

# Alluvial Aquifer Vibrating Wire Piezometers

December 2002

Prepared for  
U.S. Department of Energy  
Grand Junction Office  
Grand Junction, Colorado

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Task Order Number ST03-104

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**U.S. Department of Energy—Grand Junction Office**

**Calculation Cover Sheet**

**Calc. No.** Moab-12-2002-03-08-00      **Discipline:** Hydrogeology      **Number of Sheets:** 15

**Project:**  
Moab Ground Water

**Site:**  
Moab, Utah

**Feature:**  
Alluvial Aquifer Vibrating Wire Piezometers

**Sources of Data:**  
Field Investigations 2002

**Sources of Formulae & References:**

Geokon users manual for 4500 piezometers.

McRae, J.B. and T. Simmonds. 1991, "Long-term stability of vibrating wire instruments: one manufacturer's perspective," *Field Measurements in Geotechnics*, Serun (ed.) Balkema, Rotterdam, pp 283-293.

**Preliminary Calc.**       **Final Calc.**       **Supersedes Calc. No.** \_\_\_\_\_

Rev. No.	Revision	Calculation by	Date	Checked by	Date	Approved by	Date
		<i>Haley Smith</i>	<i>1-14-03</i>	<i>L. d. King</i>	<i>1-14-03</i>	<i>Roby W. H. H.</i>	<i>1/15/03</i>

## 1.0 Problem Statement

Total hydraulic head in the alluvial aquifer beneath the Moab Project Site adjacent to the Colorado River is needed to predict ground water flow rate and estimate flow quantities. Vibrating wire pore pressure transducers or piezometers were installed at three “nest” locations near the Colorado River to determine the pressure component of the total head. Three piezometers were installed in a vertical profile at each nest location.

## 2.0 Method of Solution

- Define location of individual piezometers.
  - Determine the elevation of each installation and discuss potential errors of recorded installation depths.
  - Compute elevation head.
- Discuss operation of vibrating wire piezometers.
  - Method of reading pressure with a vibrating wire piezometers including temperature correction.
  - Data collection with Campbell Scientific CR10X data logger and AVW components
- Application of zero correction.
- Acquire pressure readings from piezometers.
- Discuss conversion of pressure readings to hydraulic head expressed in feet of fresh water.

## 3.0 Assumptions

1. Vibrating wire piezometers exhibit minimal zero drift with time (McRae, J.B. and T. Simmonds 1991).
2. Installation depth (elevation) of vibrating wire piezometers is accurately known.

## 4.0 Solution

Ground water flow is expressed by Darcy’s Law, where discharge of a volume of water  $Q$ , is directly proportional to the cross-sectional area of flow  $A$ , and drop in total hydraulic head  $\Delta H$ , and inversely proportional to the length of flow  $L$ :

$$Q \propto A \frac{\Delta H}{L}$$

Total hydraulic head is the sum of elevation head and pressure head, i.e. ( $H_t = h_p + z$ ), where

$$\begin{aligned} H_t &= \text{total head (ft)}, \\ h_p &= \text{pressure head (ft)}, \\ z &= \text{elevation head (ft)}. \end{aligned}$$

Elevation head expresses the gravitational force applied to the flow and is computed as a distance above a given datum. The datum used is the North American Vertical Datum 1988, (NAVD 88), horizontal positions specified with Moab 1983, Utah Central Zone, modified state plane coordinate system. Elevation head is computed by subtracting the piezometer installation depth from a surveyed ground surface elevation. Three piezometers are positioned in a vertical profile at each location, denoted as Moab 2, Moab 3, and Moab 4. Horizontal location of

piezometer nests is shown on [Figure 1](#). Recorded piezometer installation depths are shown on copies of original logs of each boring which are provided in [Attachment 1](#).

Installation depths were verified by measuring length of cable extending out of the ground at each piezometer nest location. These measured depths are subtracted from the supplied cable length to compute an apparent installation depth. Differences were found in a few instances between the recorded installation depth and the apparent installation depth. [Table 1](#) summarizes both apparent and recorded installation depths.

*Table 1. Piezometer Installation Depths*

Piezometer Nest	Piezometer No.	Supplied Cable Length (ft)	Measured Cable Length (ft)	Apparent Installation Depth (ft)	Recorded Installation Depth (ft)
Moab 2	421	29	6.8	22.2	20
N6661845	422	69	30.0	39.0	50
E2185883	423	110	28.9	81.1	71
Moab 3	424	29	8.2	20.8	20
N6663845	425	69	11.3	57.7	55
E2186108	426	110	15.5	94.5	87
Moab 4	427	29	9.7	19.3	20
N6665870	428	69	22.6	46.4	55
E2186931	429	110	30.1	79.9	80

The actual installation is assumed to be the lesser of the apparent installation depth and the recorded installation depth because an apparent installation depth cannot be greater than the recorded depth. This is because the recorded depth is based on the depth of the hole drilled, which is determined by the length of drill steel used to advance the boring. However, the apparent depth can be greater than the recorded depth if slack cable was caught in the boring during backfilling operations. Thus, the actual installation depths are taken as the lesser between the recorded and apparent depth. Actual installation elevations used in this calculation are shown in [Table 2](#) and on edited copies of boring logs provided in [Attachment 2](#).

*Table 2. Elevation of Piezometers*

Piezometer Nest	Piezometer No.	Ground Elevation (NAVD 88, ft)	Actual Installation Depth (ft)	Piezometer Elevation (NAVD 88, ft)
Moab 2	421	3964.0	20	3944.0
N6661845	422	3964.0	39	3925.0
E2185883	423	3964.0	71	3893.0
Moab 3	424	3967.4	20	3947.4
N6663845	425	3967.4	55	3912.4
E2186108	426	3967.4	87	3880.4
Moab 4	427	3968.3	19.3	3949.0
N6665870	428	3968.3	46.4	3921.9
E2186931	429	3968.3	79.9	3888.4

Pressure heads are computed from pressure measurements taken by the vibrating wire sensor. [Figure 2](#) shows the components of the vibrating wire sensor.

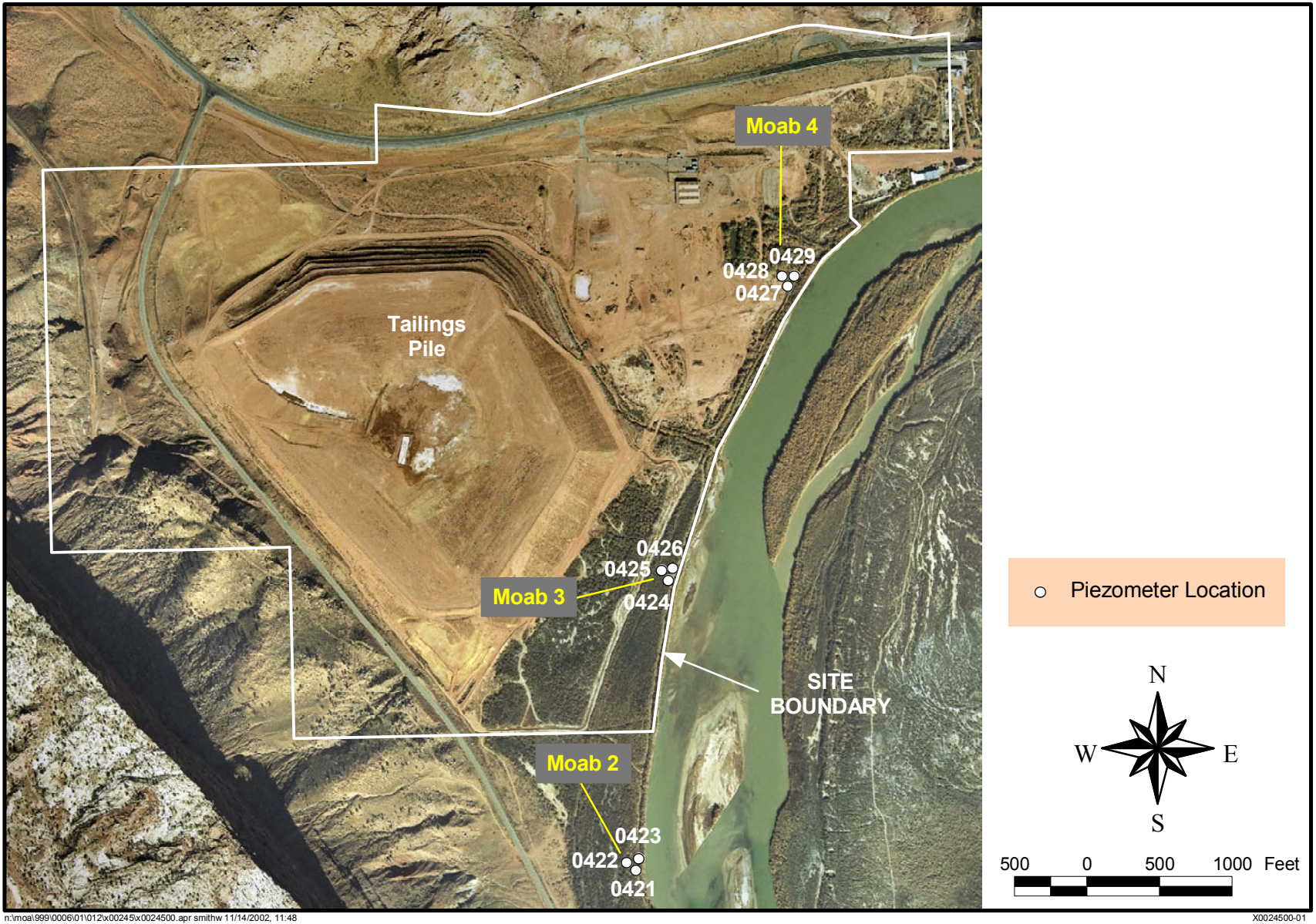


Figure 1. Horizontal Position of Piezometer Wells

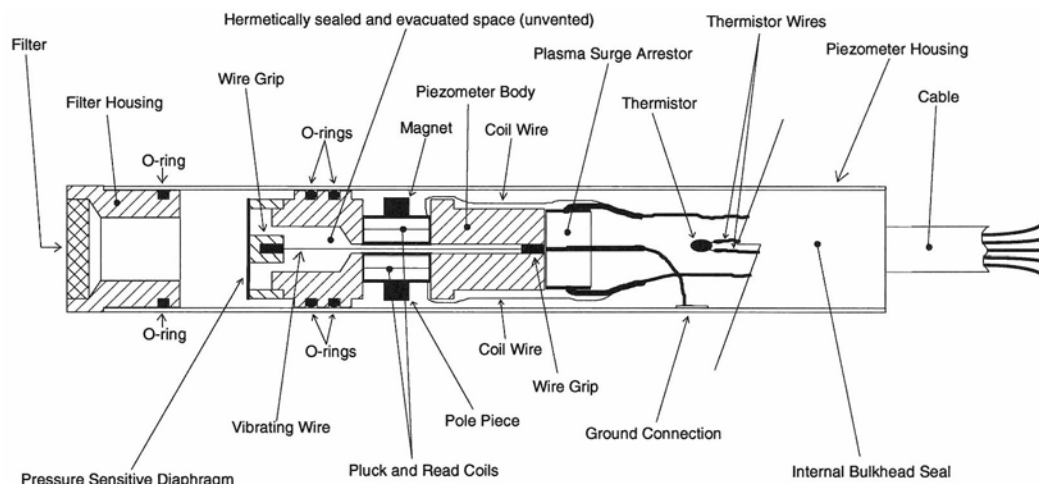


Figure 2 Geokon Series 4500 Vibrating Wire Piezometer

Fluid pressures are measured by monitoring the frequency of a vibrating wire that is attached to the pressure sensitive diaphragm. The diaphragm is open to fluid and is protected from sediment with a 50-micrometer filter. A magnetic coil plucks the wire at a specified frequency and time to excite the wire. The wire vibrates at a resonant frequency dictated by the tension in the diaphragm, which depends on the fluid pressure. An increase in fluid pressure on the diaphragm will decrease the wire tension and thus the frequency of the vibrating wire. Conversely, a decrease in fluid pressure will increase wire tension and increase the resonant frequency of the vibrating wire.

Vibration of the wire is a function of the temperature. The temperature of the piezometer instrument is measured via thermistors located within the instrument. This allows the pressure reading to be compensated for temperature affects.

The vibration frequency is converted to a pressure through an empirical calibration. An initial frequency at zero gauge pressure is measured at a known temperature and atmospheric condition. Subsequent frequency readings are computed based on this initial zero reading through calibration constants. Both initial readings and calibration coefficients are provided by the manufacturer. The manufacturer recommends updating initial readings at the site prior to installation to account for local conditions. This was not done at the time of installation for the nine piezometers listed here because of delays in shipment of all equipment. Therefore, to compensate for the manufacturer zero readings to site readings, all recorded frequencies are multiplied by an adjustment factor of 1.008, or increased by 0.8 percent. This factor is determined from other vibrating wire piezometers installed at different locations on the site.

Reading from the vibrating wire piezometers are recorded via a Campbell Scientific CR10X datalogger/controller and an electronic interface that applies a series of frequencies to the wire and transmits the resonant frequency back to the datalogger. Recorded frequencies are converted to pressures through calculation of the relationship between the frequency and pressure by the datalogger.



Pressure readings from all vibrating wire piezometer nests are shown on spreadsheets presented in [Attachment 3](#).

Pressure readings are converted to feet of equivalent fresh water heads by:

$$h_p = p \text{ (lb / in}^2\text{)} \times \left( \frac{144 \text{ in}^2 / \text{ft}^2}{\gamma \text{ lb / ft}^3} \right)$$

where

- $h_p$  = pressure head (ft)
- $p$  = the fluid pressure in pounds per square inch.
- $\gamma$  = unit weight of fresh water (62.4 pounds per cubic foot).

Elevation head, pressure head and resulting total heads are computed on spreadsheets provided in [Attachment 3](#).

## 5.0 Results

[Figures 3, 4, and 5](#) present plots of total head with respect to time for installation locations Moab 2, Moab 3 and Moab 4, respectively. Shown on [Figures 6, 7, and 8](#) are total head with respect to elevation for locations Moab 2, Moab 3 and Moab 4, respectively. Water flows from a higher total head to a lower total head. The former figures indicate the magnitude of fluctuation in total heads, while the later figures indicate direction of ground water flow in the vertical sense. [Figures 9, 10, and 11](#) present plots of ground water temperatures with respect to elevation for locations Moab 2, Moab 3 and Moab 4, respectively.

Reviewing [Figure 6](#) showing total head with respect to elevation at Moab 2 indicates an apparent sink at an approximate elevation of 3,925 ft, based on the reading from piezometer 422. This sink, or a lower total head at this elevation, indicates flow to this elevation. This may be due to vegetation affects. Tamarisk in the immediate region of this installation may be drawing water from this depth or the sink could be signifying deep flow into the underlying Paradox Formation salts.

Greater total head in the ground water compared to the river indicating that the river is gaining water from the ground water at this location (Moab 2). The temperature plot at this location indicates a higher temperature near the surface suggesting a possible influence of the river.

Horizontal flow, or smaller contribution of a vertical flow component at Moab 3 appears to exist. The plot of total head with respect to elevation shown on [Figure 7](#) is more-or-less vertical indicating little tendency for vertical flow. A slightly higher total head than the river here also indicates a gaining river system. Higher water temperature toward the surface as shown on [Figure 10](#) at Moab 3 also suggests the influence of the river.

