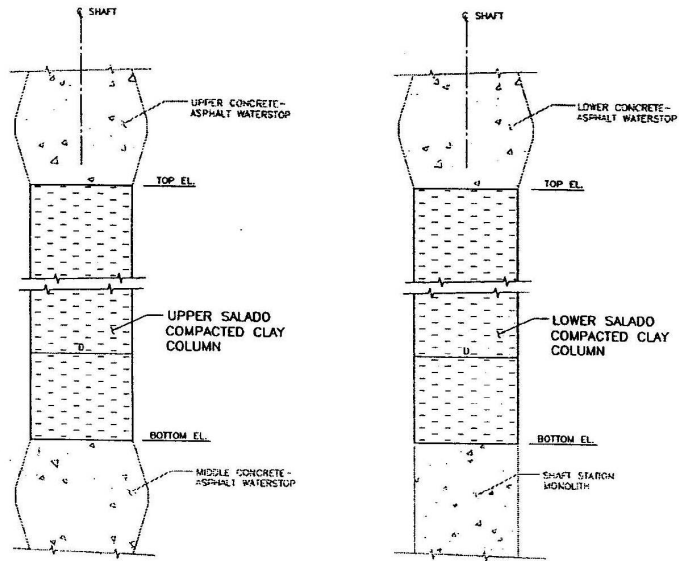


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WIPP SHAFT SEALING SYSTEM			DATE		
ASPHALT COLUMN			BY		
PARKSON BRINCKERHOFF ENERGY SERVICES, INC.			SCALE		
SHEET NO. 23 OF 28					

E-26

Asphalt Column

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 August 15, 2023 Proposed Final Permit



DETAIL
 SEE TABLE 1 FOR DETAILS
 NO SCALE
 SHT. 5 | SHT. 24
 SHT. 10
 SHT. 15
 SHT. 20

TABLE 1

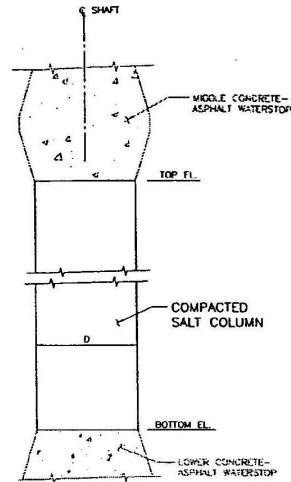
SHAFT	NOMINAL SHAFT DIAMETER D	UPPER SALADO COMPACTED CLAY COLUMN			LOWER SALADO COMPACTED CLAY COLUMN		
		TOP EL. (FT. MSL)	BOTTOM EL. (FT. MSL)	TOTAL HT. (FT.)	TOP EL. (FT. MSL)	BOTTOM EL. (FT. MSL)	TOTAL HT. (FT.)
WASTE	20'-0"	2389.0	2037.5	351.5	1382.0	1286.0	96.0
AIR INTAKE	20'-3"	2397.0	2053.0	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
 9-2-96

REV.	DATE	DESCRIPTION	BY	CHK.	APP.
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		BY	DATE		
		CK.	DATE		
		APP.	DATE		
		APP.	DATE		
UPPER AND LOWER SALADO COMPACTED CLAY COLUMNS					
PARSONS BRINCKERHOFF ENERGY SERVICES, INC.	SCALE:	SIZE:	SAL. DWG. NO.	SHEET NO.	
		B	SML-007	24	OF 28

NAME: C:\P\WIPP\A/E\SEALING DATE: MAY 06, 1996 TIME: 4:42 PM



DETAIL
 SEE TABLE 1 FOR DETAILS
 NO SCALE

SH1, 5 SH1, 25
 SH1, 10
 SH1, 15
 SH1, 20

TABLE 1

SHAFT	NOMINAL SHAFT DIAMETER D	COMPACTED SALT COLUMN		
		TOP EL. (FT. MSL)	BOTTOM EL. (FT. MSL)	TOTAL HT. (FT.)
WASTE	20'-0"	1987.5	1432.0	555.5
AIR INTAKE	20'-3"	2003.0	1439.5	563.5
EXHAUST	15'-0"	1992.0	1433.0	559.0
SALT HANDLING	11'-10"	2001.0	1441.0	560.0



