



Department of Energy

Office of Civilian Radioactive Waste Management WBS 1.2.5
Yucca Mountain Site Characterization Office QA: N/A
P.O. Box 98608
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MAY 0 1 1995

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Washington, DC 20555

TUNNEL BORING MACHINE (TBM) OPERATIONS BEYOND THE UPPER
PAINTBRUSH TUFF NONWELDED CONTACT IN YUCCA MOUNTAIN
(SCPB: N/A)

- References:
- (1) Ltr, Holonich to Shelor, dtd 6/21/94
 - (2) Ltr, Brocoum to Holonich, dtd 8/10/94
 - (3) Ltr, Federline to Milner, dtd 10/6/94
 - (4) Ltr, Milner to Holonich, dtd 3/31/95
 - (5) Ltr, Bernero to Dreyfus, dtd 10/13/94
 - (6) Ltr, Dreyfus to Bernero, dtd 11/14/94
 - (7) Ltr, Milner to Holonich, dtd 1/27/95

By this letter we are notifying you that on May 12, 1995, we are planning to lift the hold on TBM operations beyond the upper Paintbrush Tuff nonwelded (PTn) contact in Yucca Mountain, Nevada.

Concerns over the pneumatic pathways issue have been discussed in a number of letters over the past year. In your letter of June 21, 1994 (Reference 1), you requested a description of potential Exploratory Studies Facility (ESF) interference effects on the collection of ambient air pressure and air chemistry data. You described the State of Nevada's concerns with the impact of ESF construction on the ability to characterize the Yucca Mountain site, and you requested a description of the Accelerated Surface-Based Testing Plan and an explanation of how that program will address the State of Nevada's concerns. Our response of August 10, 1994 (Reference 2), provided a description of the program that would obtain pneumatic pressure data along the North Ramp of the ESF prior to the approach of the TBM. Your letter of October 6, 1994 (Reference 3), stated that our response did not fully explain how the U.S. Department of Energy (DOE) program would address the State of Nevada concern. You requested a description of the conceptual models of air flow through Yucca

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Mountain that were used to develop the Accelerated Surface-Based Testing Plan and a discussion of how the program would determine if the PTn unit over the site, the Topopah Spring unit outcrop in Solitario Canyon, and the Solitario Canyon fault are pneumatic barriers. We provided the requested information by letter of March 31, 1995 (Reference 4), which described how our testing program was developed on the basis of a conceptual model of air flow through Yucca Mountain that identifies potential stratigraphic pneumatic barriers such as the PTn unit.

Your letter of October 13, 1994 (Reference 5), with comments and questions on ESF quality assurance and design control referenced the pneumatic pathways concern. Our letter of November 14, 1994 (Reference 6), responded to that concern. We informed you by that letter that we had applied a hold, consistent with our process, on Yucca Mountain ESF TBM operation beyond the upper PTn contact until pneumatic pressure data were collected through several barometric pressure fronts. This hold reflected a sensitivity to the State of Nevada's concerns about the potential loss of data due to ESF excavation. We noted that the hold would be lifted once initial data had been collected, but that monitoring pneumatic conditions would continue. The associated letter of January 27, 1995 (Reference 7), confirmed this commitment.

The first of the pressure monitoring systems (in Borehole NRG-7a) was installed in late October and has been gathering data since the beginning of November 1994. A second system (in NRG-6) was installed in November-December and has been gathering data since January 1995. These instrument arrays record pressure changes nominally at the surface and at depth (above, within, and below the PTn) in response to atmospheric pressure changes. Instrument station locations for NRG-7a and NRG-6 are listed in Enclosure 1. Diagrams of the instrumentation arrangements for NRG-7a and NRG-6 are included in Enclosure 2.

Based on our review of the data gathered prior to April 3, 1995, the requisite data have been obtained from downhole instrumentation in boreholes NRG-7a and NRG-6. Preliminary plots of the subsurface pressure response at NRG-7a and NRG-6 are included in Enclosure 3. These data, which reflect ambient conditions, are of value in resolving the State of Nevada's concerns with respect to the PTn unit performing as a pneumatic barrier.