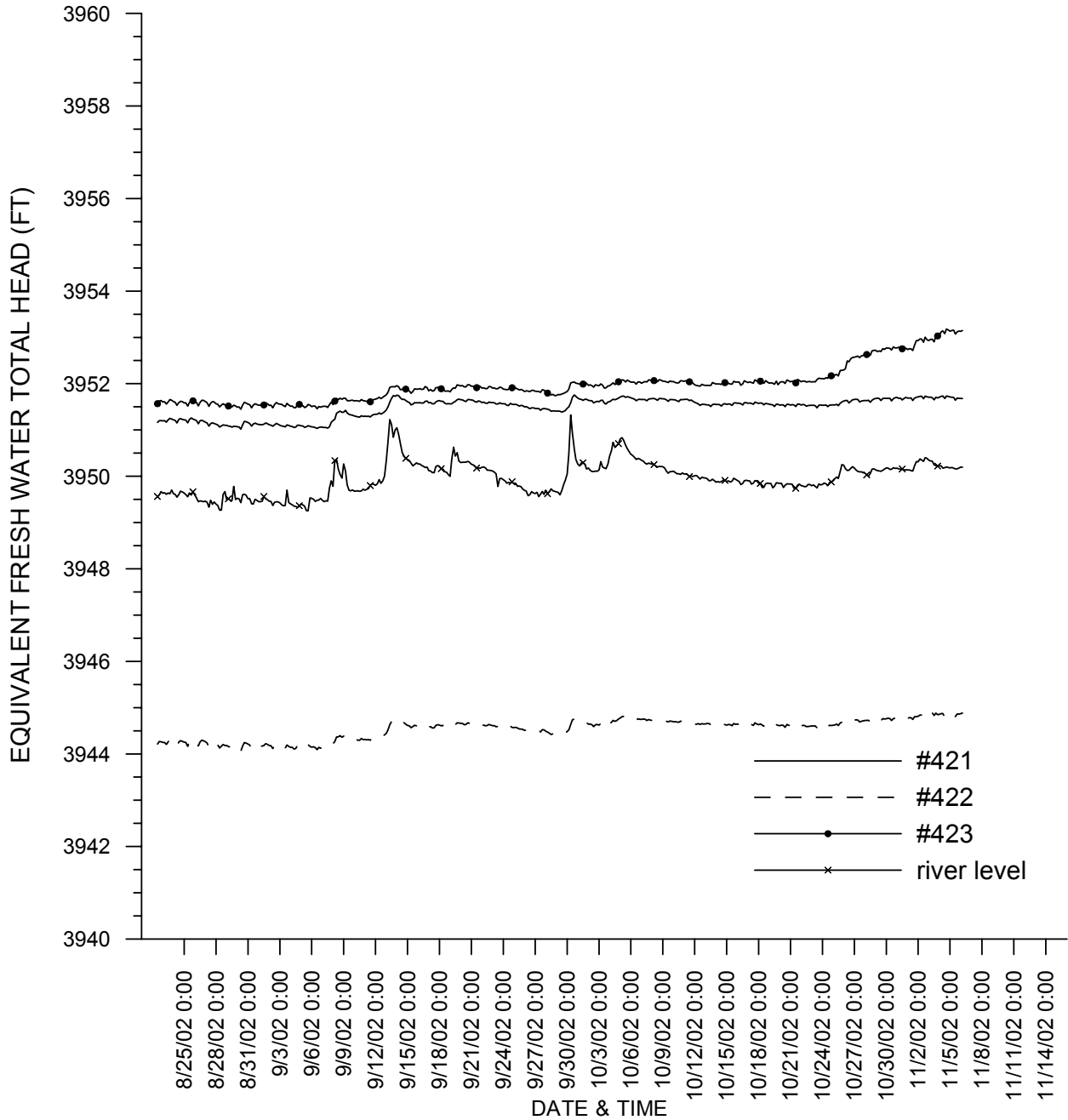


Figure 3. Moab 2, Vibrating Wire Piezometers



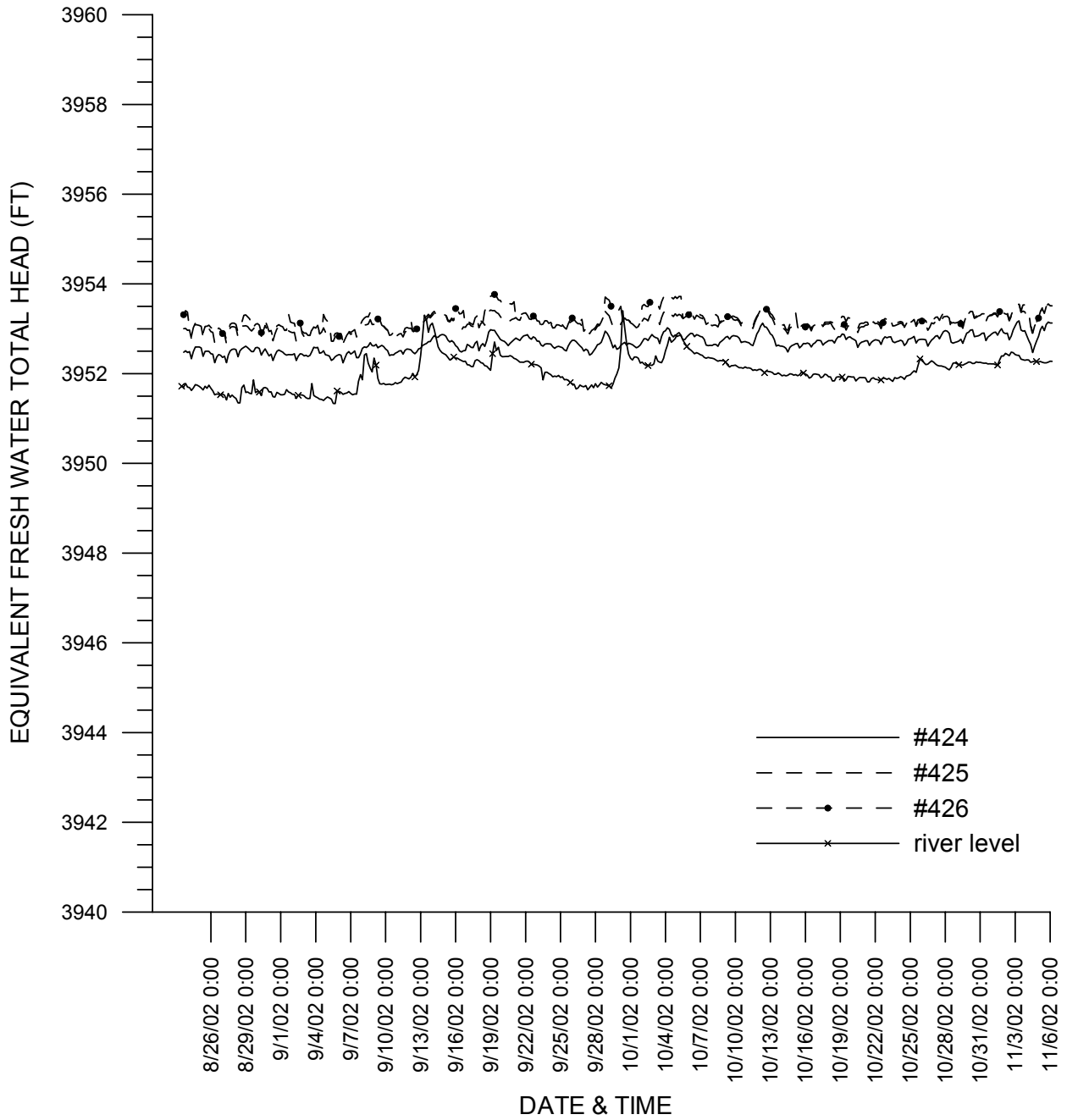


Figure 4. Moab 3, Vibrating Wire Piezometers

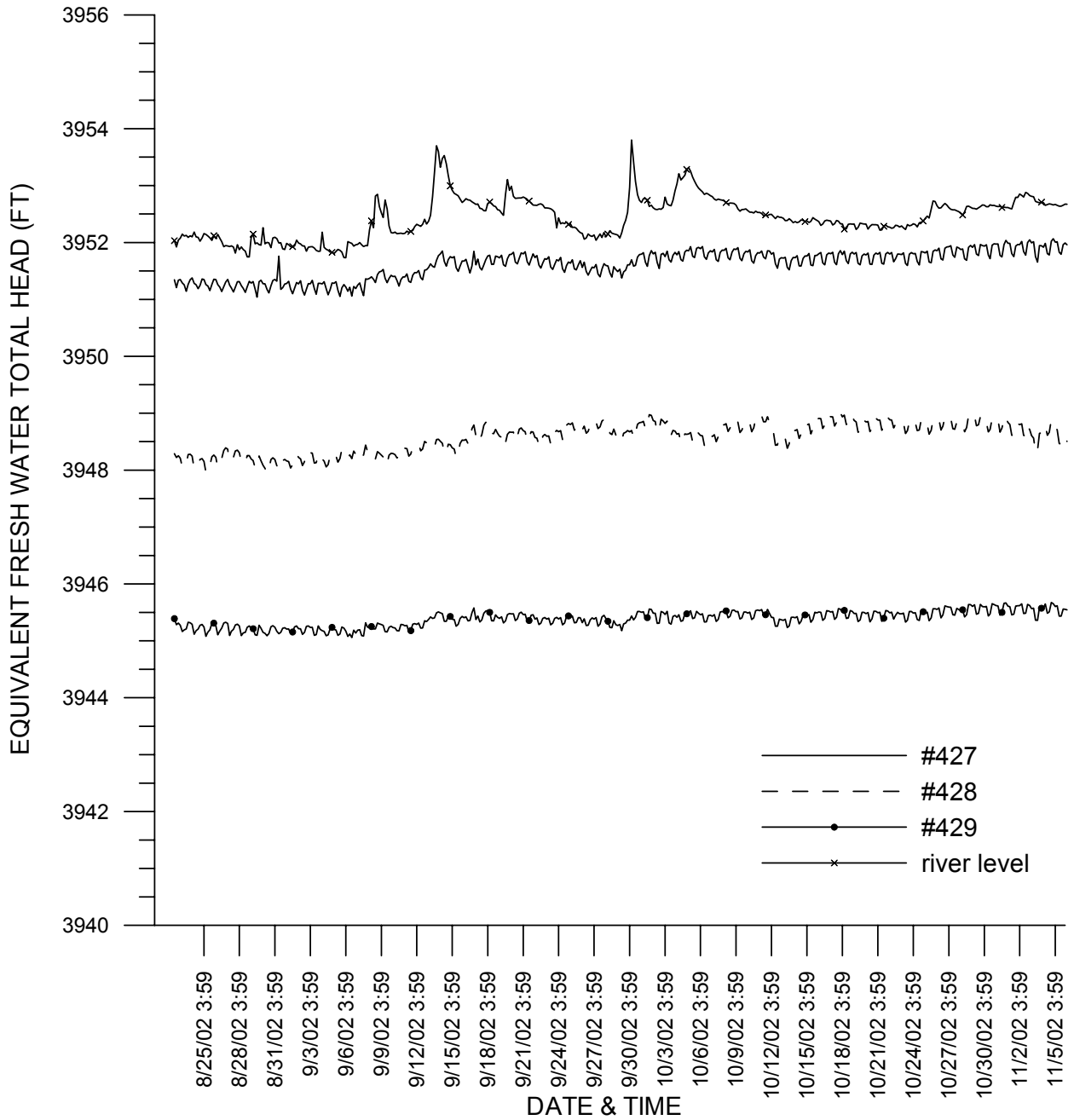


Figure 5. Moab 4, Vibrating Wire Piezometers

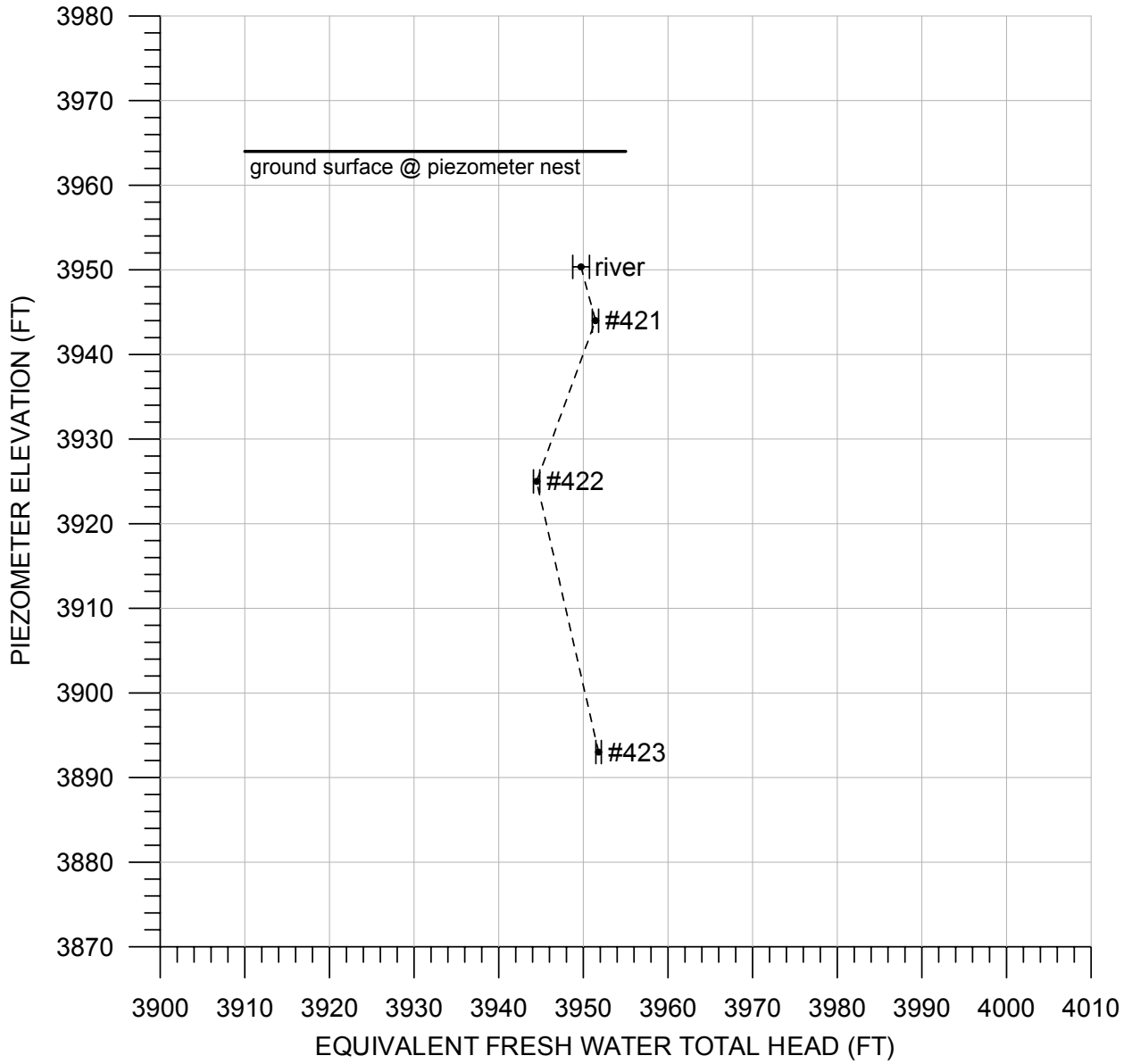


Figure 6. Moab 2, Total Head versus Elevation  
 (bars indicate range of maximum-minimum readings)

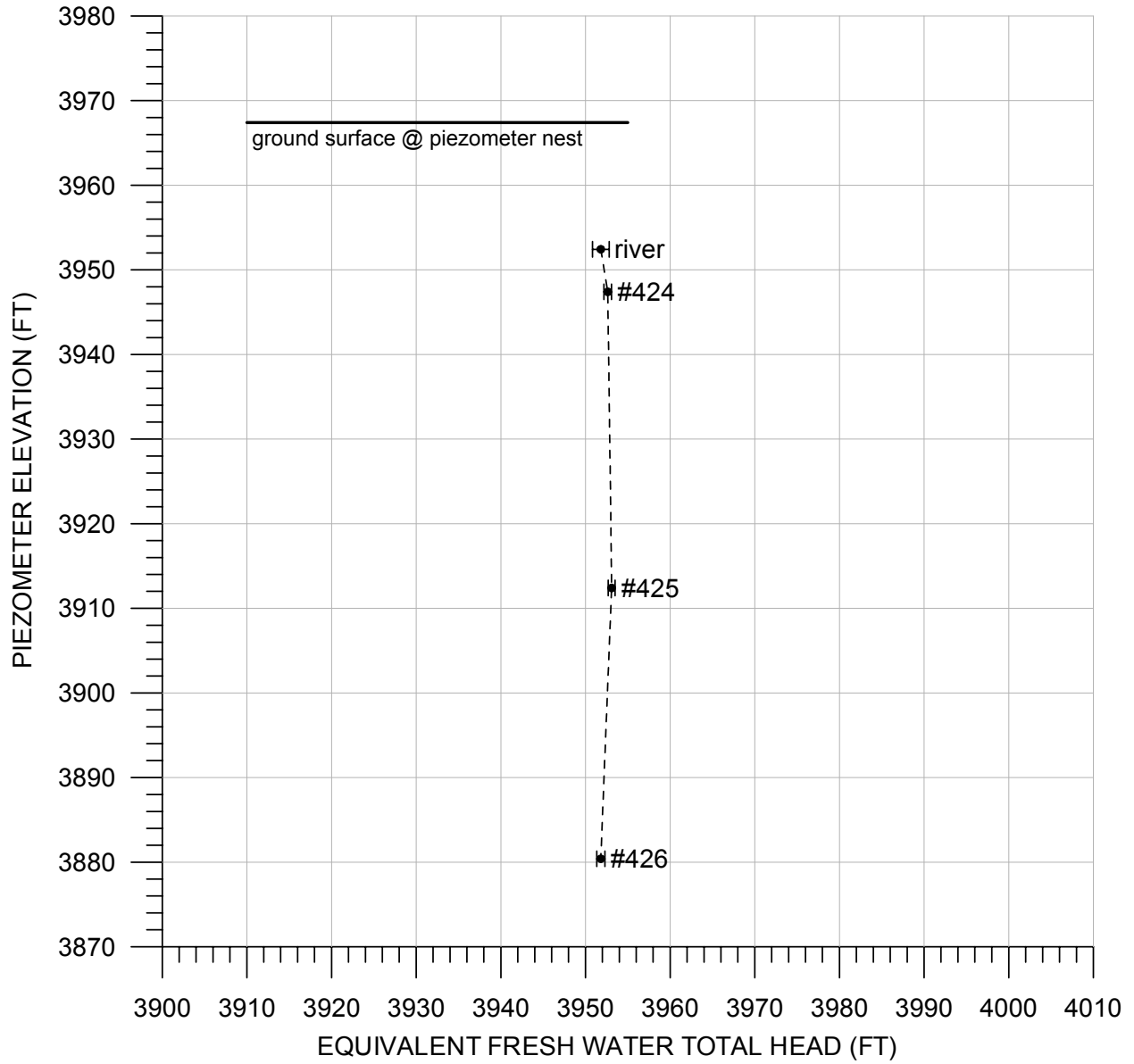


Figure 7. Moab 3, Total Head versus Elevation  
 (bars indicate range of maximum-minimum readings)

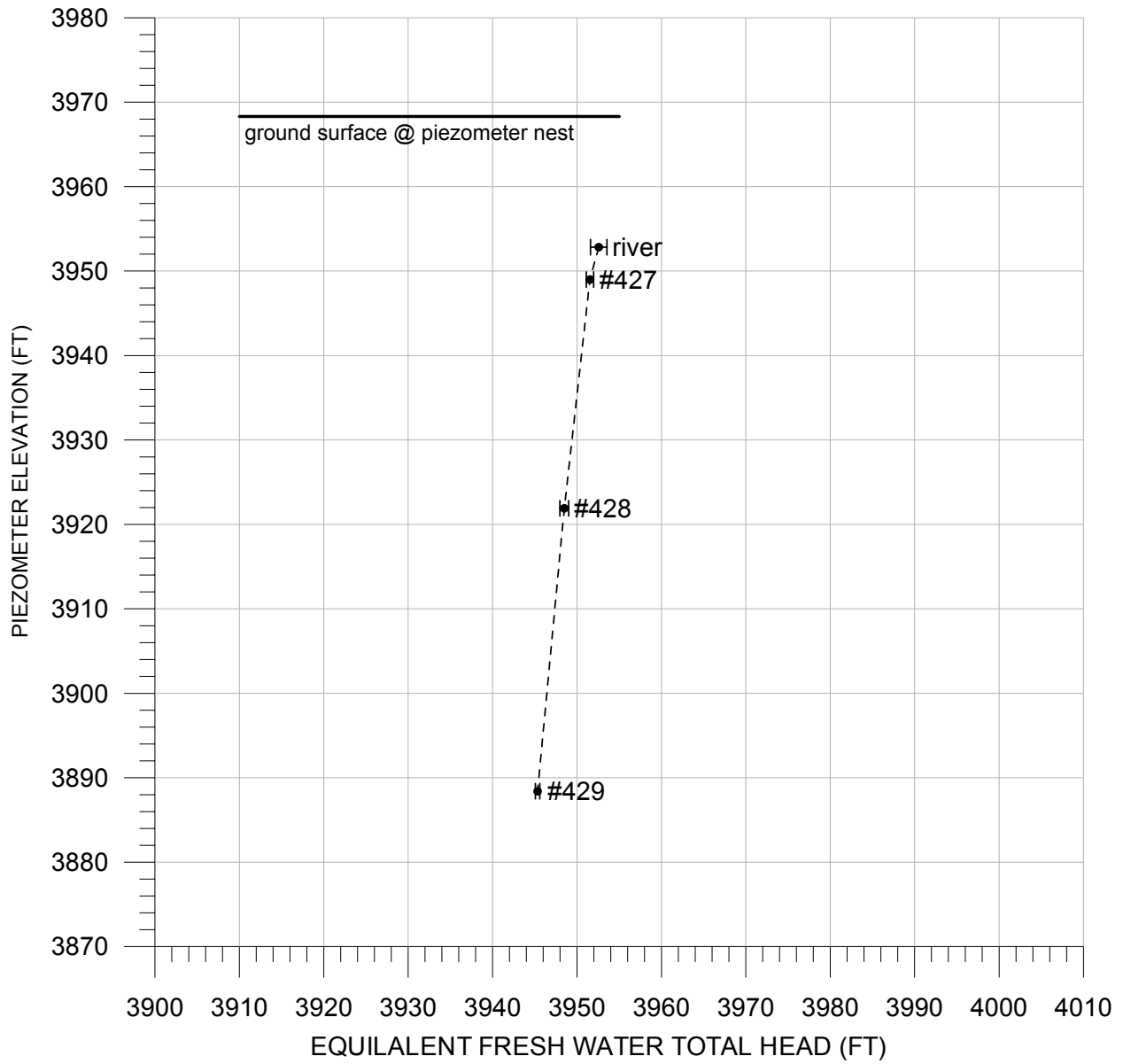


Figure 8. Moab 4, total Head versus Elevation  
 (bars indicate range of maximum-minimum readings)

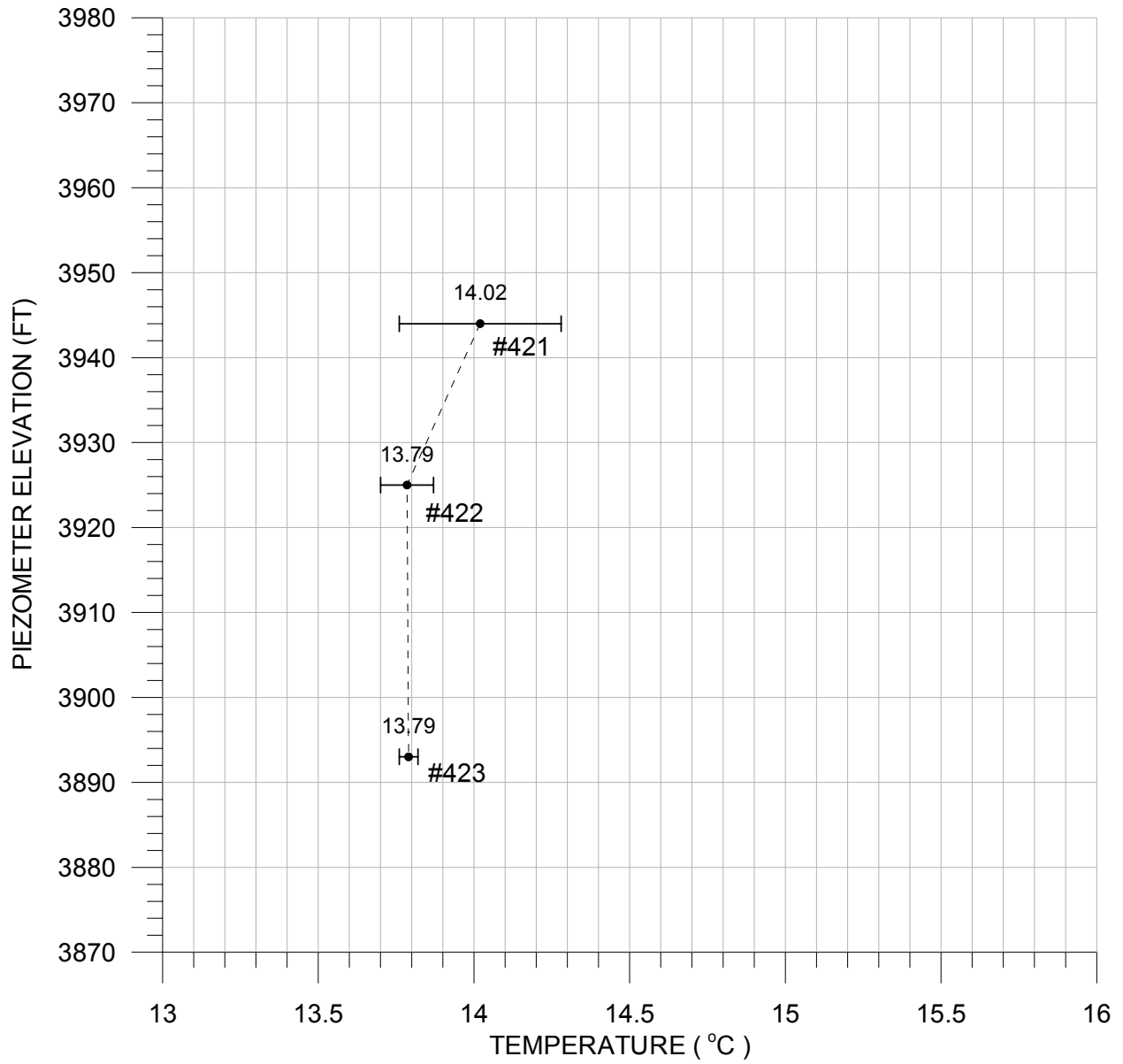


Figure 9. Moab 2, Ground Water Temperature versus Elevation

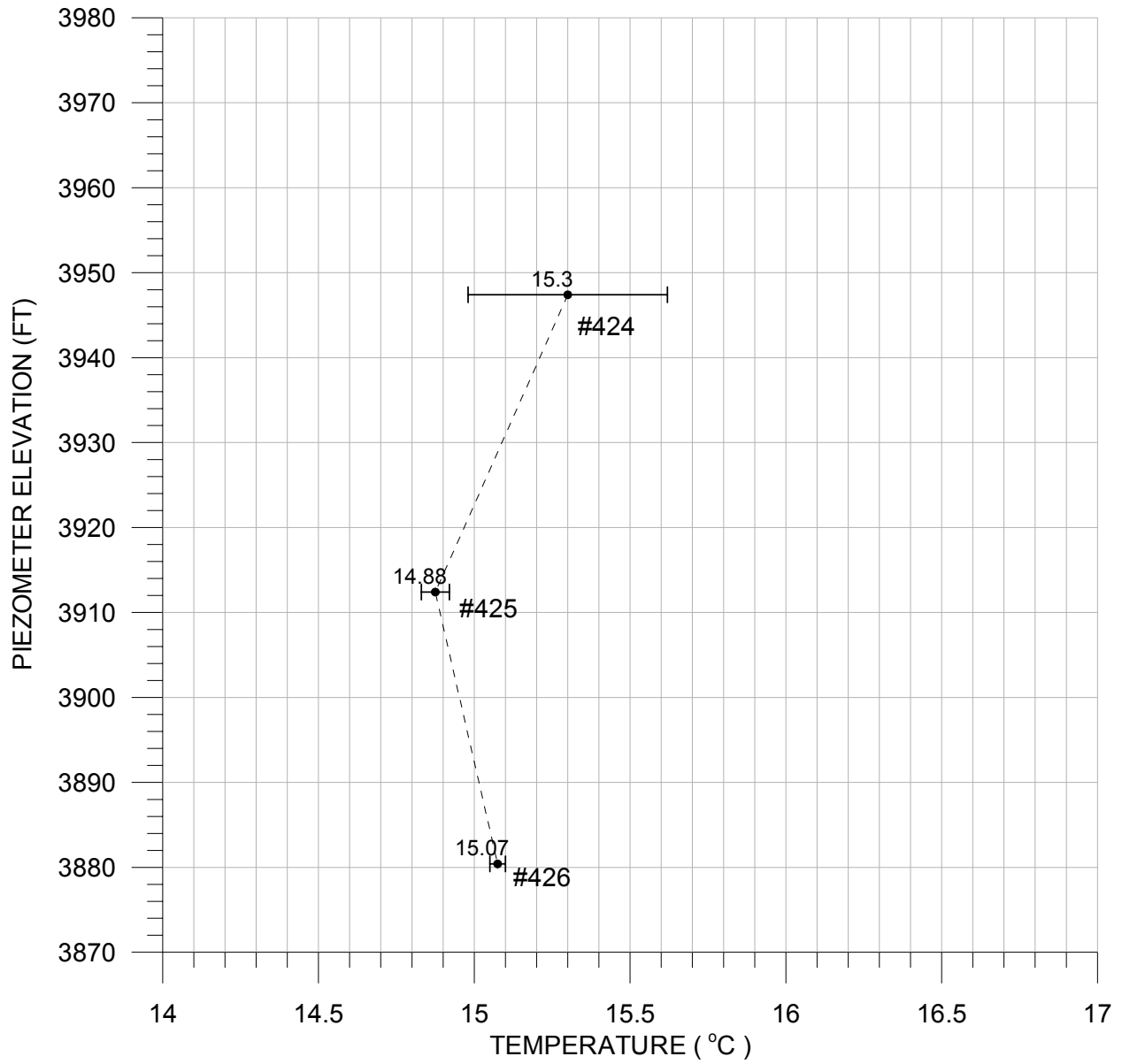


Figure 10. Moab 3, Ground Water Temperature versus Elevation



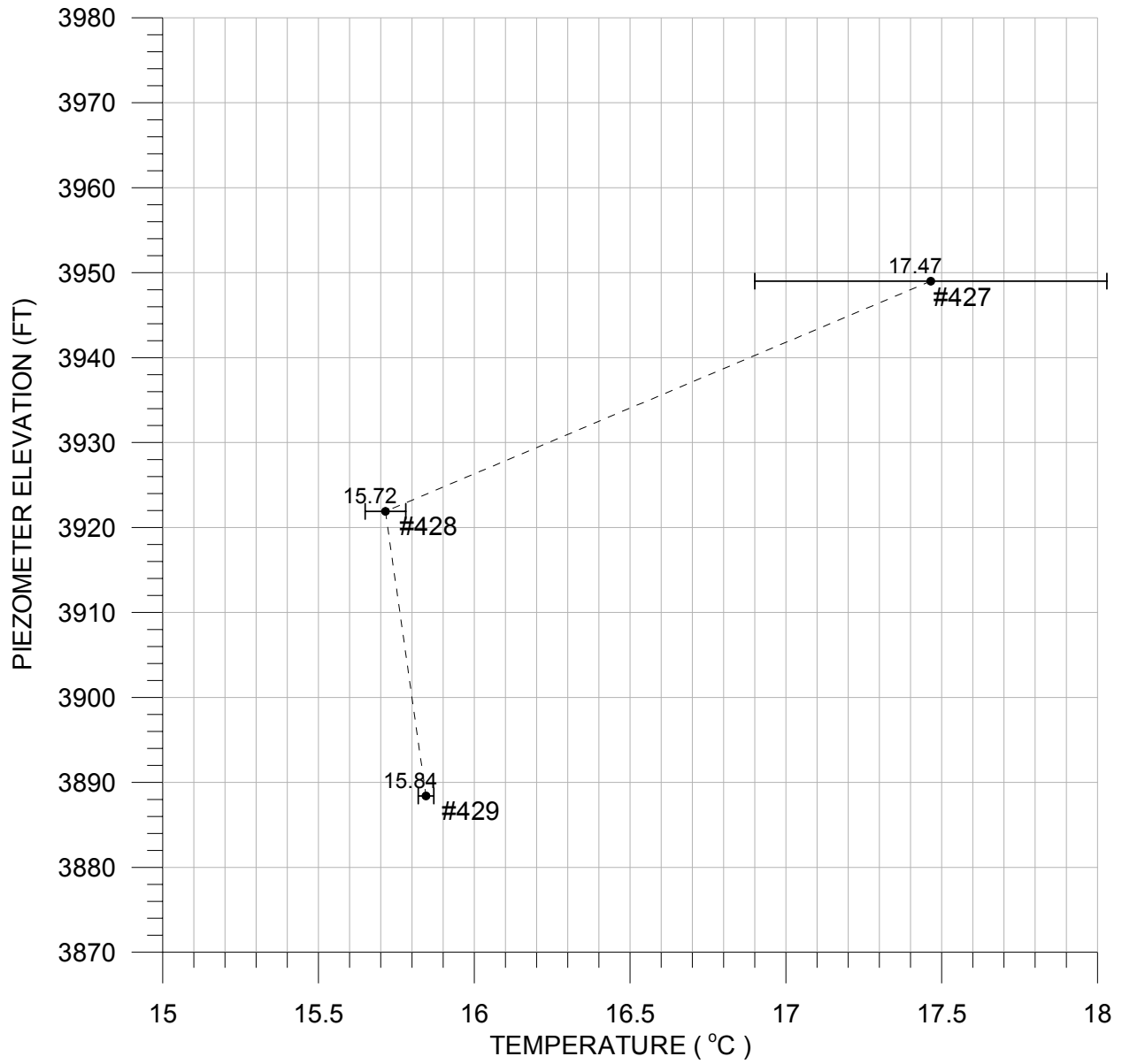


Figure 11. Moab 4, Ground Water Temperature versus Elevation

A losing river condition is shown at Moab 4 on Figure 8. Total head for the river is slightly higher than the total heads of the piezometers. This head condition reveals a river recharging the ground water regime here. A decreasing trend in total head is evident through all piezometer installations supporting these recharging phenomena. Further support of a losing river is provided by the temperature with respect to depth plot at this location. A dramatic decrease in ground water temperature, approximately 2° C occurs from an elevation of approximately 3,950 ft to 3,922 ft. This suggests a strong influence of river surface water.