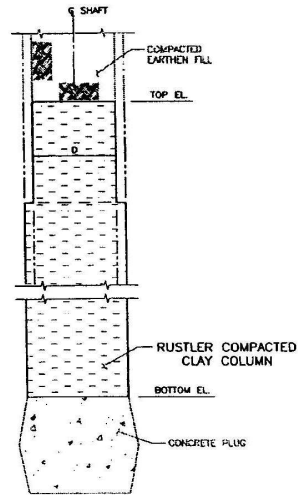
Albert W. Dennis
 8-2-96

REV.	DATE	DESCRIPTION	BY	CHK.	APP.
0	8/2/96	ISSUED FOR RECORDS PACKAGE			
SANDIA NATIONAL LABORATORIES					
WIPP A/E SUPPORT			CONTRACT NO. AG-4908		
WIPP SHAFT SEALING SYSTEM			NAME	DATE	
COMPACTED SALT COLUMN			BY	8/2/96	
			CHK.	8/2/96	
			APP.	8/2/96	
			APP.	8/2/96	
PARSONS BRINCKERHOFF ENERGY SERVICES, INC.		SCALE:	SIZE	SHL DWG. NO.	SHEET NO.
		8	B	SHL-007	25 OF 28

E-28

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

1
 SH. 4 | SH. 27
 SH. 8
 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	2801.3	234.7
AIR INTAKE	16'-7"	2840.0	2805.3	234.7
EXHAUST	14'-0"	2829.0	2594.5	234.5
SALT HANDLING	10'-0"	2830.0	2596.0	234.0