We also note that Westbay instrumentation installed by Nye County, Nevada, in Borehole NRG-4 has recorded subsurface responses to barometric fluctuations since March 18, 1995, that complement and generally agree (in terms of depth-wise time lag and amplitude attenuation) with those recorded by the DOE at NRG-7a and -6.

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Details of the available records are as follows:

Borehole: NRG-7a

Number of downhole pressure stations: 5

- a. above PTn - 1
- b. in PTn - 1
- c. below PTn - 3

Period of record: October 29, 1994-April 2, 1995; ongoing

Data gaps: All stations November 22-28 and December 1-5, 1994; January 3-5 and 8, 1995; February 9, 11-13, and 16, 1995; March 21, 1995

Number of frontal weather systems recorded: >10

Quality assurance status: Data obtained under the Office of Civilian Radioactive Waste Management (OCRWM)-approved U.S. Geologic Survey (USGS) quality assurance program

Borehole: NRG-6

Number of downhole pressure stations: 8

- a. above PTn - 2
- b. in PTn - 1
- c. below PTn - 5

Period of record: January 9, 1995-April 2, 1995; ongoing

Data gaps: Stations A and B, January 24, 1995-February 9, 1995; All stations February 21 and March 21, 1995

Number of frontal weather systems recorded: >10

Quality assurance status: Data obtained under the OCRWM-approved USGS quality assurance program

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Borehole: NRG-4

Number of downhole pressure stations: 7

- a. above PTn - 2
- b. in PTn - 1
- c. below PTn - 4

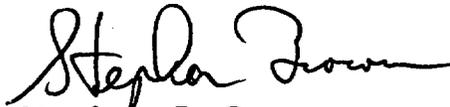
Period of record: March 18, 1995-March 26, 1995; ongoing

Data gaps: none in above period of record

Number of frontal weather systems recorded: >2

Quality assurance status: Nye County data has not been obtained under an OCRWM-approved quality assurance program

The pneumatic response data from the specified boreholes exceed the minimum data set required for lifting the hold on ESF excavation beyond the upper PTn contact. Since data for several pressure fronts have been collected, we intend to lift the hold on ESF excavation on May 12, 1995. Based on the current rate of TBM operations, we expect to reach the upper PTn contact in late May or early June 1995. We plan to continue monitoring pneumatic conditions in boreholes NRG-6 and -7a until the gaseous flow model describing the behavior of the unsaturated zone and the influence of ESF construction on the gas-flow regime has been sufficiently developed and confirmed by the data. In addition, we intend to proceed with instrumentation and monitoring of the other boreholes identified in Enclosure 3 of our letter of March 31, 1995 (Reference 4) in an expedient fashion. If you have any questions on this matter, please contact either Susan B. Jones at (702) 794-7613 or me at (702) 794-7971.



Stephan J. Brocoum
Assistant Manager for
Suitability and Licensing

AMSL:SJB-3025

Enclosures:

1. Instrument Station Locations for NRG-7A and NRG-6
2. Instrumentation Arrangements for NRG-7A and NRG-6
3. Preliminary Plots of the Subsurface Pressure Response at NRG-7A and NRG-6

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cc w/encls:

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ENCLOSURE 1

INSTRUMENT STATION LOCATIONS FOR NRG-7A AND NRG-6

Deep Unsaturated-Zone Hydrology Project

Instrument Station Locations for Boreholes USW NRG-6 and USW NRG-7a

USW NRG-6

<u>Station</u>	<u>Depth</u>	<u>Elevation</u>	<u>Unit</u>
H	-39.5'	4052.7'	Lower Lithophysal
G	-129.8'	3962.4'	Columnar
F	-180.0'	3912.2'	Pah Canyon
E	-280.0'	3812.2'	Crystal-rich Vitric (Topopah Spring)
D	-350.4'	3741.8'	Upper Non-Lithophysal
C	-455.4'	3636.8'	Upper Lithophysal
B	-535.0'	3557.2'	Upper Lithophysal
A	-720.0'	3372.2'	Upper Lithophysal/ Middle Nonlithophysal

