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MEMORANDUM TO: Malcolm Knapp, Chief
 Geotechnical Branch
 Division of Waste Management

FROM: Barbara Cooke
 Hydrology Section
 Geotechnical Branch
 Division of Waste Management

Fred Ross
 Hydrology Section
 Geotechnical Branch
 Division of Waste Management

SUBJECT: TRIP REPORT FOR HYDROLOGY DATA ORIENTATION VISIT AT BATTELLE
 OFFICE OF NUCLEAR WASTE ISOLATION (ONWI) AND DOE SALT REPOSITORY
 PROJECT OFFICE (SRPO), COLUMBUS, OHIO, MAY 14-18, 1984.

Introduction:

Barbara Cooke and Fred Ross of the Hydrology Section were two of the NRC coordinators and attendees of the May 14-18, 1984 Salt hydrology data orientation visit. Attached is a detailed set of signed meeting minutes (Attachment #1) prepared by B. Cooke, F. Ross, J. Linehan, and R. Johnson and reviewed with DOE SRPO staff. The minutes include:

- o Meeting objectives
- o Daily activities and agendas
- o NRC, DOE, ONWI and State attendees (anticipated and actual)
- o NRC staff observations
- o Action items (for DOE and NRC)
- o Minutes of non-hydrology meetings occurring during the week.
- o Lists of documents which NRC requested, and DOE agreed would be mailed to NRC, pending subcontractor patent approval.

Related Products

Additional products and documents associated with this data orientation visit, which are available for future reference, are:

WM Record File
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WM Project 16
Doc No

B407170085 840621
 PDR WASTE
 WM-16 PDR

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- o DOE/ONWI presentations - copies of the vugraphs prepared by DOE/ONWI and subcontractor staff.
- o NRC Data Inventory - prepared by Fred Ross for our use and provided to DOE as a basis for their overview presentations.
- o NRC Data Inventories - Data inventories of documents provided by ONWI to NRC and contractor staff.

Data Assessment Observations

In addition to the NRC staff observations included in the meeting minutes are the following:

- o The data bases are regional-scale, not local-scale.
- o The data bases are significantly different for each of the three regions under consideration. The differences are in types, amount, density of tests, testing Q/A techniques, intercontractor transfer of information among contractors in the same region, types of data analyses, data storage methods and data storage locations.
- o There are data recently collected by DOE that may not be used in EA's.
- o There are data that has been collected by others (states, USGS, etc) that are not being referenced in the EA's.
- o We believe we have identified 90-100% of the available DOE data.
- o We have established access to 50-70% of that data.
- o Review of the remaining 30-50% may require additional prioritization, requests and trips.
- o No direct technical contacts at the staff level are yet permitted.

Follow-up

The following activities with respect to data review are planned or underway:

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IE :BCooke:dw	:FRoss	:JPohle	:	:	:	:
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- o Determine data review priorities for the short term (pre-EA) time frame.
- o Review data critical to DOE Guidelines and EA review.

Sincerely,


 Barbara Cooke
 Hydrology Section

Fred Ross
 Hydrology Section

Attachment:
 As stated

:WMGT	:WMGT	:WMGT	:	:	:	:
E :BCooke:dw	:FRoss J.W.D.	:JPohle	:	:	:	:
E :6/20/84	:6/20/84	:6/21/84	:	:	:	:

NRC HYDROLOGY DATA ORIENTATION AND DATA REVIEW
COLUMBUS, OHIO, MARCH 14-18, 1984

NRC hydrology and salt staff and contractors conducted data orientation and review during the week of March 14-18, 1984. Objectives were to determine degree of completeness of NRC preliminary data inventory and to review unreleased data. Also attending were representatives of NRC geology, geochemistry and rock mechanics staff and representatives from Mississippi, Louisiana and Utah.

Data Orientation and Review Summary

- May 14 - NRC staff and contractors discussed data orientation visit objectives with DOE-SRPO staff and hydrology representatives from Mississippi and Louisiana.
- May 15 - DOE, ONWI, and subcontractors made overview presentations. See attached agenda (Attachment 1). Presented were data traceability, contributing organizations, QA at various organizational levels, types and amounts of data, and storage location of data. Data-related questions which NRC staff had submitted prior to meeting were addressed. The list of attendees is attached (Attachment 2), and includes representatives from Utah and Mississippi.
- May 16 - NRC staff and contractors inventoried and reviewed unreleased data and modeling documents provided by DOE which NRC staff had requested. Also provided were additional documents identified by DOE staff and contractors. S. Keefer from Utah, B. Ross, a Utah contractor, and C. Stover from Mississippi attended throughout.