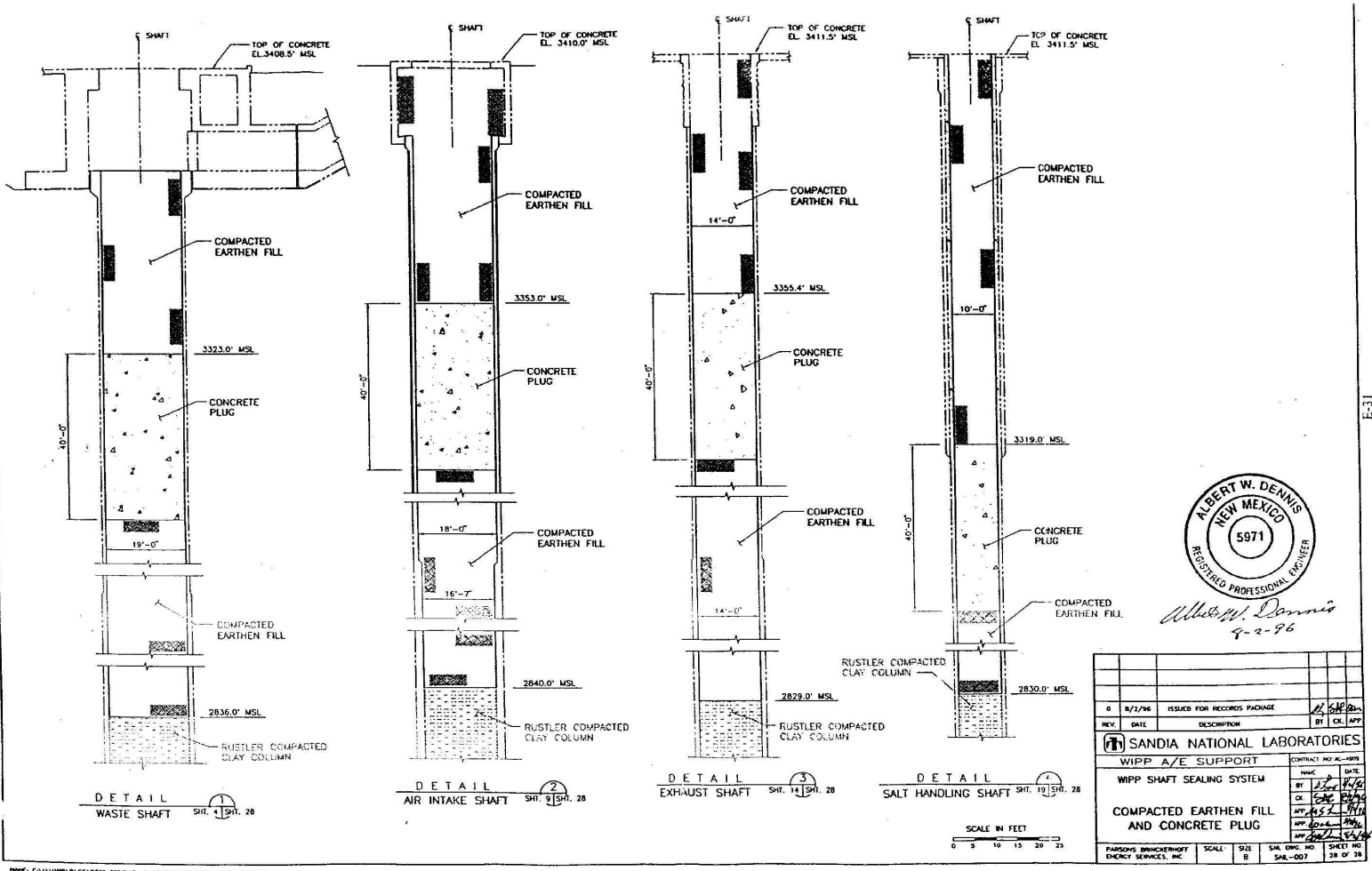


Albert W. Dennis
 7-2-96

REV.	DATE	DESCRIPTION	BY	CHK.	APP.
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SANDIA NATIONAL LABORATORIES WIPP A/E SUPPORT WIPP SHAFT SEALING SYSTEM RUSTLER COMPACTED CLAY COLUMN					
PARSONS BRINCKERHOFF ENERGY SERVICES, INC.		SCALE: SIZE B	S&L DWG. NO. S&L-007	SHEET NO. 27 OF 28	

WIP: ENVIRONMENTAL/SHAFT SEALING DATE: MAY 06, 1996 TIME: 04:10 PM

E-30



ALBERT W. DENNIS
 NEW MEXICO
 5971
 REGISTERED PROFESSIONAL ENGINEER
Albert W. Dennis
 9-2-96

0	8/1/96	ISSUED FOR RECORDS PACKAGE	BY: <i>SP</i>
REV.	DATE	DESCRIPTION	BY: <i>OK, APP</i>
SANDIA NATIONAL LABORATORIES			
WIPP A/E SUPPORT		CONTRACT NO. <i>W-1999</i>	DATE
WIPP SHAFT SEALING SYSTEM		NAME	DATE
COMPACTED EARTHEN FILL AND CONCRETE PLUG		BY: <i>SP</i>	DATE: <i>8/1/96</i>
		CHK: <i>SP</i>	DATE: <i>8/1/96</i>
		APP: <i>SP</i>	DATE: <i>8/1/96</i>
		APP: <i>SP</i>	DATE: <i>8/1/96</i>
PARSONS BRINCKERHOFF ENERGY SERVICES, INC.	SCALE: 1" = 10'	SHEET NO. 28 OF 28	SHEET NO. 28 OF 28