USW NRG-7a

<u>Station</u>	<u>Depth</u>	<u>Elevation</u>	<u>Unit</u>
E	-17.7'	4189.3'	Alluvium/Hackly Unit
D	-152.7'	4054.3'	Yucca Mountain Member Bedded Tuff
C	-387.7'	3819.3'	Upper Non-Lithophysal Topopah Spring
B	-493.7'	3713.3'	Upper Non-Lithophysal/Upper Lithophysal
A	-667.7'	3539.3'	Upper Lithophysal Topopah Spring

**PRELIMINARY DRAFT
INFORMATION ONLY**

ENCLOSURE 2

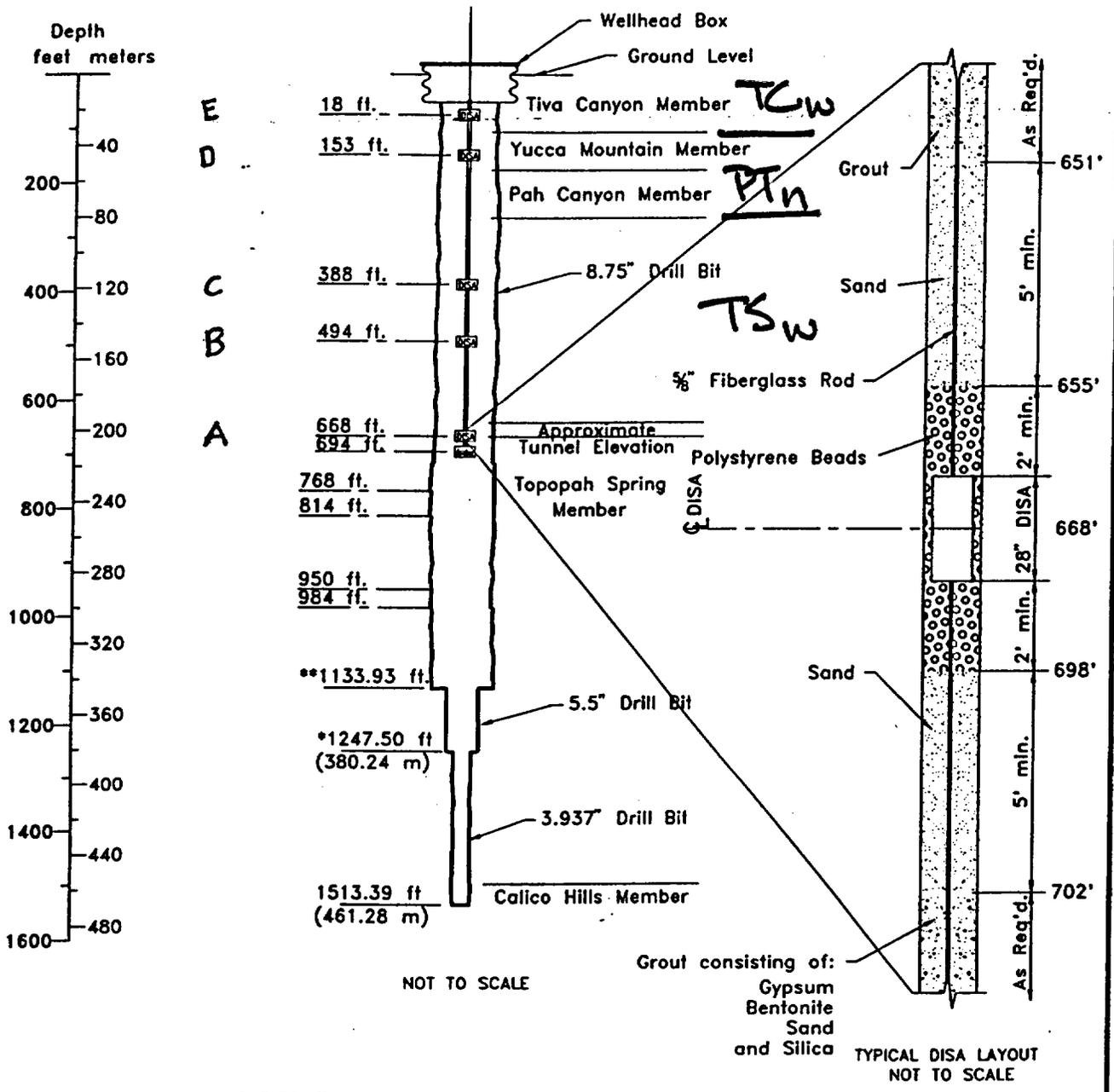
INSTRUMENTATION ARRANGEMENTS FOR NRG-7A AND NRG-6

M&O/SAIC

YMP Surface Based Test
Drilling Engineering Department

**PRELIMINARY DRAFT
INFORMATION ONLY**

HOLE DESIGNATION: USW NRG-7/7a
SURFACE COORDINATES: N 762879.96 E 562984.13
SURFACE ELEVATION: 4206.98'
TOP OF CASING: 4208.02'
BOTTOM-HOLE COORD.: n/a
BOTTOM ELEVATION: 2693.59'
DATE STARTED: October 25, 1993
DATE COMPLETED: March 3, 1994



NOT TO SCALE

Grout consisting of:
Gypsum
Bentonite
Sand
and Silica
TYPICAL DISA LAYOUT
NOT TO SCALE

- * Hole reamed from 1243.38 ft to 1247.50 ft on May 5, 1994
- ** Hole reamed with 8-3/4" bit to approximately 1133.93 ft.