## 6.0 Conclusions and Recommendations

Subsequent paragraphs discuss possible interpretations of the data presented. Total heads computed from the vibrating wire piezometers should be considered in the ground water flow model developed for the Moab Project Site. Since the heads vary with time, critical times of the year should be identified from these readings in conjunction with other head readings from open-hole standpipes to determine critical conditions. Vibrating wire piezometers data can provide insight into trends of vertical flow as groundwater approaches the river.

Data from the vibrating wire piezometers indicate that for the times recorded,

- the Colorado River adjacent to the Moab Project Site is losing water to the ground water regime at Moab 4, is in equilibrium with the ground water regime at Moab 3, and is gaining water from the ground water regime at Moab 2.
- flow beneath the Colorado River cannot be determined solely from vibrating wire piezometer data.

Errors introduced by an incorrect zero reading for wire frequencies will produce errors in calculated pressure output of less than 1 pound per square inch (psi); an equivalent 2.3 ft of fresh water. Errors in actual installation depth will produce errors in the total head calculation equal to the error in actual installation depth. After measuring the cable extending out of the ground at each piezometer location, major errors in installation depth have been removed. Thus, trends presented herein are correct and can be applied.

## **Attachment 1**

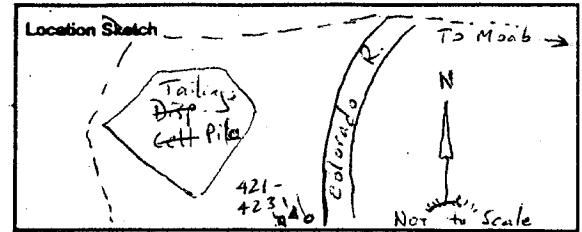
**Original Boring Logs at Moab 2, Moab 3, and Moab 4**

Facility MOAB Site MOAB WELL NUMBER 421, 422, & 423  
 Ground Elev. (Ft.) 3964.2 (est) Bit / Auger Size 9" OD (est.) Location (N) 2185880 (E) 6663964.2

Drilling Contractor CONETEC

Hole Depth (Ft) 74  
 Well Depth (Ft) Piezometer depths 7, 50  
 Well Diameter \_\_\_\_\_  
 No. of Completions \_\_\_\_\_  
 Stick-Up Height (Ft) \_\_\_\_\_  
 Slot Size \_\_\_\_\_

	TYPE	Vol. (ft <sup>3</sup> / gal)	Interval (Ft.)
Surface Casing	_____	_____	_____ to _____
Blank Well Casing	_____	_____	_____ to _____
Well Screen	_____	_____	_____ to _____
Sump/End Cap	_____	_____	_____ to _____
Lower Sand Pack	_____	_____	_____ to _____
Upper Sand Pack	_____	_____	_____ to _____
Bentonite Seal	_____	_____	_____ to _____
Grout	_____	_____	_____ to _____
Concrete	_____	_____	_____ to _____



Locking Cover Installed Y / N Padlock No. \_\_\_\_\_  
 Drilling Method Hollow - stem auger  
 Date Drilled 6-19-02 Date Developed \_\_\_\_\_  
 Sampler(s) \_\_\_\_\_

Sampling Method Direct Push  
 Fluid Level / Date 11.8 ft 6-21-02

Remarks Driller: Brian Mercer Helper: Augustin

Depth (FT)	Blows / 6"	PID ppm	Sample No.; Interval	WELL CONSTRUCTION	GRAPHIC LOG	DESCRIPTION
0						<b>Required Information:</b> Typical name; Munsell color; percentage sand and gravel; sorting (poor to well); grain angularity; induration or plasticity; moisture content (moist to saturated); Unified Soil Classification.
0-7						Pale Bwn (10YR 6/3) silt (ML) loose, dry
7-17						Light yellow Bwn (10YR 6/4) SILTY FINE SAND (SM), loose, moist
17-68						Bwn (10YR 4/3) Fine to Med Sand (SP) w/ occ (2-5%) gravel <i>[loose, saturated below 15ft]</i>
20	Direct Push					Sample # 421-20 collected as water sample w/ hydro punch. Density, Sp. Cond, U, NH <sub>3</sub> , & Cl <sup>-</sup> Sand grains are subangular.
25	Pellets					<del>Geotech Vib. W. Piezometer model 4500 S-100</del> <del>S/N 67152 set @ 20 ft</del>
35	Aquagard Grout					

a - All depths measured from ground level.

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Depth " (FT)	Blows/ 6"	PID ppm	Sample No.: Interval	Well Construction	Graphic Log	DESCRIPTION
40			☒			1/4-inch TR30 Pel-Plug Bentonite Pellets
45			☒			
50			☒			<del>Sample 422-50 collected as water sample w/ hydro-punch Analyzed for density, sp cond, u, NH<sub>4</sub><sup>+</sup>, Cl<sup>-</sup></del>
55			☒			
60			☒			Sample 422-60 collected as water sample w/ hydro-punch Analyzed for density, sp cond, u, NH <sub>4</sub> <sup>+</sup> , Cl <sup>-</sup>
65						
70	9 40 50/5		☒			68-74 Dk Greenish Gray (Gley 4/1) Sandy Gravel (GP) dense, saturated
			☒			74 ft - Refusal to gravel collected sample 423-73 as water sample w/ hydro-punch Density, sp gravity, u, NH <sub>4</sub> <sup>+</sup> , Cl <sup>-</sup>
						<del>Sample 423-73 collected as water sample w/ hydro-punch Analyzed for density, sp cond, u, NH<sub>4</sub><sup>+</sup>, Cl<sup>-</sup></del>
						16-30 sand backfill around piezometers

All depths measured from ground level.

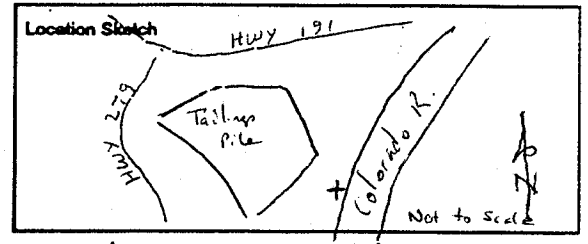
Completed By Mark Kautsky Verified By \_\_\_\_\_

Facility MOAB Site MOAB WELL NUMBER 424-425, 426  
 Ground Elev. (Ft.) 3967 (est) Bit / Auger Size \_\_\_\_\_ Location (N) 2186105 (est) (E) 6663951 (est)

Drilling Contractor CONETEC

Hole Depth (Ft) \_\_\_\_\_  
 Well Depth (Ft) \_\_\_\_\_  
 Well Diameter \_\_\_\_\_  
 No. of Completions \_\_\_\_\_  
 Stick-Up Height (Ft) \_\_\_\_\_  
 Slot Size \_\_\_\_\_

	TYPE	Vol. (ft <sup>3</sup> / gal)	Interval (Ft.)
Surface Casing	_____	_____	_____ to _____
Blank Well Casing	_____	_____	_____ to _____
Well Screen	_____	_____	_____ to _____
Sump/End Cap	_____	_____	_____ to _____
Lower Sand Pack	_____	_____	_____ to _____
Upper Sand Pack	_____	_____	_____ to _____
Bentonite Seal	_____	_____	_____ to _____
Grout	_____	_____	_____ to _____
Concrete	_____	_____	_____ to _____



Locking Cover Installed Y / N Padlock No. \_\_\_\_\_  
 Drilling Method \_\_\_\_\_  
 Date Drilled \_\_\_\_\_ Date Developed \_\_\_\_\_  
 Sampler(s) \_\_\_\_\_

Sampling Method Auger Cuttings, 0-25 ft.  
 Fluid Level / Date \_\_\_\_\_  
 Remarks \_\_\_\_\_

Depth <sup>a</sup> (FT)	Blows / 6"	PID ppm	Sample No.: Interval	WELL CONSTRUCTION	GRAPHIC LOG	DESCRIPTION
0						<b>Required Information:</b> Typical name; Munsell color; percentage sand and gravel; sorting (poor to well); grain angularity; induration or plasticity; moisture content (moist to saturated); Unified Soil Classification.
0-7						V. Pale Bwn (10YR 7/3) fine V. Fine Sandy silt (ML) Dry, loose
7-25						25 ft Brown (7.5YR 5/3) Gravelly fine sand (SP) moist loose
10-20						10-20 sand 15-25 ft grading to med sand below 15 ft
15						Driller says gravel zone at 15 ft. wet below 15 ft
20						collected water sample w/ direct push. Geobon Prognosis 67155 (S/N) set @ 20 ft
25-90						25-90 ft undifferentiated sandy gravel & gravelly sand below 25 ft. m
25-49						ARUNGUARO GRANT 25 ft - 49 ft.

<sup>a</sup> - All depths measured from ground level.

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Depth (FT)	Blows/ 6"	P10 ppm	Sample No.: Interval	Well Construction	Graphic Log	DESCRIPTION
40						
45						
50						harder coarser drilling b/w 50-55 ft.
55						<del>Water sample 425-60 collected @ 60 ft depth.</del>
60			W			Water sample 425-60 collected @ 60 ft depth.
65						
70						Aqua Guard Grant 60-80 ft
75						
80						10-20 sand set @ 80-90 ft.
85						
90						<del>Water sample 425-90 collected @ 90 ft depth.</del>
95						TD @ 90 ft
100						

if depths measured from ground level.

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**ACTEC-ERS**

597 B 3/4 Road  
rand Junction, Colorado 81502

**Borehole Summary**

Page 1 of 2

City Moab Site Moab

WELL NUMBER 427-428, 429

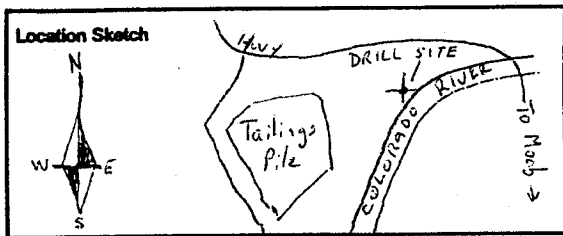
Ground Elev. (Ft.) 3968.6 Bit / Auger Size 8-inch Hollow Stem Auger

Location (N) 2186932 (E) 6663968  
est. est.

Drilling Contractor CONETEC

Hole Depth (Ft) 80  
Well Depth (Ft) NA  
Well Diameter NA  
No. of Completions 3  
Stick-Up Height (Ft) NA  
Slot Size NA

	TYPE	Vol. (ft <sup>3</sup> / gal)	Interval (Ft.)
Surface Casing			to
Link Well Casing			to
Well Screen			to
Plug/End Cap			to
Water Sand Pack			to
Gravel Sand Pack			to
Bentonite Seal			to
Grout			to
Concrete			to



Locking Cover Installed Y/N Padlock No. \_\_\_\_\_

Sampling Method \_\_\_\_\_

Drilling Method Hollow Stem Auger

Fluid Level / Date \_\_\_\_\_

Date Drilled 6-21-02 Date Developed NA

Remarks Began drilling @ 15:00 6-21-02

Sampler(s) Installed Geokon Vibrating Wire Piezometers @ 20, 55, & 80 ft.

Depth (FT)	Blows / 6"	PID ppm	Sample No.; Interval	WELL CONSTRUCTION	GRAPHIC LOG	DESCRIPTION
0						<b>Required Information:</b> Typical name; Unified Soil Classification, Munsell color; percentage sand and gravel; sorting (poor to well); grain angularity; induration or plasticity; moisture content (moist to saturated).
5						Red (2.5 YR 5/6) Fine to med sand (SP) dry, loose w/ 5-10 percent gravel
10						
15						with <del>one</del> gravel clasts below 15 ft, <sup>wet</sup> moist below 15 ft
20						Water sample 427-20 collected
25						<del>1500-100 s/N 67158</del>
30						Gravelly zone begins @ 30 ft.
35						No recovery below 30 ft.

All depths measured from ground level.

11/3/98

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Depth (FT)	Blows/ 6"	PID ppm	Sample No.: Interval	Well Construction	Graphic Log	DESCRIPTION
40						
45						Bentonite Pellets.
50						52-55 ft Driller reported cobbly zone
55						
60						Water Sample 428-60 collected @ 60 ft.
65						Aquaguard Grout
70						
75						
80						Water Sample 429-83 TD @ 80 ft
85						
90						
95						
100						

All depths measured from ground level.

Completed By Mark Kautsky

Verified By \_\_\_\_\_

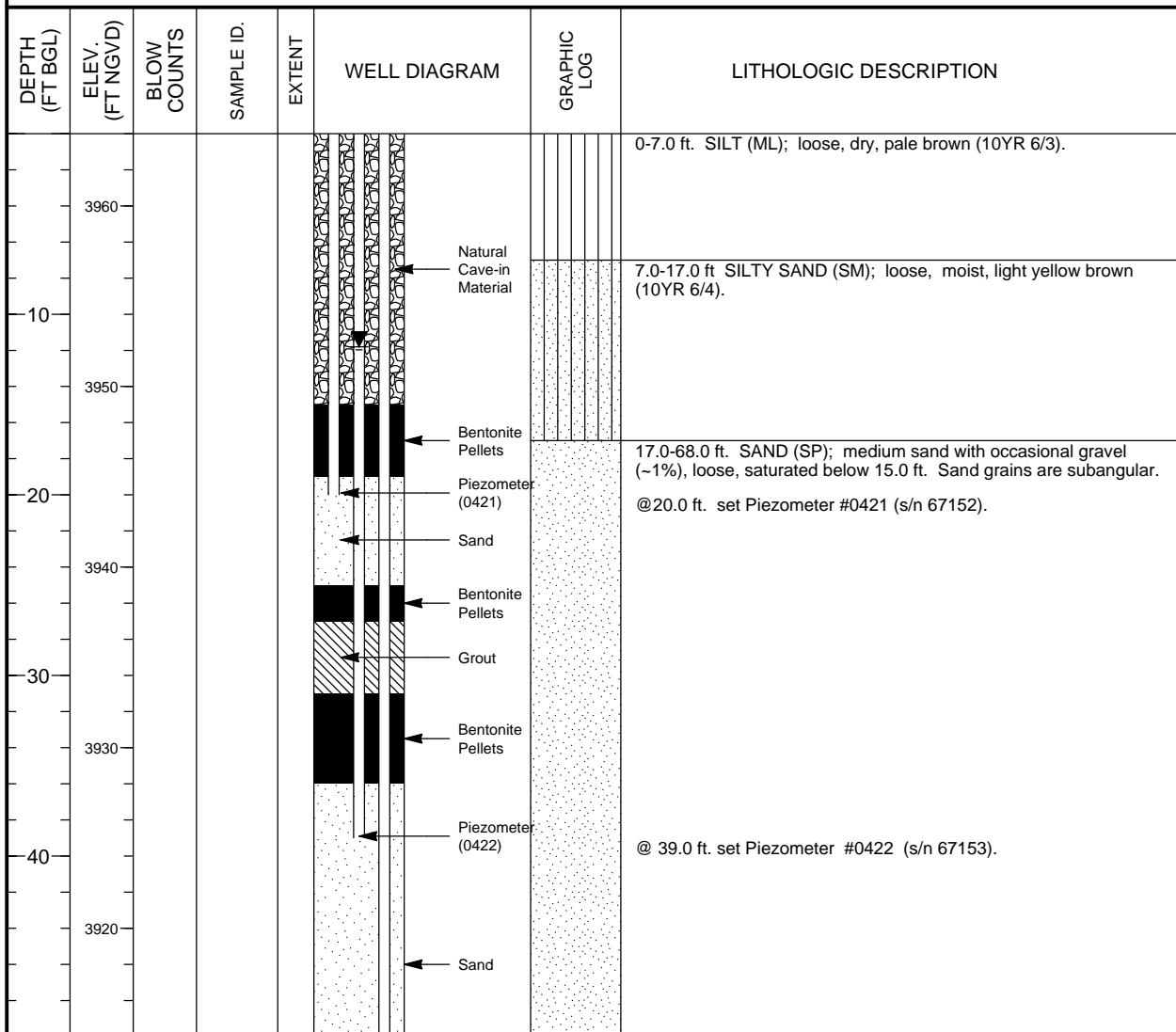
## **Attachment 2**

**Edited Boring Logs at Moab 2, Moab 3, and Moab 4**

## VIBRATING WIRE PIEZOMETER CONSTRUCTION LOG MOA01-0421

PROJECT <u>MOAB</u>	NORTH COORD. (FT) <u>6661845.01</u>	DATE DRILLED <u>06/19/2002</u>
LOCATION <u>Moab, UT</u>	EAST COORD. (FT) <u>2185883.08</u>	SURFACE ELEV. ( FT NGVD) <u>3964.00</u>
SITE <u>MOAB</u>	HOLE DEPTH (FT) <u>74.00</u>	BIT SIZE(S) (IN) <u>9.0</u>
PIEZOMETER ID <u>0421</u>		

<u>PIEZOMETER INSTALLATION</u>	<u>INTERVAL (FT)</u>	<u>DRILLING METHOD</u> <u>HOLLOW STEM AUGER</u>
		<u>SAMPLING METHOD</u> <u>DIRECT PUSH</u>
<u>START/END DEPTH:</u>	20.0 to 20.0	<u>WATER LEVEL (FT BGS)</u> <u>11.8 on 06/21/2002</u>
<u>PACK MATERIAL TYPE:</u> Sand	19.0 to 25.0	<u>LOGGED BY</u> <u>Kautsky, M.</u>
		<u>REMARKS</u> <u>Locations 0421,0422, and 0423 in same borehole.</u>



# VIBRATING WIRE PIEZOMETER CONSTRUCTION LOG MOA01-0421

**PROJECT** MOAB **PIEZOMETER ID** 0421  
**SITE** MOAB **DATES DRILLED** 06/19/2002

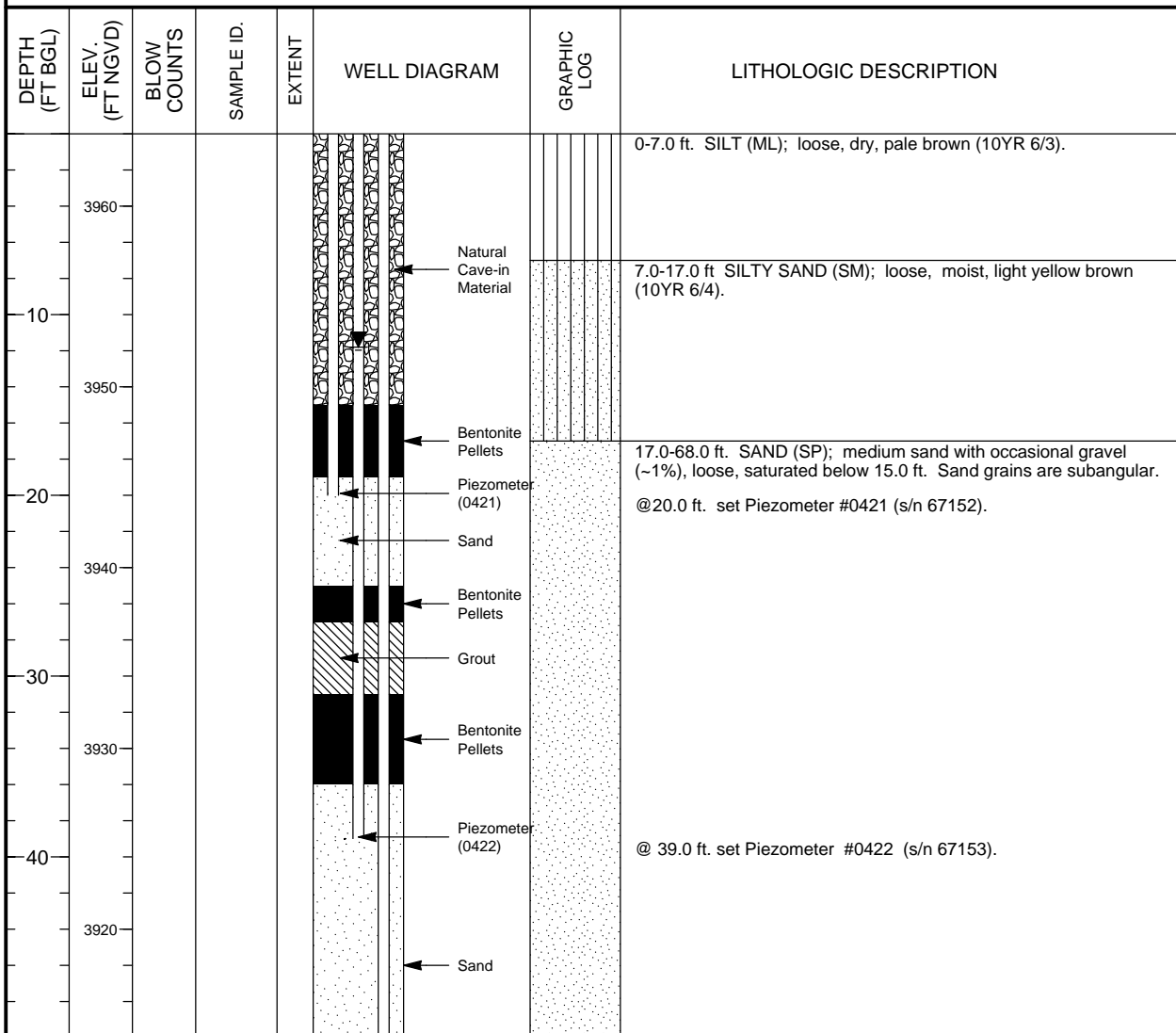
*Continued from Previous Page*

DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW COUNTS	SAMPLE ID.	EXTENT	WELL DIAGRAM	GRAPHIC LOG	LITHOLOGIC DESCRIPTION
3910							
-60							
3900							
-70							68.0-74.0 ft. SANDY GRAVEL (GP-SP); dark greenish gray, dense, saturated. @71.0 ft set Piezometer #0423 (s/n 67154)
3890							Total Depth 74.0 ft.
-80							
3880							
-90							
3870							
-100							
3860							
-110							

## VIBRATING WIRE PIEZOMETER CONSTRUCTION LOG MOA01-0422

PROJECT <u>MOAB</u>	NORTH COORD. (FT) <u>6661845.01</u>	DATE DRILLED <u>06/19/2002</u>
LOCATION <u>Moab, UT</u>	EAST COORD. (FT) <u>2185883.08</u>	SURFACE ELEV. ( FT NGVD) <u>3964.00</u>
SITE <u>MOAB</u>	HOLE DEPTH (FT) <u>74.00</u>	BIT SIZE(S) (IN) <u>9.0</u>
PIEZOMETER ID <u>0422</u>		

<u>PIEZOMETER INSTALLATION</u>	<u>INTERVAL (FT)</u>	<u>DRILLING METHOD</u> <u>HOLLOW STEM AUGER</u>
		<u>SAMPLING METHOD</u> <u>DIRECT PUSH</u>
<u>START/END DEPTH:</u>	39.0 to 39.0	<u>WATER LEVEL (FT BGS)</u> <u>11.8 on 06/21/2002</u>
<u>PACK MATERIAL TYPE:</u> Sand	36.0 to 53.0	<u>LOGGED BY</u> <u>Kautsky, M.</u>
		<u>REMARKS</u> <u>Locations 0421,0422, and 0423 in same borehole.</u>