ONWI staff gave a tour and explained Records Turnover Packages (RTP) facilities for filming, indexing and storage. NRC staff successfully searched for specific data on this system. C. Stover from Mississippi attended as well.

ONWI data management system staff instructed NRC staff on use of ONWI Records Information System (RIS) and the on-line Catalog of pending items.

J. Linehan, R. Johnson, J. Neff, L. Casey and T. Verma discussed plans and schedules for future data reviews and meetings. Attachment 3 summarizes this meeting.

Utah and Mississippi state representatives concluded their attendance at the end of the day.

May 17 - NRC staff and contractors continued data inventory and review of data and modeling documents. Copies of documents to be shipped to NRC office in Silver Spring for further review were identified (Attachment 4).

May 18 - Reviews on selected documents were continued by NRC staff and contractors.

NRC staff summarized week's activities with DOE and ONWI staff.

NRC Staff Observations

1) The Salt Repository Project Technical Data Base (SRP TDB), Records Information System (RIS) and Catalog and Procedures for Requesting Unanalyzed and Processed Data/Information from the CRWM-Salt Repository Project automated data systems are valuable as a centralized reference tool. These aided in checking completeness of NRC data document inventory.

There are still a number of data-related documents that are not in the automated data bases.

2) NRC has identified a significant amount of hydrology data that is not physically available in Columbus, such as the Woodward-Clyde long-term drill stem test data described in ONWI-491, and the pump test data on the dolomite at the base of cycle 4 salt at J. Friemel #1 and Zeack #1 in the Palo Duro Basin. NRC staff needs to review these data prior to EA review.

3) Access to DOE, ONWI, and subcontractor staff for data clarification during this review was invaluable, and NRC requests the same at forthcoming data reviews in other technical areas.

Action Items

1) NRC will provide a list of additional hydrogeology data to be made available which were identified during this review.

2) NRC will provide a list of geology and rock mechanics data to be made available.

3) NRC staff will provide a report of this meeting to DOE, states, and the PDRs. This report will include observations and concerns which NRC identifies upon further review of data documents obtained, and copies of inventory review sheets.

4) NRC provided DOE with attached list of documents (Attachment 4) which DOE agreed to transmit subject to completion of patent review (one copy each) to NRC in Silver Spring.

Above items were discussed and the above action items agreed to.

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The above subject (NIC)

Hydrology Data Presentation to the NRC

Tuesday, May 15

in Project Management Center (Room 13-4-160)

AGENDA

Day 1

- 8:30 - 8:45 NRC/DOE Introductions
- 8:45 - 9:30 ONWI Hydrology Overview - M. Deyling, ONWI
- 9:30 - 10:00 ONWI Hydrochemistry Overview - N. Hubbard, ONWI
- 10:00 - 10:15 Break
- 10:15 - 10:⁴⁵~~30~~ Quality Assurance - R. Murthy, ONWI
- 10:45 - 11:15 Gulf Coast Hydrology Data - M. Teubner, Earth Tech Corp.
- 11:30 - 1:00 Lunch
- 1:15 - 1:45 Paradox Basin Hydrology Data - J. Thackston, Woodward-Clyde
- 1:45 - 2:15 Permian Basin Hydrology Data - L. Picking, SWEC
- 2:15 - 2:45 Permian Basin Hydrology Data - C. Kreidler, TBEG
- 2:45 - 3:00 Break
- 3:00 - 4:30 (Questions & Answers) Introduction to reports

Day 2

Reviews

Day 3

Reviews

Day 4

10:00 End NRC Review and Debrief Participants

Anticipated Attendees

for May 15, 1984

Hydrology Data Presentation to the NRC

Presenters

Mike Deyling, ONWI
Norman Hubbard, ONWI
Charles Kreidler, TBEG
Ram Murthy, ONWI
Larry Picking, SWEC
Mike Teubner, ERTEC
John Thackston, WCC

Observers

Bechtel person
Ping Chen, ONWI
Jack Fitch, Fluor
Golder person
NUS person
Bob Rihs, P-R