USW NRG-7/7a
Actual

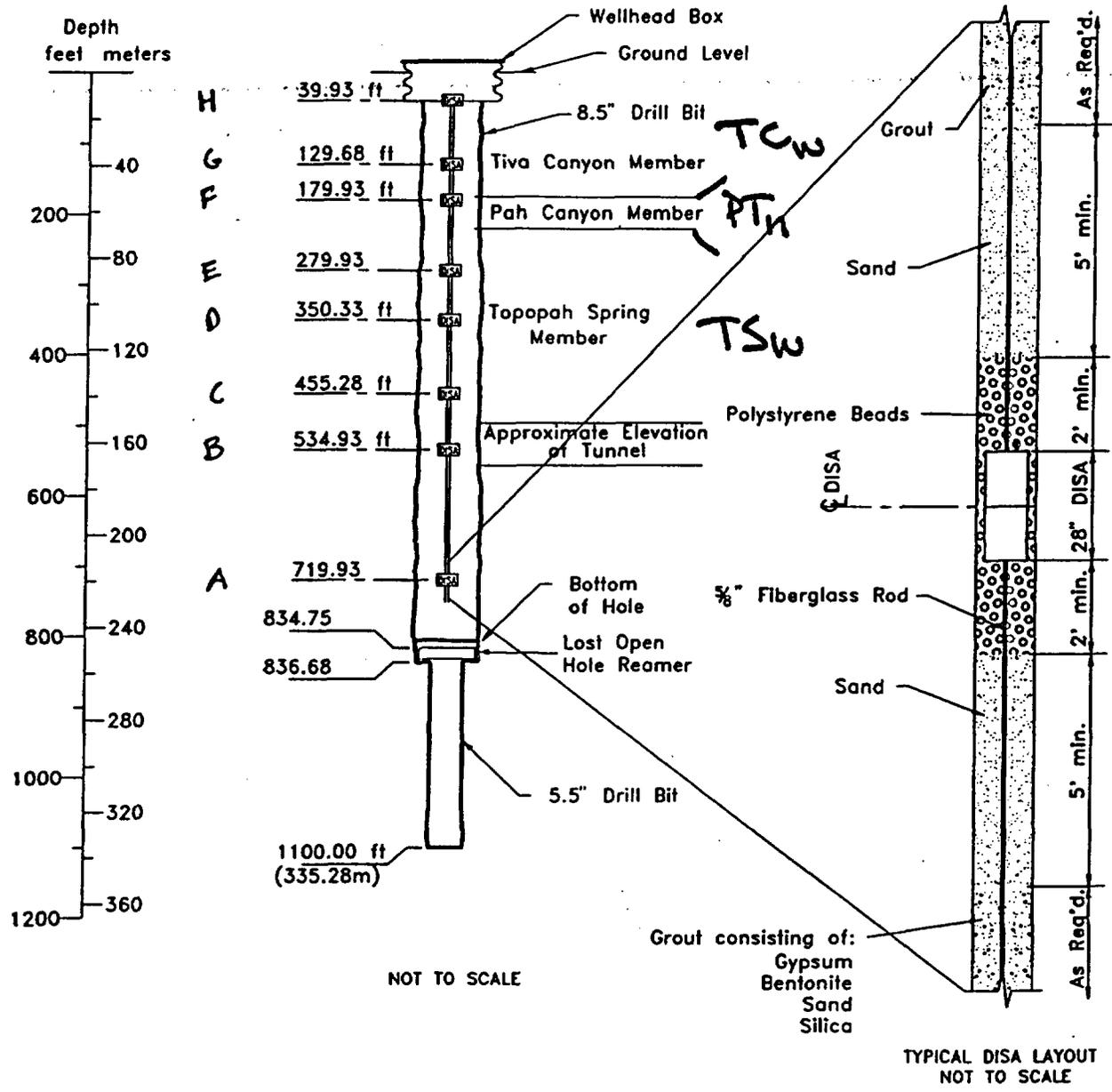
SK No. SK-94-A-DR045

M&O/SAIC

YMP Surface Based Test
Drilling Engineering

**PRELIMINARY DRAFT
INFORMATION ONLY**

HOLE DESIGNATION: USW NRG-6
SURFACE COORDINATES: N 766726.28 E 564187.17
SURFACE ELEVATION: 4092.2'
TOP OF CASING: 4093.02'
BOTTOM-HOLE COORD.: N 766714.34 E 564183.24
BOTTOM ELEVATION: 2992.2'
DATE STARTED: November 23, 1992
DATE COMPLETED: March 4, 1993



NOT TO SCALE

TYPICAL DISA LAYOUT
NOT TO SCALE

USW NRG-6
Proposed & Actual

NOTE: Bottom Hole Coordinates from deepest GYRO Survey Point. Bottom Elevation is deepest point drilled.