# VIBRATING WIRE PIEZOMETER CONSTRUCTION LOG MOA01-0422

**PROJECT** MOAB **PIEZOMETER ID** 0422  
**SITE** MOAB **DATES DRILLED** 06/19/2002

*Continued from Previous Page*

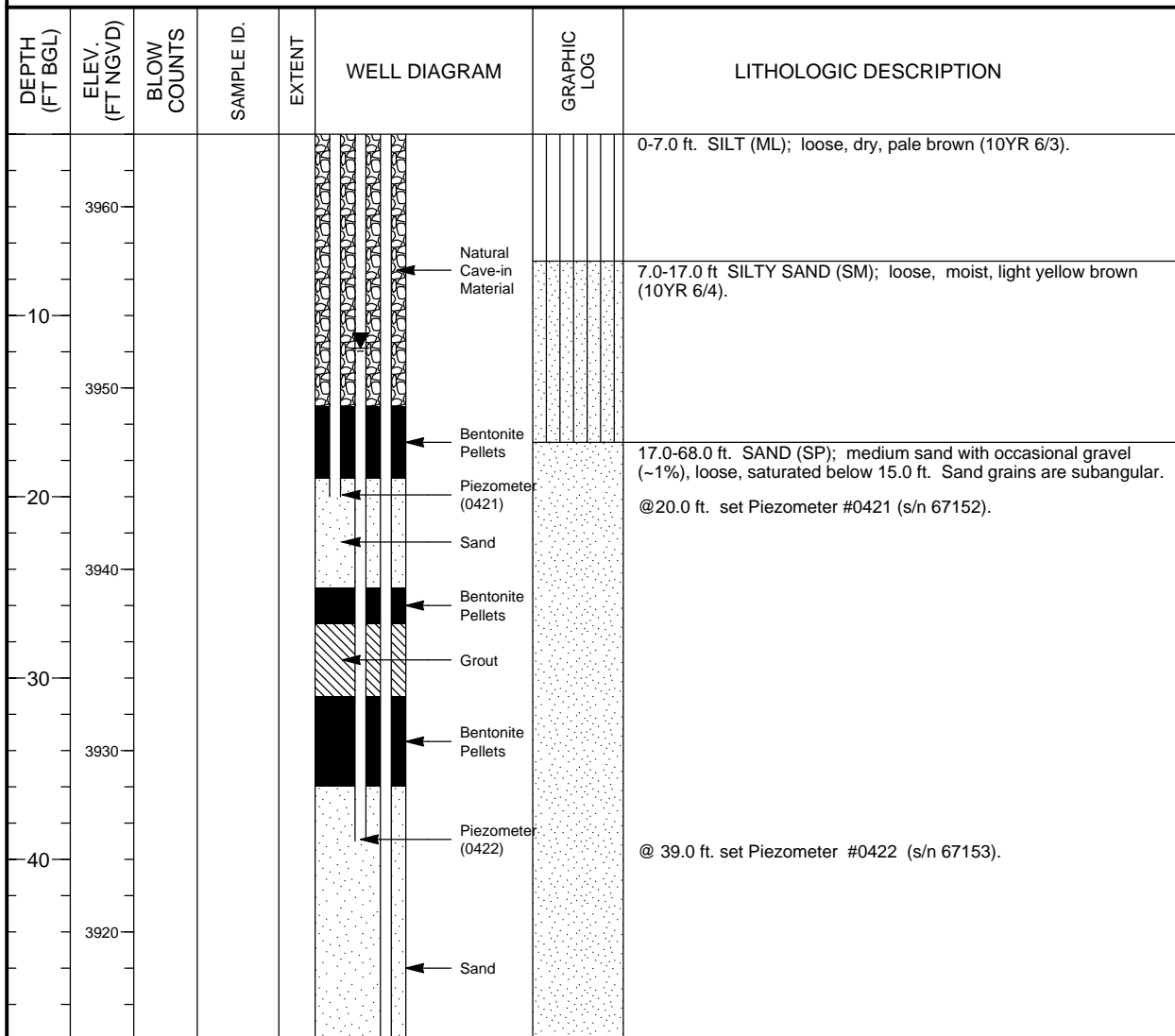
DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW COUNTS	SAMPLE ID.	EXTENT	WELL DIAGRAM	GRAPHIC LOG	LITHOLOGIC DESCRIPTION
3910							
-60							
3900							
-70							
3890							Total Depth 74.0 ft.
-80							
3880							
-90							
3870							
-100							
3860							
-110							



## VIBRATING WIRE PIEZOMETER CONSTRUCTION LOG MOA01-0423

PROJECT <u>MOAB</u>	NORTH COORD. (FT) <u>6661845.01</u>	DATE DRILLED <u>06/19/2002</u>
LOCATION <u>Moab, UT</u>	EAST COORD. (FT) <u>2185883.08</u>	SURFACE ELEV. ( FT NGVD) <u>3964.00</u>
SITE <u>MOAB</u>	HOLE DEPTH (FT) <u>74.00</u>	BIT SIZE(S) (IN) <u>9.0</u>
PIEZOMETER ID <u>0423</u>		

<u>PIEZOMETER INSTALLATION</u>	<u>INTERVAL (FT)</u>	<u>DRILLING METHOD</u> <u>HOLLOW STEM AUGER</u>
		<u>SAMPLING METHOD</u> <u>DIRECT PUSH</u>
<u>START/END DEPTH:</u>	71.0 to 71.0	<u>WATER LEVEL (FT BGS)</u> <u>11.8 on 06/21/2002</u>
<u>PACK MATERIAL TYPE:</u> Sand	63.0 to 74.0	<u>LOGGED BY</u> <u>Kautsky, M.</u>
		<u>REMARKS</u> <u>Locations 0421,0422, and 0423 in same borehole.</u>



# VIBRATING WIRE PIEZOMETER CONSTRUCTION LOG MOA01-0423

**PROJECT** MOAB **PIEZOMETER ID** 0423  
**SITE** MOAB **DATES DRILLED** 06/19/2002

*Continued from Previous Page*

DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW COUNTS	SAMPLE ID.	EXTENT	WELL DIAGRAM	GRAPHIC LOG	LITHOLOGIC DESCRIPTION
3910							
-60							
3900							
-70							68.0-74.0 ft. SANDY GRAVEL (GP-SP); dark greenish gray, dense, saturated. @71.0 ft set Piezometer #0423 (s/n 67154)
3890							Total Depth 74.0 ft.
-80							
3880							
-90							
3870							
-100							
3860							
-110							

## VIBRATING WIRE PIEZOMETER CONSTRUCTION LOG MOA01-0424

PROJECT <u>MOAB</u>	NORTH COORD. (FT) <u>6663844.67</u>	DATE DRILLED <u>06/23/2002 to 06/24/2002</u>
LOCATION <u>Moab, UT</u>	EAST COORD. (FT) <u>2186107.88</u>	SURFACE ELEV. ( FT NGVD) <u>3967.40</u>
SITE <u>MOAB</u>	HOLE DEPTH (FT) <u>90.00</u>	BIT SIZE(S) (IN) <u>8.0</u>
PIEZOMETER ID <u>0424</u>		

<u>PIEZOMETER INSTALLATION</u>	<u>INTERVAL (FT)</u>	DRILLING METHOD <u>HOLLOW STEM AUGER</u> SAMPLING METHOD <u>AUGER CUTTINGS</u> WATER LEVEL (FT BGS) _____ LOGGED BY <u>Kautsky, M.</u> REMARKS _____
START/END DEPTH:	20.0 to 20.0	
PACK MATERIAL TYPE: Sand	15.0 to 25.0	

DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW COUNTS	SAMPLE ID.	EXTENT	WELL DIAGRAM	GRAPHIC LOG	LITHOLOGIC DESCRIPTION
							0-7.0 ft. SILT (ML); very pale brown (10YR 7/3), very fine sand, dry, loose.
10	3960						7.0-25.0 ft. SAND (SP); brown (7.5 YR 5/3), gravelly fine sand, moist, loose.
20	3950						@20.0 ft. set Piezometer #0421 (s/n 67155).
30	3940						25.0-90.0 ft. SANDY GRAVEL (GP-SP); undifferentiated sandy gravel and gravelly sand.
40	3930						
50	3920						

# VIBRATING WIRE PIEZOMETER CONSTRUCTION LOG MOA01-0424

PROJECT <u>MOAB</u>	PIEZOMETER ID <u>0424</u>
SITE <u>MOAB</u>	DATES DRILLED <u>06/23/2002 to 06/24/2002</u>

*Continued from Previous Page*

DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW COUNTS	SAMPLE ID.	EXTENT	WELL DIAGRAM	GRAPHIC LOG	LITHOLOGIC DESCRIPTION
							<p>@55.0 ft. set Piezometer #0421 (s/n 67156).</p> <p>@87.0 ft. set Piezometer #0421 (s/n 67157).</p> <p>Total Depth 90.0 ft.</p>
60	3910						
70	3900						
80	3890						
90	3880						
100	3870						
110	3860						

## VIBRATING WIRE PIEZOMETER CONSTRUCTION LOG MOA01-0425

PROJECT <u>MOAB</u>	NORTH COORD. (FT) <u>6663844.67</u>	DATE DRILLED <u>06/23/2002 to 06/24/2002</u>
LOCATION <u>Moab, UT</u>	EAST COORD. (FT) <u>2186107.88</u>	SURFACE ELEV. ( FT NGVD) <u>3967.40</u>
SITE <u>MOAB</u>	HOLE DEPTH (FT) <u>90.00</u>	BIT SIZE(S) (IN) <u>8.0</u>
PIEZOMETER ID <u>0425</u>		

<b>PIEZOMETER INSTALLATION</b>	<b>INTERVAL (FT)</b>	<b>DRILLING METHOD</b> <u>HOLLOW STEM AUGER</u> <b>SAMPLING METHOD</b> <u>AUGER CUTTINGS</u> <b>WATER LEVEL (FT BGS)</b> _____ <b>LOGGED BY</b> <u>Kautsky, M.</u> <b>REMARKS</b> _____
<b>START/END DEPTH:</b>	55.0 to 55.0	
<b>PACK MATERIAL TYPE:</b> Sand	50.0 to 60.0	

DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW COUNTS	SAMPLE ID.	EXTENT	WELL DIAGRAM	GRAPHIC LOG	LITHOLOGIC DESCRIPTION
							0-7.0 ft. SILT (ML); very pale brown (10YR 7/3), very fine sand, dry, loose.
10	3960						7.0-25.0 ft. SAND (SP); brown (7.5 YR 5/3), gravelly fine sand, moist, loose.
20	3950						@20.0 ft. set Piezometer #0421 (s/n 67155).
30	3940						25.0-90.0 ft. SANDY GRAVEL (GP-SP); undifferentiated sandy gravel and gravelly sand.
40	3930						
50	3920						

# VIBRATING WIRE PIEZOMETER CONSTRUCTION LOG MOA01-0425

**PROJECT** MOAB **PIEZOMETER ID** 0425  
**SITE** MOAB **DATES DRILLED** 06/23/2002 to 06/24/2002

*Continued from Previous Page*

DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW COUNTS	SAMPLE ID.	EXTENT	WELL DIAGRAM	GRAPHIC LOG	LITHOLOGIC DESCRIPTION
60	3910						@55.0 ft. set Piezometer #0421 (s/n 67156).
70	3900						
80	3890						@87.0 ft. set Piezometer #0421 (s/n 67157).
90	3880				Total Depth 90.0 ft.		
100	3870						
110	3860						

## VIBRATING WIRE PIEZOMETER CONSTRUCTION LOG MOA01-0426

PROJECT <u>MOAB</u>	NORTH COORD. (FT) <u>6663844.67</u>	DATE DRILLED <u>06/23/2002 to 06/24/2002</u>
LOCATION <u>Moab, UT</u>	EAST COORD. (FT) <u>2186107.88</u>	SURFACE ELEV. ( FT NGVD) <u>3967.40</u>
SITE <u>MOAB</u>	HOLE DEPTH (FT) <u>90.00</u>	BIT SIZE(S) (IN) <u>8.0</u>
PIEZOMETER ID <u>0426</u>		

<u>PIEZOMETER INSTALLATION</u>	<u>INTERVAL (FT)</u>	DRILLING METHOD <u>HOLLOW STEM AUGER</u> SAMPLING METHOD <u>AUGER CUTTINGS</u> WATER LEVEL (FT BGS) _____ LOGGED BY <u>Kautsky, M.</u> REMARKS _____
START/END DEPTH:	87.0 to 87.0	
PACK MATERIAL TYPE: Sand	80.0 to 90.0	

DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW COUNTS	SAMPLE ID.	EXTENT	WELL DIAGRAM	GRAPHIC LOG	LITHOLOGIC DESCRIPTION
							0-7.0 ft. SILT (ML); very pale brown (10YR 7/3), very fine sand, dry, loose.
10	3960						7.0-25.0 ft. SAND (SP); brown (7.5 YR 5/3), gravelly fine sand, moist, loose.
20	3950						@20.0 ft. set Piezometer #0421 (s/n 67155).
30	3940						25.0-90.0 ft. SANDY GRAVEL (GP-SP); undifferentiated sandy gravel and gravelly sand.
40	3930						
50	3920						

# VIBRATING WIRE PIEZOMETER CONSTRUCTION LOG MOA01-0426

**PROJECT** MOAB **PIEZOMETER ID** 0426  
**SITE** MOAB **DATES DRILLED** 06/23/2002 to 06/24/2002

*Continued from Previous Page*

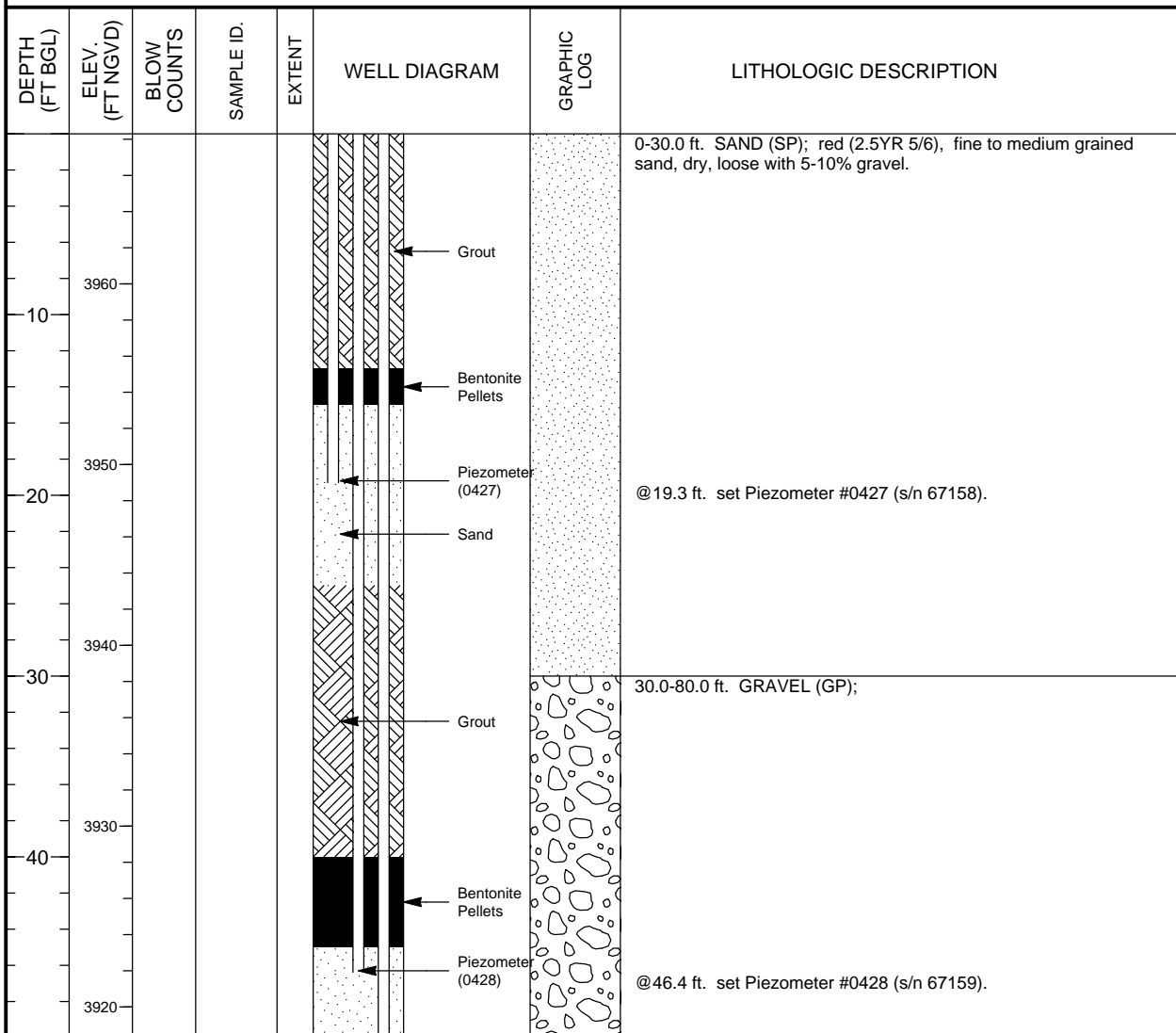
DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW COUNTS	SAMPLE ID.	EXTENT	WELL DIAGRAM	GRAPHIC LOG	LITHOLOGIC DESCRIPTION
60	3910						@55.0 ft. set Piezometer #0421 (s/n 67156).
70	3900						
80	3890						@87.0 ft. set Piezometer #0421 (s/n 67157).
90	3880				Total Depth 90.0 ft.		
100	3870						
110	3860						



## VIBRATING WIRE PIEZOMETER CONSTRUCTION LOG MOA01-0427

PROJECT <u>MOAB</u>	NORTH COORD. (FT) <u>6665870.35</u>	DATE DRILLED <u>06/21/2002 to 06/23/2002</u>
LOCATION <u>Moab, UT</u>	EAST COORD. (FT) <u>2186931.30</u>	SURFACE ELEV. ( FT NGVD) <u>3968.30</u>
SITE <u>MOAB</u>	HOLE DEPTH (FT) <u>80.00</u>	BIT SIZE(S) (IN) <u>8.0</u>
PIEZOMETER ID <u>0427</u>		

<b>PIEZOMETER INSTALLATION</b>	<b>INTERVAL (FT)</b>	<b>DRILLING METHOD</b> <u>HOLLOW STEM AUGER</u>
		<b>SAMPLING METHOD</b> _____
<b>START/END DEPTH:</b>	19.3 to 19.3	<b>WATER LEVEL (FT BGS)</b> _____
<b>PACK MATERIAL TYPE:</b> Sand	15.0 to 25.0	<b>LOGGED BY</b> <u>Kautsky, M.</u>
		<b>REMARKS</b> _____



# VIBRATING WIRE PIEZOMETER CONSTRUCTION LOG MOA01-0427

**PROJECT** MOAB **PIEZOMETER ID** 0427  
**SITE** MOAB **DATES DRILLED** 06/21/2002 to 06/23/2002

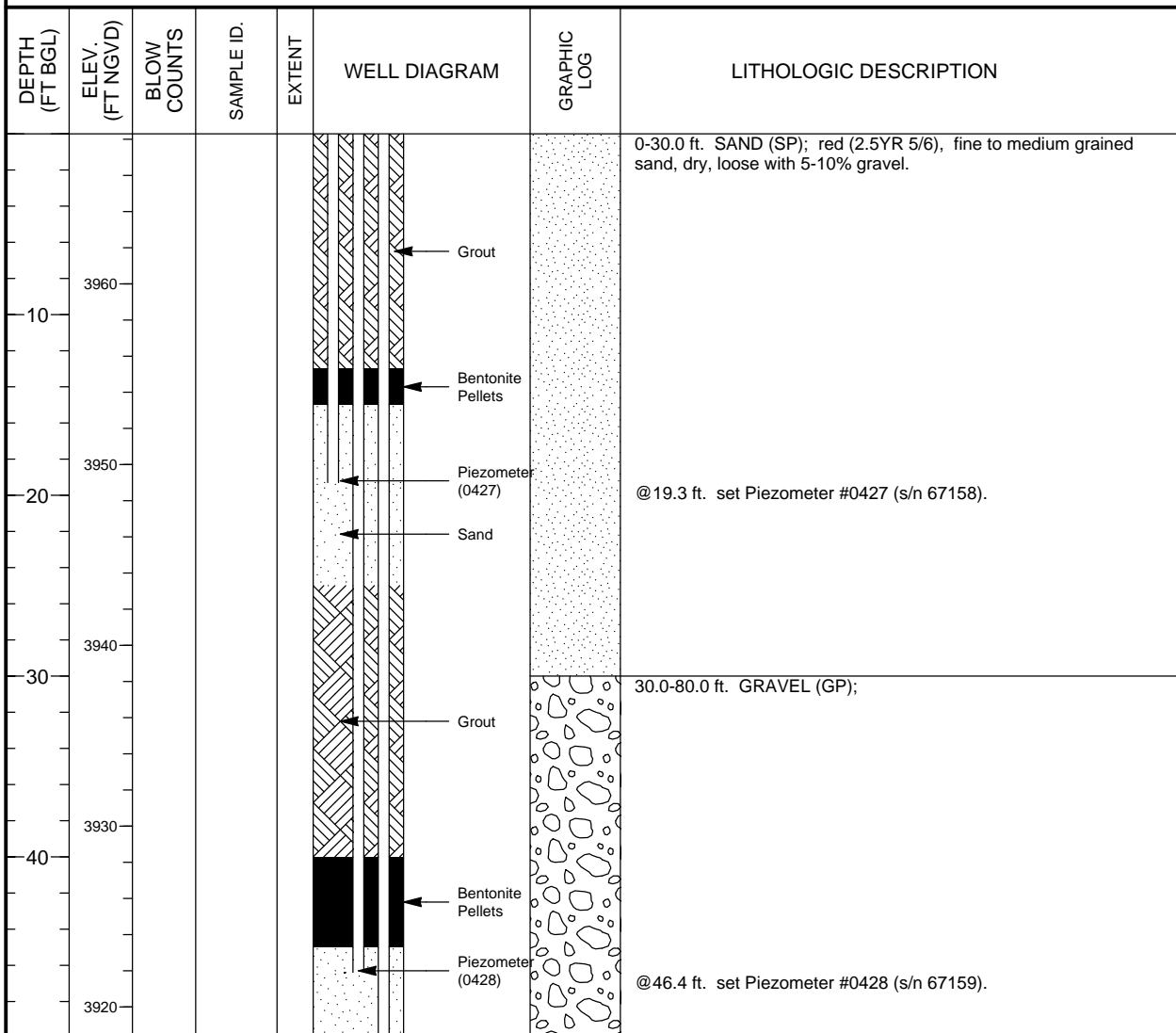
*Continued from Previous Page*

DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW COUNTS	SAMPLE ID.	EXTENT	WELL DIAGRAM	GRAPHIC LOG	LITHOLOGIC DESCRIPTION
<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 10px;">60</div> <div style="margin-bottom: 10px;">3910</div> <div style="margin-bottom: 10px;">70</div> <div style="margin-bottom: 10px;">3900</div> <div style="margin-bottom: 10px;">80</div> <div style="margin-bottom: 10px;">3890</div> <div style="margin-bottom: 10px;">90</div> <div style="margin-bottom: 10px;">3880</div> <div style="margin-bottom: 10px;">100</div> <div style="margin-bottom: 10px;">3870</div> <div style="margin-bottom: 10px;">110</div> <div style="margin-bottom: 10px;">3860</div> </div>							<p>@79.9 ft. set Piezometer #0429 (s/n 67160). Total Depth 80.0 ft.</p>

## VIBRATING WIRE PIEZOMETER CONSTRUCTION LOG MOA01-0428

PROJECT <u>MOAB</u>	NORTH COORD. (FT) <u>6665870.35</u>	DATE DRILLED <u>06/21/2002 to 06/23/2002</u>
LOCATION <u>Moab, UT</u>	EAST COORD. (FT) <u>2186931.30</u>	SURFACE ELEV. ( FT NGVD) <u>3968.30</u>
SITE <u>MOAB</u>	HOLE DEPTH (FT) <u>80.00</u>	BIT SIZE(S) (IN) <u>8.0</u>
PIEZOMETER ID <u>0428</u>		

<u>PIEZOMETER INSTALLATION</u>	<u>INTERVAL (FT)</u>	<u>DRILLING METHOD</u> <u>HOLLOW STEM AUGER</u>
		<u>SAMPLING METHOD</u>
<b>START/END DEPTH:</b>	46.4 to 46.4	<b>WATER LEVEL (FT BGS)</b>
<b>PACK MATERIAL TYPE:</b> Sand	45.0 to 60.0	<b>LOGGED BY</b> <u>Kautsky, M.</u>
		<b>REMARKS</b>