Participants

Bernie Archer, ONWI
Adrian Brown, NRC-Golder and Assoc., Consultant
Leslie Casey, SRPO
Barbara Cooke, NRC-hydrogeology
David Dawson, ONWI
Glen Faulkner, USGS-Germantown
Bill Ford, NRC-hydrology
Brad Hanson, LA
Robert Johnson, NRC
Sally Keefer, UT
Walt Kelley, NRC-geochemistry
Al La Sala, USGS-Columbus
John Linehan, NRC
Dale Markley, ONWI
Jeff Neff, SRPO
Carl Newton, DOE-HO
Jim Osiensky, NRC-hydrologist, Williams and Assoc., Inc.
Jerry Pearing, NRC-rock mechanics
Leslie Peeters, NRC-hydrochemistry/PA
Ben Ross, UT-contractor
Fred Ross, NRC-hydrogeology
Jerry Rowe, NRC-Golder and Associates
Jo Ann Sherwin, SRPO
Curtis Stover, MS Bureau of Geology
John Trapp, NRC-geology
Teek Verma, NRC-Columbus
Roy Williams, hydrologist-NRC, Williams and Assoc. Inc.
Gerry Winter, hydrologist-NRC, Williams and Assoc. Inc.

May 13, 1984

Hydrology Data Presentation Attendee List

<u>Name</u>	<u>Organization / Function</u>
Leslie A. Casey	DOE/SRPO Regulatory & Systems Project Manager
JEFF NEFF	DOE/SRPO PROGRAM MANAGER
JOHN LINDEAN	NRC SECTION LEADER -SALT
ROBERT JOHNSON	NRC PROJECT MANAGER -SALT
Fred Ross	NRC Hydrogeologist
Barbara Cooke	NRC Hydrogeologist
Bill Ford	NRC Hydrogeologist
Leslie Peeters	NRC Hydrogeologist
Roy E. Williams	WILLIAMS + ASSOC Hydrogeologist
RODNEY C. TRIPPO	N.P.I. Geology
JEROME R PEARRING	N.R.G. GEOTECHNICAL ENGINEER
James L. Osiensky	Williams + Assoc Hydrogeology
Curtis W. Stover	Ms. Bureau of Geology Geologist
CERRY WINTER	WILLIAMS & ASSOC. HYDROGEOLOGY
Jerry Rowe	NRC / Golden Assoc Hydrogeology
Larry Picking	Stone & Webster Hydrogeologist
Tilak (Teek) Verma	NRC On-Site Licensing Rep
ADRIAN BROWN	CONS. TO GOLDEN/NRC GEOMORPHOLOGY/SYSTEMS
Dale Markley	ONWI Hydrogeologist
JOHN THACKSTON	WCC "
Mike Doyling	ONWI Hydrogeologist
Jo Ann Thurman	DOE/SRPO Chief Site-Evaluation
Albert M. La Sala, Jr	USGS/SRPO Hydrologist (Liason & Tech. advice)
Gene L. Faulkner	USGS (SI/DOE/HQ) Hydrologist (Hydrogeology)
MICHAEL TEUBNER	Earth Technology Hydrogeologist
Jim Miller	Earth Technology Geologist

NAME

ORG / FUNCTION

Sally Kefer
CARL NEWTON

State of Utah - DWR - Hydrologist
DOE - HQ / Licensing

DAVID PENTZ

GOLDER / IN-SITU TEST CONTRACTOR (ONWI):

Charles Kreidler

Texas Bureau of Economic Geology

Norman Hubbard

ONWI / Geochemistry / Hydro Serv.

Ping Chen

ONWI / Regulatory

Neal Carter

BPMD General Mgr

Tom Thompson

Budget Project Manager

DM DAWSON

ONWE / REGULATORY DEPT.

Ben Ross

Disposal Safety Inc.