SK No. SK-94-A-DR044

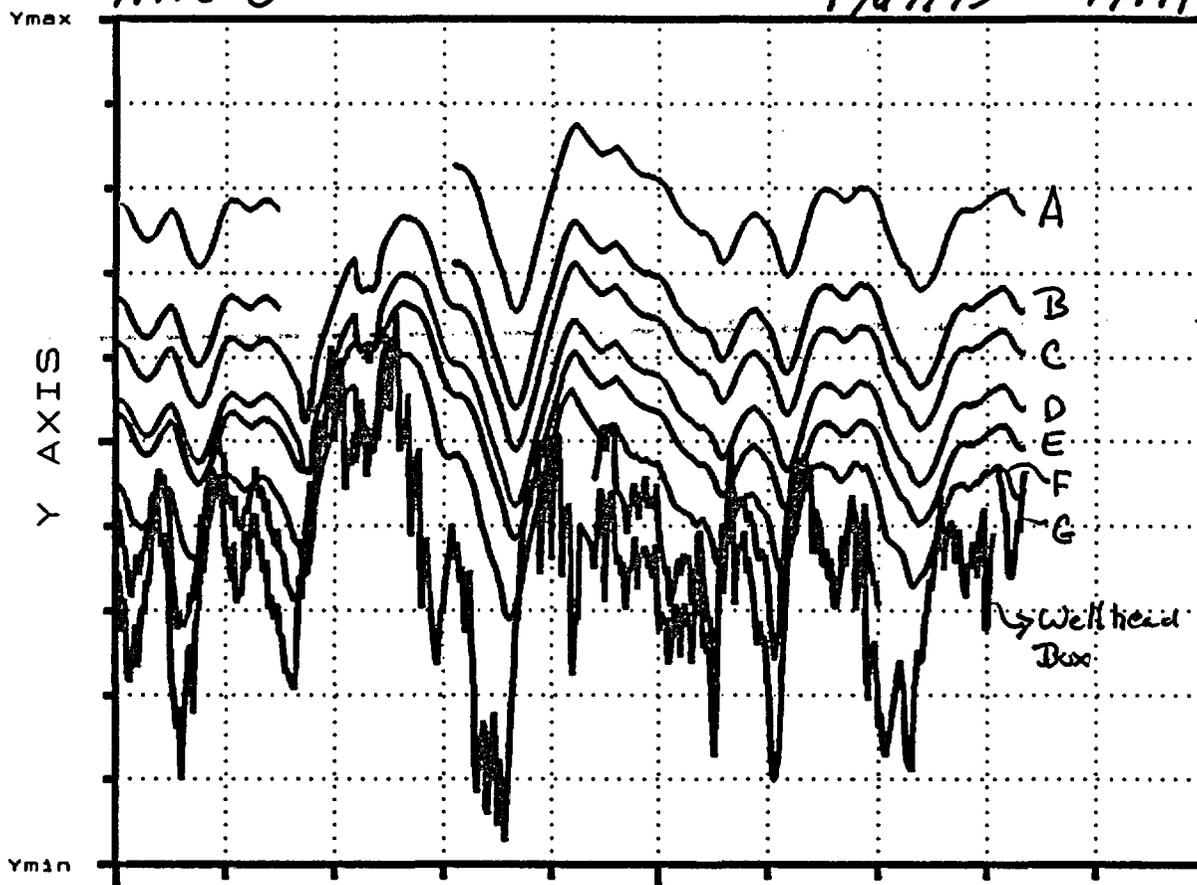
11/22/94

ENCLOSURE 3

PRELIMINARY PLOTS OF THE SUBSURFACE PRESSURE