# VIBRATING WIRE PIEZOMETER CONSTRUCTION LOG MOA01-0428

**PROJECT** MOAB **PIEZOMETER ID** 0428  
**SITE** MOAB **DATES DRILLED** 06/21/2002 to 06/23/2002

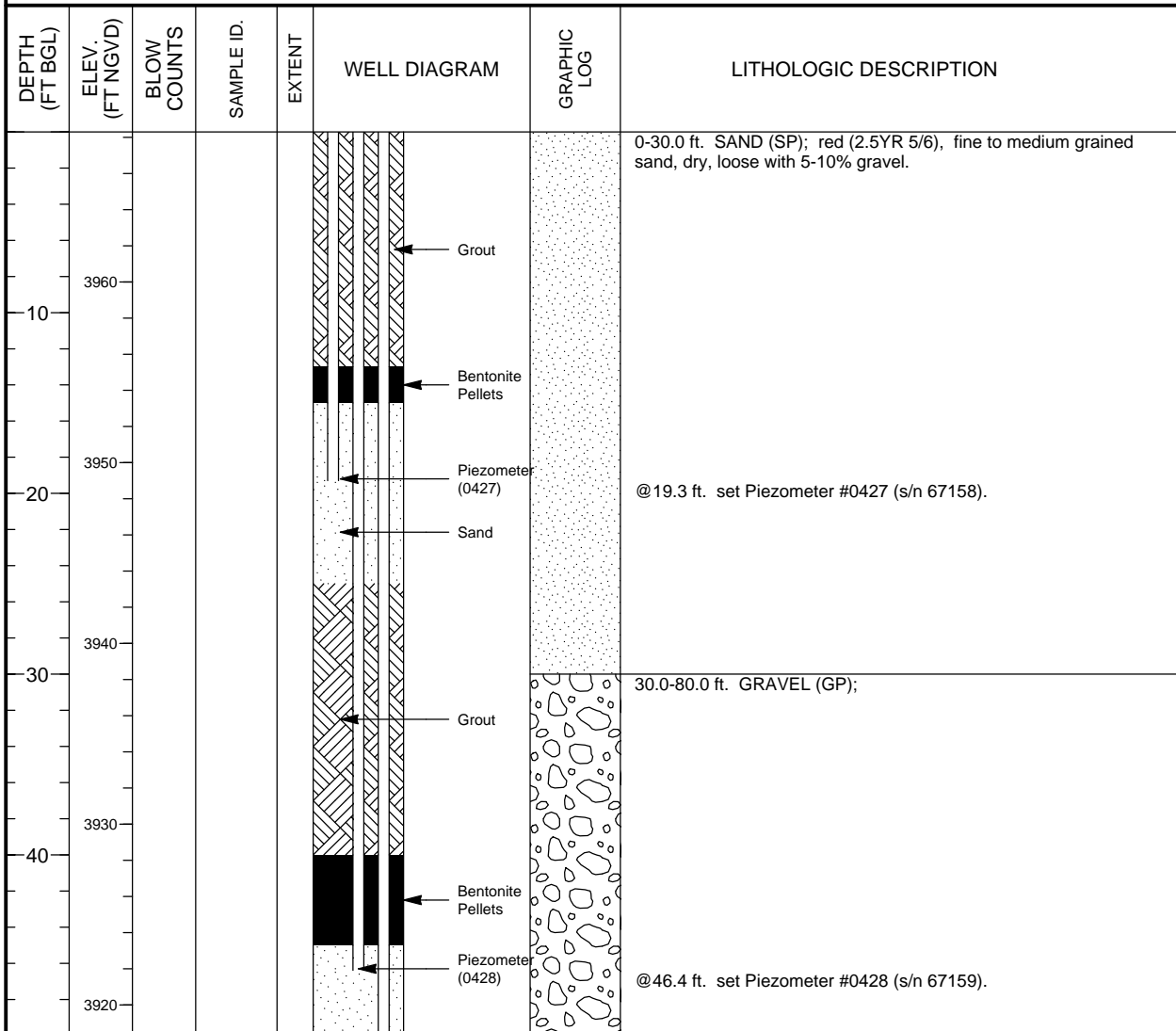
*Continued from Previous Page*

DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW COUNTS	SAMPLE ID.	EXTENT	WELL DIAGRAM	GRAPHIC LOG	LITHOLOGIC DESCRIPTION
<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 10px;">60</div> <div style="margin-bottom: 10px;">3910</div> <div style="margin-bottom: 10px;">70</div> <div style="margin-bottom: 10px;">3900</div> <div style="margin-bottom: 10px;">80</div> <div style="margin-bottom: 10px;">3890</div> <div style="margin-bottom: 10px;">90</div> <div style="margin-bottom: 10px;">3880</div> <div style="margin-bottom: 10px;">100</div> <div style="margin-bottom: 10px;">3870</div> <div style="margin-bottom: 10px;">110</div> <div style="margin-bottom: 10px;">3860</div> </div>					<p style="margin-left: 100px;">Sand</p> <p style="margin-left: 100px;">Grout</p> <p style="margin-left: 100px;">Sand</p> <p style="margin-left: 100px;">Piezometer (0429)</p>		<p>@79.9 ft. set Piezometer #0429 (s/n 67160). Total Depth 80.0 ft.</p>

## VIBRATING WIRE PIEZOMETER CONSTRUCTION LOG MOA01-0429

PROJECT <u>MOAB</u>	NORTH COORD. (FT) <u>6665870.35</u>	DATE DRILLED <u>06/21/2002 to 06/23/2002</u>
LOCATION <u>Moab, UT</u>	EAST COORD. (FT) <u>2186931.30</u>	SURFACE ELEV. ( FT NGVD) <u>3968.30</u>
SITE <u>MOAB</u>	HOLE DEPTH (FT) <u>80.00</u>	BIT SIZE(S) (IN) <u>8.0</u>
PIEZOMETER ID <u>0429</u>		

<u>PIEZOMETER INSTALLATION</u>	<u>INTERVAL (FT)</u>	<u>DRILLING METHOD</u> <u>HOLLOW STEM AUGER</u>
		<u>SAMPLING METHOD</u>
<b>START/END DEPTH:</b>	79.9 to 79.9	<b>WATER LEVEL (FT BGS)</b>
<b>PACK MATERIAL TYPE:</b> Sand	75.0 to 80.0	<b>LOGGED BY</b> <u>Kautsky, M.</u>
		<b>REMARKS</b>



# VIBRATING WIRE PIEZOMETER CONSTRUCTION LOG MOA01-0429

**PROJECT** MOAB **PIEZOMETER ID** 0429  
**SITE** MOAB **DATES DRILLED** 06/21/2002 to 06/23/2002

*Continued from Previous Page*

DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW COUNTS	SAMPLE ID.	EXTENT	WELL DIAGRAM	GRAPHIC LOG	LITHOLOGIC DESCRIPTION
<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 10px;">60</div> <div style="margin-bottom: 10px;">3910</div> <div style="margin-bottom: 10px;">70</div> <div style="margin-bottom: 10px;">3900</div> <div style="margin-bottom: 10px;">80</div> <div style="margin-bottom: 10px;">3890</div> <div style="margin-bottom: 10px;">90</div> <div style="margin-bottom: 10px;">3880</div> <div style="margin-bottom: 10px;">100</div> <div style="margin-bottom: 10px;">3870</div> <div style="margin-bottom: 10px;">110</div> <div style="margin-bottom: 10px;">3860</div> </div>							<p>@79.9 ft. set Piezometer #0429 (s/n 67160). Total Depth 80.0 ft.</p>

**Attachment 3**  
**Spreadsheet Output**

Variables and column headings used in the following spreadsheets are defined below.

Adj.  $R_0$   $\equiv$  Adjusted wire frequency zero reading (Hz).

$R_1$   $\equiv$  Wire frequency reading (Hz).

$G$   $\equiv$  Linear gage factor (psi/digit).

$T_0$   $\equiv$  Zero temperature reading ( $^{\circ}\text{C}$ ).

$T_1$   $\equiv$  Temperature reading ( $^{\circ}\text{C}$ ).

$K$   $\equiv$  Thermal factor (psi/ $^{\circ}\text{C}$ ).

Uncorrected PSI is the reading obtained from the data logger without a correction applied to account for atmospheric conditions.

Corrected PSI has the correction for atmospheric conditions applied.

Computed PSI are pressure readings computed from frequency readings and temperature readings using the coefficients listed above with the following formula:

$$\text{PSI} = ((R_0 - R_1) * G) + ((T_1 - T_0) * K)$$



3910 3964.0 ground surface @ piezometer nest  
 3955 3964.0

#421	
piezo. elev.	3944.0
Mean	3951.482
S.E.	0.00891
$\sigma$	0.211151
$\sigma^2$	0.044585
Range	0.740045
Minimum	3951.015
Maximum	3951.755
n	454

#422	
piezo. elev.	3925.0
Mean	3944.538
S.E.	0.010131
$\sigma$	0.215872
$\sigma^2$	0.046601
Range	0.821382
Minimum	3944.065
Maximum	3944.886
Count	454

#423	
piezo. elev.	3893.0
Mean	3951.988
S.E.	0.019087
$\sigma$	0.406689
$\sigma^2$	0.165396
Range	1.732278
Minimum	3951.446
Maximum	3953.178
Count	454

river	
bank elev.	3950.35
Mean	3949.957
S.E.	0.016727
$\sigma$	0.358413
$\sigma^2$	0.12703
Range	2.069
Minimum	3949.253
Maximum	3951.322
Count	151

Column1	
Mean	3951.482
Standard Er	0.00891
Median	3951.58
Mode	#N/A
Standard D:	0.211151
Sample Var	0.044585
Kurtosis	-0.67216
Skewness	-0.86958
Range	0.740045
Minimum	3951.015
Maximum	3951.755
Sum	1793973
Count	454

Column1	
Mean	3944.538
Standard E	0.010131
Median	3944.616
Mode	3944.611
Standard C	0.215872
Sample Va	0.046601
Kurtosis	-0.86063
Skewness	-0.63601
Range	0.821382
Minimum	3944.065
Maximum	3944.886
Sum	1790820
Count	454

Column1	
Mean	3951.988
Standard Er	0.019087
Median	3951.946
Mode	3951.614
Standard D:	0.406689
Sample Var	0.165396
Kurtosis	1.08667
Skewness	1.236178
Range	1.732278
Minimum	3951.446
Maximum	3953.178
Sum	1794202
Count	454

Column1	
Mean	3949.957
Standard E	0.016727
Median	3949.94
Mode	3950.265
Standard C	0.358413
Sample Vs	0.12703
Kurtosis	0.466491
Skewness	0.445436
Range	2.069
Minimum	3949.253
Maximum	3951.322
Sum	1793281
Count	454

MOAB 2 - VIBRATING WIRE PIEZOMETERS

river	label	reading elev.	total head	1/2 range	max temp	min temp	temp. Δ / 2	avg temp
		3950.35	3949.96	1.034				
		3944.0	3951.48	0.370	14.28	13.76	0.26	14.02
#421		3925.0	3944.54	0.411	13.87	13.70	0.09	13.79
#423		3923.0	3951.99	0.866	13.82	13.76	0.03	13.79

year	day of year	hour of day	decimal date	date & time	PRESSURE				battery voltage		temperature °C				vibrating wire frequency				#421				#422				#423				approximate river elevation		
					uncorrected PSI	corrected PSI *	total head (ft)	uncorrected PSI	corrected PSI *	total head (ft)	uncorrected PSI	corrected PSI *	total head (ft)	#124	min	max	#421	#422	#423	#124	#421	#422	#423	#124	computed PSI	corrected PSI *	total head (ft)	computed PSI	corrected PSI *	total head (ft)		computed PSI	corrected PSI *
2002	234	1200	234.60	8/22/2002 12:00	1.566	1.566	3947.66	1.566	1.566	3947.66	0.09	12.85	13.38	13.78	13.75	13.81	33.31	8437.6	7593.7	7865.8	5492.6	3.10	3.10	3.120	3951.16	8.33	8.33	3944.21	25.38	25.38	3951.57	3949.56	
2002	234	1600	234.67	8/22/2002 16:00	1.560	1.603	3947.70	1.560	1.603	3947.70	0.04	13.02	13.11	13.76	13.71	13.79	39.09	8438.7	7594.5	7866.6	5437.1	3.08	3.10	3.120	3951.20	8.31	8.350	3944.27	25.36	25.404	3951.62	3949.60	
2002	234	2000	234.83	8/22/2002 20:00	1.548	1.601	3947.69	1.548	1.601	3947.69	0.03	12.84	13.03	13.78	13.75	13.8	27.28	8439.1	7595	7866.8	5401.3	3.07	3.10	3.120	3951.20	8.30	8.341	3944.25	25.37	25.395	3951.60	3949.63	
2002	235	0	235.00	8/23/2002 0:00	1.572	1.599	3947.69	1.572	1.599	3947.69	0.06	12.75	12.95	13.77	13.74	13.79	19.25	8438.1	7594.2	7865.3	5426.5	3.09	3.119	3.120	3951.20	8.30	8.341	3944.25	25.38	25.395	3951.61	3949.63	
2002	235	400	235.17	8/23/2002 4:00	1.580	1.601	3947.69	1.580	1.601	3947.69	0.07	12.68	12.75	13.77	13.74	13.79	14.23	8437.8	7593.9	7865.3	5427	3.10	3.120	3.120	3951.20	8.32	8.342	3944.25	25.38	25.398	3951.61	3949.63	
2002	235	800	235.33	8/23/2002 8:00	1.585	1.589	3947.671	1.585	1.589	3947.671	0.08	12.68	13.21	13.77	13.74	13.79	15.75	8437.2	7593.6	7865.7	5470.3	3.11	3.107	3.120	3951.17	8.33	8.322	3944.20	25.38	25.376	3951.56	3949.61	
2002	235	1200	235.50	8/23/2002 12:00	1.569	1.610	3947.72	1.569	1.610	3947.72	0.09	13.11	13.36	13.78	13.73	13.81	33.59	8437	7593.3	7865.6	5475.9	3.12	3.129	3.129	3951.22	8.34	8.346	3944.26	25.38	25.395	3951.60	3949.64	
2002	235	1600	235.67	8/23/2002 16:00	1.555	1.624	3947.75	1.555	1.624	3947.75	0.02	13.01	13.11	13.76	13.71	13.79	38.91	8438.9	7594.8	7867.1	5397.3	3.07	3.132	3.129	3951.25	8.30	8.369	3944.31	25.35	25.418	3951.66	3949.62	
2002	235	2000	235.83	8/23/2002 20:00	1.552	1.618	3947.73	1.552	1.618	3947.73	0.02	12.85	13.03	13.78	13.75	13.81	28.25	8438	7595	7867.2	5382.8	3.07	3.146	3.146	3951.24	8.30	8.361	3944.29	25.35	25.412	3951.69	3949.62	
2002	236	0	236.00	8/24/2002 0:00	1.564	1.611	3947.72	1.564	1.611	3947.72	0.04	12.74	12.85	13.77	13.74	13.79	17.31	8438.5	7594.6	7867	5392.1	3.08	3.129	3.129	3951.22	8.32	8.343	3944.25	25.37	25.393	3951.60	3949.61	
2002	236	400	236.17	8/24/2002 4:00	1.578	1.605	3947.70	1.578	1.605	3947.70	0.06	12.68	12.75	13.79	13.74	13.79	13.93	8437.9	7594.1	7867.2	5403.2	3.11	3.099	3.109	3951.16	8.32	8.309	3944.18	25.37	25.383	3951.53	3949.65	
2002	236	800	236.33	8/24/2002 8:00	1.586	1.612	3947.64	1.586	1.612	3947.64	0.07	12.69	12.75	13.79	13.74	13.79	10.3	8437.5	7594.1	7867.2	5463.2	3.11	3.129	3.129	3951.22	8.30	8.352	3944.27	25.35	25.398	3951.61	3949.62	
2002	236	1200	236.67	8/24/2002 12:00	1.607	1.612	3947.72	1.607	1.612	3947.72	0.08	13.1	13.5	13.78	13.73	13.81	34.47	8436.7	7593.2	7865.5	5486.9	3.13	3.130	3.130	3951.21	8.34	8.342	3944.25	25.38	25.389	3951.59	3949.60	
2002	236	1600	236.87	8/24/2002 16:00	1.589	1.621	3947.74	1.589	1.621	3947.74	0.06	13.11	13.11	13.76	13.71	13.79	40.67	8437.4	7593.2	7865.2	5456.8	3.13	3.141	3.141	3951.25	8.34	8.342	3944.25	25.38	25.389	3951.59	3949.60	
2002	236	2000	236.83	8/24/2002 20:00	1.584	1.615	3947.73	1.584	1.615	3947.73	0.06	12.82	13.02	13.77	13.74	13.8	24	8437.7	7593.9	7865.3	5428.7	3.10	3.132	3.132	3951.23	8.32	8.352	3944.25	25.38	25.389	3951.59	3949.60	
2002	237	0	237.00	8/25/2002 0:00	1.608	1.609	3947.71	1.608	1.609	3947.71	0.09	12.7	12.83	13.79	13.74	13.79	13.52	8436.6	7593	7865.3	5455.6	3.13	3.125	3.125	3951.21	8.35	8.342	3944.25	25.39	25.387	3951.59	3949.60	
2002	237	400	237.17	8/25/2002 4:00	1.614	1.607	3947.71	1.614	1.607	3947.71	0.12	12.63	12.71	13.79	13.73	13.79	8.49	8436.4	7592.7	7865.2	5467.6	3.13	3.099	3.099	3951.15	8.34	8.305	3944.16	25.39	25.357	3951.52	3949.56	
2002	237	800	237.33	8/25/2002 8:00	1.621	1.632	3947.65	1.621	1.632	3947.65	0.09	12.63	12.71	13.79	13.73	13.79	13.58	8436.4	7592.7	7865.2	5467.6	3.13	3.099	3.099	3951.15	8.34	8.305	3944.16	25.39	25.357	3951.52	3949.56	
2002	237	1200	237.50	8/25/2002 12:00	1.621	1.612	3947.72	1.621	1.612	3947.72	0.04	12.63	12.71	13.79	13.73	13.79	13.81	32.23	8436.1	7592.6	7865	5505	3.14	3.131	3.131	3951.22	8.30	8.343	3944.25	25.40	25.389	3951.59	3949.60
2002	237	1600	237.67	8/25/2002 16:00	1.579	1.629	3947.76	1.579	1.629	3947.76	0.04	12.99	13.13	13.76	13.71	13.76	42.84	8437.9	7594	7865.5	5433.5	3.10	3.147	3.147	3951.26	8.32	8.369	3944.31	25.36	25.414	3951.65	3949.59	
2002	237	2000	237.83	8/25/2002 20:00	1.564	1.619	3947.74	1.564	1.619	3947.74	0.03	12.83	13.01	13.81	13.72	13.81	27.48	8438.5	7594.6	7867	5398.1	3.08	3.136	3.136	3951.24	8.30	8.360	3944.29	25.35	25.406	3951.63	3949.66	
2002	238	0	238.00	8/26/2002 0:00	1.577	1.610	3947.72	1.577	1.610	3947.72	0.05	12.73	12.83	13.79	13.71	13.79	16.69	8437.9	7594.2	7866.7	5412.3	3.10	3.129	3.129	3951.22	8.31	8.347	3944.26	25.38	25.391	3951.60	3949.60	
2002	238	400	238.17	8/26/2002 4:00	1.572	1.603	3947.70	1.572	1.603	3947.70	0.06	12.65	12.73	13.79	13.71	13.79	11.29	8438.1	7594.2	7866.6	5405.8	3.09	3.122	3.122	3951.20	8.31	8.345	3944.26	25.38	25.392	3951.60	3949.60	
2002	238	800	238.33	8/26/2002 8:00	1.563	1.573	3947.63	1.563	1.573	3947.63	0.08	12.62	13.53	13.79	13.71	13.79	9.62	8438.5	7594.9	7867.1	5435.7	3.07	3.088	3.088	3951.19	8.31	8.345	3944.26	25.34	25.391	3951.59	3949.47	
2002	238	1200	238.50	8/26/2002 12:00	1.554	1.601	3947.69	1.554	1.601	3947.69	-0.02	12.99	13.11	13.81	13.73	13.81	34.8	8438.3	7594.9	7867.3	5423.9	3.07	3.118	3.118	3951.20	8.30	8.345	3944.26	25.34	25.391	3951.59	3949.47	
2002	238	1600	238.67	8/26/2002 16:00	1.606	1.606	3947.71	1.606	1.606	3947.71	0.04	13.11	13.5	13.78	13.73	13.81	34.8	8438.3	7594.9	7867.3	5423.9	3.07	3.118	3.118	3951.20	8.30	8.345	3944.26	25.34	25.391	3951.59	3949.47	
2002	238	2000	238.83	8/26/2002 20:00	1.479	1.598	3947.69	1.479	1.598	3947.69	-0.02	12.83	13.01	13.81	13.73	13.81	30.36	8442	7597.5	7869.5	5305.3	3.00	3.116	3.116	3951.19	8.24	8.356	3944.28	25.29	25.411	3951.64	3949.46	
2002	239	0	239.00	8/27/2002 0:00	1.481	1.588	3947.66	1.481	1.588	3947.66	-0.03	12.76	12.84	13.79	13.71	13.79	22.87	8441.9	7597.4	7869.5	5310.9	3.00	3.107	3.107	3951.17	8.24	8.347	3944.26	25.29	25.399	3951.61	3949.46	
2002	239	400	239.17	8/27/2002 4:00	1.493	1.580	3947.65	1.493	1.580	3947.65	0.00	12.68	12.78	13.79	13.71	13.79	13.49	8441.4	7597	7869.1	5324	3.01	3.099	3.099	3951.15	8.25	8.336	3944.24	25.30	25.389	3951.59	3949.46	
2002	239	800	239.33	8/27/2002 8:00	1.497	1																											