Compacted Earthen Fill and Concrete Plug

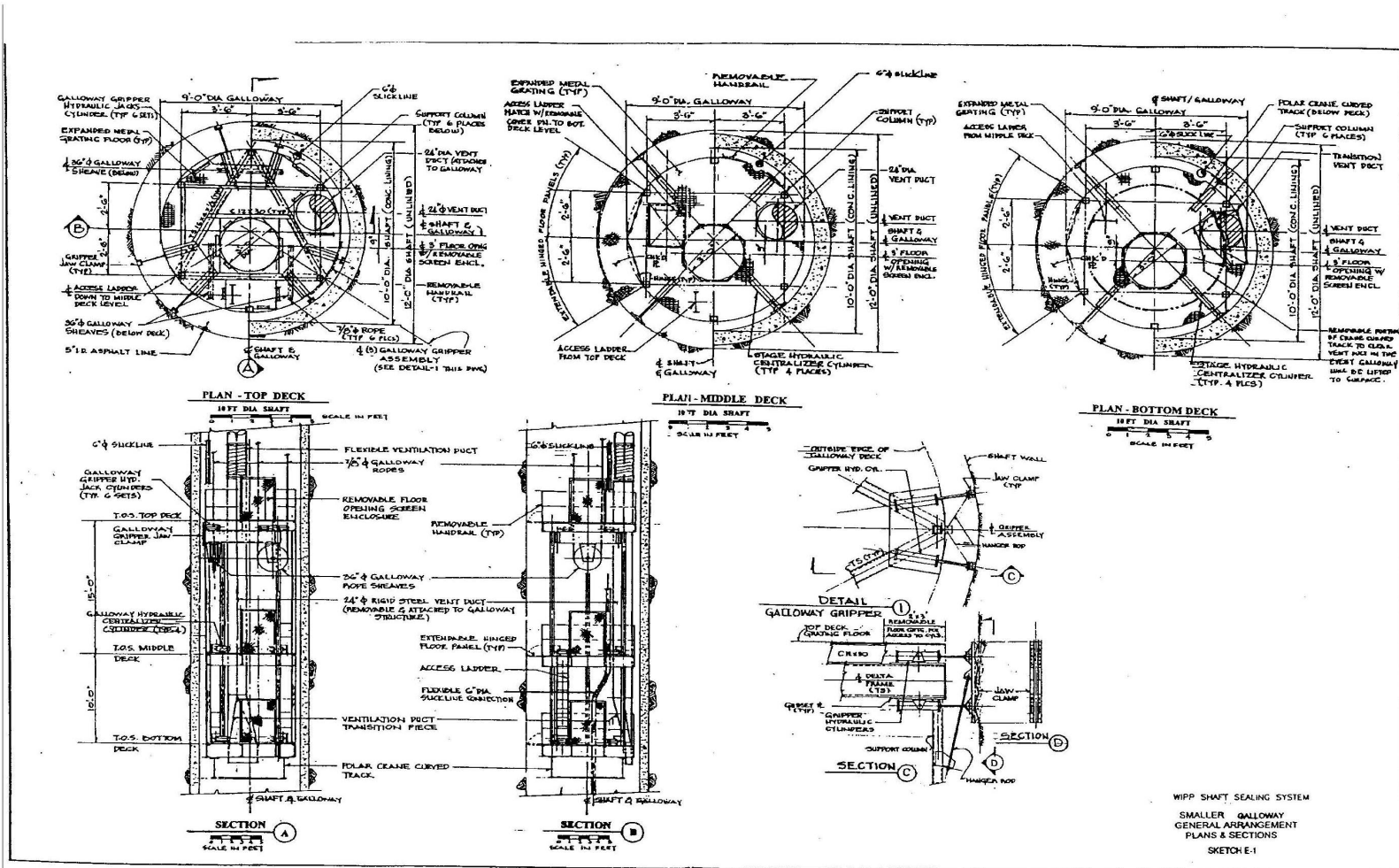
Sheet 28 of 28

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

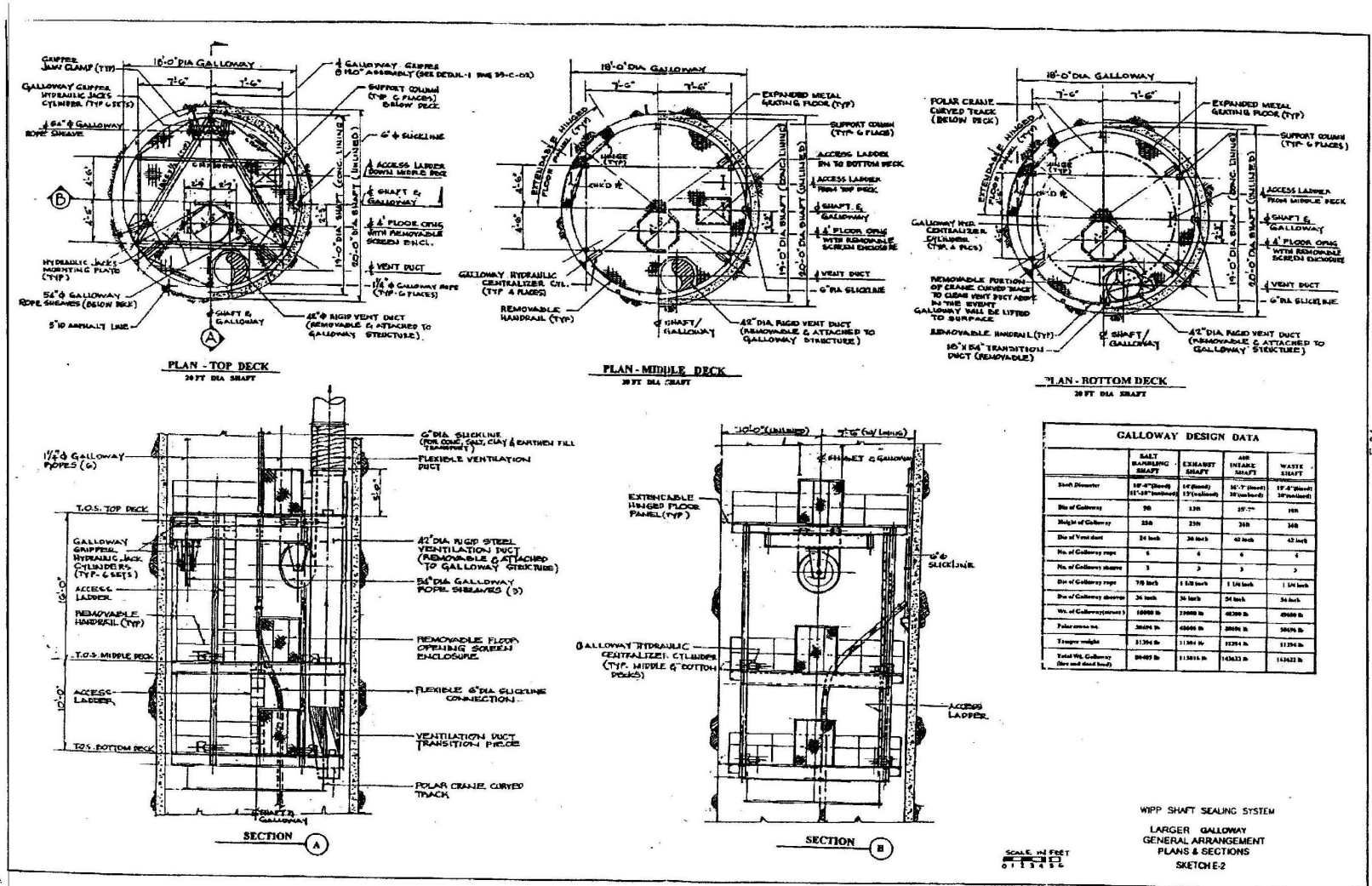
DRAWING NUMBER	TITLE
SKETCH E-1	WIPP SHAFT SEALING SYSTEM SMALLER GALLOWAY GENERAL ARRANGEMENT PLANS AND SECTIONS
SKETCH E-2	WIPP SHAFT SEALING SYSTEM LARGER GALLOWAY GENERAL ARRANGEMENT PLANS AND SECTIONS
SKETCH E-3	WIPP SHAFT SEALING SYSTEM TYPICAL HEADFRAME PLANS AND SECTIONS
SKETCH E-4	WIPP SHAFT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