RESPONSE AT NRG-7A AND NRG-6

NRG 6

1/09/95 - 4/19/95



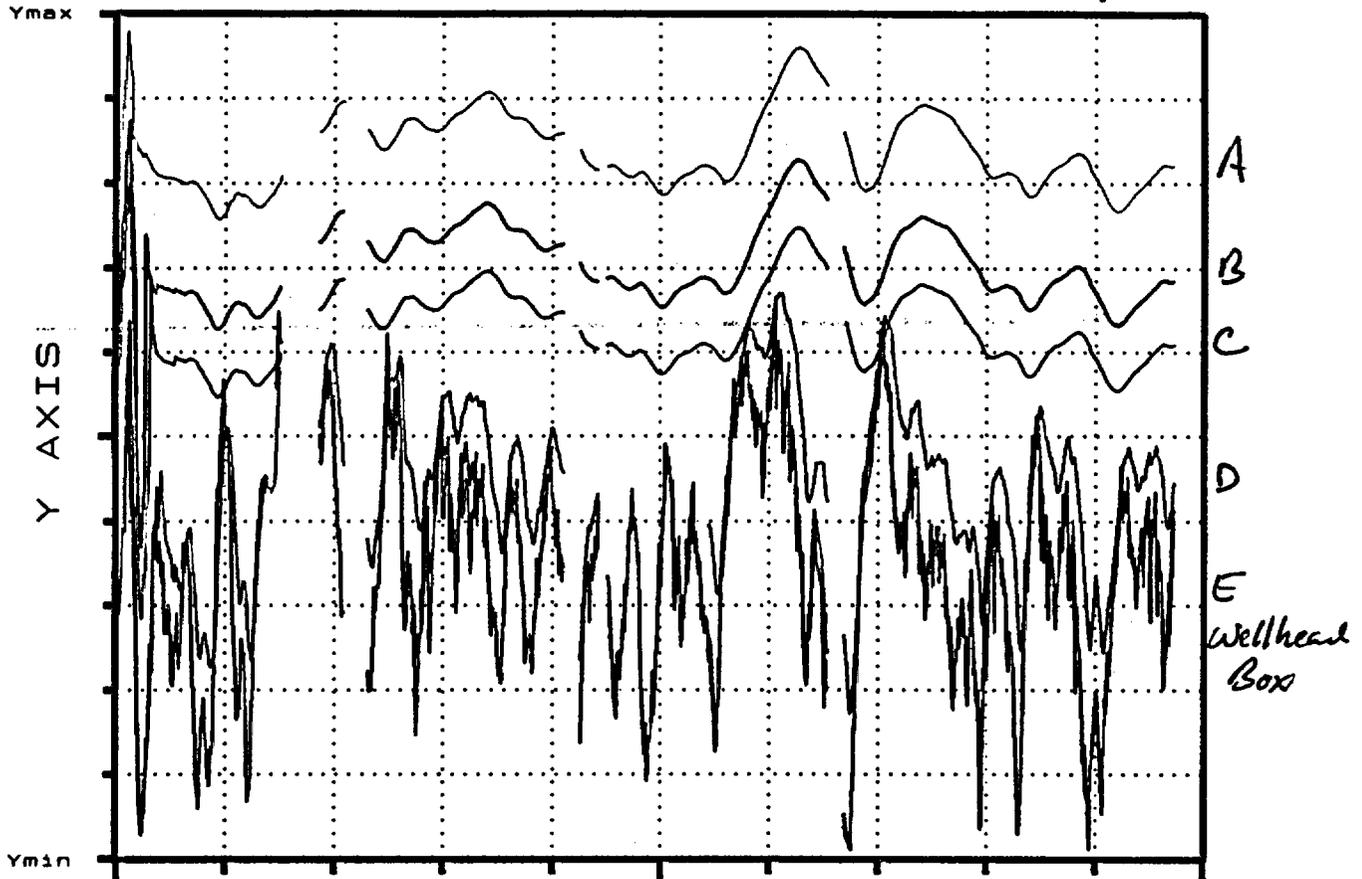
xmin 1/09/95 TIME (Hours) 2400 xmax 4/19/95