year	day of year	hour of day	date	date & time	PRESSURE				battery voltage		temperature °C				vibrating wire frequency				#421			#422			#423			approximate river elevation							
					uncorrected PSI	#421 corrected PSI * total head (ft)	uncorrected PSI	#422 corrected PSI * total head (ft)	uncorrected PSI	#423 corrected PSI * total head (ft)	#124	min	max	#421	#422	#423	#124	#421	#422	#423	#124	computed PSI	corrected PSI *	total head (ft)	computed PSI	corrected PSI *	total head (ft)		computed PSI	corrected PSI *	total head (ft)				
2002	251	2000	251.83	9/8/2002 20:00	1.671	1.681	3947.88	6.910	6.920	3940.97	23.730	23.740	3947.78	0.08	12.87	13.17	13.85	13.71	13.79	22.78	8434	7591.4	7864.5	5459.4	3.19	3.199	3951.38	8.38	8.390	3944.36	25.41	25.420	3951.66	3949.96	
2002	252	0	252.00	9/9/2002 0:00	1.697	1.682	3947.88	6.946	6.931	3940.99	23.770	23.755	3947.82	0.10	12.78	13.71	13.88	13.71	13.79	17.96	8432.9	7589.9	7863	5468.4	3.21	3.199	3951.38	8.41	8.400	3944.38	25.45	25.411	3951.69	3950.27	
2002	252	400	252.17	9/9/2002 4:00	1.730	1.699	3947.92	6.974	6.943	3941.02	23.780	23.749	3947.81	0.12	12.72	12.78	13.88	13.71	13.79	16.53	8431.5	7588.7	7862.4	5511	3.25	3.217	3951.42	8.44	8.412	3944.41	25.46	25.429	3951.68	3950.11	
2002	252	800	252.33	9/9/2002 8:00	1.732	1.675	3947.87	6.975	6.918	3940.96	23.790	23.733	3947.77	0.14	12.68	13.05	13.87	13.71	13.79	13.43	8431.4	7588.6	7862.2	5545	3.25	3.194	3951.37	8.44	8.388	3944.36	25.46	25.408	3951.63	3949.81	
2002	252	1200	252.50	9/9/2002 12:00	1.712	1.663	3947.84	6.961	6.912	3940.95	23.780	23.751	3947.76	0.14	13.05	13.41	13.88	13.72	13.8	27.17	8432.3	7589.2	7862.6	5557.5	3.23	3.180	3951.34	8.43	8.382	3944.34	25.46	25.406	3951.63	3949.69	
2002	252	1600	252.67	9/9/2002 16:00	1.672	1.656	3947.82	6.925	6.906	3940.94	23.750	23.734	3947.77	0.10	13.11	13.21	13.86	13.72	13.8	29.81	8433.9	7590.8	7863.8	5511.3	3.19	3.175	3951.33	8.39	8.378	3944.33	25.43	25.411	3951.64	3949.69	
2002	252	2000	252.83	9/9/2002 20:00	1.660	1.652	3947.81	6.915	6.907	3940.94	23.740	23.732	3947.77	0.10	12.88	13.17	13.88	13.71	13.8	23.86	8434.4	7591.2	7864.1	5468.1	3.18	3.170	3951.32	8.38	8.376	3944.33	25.42	25.412	3951.64	3949.70	
2002	253	0	253.00	9/10/2002 0:00	1.664	1.646	3947.80	6.918	6.900	3940.92	23.750	23.732	3947.77	0.11	12.79	12.89	13.88	13.71	13.79	18.7	8434.2	7591.1	7864	5494.1	3.18	3.165	3951.30	8.38	8.369	3944.31	25.42	25.404	3951.63	3949.68	
2002	253	400	253.17	9/10/2002 4:00	1.651	1.643	3947.79	6.908	6.900	3940.92	23.740	23.732	3947.77	0.10	12.73	12.8	13.88	13.71	13.79	18.22	8434.8	7591.5	7864.3	5478.3	3.17	3.161	3951.29	8.38	8.362	3944.30	25.42	25.405	3951.63	3949.69	
2002	253	800	253.33	9/10/2002 8:00	1.658	1.638	3947.78	6.914	6.894	3940.91	23.750	23.730	3947.76	0.11	12.71	12.83	13.88	13.71	13.79	17.51	8434.5	7591.3	7864.3	5502.8	3.17	3.163	3951.28	8.38	8.362	3944.30	25.42	25.402	3951.62	3949.67	
2002	253	1200	253.50	9/10/2002 12:00	1.647	1.634	3947.77	6.906	6.893	3940.91	23.740	23.727	3947.75	0.11	12.78	13.33	13.88	13.71	13.79	27.8	8434.9	7591.6	7864.3	5465.4	3.15	3.156	3951.28	8.38	8.362	3944.30	25.42	25.405	3951.63	3949.69	
2002	253	1600	253.67	9/10/2002 16:00	1.610	1.648	3947.80	6.871	6.909	3940.94	23.700	23.736	3947.78	0.10	12.78	13.33	13.88	13.71	13.79	27.8	8434.9	7591.6	7864.3	5465.4	3.15	3.156	3951.28	8.38	8.362	3944.30	25.42	25.405	3951.63	3949.69	
2002	253	2000	253.83	9/10/2002 20:00	1.614	1.642	3947.79	6.868	6.896	3940.91	23.700	23.728	3947.76	0.06	12.88	13.15	13.88	13.72	13.8	25.99	8436.3	7593.2	7865.8	5437.1	3.13	3.160	3951.29	8.34	8.366	3944.31	25.38	25.408	3951.63	3949.72	
2002	254	0	254.00	9/11/2002 0:00	1.651	1.644	3947.79	6.908	6.897	3940.92	23.710	23.725	3947.75	0.07	12.79	12.89	13.88	13.71	13.79	21.73	8435.7	7592.5	7865.4	5450.1	3.13	3.162	3951.30	8.35	8.369	3944.31	25.39	25.404	3951.63	3949.72	
2002	254	400	254.17	9/11/2002 4:00	1.633	1.642	3947.79	6.887	6.897	3940.92	23.710	23.719	3947.74	0.08	12.75	12.8	13.88	13.71	13.79	20.81	8435.5	7592.4	7865.3	5456.4	3.15	3.161	3951.29	8.36	8.365	3944.30	25.39	25.401	3951.62	3949.73	
2002	254	800	254.33	9/11/2002 8:00	1.651	1.644	3947.79	6.908	6.900	3940.92	23.730	23.723	3947.75	0.09	12.71	12.76	13.88	13.71	13.79	16.53	8434.8	7591.6	7865.4	5474	3.17	3.162	3951.30	8.36	8.362	3944.30	25.39	25.397	3951.62	3949.73	
2002	254	1200	254.50	9/11/2002 12:00	1.633	1.636	3947.78	6.889	6.892	3940.90	23.720	23.723	3947.75	0.08	12.7	13.35	13.88	13.71	13.79	19.82	8435.5	7592.3	7865.2	5465	3.13	3.155	3951.28	8.38	8.362	3944.30	25.39	25.397	3951.62	3949.73	
2002	254	1600	254.67	9/11/2002 16:00	1.616	1.651	3947.81	6.873	6.908	3940.94	23.700	23.735	3947.78	0.08	12.7	13.35	13.88	13.71	13.79	19.82	8435.5	7592.3	7865.2	5465	3.13	3.155	3951.28	8.38	8.362	3944.30	25.39	25.397	3951.62	3949.73	
2002	254	2000	254.83	9/11/2002 20:00	1.626	1.660	3947.83	6.882	6.916	3940.96	23.710	23.744	3947.79	0.05	12.89	13.25	13.88	13.71	13.79	20.69	8435.8	7592.6	7865.6	5418.8	3.14	3.170	3951.32	8.34	8.377	3944.33	25.38	25.418	3951.66	3949.68	
2002	255	0	255.00	9/12/2002 0:00	1.635	1.661	3947.83	6.888	6.914	3940.96	23.720	23.746	3947.80	0.06	12.79	12.89	13.88	13.74	13.79	16.03	8435.4	7592.4	7865.1	5422.7	3.15	3.180	3951.34	8.36	8.382	3944.34	25.40	25.422	3951.67	3949.80	
2002	255	400	255.17	9/12/2002 4:00	1.632	1.665	3947.84	6.888	6.919	3940.97	23.720	23.751	3947.81	0.05	12.88	13.4	13.88	13.74	13.79	22.41	8435.6	7592.4	7865.2	5422.5	3.15	3.182	3951.34	8.36	8.390	3944.36	25.40	25.427	3951.68	3949.84	
2002	255	800	255.33	9/12/2002 8:00	1.649	1.674	3947.86	6.905	6.930	3940.99	23.740	23.765	3947.84	0.06	12.68	12.72	13.87	13.74	13.79	13.76	8434.8	7591.6	7864.3	5420.2	3.17	3.194	3951.37	8.37	8.400	3944.38	25.42	25.427	3951.68	3949.85	
2002	255	1200	255.50	9/12/2002 12:00	1.632	1.665	3947.84	6.888	6.919	3940.97	23.720	23.751	3947.81	0.05	12.88	13.4	13.88	13.74	13.79	22.41	8435.6	7592.4	7865.2	5422.5	3.13	3.191	3951.36	8.34	8.396	3944.38	25.38	25.438	3951.70	3949.90	
2002	255	1600	255.67	9/12/2002 16:00	1.611	1.672	3947.86	6.886	6.927	3940.99	23.700	23.761	3947.83	0.03	13.21	13.27	13.88	13.71	13.79	25.13	8436.5	7593.3	7865.9	5405.4	3.13	3.191	3951.36	8.34	8.396	3944.38	25.38	25.438	3951.70	3949.90	
2002	255	2000	255.83	9/12/2002 20:00	1.643	1.666	3947.89	6.889	6.942	3941.02	23.700	23.773	3947.86	0.05	12.85	13.13	13.9	13.74	13.79	15.58	8435.1	7591.9	7864.8	5394.9	3.16	3.204	3951.39	8.37	8.411	3944.41	25.41	25.451	3951.73	3950.00	
2002	256	0	256.00	9/13/2002 0:00	1.661	1.700	3947.92	6.916	6.955	3941.05	23.750	23.788	3947.90	0.03	12.75	12.84	13.9	13.74	13.79	13.79	13.79	8433.2	7589.8	7863.1	5392.2	3.18	3.219	3951.43	8.39	8.425	3944.44	25.42	25.481	3951.76	3950.33
2002	256	400	256.17	9/13/2002 4:00	1.689	1.732	3948.00	6.947	6.990	3941.13	23.770	23.813	3947.95	0.04	12.69	12.75	13.9	13.74	13.79	13.88	8433.2	7589.8	7863.1	5392.1	3.21	3.250	3951.50	8.42	8.460	3944.52	25.44	25.487	3951.82	3950.75	
2002	256	800	256.33	9/13/2002 8:00	1.749	1.776	3948.10	7.010	7.037	3941.24	23.830	23.857	3948.05	0.06	12.68	12.74	13.9	13.74	13.79	13.87	8430.7	7587.1	7860.5	5418.8	3.27	3.294	3951.60	8.48	8.490	3944.63	25.50	25.532	3951.92	3951.22	
2002	256	1200	256.50	9/13/2002 12:00	1.786	1.812	3948.16	7.040	7.066	3941.31	23.830	23.856	3948.05	0.06	12.74	13.42	13.88	13.74	13.79	25.57	8429.2	7585.8	7860.2	5439.1	3.30										

year	day of year	hour of day	decimal	date & time	PRESSURE												battery voltage	temperature °C				vibrating wire frequency				#421			#422			#423			approximate elevation
					#421			#422			#423			#124	min	max		#421	#422	#423	#124	#421	#422	#423	#124	computed PSI	corrected PSI *	total head (ft)	computed PSI	corrected PSI *	total head (ft)	computed PSI	corrected PSI *	total head (ft)	
					uncorrected PSI	corrected PSI *	total head (ft)	uncorrected PSI	corrected PSI *	total head (ft)	uncorrected PSI	corrected PSI *	total head (ft)																						
2002	270	1600	270.67	9/27/2002 16:00	-0.112	13.1	13.3	14.02	13.78	13.81	29.46	8440.3	7596.4	7868.7	5179.8	3.03	3.232	3951.46	8.26	8.461	3944.53	25.31	25.510	3951.87	3949.67										
2002	270	2000	270.83	9/27/2002 20:00	-0.112	12.87	13.15	14.01	13.77	13.79	24.06	8440.2	7596.5	7868.9	5171.1	3.04	3.234	3951.46	8.26	8.458	3944.52	25.31	25.509	3951.86	3949.61										
2002	271	0	271.00	9/28/2002 0:00	-0.068	12.79	12.87	14.01	13.77	13.79	21.9	8438.5	7595.2	7867.9	5234.9	3.08	3.231	3951.46	8.26	8.445	3944.49	25.33	25.485	3951.81	3949.70										
2002	271	400	271.17	9/28/2002 4:00	-0.042	12.73	12.79	14.01	13.77	13.79	18.73	8437.6	7594.4	7867.1	5299.3	3.10	3.227	3951.45	8.31	8.438	3944.47	25.35	25.478	3951.80	3949.62										
2002	271	800	271.33	9/28/2002 8:00	-0.004	12.7	12.76	14.01	13.77	13.79	17.73	8438.2	7593.2	7865.8	5304.9	3.13	3.223	3951.44	8.34	8.428	3944.45	25.38	25.471	3951.78	3949.67										
2002	271	1600	271.67	9/28/2002 16:00	0.013	12.78	13.33	14.01	13.77	13.79	23.81	8436.1	7593	7865.5	5362	3.13	3.208	3951.40	8.34	8.415	3944.42	25.39	25.461	3951.76	3949.73										
2002	271	2000	271.83	9/28/2002 20:00	-0.001	13.17	13.25	14.02	13.78	13.8	26.85	8436.5	7593.3	7865.8	5345.6	3.12	3.212	3951.41	8.33	8.422	3944.44	25.38	25.468	3951.77	3949.69										
2002	272	0	272.00	9/29/2002 0:00	0.051	12.85	13.21	14.04	13.77	13.79	16.88	8434.4	7591.2	7864.1	5408	3.17	3.211	3951.41	8.38	8.419	3944.43	25.42	25.466	3951.74	3949.67										
2002	272	400	272.17	9/29/2002 4:00	0.067	12.76	12.85	14.04	13.77	13.79	13.65	8433.8	7590.5	7863.4	5426.8	3.19	3.209	3951.41	8.40	8.420	3944.43	25.44	25.466	3951.75	3949.65										
2002	272	800	272.33	9/29/2002 8:00	0.051	12.7	12.76	14.03	13.76	13.79	12.08	8434.2	7590.9	7863.5	5408.5	3.18	3.208	3951.40	8.39	8.419	3944.43	25.43	25.462	3951.76	3949.60										
2002	272	1200	272.50	9/29/2002 12:00	0.059	12.65	12.75	14.03	13.76	13.79	10.19	8434.1	7591	7863.7	5399.8	3.17	3.211	3951.41	8.40	8.420	3944.43	25.44	25.466	3951.75	3949.67										
2002	272	1600	272.67	9/29/2002 16:00	0.025	12.76	13.48	14.04	13.77	13.79	21.93	8435.9	7592.4	7864.6	5377.4	3.14	3.200	3951.39	8.36	8.417	3944.42	25.41	25.470	3951.78	3949.69										
2002	272	2000	272.83	9/29/2002 20:00	0.029	13	13.32	14.04	13.77	13.79	17.48	8435.5	7592.5	7864.2	5375.3	3.15	3.206	3951.40	8.35	8.411	3944.41	25.42	25.476	3951.79	3949.82										
2002	273	0	273.00	9/30/2002 0:00	0.023	12.83	13.26	14.03	13.76	13.79	11	8435.4	7592.1	7864.1	5355.1	3.15	3.215	3951.42	8.36	8.427	3944.45	25.42	25.484	3951.81	3949.91										
2002	273	400	273.17	9/30/2002 4:00	0.042	12.74	12.83	14.03	13.76	13.79	8.14	8433.7	7590.5	7862.9	5378.6	3.19	3.237	3951.47	8.40	8.446	3944.49	25.45	25.493	3951.83	3950.05										
2002	273	800	273.33	9/30/2002 8:00	0.042	12.64	12.74	14.03	13.76	13.79	4.848	8433.2	7589.9	7861.9	5373	3.20	3.249	3951.50	8.41	8.458	3944.52	25.47	25.516	3951.88	3950.49										
2002	273	1200	273.50	9/30/2002 12:00	0.052	12.59	12.88	14.03	13.76	13.79	3.514	8431.1	7587.3	7859	5386.3	3.25	3.289	3951.50	8.47	8.510	3944.64	25.54	25.575	3952.02	3951.32										
2002	273	1600	273.67	9/30/2002 16:00	0.032	12.9	13.67	14.04	13.77	13.79	21.31	8429.9	7586.3	7857.7	5387.9	3.28	3.338	3951.70	8.50	8.553	3944.74	25.52	25.579	3952.03	3950.94										
2002	274	0	274.00	10/1/2002 0:00	-0.017	13.2	13.55	14.04	13.77	13.8	25.83	8431	7588.1	7861.6	5319.6	3.26	3.361	3951.76	8.46	8.560	3944.75	25.48	25.583	3952.04	3950.59										
2002	274	400	274.17	10/1/2002 4:00	-0.022	12.85	13.22	14.04	13.77	13.79	13.17	8431.8	7589.1	7862.3	5290.5	3.24	3.346	3951.72	8.43	8.541	3944.71	25.48	25.571	3952.01	3950.36										
2002	274	800	274.33	10/1/2002 8:00	-0.018	12.71	12.85	14.03	13.76	13.79	6.688	8432.2	7589.3	7862.3	5284.1	3.23	3.333	3951.69	8.43	8.533	3944.69	25.46	25.567	3952.00	3950.26										
2002	274	1200	274.50	10/1/2002 12:00	-0.023	12.67	12.71	14.03	13.76	13.79	13.03	8432.8	7589.8	7862.7	5287.8	3.21	3.323	3951.67	8.42	8.526	3944.68	25.45	25.563	3951.99	3950.22										
2002	274	1600	274.67	10/1/2002 16:00	-0.012	12.68	12.69	14.04	13.76	13.79	13.82	8432.5	7589.5	7862.2	5306.5	3.22	3.319	3951.66	8.40	8.519	3944.66	25.44	25.563	3951.99	3950.29										
2002	274	2000	274.83	10/1/2002 20:00	-0.037	12.69	13.4	14.04	13.77	13.79	15.44	8433.4	7590.4	7863	5286.2	3.20	3.249	3951.66	8.40	8.489	3944.59	25.45	25.533	3951.92	3950.10										
2002	275	0	275.00	10/2/2002 0:00	-0.096	13.17	13.25	14.04	13.77	13.8	24.62	8435.9	7592.7	7865.1	5196.9	3.14	3.321	3951.66	8.35	8.531	3944.69	25.40	25.579	3952.03	3950.27										
2002	275	400	275.17	10/2/2002 4:00	-0.088	12.88	13.26	14.04	13.77	13.79	16.56	8435.6	7592.6	7865.2	5194.8	3.15	3.321	3951.66	8.35	8.528	3944.67	25.39	25.569	3952.01	3950.16										
2002	275	800	275.33	10/2/2002 8:00	-0.039	12.79	12.88	14.04	13.76	13.79	12.35	8434	7591.1	7863.9	5263	3.18	3.310	3951.64	8.39	8.512	3944.64	25.42	25.561	3951.96	3950.18										
2002	275	1200	275.50	10/2/2002 12:00	-0.027	12.69	12.79	14.03	13.76	13.79	8.27	8433.6	7590.5	7863.2	5272.9	3.19	3.308	3951.63	8.39	8.514	3944.65	25.44	25.565	3951.97	3950.13										
2002	275	1600	275.67	10/2/2002 16:00	-0.001	12.64	12.69	14.03	13.79	13.79	7.96	8432.6	7589.7	7862.4	5312.7	3.22	3.306	3951.63	8.40	8.488	3944.59	25.45	25.533	3951.92	3950.10										
2002	275	2000	275.83	10/2/2002 20:00	-0.057	13.27	13.43	14.04	13.77	13.79	15.44	8433.4	7590.4	7863	5286.2	3.20	3.249	3951.66	8.40	8.489	3944.59	25.45	25.533	3951.92	3950.10										
2002	276	0	276.00	10/3/2002 0:00	-0.035	12.88	13.35	14.04	13.79	13.79	12.51	8434.2	7591	7863.7	5268.1	3.18	3.301	3951.62	8.39	8.510	3944.64	25.43	25.551	3951.96	3950.11										
2002	276	400	276.17	10/3/2002 4:00	-0.011	12.77	12.88	14.03	13.79	13.79	9.21	8433.3	7590.2	7862.8	5301.3	3.20	3.298	3951.61	8.41	8.503	3944.62	25.45	25.548	3951.96	3950.14										
2002	276	800	276.33	10/3/2002 8:00	-0.023	12.67	12.77	14.03	13.76	13.79	8.22	8433.3	7590.1	7862.6	5278.9	3.20	3.311	3951.64	8.41	8.519	3944.66	25.46	25.565	3952.00	3950.32										
2002	276	1200	276.50	10/3/2002 12:00	0	12.63	12.67	14.06	13.76	13.79	6.849	8432.3	7589.3	7862.2	5311.9	3.22	3.312	3951.64	8.43	8.515	3944.66	25.46	25.565	3952.00	3950.32										
2002	276	1600	276.67	10/3/2002 16:00	0.022	12.63	13.56	14.03	13.79	13.79	11.45	8432.6	7589.7	7862.4	5354.7	3.22	3.323	3951.66	8.42	8.508	3944.65	25.46	25.562	3951.99	3950.20										
2002	276	2000	276.83	10/3/2002 20:00	0.058	12.83	13.52	14.06	13.79	13.79	10.01	8432.3	7589.1	7861.8	5371.6	3.23	3.276	3951.66	8.43	8.481	3944.57	25.48	25.528	3951.91	3950.16										
2002	277	0	277.00	10/4/2002 0:00	0.091	12.72	12.83	14.06	13.79	13.79	4.534	8429.1	7585.5	7858.6	5447.8	3.30	3.299	3951.61	8.47	8.503	3944.62	25.51	25.545	3951.95	3950.27										
2002	277	400	277.17	10/4/2002 4:00	0.092	12.62	12.72	14.06	13.79	13.79	1.95	8428.5	7584.7	7857.9	5444.9	3.32	3.311	3951.61	8.52	8.512	3944.64	25.55	25.546	3951.95	3950.43										
2002	277	800	277.33	10/4/2002 8:00	0.109	12.58	12.67	14.06	13.79	13.79	1.274	8427.4	7583.2	7856.6	5470.3	3.34	3.321	3951.69	8.57	8.548	3944.73	25.60	25.575	3952.02	3950.62										
2002	277	1200	277.50	10/4/2002 12:00	0.109	12.58	13.7	14.07	13.79	13.79	16.3	8427.6	7583.6	7857.3	5499.5	3.34	3.316	3951.65	8.56	8.538	3944.70	25.58	25.559	3951.98	3950.62										
2002	277	1600	277.67	10/4/2002 16:00	0.091	13.32	13.42	14.07	13.79	13.79	17.71	8428.1	7584.1	7857.4	5472.2	3.33	3.322	3951.67	8.55	8.545	3944.72	25.58	25.574	3952.02	3950.66										
2002	277	2000	277.83	10/4/2002 20:00	0.102	12.89	13.28	14.06	13.79	13.79	12.43	8427.2	7583	7856.5	5479.1	3.35	3.333	3951.69	8.57	8.559	3944.														