E-32

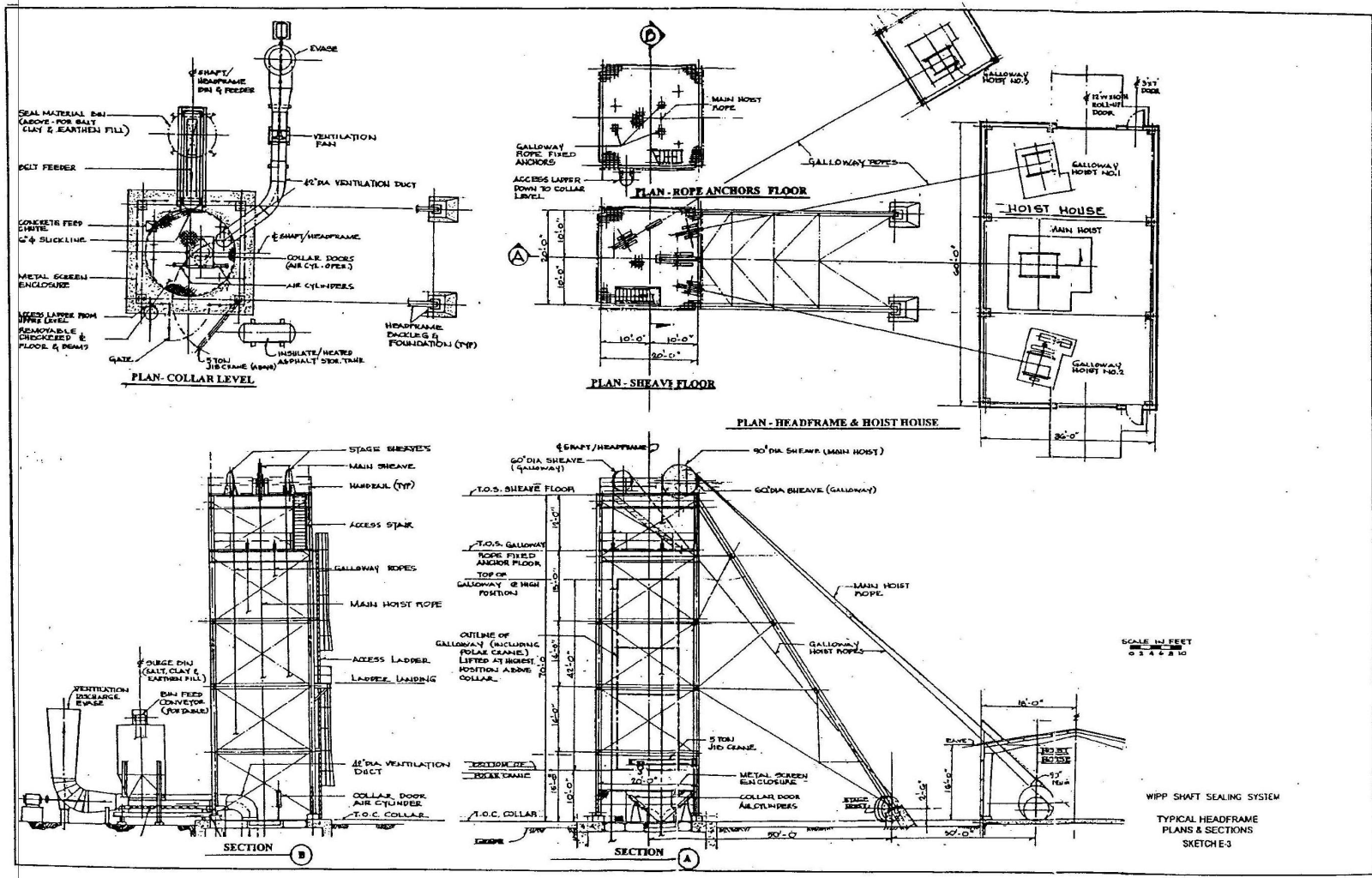
List of Sketches



WIPP Shaft Sealing System Smaller Galloway Genral Arrangement Plans and Sections

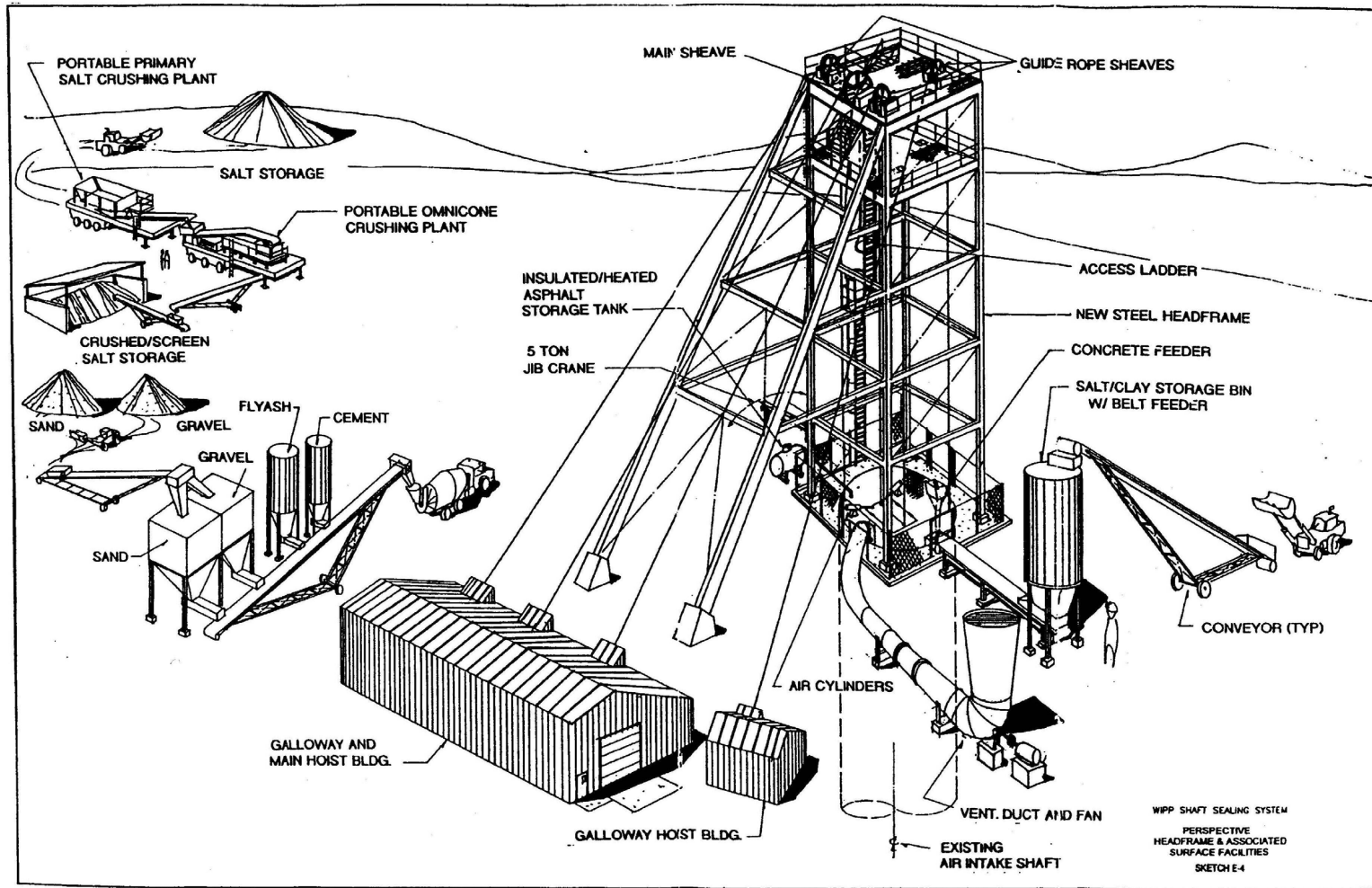


WIPP Shaft Sealing System Larger Galloway General Arrangement Plans and Sections



E-33

WIPP Shaft Sealing System Typical Headframe Plans and Sections



WIPP Shaft Sealing System Typical Headframe and Associated Surface Facilities

Waste Isolation Pilot Plant
 Hazardous Waste Facility Permit
 Attachment G2, Appendix G2-E
 August 15, 2023 Proposed Final Permit

WIPP
 UC721 Distribution List

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 Office of Program Mgmt. & Integ.
 Director, RW-40
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 Forrestal Building
 Washington, DC 20585

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 Yucca Mountain Site Characterization Office
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 101 Convention Center Drive, Suite #P-110
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 Austin, TX 78731

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Waste Isolation Pilot Plant
 Hazardous Waste Facility Permit
 Attachment G2, Appendix G2-E
 August 15, 2023 Proposed Final Permit

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 583 Henderson Hall, HN-15
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Waste Isolation Pilot Plant
 Hazardous Waste Facility Permit
 Attachment G2, Appendix G2-E
 August 15, 2023 Proposed Final Permit

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