BERNARD BRENER

ONWI / FUNCTIONAL GEOLOGY MGR

RAM MURPHY

ONWI / Lead Q.A. Specialist

ROBERT RIHS

PARSONS - REDPATH / MGR QA

JACK FITCH

FLUOR ENG INVEETS

Matt Golis

ONWI / TDS manager

During the course of the hydrology data review, May 14-18, 1984, discussions were held between NRC (J. Linehan, R. Johnson, and T. Verma) and DOE staff (J. Neff and L. Gasey) on the following:

- o Proposed meeting between NRC (Division of Waste Management, Repository Projects Branch (WMP) and Division of Safeguards) and DOE-SRPO and DOE consultant (Fluor) to discuss site security aspects of a high level waste repository and allow DOE to review site security plans for various fuel cycle facilities. A meeting in Silver Spring on May 23, 1984 was agreed to.
- o Proposed meeting with NRC (WMP) requested by DOE-SRPO on performance assessment methodology. Purpose of the meeting is for NRC to explain to DOE-SRPO, NRC's current thinking on performance assessment methodology at salt sites. Following the meeting DOE-SRPO plans to finalize the salt performance assessment plan and provide it to NRC and other interested parties for comment. A meeting on June 14-15, 1984 was agreed to. It is anticipated that DOE-SRPO staff will review performance assessment related documents on the afternoon of June 14 and discussions will be held on June 15.
- o To facilitate communications between NRC (WMP and site rep.) and DOE-SRPO, weekly conference calls will be held at 4 p.m. on Mondays or the first working day of the week. It was also agreed that more frequent meetings (approximately monthly) between DOE-SRP and NRC staff would be appropriate.
- o NRC staff requested that DOE-SRPO establish DOE-SRPO or ONWI contacts in the various technical areas to facilitate exchange of information (not to discuss data interpretations or technical reviews). NRC had provided DOE-SRPO and the salt states with such contacts at the last salt state DOE-SRPO-NRC meeting. DOE-SRPO indicated that they could not followup on this until after September 1, 1984 due to the press of EAs.
- o Rock Mechanics data review. NRC and DOE-SRPO staff agreed to hold the review in July 1984. The review would be similar to that for hydrology with a one-day overview by DOE-SRPO and consultants followed by review of data by NRC staff and consultants and interested salt states. NRC agreed to provide DOE-SRPO with an inventory of key documents identified in the above technical areas, as well as specific documents and data needed for the data review in the immediate future and an update by mid-June. DOE, in turn, committed to providing NRC with a bibliography of data and reports (developed by a RIS search and a contractor search) prior to the meeting. DOE will propose specific dates in the near future for the July data review meeting.

o Geochemistry Meeting

NRC requested a meeting with DOE-SRPO staff to discuss DOE-SRPO's geochemical program as well as the supporting rationale and data. Based on discussions between NRC staff and DOE-SRPO staff and contractors, NRC agreed to first review Draft No. 3 of the EAs and then propose a date and scope for the meeting.

It is anticipated that the meeting with DOE would be limited to one day and be attended by five NRC staff and consultants.

2- 4

HYDROLOGY DATA REFERENCES

Permian

leioz BMI/SRP-5009 Well Completion Report Zeeck No. 1 Palo Duro Basin,
January 1983 (SWEC)

leioz BMI/SRP-5008 Well Completion Report Detten No. 1 Palo Duro Basin,
November 1982 (SWEC)

leioz BMI/SRP-5010 Pumping Test and Fluid Sampling Report Sawyer No. 1 Well
Palo Duro Basin, March 1983 (SWEC)

leioz BMI/SRP-5011 Well Completion Report J. Friemel No. 1 (PD-9) Palo Duro
Basin, December 1983 (SWEC)

leioz BMI/SRP-5004 Well Completion Report Harman No. 1 Palo Duro Basin,
February 1983 (SWEC)

leioz BMI/SRP-5006 Well Completion Report Sawyer No. 1 (PD-3) Well Palo Duro
Basin, Texas: Unanalyzed Data January, 1984 (SWEC)

leioz BMI/SRP-5014 Drill-Stem Test Formation Pressure Data Base No date (SWEC)

leioz BMI/SRP-5013 Listing of Oil and Gas Well Data File No date (SWEC)

leioz BMI/SRP-5005 Well Completion Report Mansfield No. 1 (PD-4) Well Palo Duro
Basin, Texas: Unanalyzed Data January, 1984 (SWEC)

leioz BMI/SRP-5007 Well Completion Report Holtzclaw No. 1 (PD-10) Palo Duro
Basin, December 1983 (SWEC)

PC Reports which will be released pending patent clearance .
BEG Reports which will be sent by BEG

✓ BMI/SRP-5003 Well Completion Report G. Friemel No. 1 (PD-5) Palo Duro Basin, April 1984 (SWEC)