year	day of year	hour of day	decimal date	date & time	PRESSURE												battery voltage	temperature °C				vibrating wire frequency				#421			#422			#423			approximate river elevation
					#421		#422		#423		#124	#421		#422		#423		#421		#422		#423		computed PSI	corrected PSI	total head (ft)	computed PSI	corrected PSI	total head (ft)	computed PSI	corrected PSI	total head (ft)			
					uncorrected PSI	corrected PSI	total head (ft)	uncorrected PSI	corrected PSI	total head (ft)	uncorrected PSI	corrected PSI	total head (ft)	uncorrected PSI	corrected PSI	total head (ft)		min	max	#421	#422	#423	#124	#421	#422	#423	#124	computed PSI	corrected PSI	total head (ft)	computed PSI	corrected PSI	total head (ft)	computed PSI	
2002	289	1200	289.50	10/16/2002 12:00	0.06	12.61	13.83	14.12	13.82	13.79	20.75	8431.6	7587.5	7859.1	5429.5	3.24	3.267	3951.54	8.47	8.496	3944.61	25.54	25.585	3952.00	3949.85										
2002	289	1600	289.67	10/16/2002 16:00	0.004	13.05	13.37	14.12	13.83	13.8	26.26	8433	7588.9	7860.2	5353.1	3.21	3.219	3951.59	8.44	8.512	3944.64	25.51	25.595	3952.06	3949.90										
2002	289	2000	289.83	10/16/2002 20:00	0.012	12.8	13.04	14.14	13.81	13.79	7.61	8432.7	7588.9	7860.3	5332.8	3.21	3.288	3951.59	8.45	8.508	3944.63	25.52	25.577	3952.02	3949.90										
2002	290	0	290.00	10/17/2002 0:00	0.028	12.64	12.8	14.14	13.81	13.79	0.363	8432.2	7588.3	7859.9	5345.7	3.23	3.283	3951.58	8.45	8.508	3944.63	25.52	25.577	3952.02	3949.90										
2002	290	400	290.17	10/17/2002 4:00	0.033	12.55	12.65	14.14	13.81	13.81	-2.531	8432	7587.9	7859.5	5347.3	3.23	3.284	3951.58	8.46	8.514	3944.65	25.53	25.577	3952.04	3949.90										
2002	290	800	290.33	10/17/2002 8:00	0.048	12.51	12.56	14.14	13.81	13.78	-4.481	8431.5	7587.5	7859.1	5365.7	3.24	3.281	3951.57	8.47	8.508	3944.63	25.54	25.577	3952.02	3949.85										
2002	290	1200	290.50	10/17/2002 12:00	0.03	12.51	13.83	14.12	13.82	13.79	22.02	8432.6	7588.6	7860.1	5385.9	3.22	3.273	3951.55	8.44	8.500	3944.62	25.51	25.571	3952.01	3949.85										
2002	290	1600	290.67	10/17/2002 16:00	-0.032	13.03	13.35	14.16	13.83	13.8	26.81	8434.3	7590.2	7861.4	5299.4	3.17	3.293	3951.60	8.41	8.525	3944.67	25.48	25.602	3952.08	3949.91										
2002	290	2000	290.83	10/17/2002 20:00	-0.021	12.83	13.03	14.14	13.82	13.79	12.92	8434.1	7590.2	7861.5	5290.8	3.18	3.288	3951.59	8.41	8.514	3944.65	25.48	25.589	3952.05	3949.90										
2002	291	0	291.00	10/18/2002 0:00	0.013	12.71	12.83	14.14	13.81	13.79	9.31	8432.9	7589.1	7860.4	5336.3	3.21	3.282	3951.57	8.43	8.506	3944.63	25.51	25.581	3952.03	3949.85										
2002	291	400	291.17	10/18/2002 4:00	0.004	12.67	12.71	14.14	13.81	13.79	11.19	8433.1	7589.1	7860.4	5326.4	3.20	3.287	3951.58	8.43	8.515	3944.65	25.51	25.590	3952.05	3949.85										
2002	291	800	291.33	10/18/2002 8:00	0.026	12.64	12.68	14.14	13.81	13.79	5.793	8432.3	7588.6	7859.9	5350.4	3.22	3.284	3951.58	8.44	8.504	3944.63	25.52	25.580	3952.03	3949.85										
2002	291	1200	291.50	10/18/2002 12:00	0.025	12.63	13.59	14.12	13.82	13.79	22.74	8433	7589.1	7860.4	5379.2	3.21	3.269	3951.54	8.43	8.494	3944.60	25.51	25.569	3952.01	3949.76										
2002	291	1600	291.67	10/18/2002 16:00	-0.015	13.02	13.32	14.16	13.83	13.8	25.64	8434.1	7590	7861	5323.4	3.16	3.281	3951.57	8.41	8.513	3944.64	25.49	25.595	3952.07	3949.84										
2002	291	2000	291.83	10/18/2002 20:00	0.007	12.81	13.02	14.14	13.81	13.81	8.57	8433.3	7589.5	7860.6	5326.8	3.20	3.279	3951.57	8.42	8.503	3944.62	25.50	25.582	3952.04	3949.85										
2002	292	0	292.00	10/19/2002 0:00	0.04	12.65	12.81	14.14	13.81	13.81	1.612	8432.1	7588.3	7859.7	5364.8	3.23	3.275	3951.56	8.45	8.497	3944.61	25.52	25.570	3952.01	3949.84										
2002	292	400	292.17	10/19/2002 4:00	0.056	12.56	12.66	14.14	13.81	13.81	-1.694	8431.6	7587.5	7858.8	5383.5	3.24	3.271	3951.55	8.49	8.497	3944.61	25.57	25.570	3952.01	3949.84										
2002	292	800	292.33	10/19/2002 8:00	0.082	12.52	12.57	14.14	13.81	13.79	-3.187	8430.6	7586.5	7857.9	5420.9	3.26	3.269	3951.54	8.49	8.497	3944.61	25.57	25.571	3952.01	3949.75										
2002	292	1200	292.50	10/19/2002 12:00	0.076	12.52	13.8	14.15	13.82	13.79	20.6	8431.5	7587.3	7858.6	5454.2	3.24	3.253	3951.51	8.47	8.485	3944.58	25.55	25.561	3951.99	3949.79										
2002	292	1600	292.67	10/19/2002 16:00	0.028	13.02	13.37	14.16	13.83	13.8	25.01	8432.6	7588.4	7859.4	5386.9	3.22	3.274	3951.56	8.45	8.507	3944.63	25.53	25.590	3952.05	3949.86										
2002	292	2000	292.83	10/19/2002 20:00	0.035	12.8	13.02	14.14	13.81	13.79	7.14	8432.4	7588.4	7860.5	5387.4	3.22	3.273	3951.55	8.45	8.500	3944.62	25.50	25.567	3952.06	3949.85										
2002	293	0	293.00	10/20/2002 0:00	0.051	12.64	12.8	14.14	13.81	13.79	-0.209	8432	7587.8	7858.9	5378.8	3.23	3.266	3951.54	8.46	8.498	3944.61	25.54	25.579	3952.03	3949.85										
2002	293	400	293.17	10/20/2002 4:00	0.053	12.56	12.65	14.14	13.81	13.81	-1.929	8431.8	7587.5	7858.5	5379	3.23	3.269	3951.54	8.47	8.503	3944.62	25.55	25.588	3952.04	3949.85										
2002	293	800	293.33	10/20/2002 8:00	0.069	12.51	12.56	14.14	13.81	13.79	-3.714	8431.2	7586.9	7857.4	5400.1	3.25	3.267	3951.54	8.48	8.501	3944.62	25.57	25.584	3952.04	3949.76										
2002	293	1200	293.50	10/20/2002 12:00	0.064	12.51	13.45	14.14	13.82	13.79	15.38	8432.5	7588.3	7859.2	5410.2	3.22	3.251	3951.50	8.45	8.483	3944.58	25.54	25.569	3952.00	3949.80										
2002	293	1600	293.67	10/20/2002 16:00	0.005	13.02	13.45	14.15	13.82	13.79	23.35	8433.6	7589.3	7859.9	5349.6	3.19	3.273	3951.55	8.43	8.509	3944.64	25.52	25.601	3952.08	3949.84										
2002	293	2000	293.83	10/20/2002 20:00	0.012	12.82	13.03	14.14	13.81	13.81	7.3	8433.3	7589.3	7859.9	5331.6	3.20	3.274	3951.55	8.43	8.502	3944.62	25.52	25.594	3952.06	3949.83										
2002	294	0	294.00	10/21/2002 0:00	0.032	12.65	12.82	14.14	13.81	13.79	-0.261	8432.8	7588.7	7859.5	5348.4	3.21	3.266	3951.54	8.44	8.496	3944.61	25.53	25.584	3952.04	3949.83										
2002	294	400	294.17	10/21/2002 4:00	0.038	12.55	12.66	14.14	13.81	13.79	-3.371	8432.4	7588.2	7859	5352.8	3.22	3.270	3951.55	8.45	8.502	3944.62	25.54	25.589	3952.05	3949.83										
2002	294	800	294.33	10/21/2002 8:00	0.057	12.5	12.55	14.14	13.81	13.78	-5.282	8431.7	7587.5	7858.5	5377.8	3.24	3.267	3951.54	8.47	8.499	3944.61	25.56	25.587	3952.05	3949.74										
2002	294	1200	294.50	10/21/2002 12:00	0.042	12.5	13.85	14.15	13.82	13.79	19.19	8432.9	7589.8	7859.8	5386.3	3.21	3.253	3951.51	8.44	8.484	3944.58	25.53	25.574	3952.02	3949.74										
2002	294	1600	294.67	10/21/2002 16:00	-0.008	13.01	13.4	14.16	13.83	13.8	24.82	8434	7589.9	7860.2	5332.1	3.18	3.276	3951.56	8.41	8.508	3944.63	25.51	25.607	3952.09	3949.81										
2002	294	2000	294.83	10/21/2002 20:00	0.004	12.8	13.02	14.14	13.81	13.81	7.59	8433.6	7589.7	7860.1	5319.4	3.19	3.275	3951.56	8.42	8.501	3944.62	25.51	25.597	3952.07	3949.83										
2002	295	0	295.00	10/22/2002 0:00	0.026	12.65	12.8	14.14	13.81	13.79	1.56	8433	7588.9	7859.7	5342.3	3.21	3.267	3951.54	8.44	8.498	3944.61	25.52	25.585	3952.04	3949.80										
2002	295	400	295.17	10/22/2002 4:00	0.028	12.6	12.66	14.14	13.81	13.79	6.03	8432.7	7588.7	7859.4	5354.7	3.21	3.272	3951.55	8.44	8.500	3944.62	25.53	25.590	3952.05	3949.79										
2002	295	800	295.33	10/22/2002 8:00	0.041	12.61	12.63	14.14	13.81	13.79	4.874	8432.3	7588.2	7858.9	5371.8	3.22	3.269	3951.54	8.43	8.499	3944.59	25.52	25.581	3952.03	3949.78										
2002	295	1200	295.50	10/22/2002 12:00	0.027	12.61	13.62	14.15	13.82	13.79	21.78	8433.4	7589.2	7859.8	5390.2	3.20	3.268	3951.51	8.42	8.489	3944.59	25.52	25.587	3952.05	3949.75										
2002	295	1600	295.67	10/22/2002 16:00	0.021	13.04	13.45	14.15	13.82	13.79	19.5	8433.4	7589.4	7859.8	5366.5	3.20	3.262	3951.53	8.42	8.491	3944.59	25.52	25.587	3952.05	3949.75										
2002	296	0	296.00	10/23/2002 0:00	0.04	12.84	13.08	14.14	13.81	13.79	12.97	8432.6	7588.5	7859	5384.1	3.22	3.263	3951.53	8.45	8.493	3944.60	25.54	25.587	3952.05	3949.82										
2002	296	400	296.17	10/23/2002 4:00	0.05	12.73	12.84	14.14	13.81	13.79	7.61	8432.1	7588	7858.8	5390	3.23	3.265	3951.53	8.46	8.494	3944.60	25.55	25.582	3952.04	3949.79										
2002	296	800	296.33	10/23/2002 8:00	0.054	12.65	12.73	14.17	13.81	13.81	5.53	8431.9	7587.8	7858.5	5393.1	3.23	3.265	3951.53	8.46	8.495	3944.60	25.55	25.585	3952.04	3949.81										
2002	296	1200	296.50	10/23/2002 12:00	0.071	12.58	12.65	14.17	13.81	13.79	1.508	8431.4	7587.1																						





#424	
piezo. elev	3947.4
Mean	3952.042
S.E.	0.016856
$\sigma$	0.356769
$\sigma^2$	0.127284
Range	2.069
Minimum	3951.333
Maximum	3953.402
n	448

#425	
piezo. elev	3912.4
Mean	3953.13
S.E.	0.007482
$\sigma$	0.158359
$\sigma^2$	0.025077
Range	0.863578
Minimum	3952.687
Maximum	3953.551
n	448

#426	
piezo. elev	3880.4
Mean	3953.186
S.E.	0.010039
$\sigma$	0.212491
$\sigma^2$	0.045152
Range	1.157451
Minimum	3952.671
Maximum	3953.828
n	448

river	
bank elev.	3952.43
Mean	3952.042
S.E.	0.016856
$\sigma$	0.356769
$\sigma^2$	0.127284
Range	2.069
Minimum	3951.333
Maximum	3953.402
Count	448

Column1	
Mean	3952.042
Standard E	0.016856
Median	3952.029
Mode	3952.345
Standard I	0.356769
Sample V $\sigma$	0.127284
Kurtosis	0.467974
Skewness	0.423657
Range	2.069
Minimum	3951.333
Maximum	3953.402
Sum	1770515
Count	448

Column1	
Mean	3953.13
Standard E	0.007482
Median	3953.132
Mode	3952.923
Standard I	0.158359
Sample V $\sigma$	0.025077
Kurtosis	-0.158226
Skewness	-0.026887
Range	0.863578
Minimum	3952.687
Maximum	3953.551
Sum	1771002
Count	448

Column1	
Mean	3953.186
Standard E	0.010039
Median	3953.143
Mode	3953.081
Standard I	0.212491
Sample V $\sigma$	0.045152
Kurtosis	0.244608
Skewness	0.602155
Range	1.157451
Minimum	3952.671
Maximum	3953.828
Sum	1771027
Count	448

Column1	
Mean	3952.042
Standard E	0.016856
Median	3952.029
Mode	3952.345
Standard I	0.356769
Sample V $\sigma$	0.127284
Kurtosis	0.467974
Skewness	0.423657
Range	2.069
Minimum	3951.333
Maximum	3953.402
Sum	1770515
Count	448

MOAB 3 - VIBRATING WIRE PIEZOMETERS

ground piezometer	piezometer	Adj. R <sub>c</sub>	G	T <sub>0</sub>	K	label	reading elev.	total head	1/2 range	max temp	min temp	temp. Δ / 2	avg temp
piezomete elevation (ft)	depth (ft)	elevation (ft)				river	3952.43	3952.04	1.034				
#424	3967.4	20.0	3947.4	9127	0.02371		3947.4	3952.04	1.034	15.62	14.98	0.32	15.30
#425	3967.4	55.0	3912.4	8968	0.02298		3912.4	3953.13	0.432	14.92	14.83	0.045	14.88
#426	3967.4	87.0	3880.4	9400	0.02354		3880.4	3952.04	0.579	15.10	15.05	0.025	15.08

3910 3967.4 ground surface @ piezometer nest  
3955 3967.4

day of year		hour of day	decimel date	#424		#425		#426		battery voltage		temperature °C			vibrating wire frequency			#424		#425		#426		approximate		
year	year	day	date	date & time	uncorrected PSI	corrected PSI <sup>a</sup>	total head (ft)	uncorrected PSI	corrected PSI <sup>a</sup>	total head (ft)	min	max	#424	#425	#426	computed PSI	corrected PSI <sup>a</sup>	total head (ft)	computed PSI	corrected PSI <sup>a</sup>	total head (ft)	computed PSI	corrected PSI <sup>a</sup>	total head (ft)	river elevation	
2002	235	1200	235.50	8/23/2002 12:00	0.616		3948.82	18.07		3949.48	13.14	13.45	14.99	14.88	15.08	9041.4	8213.6	8064.8	2.28	2.209	3952.55	17.65	17.595	3953.13	31.69	3953.52
2002	235	1600	235.67	8/23/2002 16:00	0.584	0.540	3948.65	18.05	16.006	3949.34	13.08	13.14	14.98	14.9	15.09	9042.8	8214.1	8066.7	2.24	2.204	3952.48	17.64	17.596	3953.00	31.64	31.596
2002	235	2000	235.83	8/23/2002 20:00	0.589	0.555	3948.68	18.05	16.016	3949.36	13.07	13.09	14.99	14.88	15.08	9042.6	8214.5	8065.5	2.25	2.214	3952.51	17.63	17.596	3953.01	31.67	31.635
2002	236	0	236.00	8/24/2002 0:00	0.597	0.537	3948.64	18.05	15.990	3949.30	13.08	13.020	14.97	14.9	15.1	9042.2	8214.1	8065	2.26	2.197	3952.47	17.64	17.579	3952.97	31.68	31.620
2002	236	400	236.17	8/24/2002 4:00	0.613	0.547	3948.66	18.06	15.994	3949.31	13.08	13.020	14.92	14.92	15.09	9041.5	8213.7	8071.4	2.27	2.208	3952.49	17.65	17.581	3952.97	31.53	31.464
2002	236	800	236.33	8/24/2002 8:00	0.572	0.479	3948.51	16	15.907	3949.11	12.99	13.62	15	14.92	15.09	9043.3	8216.2	8073.5	2.23	2.138	3952.33	17.59	17.497	3952.78	31.48	31.387
2002	236	1200	236.50	8/24/2002 12:00	0.622	0.546	3948.66	18.07	15.994	3949.31	13.12	13.61	14.99	14.88	15.08	9041.2	8213.6	8070.7	2.28	2.205	3952.49	17.65	17.575	3952.96	31.55	31.471
2002	236	1600	236.67	8/24/2002 16:00	0.608	0.590	3948.76	18.07	16.052	3949.44	13.06	13.13	15.01	14.9	15.06	9041.7	8213.5	8071.3	2.27	2.251	3952.59	17.65	17.635	3953.10	31.53	31.515
2002	236	2000	236.83	8/24/2002 20:00	0.613	0.592	3948.77	18.07	16.049	3949.44	12.82	13.08	14.99	14.91	15.08	9041.6	8213.5	8071.3	2.27	2.251	3952.59	17.65	17.631	3953.09	31.53	31.511
2002	237	0	237.00	8/25/2002 0:00	0.632	0.592	3948.77	18.08	16.040	3949.42	12.88	12.82	15.01	14.92	15.09	9040.8	8212.9	8070.4	2.29	2.250	3952.59	17.67	17.626	3953.07	31.55	31.513
2002	237	400	237.17	8/25/2002 4:00	0.643	0.583	3948.75	18.09	16.030	3949.39	12.6	12.68	15	14.92	15.09	9040.3	8212.9	8069.9	2.30	2.242	3952.57	17.68	17.626	3953.06	31.57	31.505
2002	237	800	237.33	8/25/2002 8:00	0.594	0.500	3948.55	18.02	15.926	3949.15	12.91	13.7	15.03	14.92	15.09	9042.3	8215.4	8072	2.25	2.160	3952.39	17.61	17.514	3952.82	31.52	31.422
2002	237	1200	237.50	8/25/2002 12:00	0.631	0.549	3948.67	18.08	15.998	3949.32	12.96	13.68	14.99	14.88	15.08	9040.8	8213	8069.9	2.29	2.209	3952.50	17.66	17.583	3952.98	31.57	31.463
2002	237	1600	237.67	8/25/2002 16:00	0.604	0.549	3948.67	18.07	16.015	3949.36	12.94	13.17	15.01	14.9	15.06	9041.9	8213.4	8071	2.26	2.209	3952.50	17.65	17.600	3953.02	31.54	31.466
2002	237	2000	237.83	8/25/2002 20:00	0.603	0.547	3948.66	18.06	16.004	3949.33	12.83	13.08	15.02	14.88	15.08	9041.9	8213.4	8071	2.26	2.208	3952.50	17.65	17.587	3953.00	31.55	31.466
2002	238	0	238.00	8/26/2002 0:00	0.613	0.527	3948.62	18.07	15.984	3949.29	12.7	12.83	15.01	14.9	15.1	9041.6	8213.5	8070.2	2.27	2.185	3952.44	17.65	17.556	3952.94	31.56	31.472
2002	238	400	238.17	8/26/2002 4:00	0.615	0.521	3948.60	18.07	15.976	3949.27	12.61	12.7	15.03	14.92	15.09	9041.4	8213.5	8070.2	2.28	2.182	3952.44	17.65	17.556	3952.94	31.56	31.464
2002	238	800	238.33	8/26/2002 8:00	0.561	0.439	3948.41	15.99	15.868	3949.02	12.58	13.63	15.03	14.92	15.09	9043.7	8216.6	8068	2.22	2.154	3952.37	17.63	17.536	3952.87	31.52	31.427
2002	238	1200	238.50	8/26/2002 12:00	0.589	0.493	3948.54	16.05	15.954	3949.22	13.01	13.61	15.02	14.88	15.08	9042.5	8214.4	8071.7	2.25	2.154	3952.37	17.63	17.536	3952.87	31.52	31.427
2002	238	1600	238.67	8/26/2002 16:00	0.554	0.517	3948.59	16.03	15.993	3949.31	13.04	13.13	15.01	14.9	15.06	9044	8215.2	8072.5	2.21	2.178	3952.43	17.61	17.576	3952.96	31.50	31.468
2002	238	2000	238.83	8/26/2002 20:00	0.543	0.511	3948.58	16.03	15.978	3949.27	12.99	13.07	15.02	14.88	15.08	9044.5	8216	8073.3	2.20	2.170	3952.41	17.60	17.564	3952.93	31.49	31.453
2002	239	0	239.00	8/27/2002 0:00	0.545	0.491	3948.53	16	15.946	3949.20	12.83	13.07	15.02	14.88	15.08	9044.4	8216.2	8074	2.20	2.151	3952.36	17.59	17.536	3952.87	31.47	31.415
2002	239	400	239.17	8/27/2002 4:00	0.559	0.503	3948.56	16.01	15.954	3949.22	12.73	12.83	15.02	14.91	15.09	9043.8	8215.9	8073.7	2.22	2.163	3952.39	17.60	17.541	3952.88	31.48	31.420
2002	239	800	239.33	8/27/2002 8:00	0.517	0.440	3948.42	15.95	15.873	3949.03	12.83	13.63	15.02	14.91	15.09	9043.8	8215.9	8073.7	2.22	2.099	3952.39	17.60	17.541	3952.88	31.48	31.420
2002	239	1200	239.50	8/27/2002 12:00	0.553	0.513	3948.58	16.01	15.970	3949.25	12.83	13.61	15.02	14.91	15.09	9043.8	8215.9	8073.7	2.22	2.099	3952.39	17.60	17.541	3952.88	31.48	31.420
2002	239	1600	239.67	8/27/2002 16:00	0.534	0.552	3948.67	16	16.032	3949.40	13.12	13.6	15.02	14.88	15.08	9044.1	8216.1	8073.5	2.21	2.172	3952.41	17.59	17.553	3952.91	31.48	31.441
2002	239	2000	239.83	8/27/2002 20:00	0.537	0.569	3948.71	16.01	16.018	3949.36	12.88	13.6	15.02	14.88	15.08	9044.8	8216.4	8073.3	2.19	2.213	3952.41	17.59	17.604	3953.02	31.49	31.504
2002	240	0	240.00	8/28/2002 0:00	0.553	0.573	3948.72	16.01	16.030	3949.39	12.89	13.11	15.02	14.88	15.08	9044.8	8216.6	8073.4	2.20	2.227	3952.54	17.58	17.614	3953.05	31.48	31.515
2002	240	400	240.17	8/28/2002 4:00	0.567	0.567	3948.71	16.02	16.020	3949.37	12.71	12.84	15.04	14.9	15.09	9044.1	8216.1	8072.9	2.21	2.232	3952.55	17.59	17.613	3953.04	31.49	31.514
2002	240	800	240.33	8/28/2002 8:00	0.531	0.497	3948.55	15.96	15.926	3949.15	12.6	13.61	15.03	14.92	15.09	9045	8216.2	8072.6	2.19	2.156	3952.38	17.54	17.510	3952.81	31.45	31.504
2002	240	1200	240.50	8/28/2002 12:00	0.571	0.554	3948.68	16.02	16.003	3949.33	13.17	13.59	15.05	14.88	15.08	9043.3	8215.6	8072.1	2.23	2.213	3952.51	17.60	17.588	3952.99	31.51	31.497
2002	240	1600	240.67	8/28/2002 16:00	0.554	0.574	3948.72	16.01	16.030	3949.39	13.11	13.17	15.03	14.89	15.09	9044	8215.8	8072.5	2.21	2.234	3952.56	17.60	17.620	3953.05	31.50	31.524
2002	240	2000	240.83	8/28/2002 20:00	0.568	0.588	3948.76	16.02	16.040	3949.42	12.85	13.12	15.05	14.88	15.08	9043.4	8215.8	8069.7	2.23	2.248	3952.59	17.60	17.620	3953.06	31.57	31.590
2002	241	0	241.00	8/29/2002 0:00	0.604	0.600	3948.78	16.04	16.036	3949.41	12.75	12.85	15.05	14.88	15.08	9041.9	8216.6	8068.5	2.26	2.259	3952.61	17.63	17.624	3953.07	31.60	31.594
2002	241	400	241.17	8/29/2002 4:00	0.605	0.584	3948.75	16.05	16.029	3949.39	12.71	12.75	15.05	14.91	15.08	9041.8	8216.2	8068.6	2.27	2.245	3952.58	17.64	17.615	3953.05	31.60	31.575
2002	241	800	241.33	8/29/2002 8:00	0.623	0.586	3948.71	16.06	16.003	3949.33	12.69	12.72	15.05	14.91	15.08	9041.1	8213.8	8067.9	2.28	2.225	3952.54	17.65	17.588	3952.99	31.61	31.555
2002	241	1200	241.50	8/29/2002 12:00	0.596	0.547	3948.66	16.04	15.991	3949.30	12.89	13.36	15.05	14.88	15.08	9042.2	8214.9	8072.7	2.26	2.207	3952.49	17.62	17.572	3952.95	31.50	31.450
2002	241	1600	241.67	8/29/2002 16:00	0.562	0.548	3948.66	16.02	16.006	3949.34	13.13	13.21	15.05	14.88	15.08	9043.7	8215.5	8073.1	2.22	2.20						