STA	SENSOR	DESCRIPTION	YMIN	YMAX	YSCALE	XMIN	XMAX	
A	0701	Pressure (kPa)	8.5900E+01	9.0900E+01	5.00E+00	28720	31120	
B	0707	Pressure (kPa)	8.5900E+01	9.0900E+01	5.00E+00	28720	31120	
C	0714	Pressure (kPa)	8.5900E+01	9.0900E+01	5.00E+00	28720	31120	
D	0720	Pressure (kPa)	8.5900E+01	9.0900E+01	5.00E+00	28720	31120	
E	0725	Pressure (kPa)	8.5900E+01	9.0900E+01	5.00E+00	28720	31120	
F	0732	Pressure (kPa)	8.5900E+01	9.0900E+01	5.00E+00	28720	31120	
G	0737	Pressure (kPa)	8.5900E+01	9.0900E+01	5.00E+00	28720	31120	
Well head Box	I	0752	Pressure (kPa)	8.5900E+01	9.0900E+01	5.00E+00	28720	31120

**PRELIMINARY DRAFT
INFORMATION ONLY**

NRG 7a

10/29/94 - 4/7/95



STA
A
B
C
D
E

Wellhead
Box

					Xmin	Xmax		
			TIME (Hours)		10/29/94	4/7/95		
	SENSOR	DESCRIPTION		YMIN	YMAX	YSCALE	XMIN	XMAX
—	A	0401 Pressure (kPa)		8.5900E+01	8.9900E+01	4.00E+00	26990	30830
—	B	0408 Pressure (kPa)		8.5900E+01	8.9900E+01	4.00E+00	26990	30830
—	C	0413 Pressure (kPa)		8.5900E+01	8.9900E+01	4.00E+00	26990	30830
—	D	0420 Pressure (kPa)		8.5900E+01	8.9900E+01	4.00E+00	26990	30830
—	E	0425 Pressure (kPa)		8.5900E+01	8.9900E+01	4.00E+00	26990	30830
—	G	0452 Pressure (kPa)		8.5900E+01	8.9900E+01	4.00E+00	26990	30830

**PRELIMINARY DRAFT
INFORMATION ONLY**