✓ BMI/SRP-5012 Permeability Data Base-Palo Duro Basin: Texas, Oklahoma, and New Mexico: Unanalyzed Data, May 1984 (SWEC)

✓ BMI/SRP-5012 Permeability Data Base No date (SWEC)

✓ BMI/SRP-5002 Well Completion Report Dissolution Zone Water Wells (PD-8, PD-11, PD-12, PD-13) Palo Duro Basin, December 1983 (SWEC)

✓ BMI/SRP-5002 Well Completion Report Dissolution Zone Water Wells (PD-8, PD-11, PD-12, PD-13), Palo Duro Basin, Texas: Unanalyzed Data, April 1984 (SWEC)

Xerox ✓ LIB No. 1135 Ogallala Aquifer Mapping Program, October 1983 (SWEC)

Xerox ✓ ONWI-504 First Status Report On Regional Ground-Water Flow Modeling for The Palo Duro Basin, Texas, March 1984 (INTERA)

✓ Draft Report Hydrogeologic Investigations Based On Drill-Stem Test Data Palo Duro Basin Area Texas and New Mexico, May 1984 (SWEC) PC

~~BMI/SRP-5014 Formations Pressure Data File Palo Duro Basin, Texas and New Mexico: Unanalyzed Data May 1984 (SWEC)~~

Letter Report Host Rock Geochemistry, March 14, 1984 (TBEG)

Xerox ✓ Wirojanagud, P., Kreidler, C. and Smith, D. (TBEG). Numerical Modeling of Regional Ground-Water Flow In The Deep-Brine Aquifers Up The Palo Duro Basin, Texas Panhandle.

Intera, Dec. 1983. First Status Report On Regional Ground-Water Flow Modeling For The Palo Duro Basin, Texas, Third Draft. PC

Intera, Oct. 1983. Second Status Report On Regional Ground-Water Flow Modeling For The Palo Duro Basin, Texas, First Draft.

Intera, Dec. 1982. Status Report On Regional Ground-Water Flow Modeling For The Palo Duro Basin, Texas, First Draft.

SWEC, Mar. 1983. Pumping Test and Fluid Sampling Report Sawyer No. 1 Well Palo Duro Basin.

SWEC, Jul. 1983. Pumping Test and Fluid Sampling Report Mansfield No. 1 Well Palo Duro Basin.

SWEC, 1983b. Investigations Based On Drill-Stem Test Data, Palo Duro Basin Area, Texas and New Mexico, BWI/ONWI-xxx, prepared for the Office of Nuclear Waste Isolation, Battelle Memorial Institute, Columbus, OH. July Draft. (This may be the source as Bair, et, al, above).

Resource Engineering, Inc., 1983. Laboratory Testing of Rock and Salt.

SWEC, 1983 & 1984. Wolfcamp Potentiometric Surface After Culling Depressed, Overpressured, and Underpressured Data, Palo Duro Basin, Geotechnical: Sketch Nos. 13697-37-H-1 and 13697-37-E-1.

SWEC, 1983. Geotechnical Profile - Detten No. 1 - G. Friemel No. 1, Geotechnical Sketch No. 13697-G(B)-29.

SWEC, 1983. Geotechnical Sketch No. 13697-37-C-1 Inferred Faults In Northern Palo Duro Basin.

SWEC, 1983. Zone of Dissolution of the Lower San Andres Unit 4 Salt; Sketch No. 13697-37-D-1.

SWEC, 1983. Thickness of Thick Salt Bed in Lower San Andres, Unit 4 in Northern Palo Duro Basin: Sketch No. 136597-36-A-2

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(hydrochem)

SWELL, M. J., 1984. Summary of Chemical and Isotopic Data produced by Bendix Field Engineering Corporation for Mansfield No. 1, Zeck No. 1, Sawyer No. 1, and Friemel No. 1 Wells in the Texas Panhandle, ONWI Technical Report, Tables 1 and 4.

xerox
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SWEC, 1983. Pennsylvanian Potentiometric Surface After Culling Depressured, Overpressured, Data in Northern Palo Duro Basin: Sketch 13697-37-F-1.

PC

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BEG

P.G. Smith 1983, modeling the Deep Basin hydro. of a Potential high-level Rad waste site in Texas.

xerox

TBEG - Well Summary Reports

BE

xerox

PARADOX BASIN

Thackston, J. W., et al., 1983, Draft Preliminary Hydrologic Budget Studies, Indian Creek Water Shed and Vicinity, Western Paradox Basin, Utah (WCC) - Refs and title page only

McCulley, B. L., Thackston, J. W., and Probst, L. M., 1984. Status Report: Geochemical Interactions Between Ground-water and Paleozoic Strata, Gibson Dome Area, Southeastern Utah, draft prepared by McDermid-Clyde PC

CNWI-503 First Status Report on Regional Ground-water Flow Modeling for the Paradox Basin, Utah May, 1984 (Intera)

Richter + Huntcoen, 1980. Ground water Res. in the Part of Canyonlands National Park East of the Colo. River and Contiguous Bureau of Land Management Lands, Utah -

~~Paradox Basin~~

Paradox 2nd status of modeling (Intera)

PC

Domes

Please Copy

ONWI / E 512 - 02900 / TR-30, Second
Status Report on Regional and Local Ground-Water
Flow Modeling for Richton & Cypress Creek
Domes, Mississippi. 3rd Draft

PC

Salt Dome, Project Records List For IES-LSU
July 2, 1981.

BMI / ONWI - 525, Potentiometric Level
Monitoring Program - Mississippi and Louisiana:
Annual Status Report for Fiscal Year 1983

ONWI / E 512 - 02900 / TR 20, Status Report
on Regional Ground-Water Flow Modeling of
the Verberre Dome, La., First Draft 1983

ONWI / E 512 - 02900 / TR-30

ONWI / E 512 - 02900 / TR-21

Braker, A.R., Salt Water Disposal Wells
in Mississippi, Info. Series MGS-72-4

Mississippi State Oil & Gas Board, Mo.
Report on Fluids Injected into Oil

Mississippi State Oil & Gas Board
Mississippi Oil & Gas Production Annual
Report, 1982

GEOCHEMISTRY DOCUMENTS LIST

Hubbard, Livingston, Fukui, The composition and stratigraphic Distribution of Materials in the Lower San Andres Salt Unit 4

Zaikowski, Kosanke, Hubbard, Progress on Radiometric Dating of Wolfcamp Brines Using ^4He and ^{40}Ar

Hubbard, Laul, Perkins, The use of Natural Radionuclides to Predict the Behavior of Radwaste Radionuclides in Far-Field Aquifers

Characterization Status Report (332 FJ) Host Rock Geochemistry (6.1)

Sewel, 1984 Palo Duro Brine Samples Table 1, Table 4

SWEC, 1982 Springs & Seeps in the Palo Duro Basin Area, TX. draft report

GEOLOGY DOCUMENTS LIST

DATAET:

HIGH RESOLUTION SEISMIC REFLECTION
STUDY, VACHELIE DOME

CSR

3.1.1, 7.2.1, 7.2.2, 3.1.2

SEISMIC REFLECTION, GRAVITY &
MAGNETIC STUDIES OF GEOLOGIC STRUCTURES
IN THE GIBSON DOME AREA

PC

STRATIGRAPHY & STRUCTURAL CONFIGURATION
OF THE NAUASO THROUGH OUNNY
FORMATIONS IN THE VICINITY OF
GIBSON DOME

PC

E-LOGS

DATAET (

ROCK MECHANICS/DESIGN DOCUMENTS LIST

~~ERTEC High Resolution Seismic Reflection Survey~~
~~WILSON DOME~~
~~Fracture Identification~~

Birdwell Seismic Program: Log, 3-D Velocity
Wilson Dome

Report of Laboratory testing of Rock Core Samples
from Manfield No. 1 Well - Permian Basin Project
Stone & Weller Engineering Corp. No. 14. 1983

Laboratory testing of Rock and Salt Samples for Determination
of Specific Gravity and total Porosity - SWEC - 9/20/83
Resource Engineering Incorporated

Schlumberger - Sonic Variable Density/Waveforms
J. FRIEMEL No. 1 2400 - 3000'

Schlumberger - Long Spread Sonic Digitized Waveform
J. Friemel No. 1 2400 - 3000'

Schlumberger - Fracture Identification Log
J. Friemel No. 1 2400 - 3000'

~~Report of Laboratory testing on Rock Core Samples from Manfield~~