PRESSURE														battery voltage			temperature °C			vibrating wire frequency			#424			#425			#426			approximate		
year	day of year	hour of day	decimel date	date & time	#424			#425			#426			min	max	#424	#425	#426	#424	#425	#426	computed PSI	corrected PSI	total head (ft)	computed PSI	corrected PSI	total head (ft)	computed PSI	corrected PSI	total head (ft)	computed PSI	corrected PSI	total head (ft)	river elevation
2002	250	1600	250.67	9/7/2002 16:00	0.518	0.489	3948.53	15.98	15.951	3949.21	29.89	29.861	3949.31	13.16	13.24	15.13	14.88	15.08	9045.5	8217.4	8073.2	2.18	2.147	3952.36	17.56	17.535	3952.86	31.49	31.459	3953.00	3951.83			
2002	250	2000	250.83	9/7/2002 20:00	0.586	0.528	3948.82	16.04	15.982	3949.28	29.86	29.902	3949.40	12.79	13.21	15.15	14.87	15.07	9042.6	8214.7	8070.2	2.24	2.187	3952.45	17.63	17.568	3952.94	31.56	31.501	3953.09	3951.98			
2002	251	0	251.00	9/8/2002 0:00	0.619	0.578	3948.73	16.07	16.029	3949.39	29.88	29.939	3949.49	12.71	12.79	15.15	14.87	15.07	9041.2	8213.5	8069.2	2.28	2.237	3952.56	17.65	17.612	3953.04	31.58	31.541	3953.19	3951.86			
2002	251	400	251.33	9/8/2002 4:00	0.63	0.592	3948.77	16.08	16.042	3949.42	30	29.962	3949.54	12.67	12.72	15.15	14.9	15.1	9040.7	8212.8	8068.3	2.29	2.252	3952.60	17.67	17.631	3953.09	31.60	31.565	3953.24	3952.42			
2002	251	800	251.17	9/8/2002 8:00	0.636	0.588	3948.76	16.1	16.052	3949.44	30.02	29.972	3949.57	12.86	13	15.15	14.9	15.07	9040.5	8212.3	8067.4	2.29	2.246	3952.58	17.68	17.632	3953.09	31.62	31.576	3953.27	3952.45			
2002	251	1200	251.50	9/8/2002 12:00	0.641	0.601	3948.79	16.09	16.050	3949.44	30.01	29.970	3949.56	13.08	13.4	15.16	14.88	15.08	9040.2	8212.4	8067.8	2.30	2.261	3952.62	17.68	17.638	3953.10	31.61	31.575	3953.26	3952.23			
2002	251	1600	251.67	9/8/2002 16:00	0.624	0.632	3948.86	16.09	16.098	3949.55	30.01	30.018	3949.67	13.19	13.27	15.16	14.88	15.08	9040.9	8212.6	8068.1	2.28	2.293	3952.69	17.67	17.682	3953.20	31.61	31.616	3953.36	3952.12			
2002	251	2000	251.83	9/8/2002 20:00	0.649	0.604	3948.79	16.1	16.055	3949.45	30.01	29.955	3949.55	12.87	13.25	15.16	14.88	15.08	9039.9	8212.3	8067.9	2.31	2.263	3952.62	17.68	17.636	3953.10	31.61	31.567	3953.25	3952.04			
2002	252	0	252.00	9/9/2002 0:00	0.674	0.604	3948.79	16.12	16.050	3949.44	30.05	29.980	3949.58	12.78	12.87	15.15	14.87	15.07	9038.9	8211.2	8066.2	2.33	2.262	3952.62	17.71	17.636	3953.10	31.65	31.583	3953.28	3952.35			
2002	252	400	252.17	9/9/2002 4:00	0.697	0.617	3948.82	16.15	16.070	3949.48	30.07	29.990	3949.61	12.72	12.78	15.15	14.87	15.07	9037.9	8210.1	8065.3	2.36	2.276	3952.65	17.73	17.652	3953.13	31.67	31.594	3953.31	3952.19			
2002	252	800	252.33	9/9/2002 8:00	0.675	0.584	3948.75	16.12	16.029	3949.39	30.05	29.959	3949.54	12.66	13.24	15.18	14.9	15.06	9038.8	8211.4	8066.5	2.33	2.243	3952.58	17.70	17.610	3953.04	31.65	31.555	3953.22	3951.89			
2002	252	1200	252.50	9/9/2002 12:00	0.686	0.595	3948.77	16.12	16.029	3949.39	30.04	29.949	3949.51	13.24	13.47	15.16	14.88	15.08	9038.3	8211.2	8066.7	2.35	2.255	3952.60	17.71	17.615	3953.05	31.64	31.550	3953.21	3951.77			
2002	252	1600	252.67	9/9/2002 16:00	0.664	0.608	3948.80	16.11	16.054	3949.45	29.95	29.984	3949.39	13.19	13.27	15.16	14.88	15.08	9039.3	8211.8	8070.5	2.32	2.267	3952.63	17.69	17.636	3953.10	31.55	31.495	3953.08	3951.77			
2002	252	2000	252.83	9/9/2002 20:00	0.672	0.595	3948.77	16.11	16.033	3949.40	29.96	29.894	3949.36	12.87	13.26	15.16	14.88	15.08	9038.9	8211.6	8070.2	2.33	2.255	3952.60	17.70	17.620	3953.06	31.56	31.481	3953.05	3951.78			
2002	253	0	253.00	9/10/2002 0:00	0.673	0.571	3948.72	16.11	16.008	3949.34	29.96	29.858	3949.30	12.78	12.87	15.19	14.88	15.07	9038.8	8211.4	8070	2.33	2.232	3952.55	17.70	17.599	3953.01	31.56	31.461	3953.00	3951.76			
2002	253	400	253.17	9/10/2002 4:00	0.673	0.555	3948.68	16.11	15.992	3949.30	29.96	29.842	3949.20	12.72	12.78	15.19	14.88	15.07	9038.8	8211.5	8070.1	2.33	2.216	3952.51	17.70	17.581	3952.97	31.56	31.443	3952.96	3951.76			
2002	253	800	253.33	9/10/2002 8:00	0.653	0.509	3948.57	16.09	15.946	3949.20	29.94	29.796	3949.16	12.69	13.07	15.18	14.87	15.07	9039.7	8212.6	8071.1	2.31	2.189	3952.40	17.67	17.530	3952.85	31.54	31.401	3952.86	3951.75			
2002	253	1200	253.50	9/10/2002 12:00	0.65	0.514	3948.59	16.09	15.954	3949.22	29.94	29.804	3949.18	13.08	13.38	15.16	14.88	15.08	9039.8	8212.7	8071.1	2.31	2.175	3952.42	17.67	17.536	3952.87	31.54	31.385	3952.83	3951.76			
2002	253	1600	253.67	9/10/2002 16:00	0.618	0.515	3948.59	16.08	15.977	3949.27	29.89	29.787	3949.14	13.13	13.23	15.16	14.88	15.08	9041.2	8213.1	8073.2	2.28	2.175	3952.42	17.67	17.563	3952.93	31.48	31.388	3952.83	3951.80			
2002	253	2000	253.83	9/10/2002 20:00	0.628	0.533	3948.63	16.07	15.975	3949.27	29.89	29.785	3949.13	12.87	13.18	15.19	14.88	15.08	9040.8	8213.3	8073.4	2.29	2.181	3952.46	17.66	17.560	3952.92	31.49	31.394	3952.85	3951.78			
2002	254	0	254.00	9/11/2002 0:00	0.646	0.541	3948.65	16.09	15.985	3949.29	29.9	29.795	3949.16	12.78	12.87	15.19	14.88	15.08	9040.8	8213.3	8073.2	2.28	2.175	3952.42	17.67	17.563	3952.93	31.48	31.388	3952.83	3951.80			
2002	254	400	254.17	9/11/2002 4:00	0.648	0.553	3948.68	16.09	15.995	3949.31	29.9	29.805	3949.18	12.73	12.79	15.19	14.88	15.08	9040.8	8212.7	8073.4	2.29	2.181	3952.46	17.67	17.560	3952.92	31.50	31.409	3952.88	3951.81			
2002	254	800	254.33	9/11/2002 8:00	0.662	0.555	3948.68	16.1	15.993	3949.31	29.92	29.813	3949.20	12.68	12.73	15.19	14.88	15.08	9040.8	8212.7	8073.4	2.29	2.181	3952.46	17.67	17.560	3952.92	31.50	31.409	3952.88	3951.81			
2002	254	1200	254.50	9/11/2002 12:00	0.622	0.522	3948.60	16.06	15.960	3949.23	29.88	29.780	3949.12	12.68	13.41	15.19	14.88	15.08	9041.5	8213.8	8073.6	2.28	2.221	3952.52	17.65	17.549	3952.90	31.48	31.381	3952.82	3951.88			
2002	254	1600	254.67	9/11/2002 16:00	0.61	0.561	3948.69	16.06	16.011	3949.35	29.88	29.841	3949.24	13.28	13.38	15.19	14.88	15.08	9041.5	8213.8	8073.6	2.28	2.221	3952.52	17.65	17.549	3952.90	31.48	31.381	3952.82	3951.88			
2002	254	2000	254.83	9/11/2002 20:00	0.631	0.572	3948.72	16.08	16.021	3949.37	29.9	29.848	3949.28	12.78	12.88	15.18	14.87	15.07	9040.2	8212.8	8071.9	2.30	2.229	3952.54	17.67	17.597	3953.01	31.52	31.447	3952.97	3951.92			
2002	255	0	255.00	9/12/2002 0:00	0.641	0.569	3948.71	16.08	16.012	3949.35	30.02	29.942	3949.50	12.71	12.78	15.18	14.87	15.07	9040.2	8212.5	8067.7	2.30	2.223	3952.53	17.68	17.598	3953.01	31.62	31.539	3953.18	3951.92			
2002	255	400	255.17	9/12/2002 4:00	0.641	0.563	3948.70	16.09	16.012	3949.35	29.93	29.836	3949.25	12.66	12.92	15.21	14.87	15.09	9040.4	8213	8071.4	2.30	2.201	3952.48	17.66	17.571	3952.94	31.53	31.436	3952.94	3952.01			
2002	255	800	255.33	9/12/2002 8:00	0.637	0.543	3948.65	16.08	15.986	3949.29	29.92	29.836	3949.25	12.91	13.45	15.19	14.88	15.08	9041.5	8213.9	8071.7	2.27	2.186	3952.44	17.64	17.560	3952.92	31.52	31.439	3952.95	3951.93			
2002	255	1200	255.50	9/12/2002 12:00	0.611	0.527	3948.82	16.06	15.976	3949.27	29.92	29.858	3949.30	13.27	13.32	15.19	14.88	15.08	9042.1	8214.3	8072.2	2.26	2.204	3952.49	17.63	17.583	3952.98	31.51	31.459	3952.98	3951.98			
2002	255	1600	255.67	9/12/2002 16:00	0.595	0.543	3948.65	16.05	15.988	3949.32	29.91	29.858	3949.30	12.82	13.27	15.21	14.87	15.07	9040.8	8212.9	8070.7	2.29	2.233	3952.55	17.67	17.614	3953.05	31.55	31.494	3953.08	3952.08			
2002	255	2000	255.83	9/12/2002 20:00	0.627	0.574	3948.72	16.08	16.027	3949.39	29.95	29.897	3949.39	12.82	13.27	15.21	14.87	15.07	9040.2	8212.9	8070.7	2.29	2.233	3952.55	17.68	17.624	3953.05	31.57	31.505	3953.10	3952.41			
2002	256	0	256.00	9/13/2002 0:00	0.641	0.580	3948.74	16.1	16.039	3949.41	29.97	29.909	3949.42	12.73	12.82	15.21	14.87	15.07	9039.3	8211.1	8068.5	2.32	2.265	3952.63	17.71	17.653	3953.14	31.60	31.543	3953.19	3952.83			
2002	256	400	256.17	9/13/2002 4:00	0.662	0.606	3948.80	16.12	16.064	3949.47	30	29.944	3949.50	12.67	12.73	15.21	14.87	15.07	9038.6	8210.1	8067.1	2.34	2.276	3952.65	17.73	17.670	3953.18	31.63	31.570	3953.25	3953.30			
2002	256	800	256.33	9/13/2002 8:00	0.68	0.618	3948.83																											





				PRESSURE																								
		#424		#425			#426			battery voltage		temperature °C			vibrating wire frequency			#424			#425			#426			approximate	
year	day of year	hour of day	decimel date	date & time	uncorrected PSI	corrected PSI	total head (ft)	uncorrected PSI	corrected PSI	total head (ft)	uncorrected PSI	corrected PSI	total head (ft)	min	max	#424	#425	#426	computed PSI	corrected PSI	total head (ft)	computed PSI	corrected PSI	total head (ft)	computed PSI	corrected PSI	total head (ft)	river elevation
2002	300	1600	300.87	10/27/2002 16:00							13.4	13.52	15.57	14.85	15.07	9038.3	8212.1	8072.3	2.34	2.364	3952.86	17.69	17.713	3953.28	31.51	31.536	3953.18	3952.17
2002	300	2000	300.83	10/27/2002 20:00							12.82	13.49	15.57	14.87	15.06	9036.3	8210.2	8070.2	2.38	2.400	3952.94	17.73	17.744	3953.35	31.56	31.574	3953.26	3952.16
2002	301	0	301.00	10/28/2002 0:00							12.68	12.83	15.56	14.86	15.09	9035.3	8209.4	8069.4	2.41	2.409	3952.96	17.75	17.749	3953.36	31.58	31.578	3953.27	3952.15
2002	301	400	301.17	10/28/2002 4:00							12.56	12.68	15.56	14.86	15.09	9035.1	8209	8068.8	2.41	2.403	3952.95	17.76	17.747	3953.35	31.59	31.581	3953.28	3952.11
2002	301	800	301.33	10/28/2002 8:00							12.53	12.57	15.56	14.86	15.09	9035.2	8209.1	8068.8	2.41	2.384	3952.90	17.75	17.728	3953.31	31.59	31.564	3953.24	3952.08
2002	301	1200	301.50	10/28/2002 12:00							12.53	13.83	15.57	14.87	15.06	9038.4	8212.2	8072.6	2.33	2.298	3952.70	17.68	17.647	3953.12	31.50	31.466	3953.01	3952.14
2002	301	1600	301.67	10/28/2002 16:00							13.44	13.58	15.57	14.85	15.07	9039.6	8212.8	8072.7	2.31	2.288	3952.68	17.67	17.652	3953.14	31.50	31.482	3953.05	3952.23
2002	301	2000	301.83	10/28/2002 20:00							12.86	13.46	15.57	14.87	15.06	9038.4	8211.9	8071.7	2.33	2.295	3952.70	17.69	17.650	3953.13	31.52	31.483	3953.05	3952.24
2002	302	0	302.00	10/29/2002 0:00							12.74	12.87	15.56	14.86	15.06	9037.5	8211.1	8071.1	2.36	2.300	3952.71	17.71	17.653	3953.14	31.54	31.482	3953.05	3952.22
2002	302	400	302.17	10/29/2002 4:00							12.61	12.74	15.59	14.86	15.09	9037.3	8210.9	8070.7	2.36	2.308	3952.73	17.71	17.661	3953.16	31.55	31.494	3953.08	3952.20
2002	302	800	302.33	10/29/2002 8:00							12.53	12.61	15.59	14.86	15.09	9036.9	8210.6	8070.4	2.37	2.325	3952.77	17.72	17.675	3953.19	31.55	31.508	3953.11	3952.20
2002	302	1200	302.50	10/29/2002 12:00							12.53	13.88	15.57	14.87	15.07	9039.4	8213.2	8073.2	2.31	2.287	3952.68	17.66	17.636	3953.10	31.49	31.464	3953.01	3952.19
2002	302	1600	302.67	10/29/2002 16:00							13.51	13.57	15.57	14.87	15.07	9039.9	8213.4	8072.6	2.30	2.334	3952.79	17.66	17.691	3953.22	31.50	31.537	3953.18	3952.21
2002	302	2000	302.83	10/29/2002 20:00							12.84	13.62	15.59	14.86	15.06	9037.5	8211.3	8069.9	2.36	2.385	3952.90	17.70	17.733	3953.32	31.57	31.595	3953.31	3952.23
2002	303	0	303.00	10/30/2002 0:00							12.71	12.84	15.59	14.86	15.09	9036.5	8210.4	8068.5	2.38	2.393	3952.92	17.72	17.739	3953.34	31.60	31.612	3953.35	3952.26
2002	303	400	303.17	10/30/2002 4:00							12.59	12.71	15.59	14.86	15.09	9035.9	8209.7	8068	2.39	2.415	3952.97	17.74	17.762	3953.39	31.61	31.631	3953.40	3952.26
2002	303	800	303.33	10/30/2002 8:00							12.51	12.6	15.59	14.86	15.09	9035.3	8209.2	8067.4	2.41	2.417	3952.98	17.75	17.762	3953.39	31.62	31.633	3953.40	3952.23
2002	303	1200	303.50	10/30/2002 12:00							12.51	13.94	15.57	14.87	15.06	9038.2	8212	8070.5	2.34	2.349	3952.82	17.69	17.698	3953.24	31.55	31.562	3953.23	3952.23
2002	303	1600	303.67	10/30/2002 16:00							13.43	13.65	15.58	14.85	15.07	9038.9	8212.2	8071.1	2.32	2.355	3952.83	17.68	17.716	3953.28	31.54	31.569	3953.25	3952.27
2002	303	2000	303.83	10/30/2002 20:00							12.86	13.51	15.57	14.87	15.06	9037.5	8211	8069.3	2.36	2.359	3952.84	17.71	17.714	3953.28	31.58	31.583	3953.28	3952.25
2002	304	0	304.00	10/31/2002 0:00							12.74	12.86	15.59	14.87	15.09	9036.4	8210.2	8068.3	2.38	2.368	3952.86	17.73	17.715	3953.28	31.60	31.589	3953.30	3952.25
2002	304	400	304.17	10/31/2002 4:00							12.59	12.74	15.59	14.86	15.09	9035.5	8209.4	8067.4	2.40	2.383	3952.90	17.75	17.728	3953.31	31.62	31.604	3953.33	3952.24
2002	304	800	304.33	10/31/2002 8:00							12.5	12.6	15.59	14.86	15.08	9034.8	8208.7	8066.8	2.42	2.386	3952.91	17.76	17.730	3953.32	31.64	31.604	3953.33	3952.23
2002	304	1200	304.50	10/31/2002 12:00							12.5	13.96	15.57	14.87	15.07	9038	8211.6	8070	2.34	2.312	3952.74	17.70	17.665	3953.17	31.56	31.531	3953.16	3952.24
2002	304	1600	304.67	10/31/2002 16:00							13.42	13.58	15.58	14.85	15.07	9038.9	8212.1	8070.4	2.32	2.346	3952.82	17.69	17.711	3953.27	31.55	31.579	3953.27	3952.22
2002	304	2000	304.83	10/31/2002 20:00							12.85	13.45	15.6	14.87	15.07	9037.7	8211	8069.2	2.35	2.361	3952.85	17.71	17.721	3953.29	31.58	31.592	3953.30	3952.22
2002	305	0	305.00	11/1/2002 0:00							12.74	12.86	15.59	14.87	15.06	9036.1	8210	8068.1	2.39	2.377	3952.89	17.73	17.722	3953.30	31.61	31.596	3953.31	3952.22
2002	305	400	305.17	11/1/2002 4:00							12.62	12.74	15.59	14.86	15.09	9034.9	8208.8	8066.8	2.42	2.390	3952.92	17.76	17.735	3953.33	31.64	31.612	3953.35	3952.22
2002	305	800	305.33	11/1/2002 8:00							12.56	12.62	15.59	14.86	15.09	9034.1	8208.2	8066.2	2.44	2.395	3952.93	17.78	17.734	3953.33	31.65	31.611	3953.35	3952.20
2002	305	1200	305.50	11/1/2002 12:00							12.57	13.76	15.6	14.87	15.07	9036.2	8210.2	8068.6	2.39	2.364	3952.86	17.73	17.707	3953.28	31.60	31.574	3953.26	3952.19
2002	305	1600	305.67	11/1/2002 16:00							13.44	13.55	15.58	14.85	15.07	9036.8	8210.3	8068.6	2.37	2.402	3952.94	17.73	17.758	3953.38	31.60	31.626	3953.38	3952.31
2002	305	2000	305.83	11/1/2002 20:00							12.84	13.53	15.59	14.86	15.06	9035.4	8208.9	8066.9	2.41	2.428	3953.00	17.76	17.782	3953.44	31.64	31.659	3953.46	3952.40
2002	306	0	306.00	11/2/2002 0:00							12.74	12.84	15.59	14.86	15.06	9035	8208.4	8066.4	2.41	2.391	3952.92	17.77	17.747	3953.35	31.65	31.624	3953.38	3952.39
2002	306	400	306.17	11/2/2002 4:00							12.64	12.74	15.59	14.87	15.09	9034.5	8207.9	8065.7	2.43	2.381	3952.89	17.78	17.736	3953.33	31.66	31.618	3953.36	3952.45
2002	306	800	306.33	11/2/2002 8:00							12.57	12.64	15.59	14.86	15.09	9033.5	8207.2	8065	2.45	2.384	3952.90	17.80	17.732	3953.32	31.68	31.614	3953.36	3952.43
2002	306	1200	306.50	11/2/2002 12:00							12.56	13.71	15.59	14.86	15.06	9036	8209.7	8067.9	2.39	2.320	3952.75	17.74	17.670	3953.18	31.61	31.542	3953.19	3952.40
2002	306	1600	306.67	11/2/2002 16:00							13.51	13.63	15.6	14.87	15.07	9036.1	8209.4	8067.4	2.39	2.358	3952.84	17.75	17.717	3953.28	31.62	31.593	3953.31	3952.48
2002	306	2000	306.83	11/2/2002 20:00							12.78	13.52	15.59	14.86	15.09	9033.6	8207.3	8065.1	2.45	2.415	3952.97	17.80	17.763	3953.39	31.68	31.645	3953.43	3952.47
2002	307	0	307.00	11/3/2002 0:00							12.68	12.78	15.59	14.86	15.09	9031.5	8205.7	8063.6	2.50	2.456	3953.07	17.83	17.791	3953.46	31.71	31.671	3953.49	3952.43
2002	307	400	307.17	11/3/2002 4:00							12.52	12.69	15.59	14.89	15.08	9030	8204.1	8062	2.53	2.490	3953.15	17.87	17.826	3953.54	31.75	31.708	3953.57	3952.41
2002	307	800	307.33	11/3/2002 8:00							12.48	12.52	15.59	14.86	15.09	9028.6	8203	8061.1	2.57	2.504	3953.18	17.89	17.832	3953.55	31.77	31.709	3953.58	3952.41
2002	307	1200	307.50	11/3/2002 12:00							13.48	13.98	15.59	14.87	15.06	9031.7	8205.9	8064	2.49	2.415	3952.97	17.83	17.750	3953.36	31.70	31.627	3953.38	3952.32
2002	307	1600	307.67	11/3/2002 16:00							13.58	13.69	15.6	14.87	15.06	9033.5	8206.7	8062.7	2.45	2.404	3952.95	17.81	17.764	3953.39	31.74	31.689	3953.53	3952.31

#427		#428		#429		river	
Mean	3951.615	Mean	3948.577	Mean	3945.382	bank elev.	3952.83
S.E.	0.011598	S.E.	0.012522	S.E.	0.006636	Mean	3952.435
$\sigma$	0.246842	$\sigma$	0.266508	$\sigma$	0.141238	S.E.	0.016824
$\sigma^2$	0.060931	$\sigma^2$	0.071027	$\sigma^2$	0.019948	$\sigma$	0.358082
Range	1.02449	Range	1.069093	Range	0.615399	$\sigma^2$	0.128223
Minimum	3951.041	Minimum	3947.951	Minimum	3945.059	Range	2.069
Maximum	3952.065	Maximum	3949.02	Maximum	3945.675	Minimum	3951.733
Count	453	Count	324	Count	453	Maximum	3953.802
Count	453	Count	324	Count	453	Count	453

Column1		Column1		Column1		Column1	
Mean	3951.615	Mean	3948.577	Mean	3945.382	Mean	3952.435
Standard Error	0.011598	Standard Error	0.012522	Standard Error	0.006636	Standard E	0.016824
Median	3951.671	Median	3948.641	Median	3945.395	Median	3952.418
Mode	#N/A	Mode	3948.479	Mode	3945.209	Mode	3952.745
Standard Deviation	0.246842	Standard Deviation	0.266508	Standard Deviation	0.141238	Standard I	0.358082
Sample Variance	0.060931	Sample Variance	0.071027	Sample Variance	0.019948	Sample V	0.128223
Kurtosis	-0.851585	Kurtosis	-0.951112	Kurtosis	-0.729871	Kurtosis	0.431094
Skewness	-0.472948	Skewness	-0.463051	Skewness	-0.209258	Skewness	0.445774
Range	1.02449	Range	1.069093	Range	0.615399	Range	2.069
Minimum	3951.041	Minimum	3947.951	Minimum	3945.059	Minimum	3951.733
Maximum	3952.065	Maximum	3949.02	Maximum	3945.675	Maximum	3953.802
Sum	1790082	Sum	1788705	Sum	1787258	Sum	1790453
Count	453	Count	453	Count	453	Count	453

\* correction applied for changes in atmospheric pressure



MOAB 4 - VIBRATING WIRE PIEZOMETERS

ground	piezometer	label	reading elev.	total head	1/2 range	max temp	min temp	temp Δ/2	avg temp
piezomete elevation (ft)	depth (ft) elevation (ft)	river	3952.83	3952.44	1.034				
#427 3968.3	19.3 3949.0	#427	3949.0	3951.62	0.512	18.03	16.90	0.565	17.47
#428 3968.3	46.4 3921.9	#428	3921.9	3948.58	0.535	15.78	15.65	0.065	15.72
#429 3968.3	79.9 3888.4	#429	3888.4	3945.36	0.308	15.87	15.82	0.025	15.85

day of year		hour of day		decimel		date & time		PRESSURE			battery voltage		temperature °C			vibrating wire frequency			#427			#428			#429			approximate			
year	year	year	year	year	year	year	year	uncorrected PSI	corrected PSI	total head (ft)	uncorrected PSI	corrected PSI	total head (ft)	uncorrected PSI	corrected PSI	total head (ft)	min	max	#427	#428	#429	computed PSI	corrected PSI	total head (ft)	computed PSI	corrected PSI	total head (ft)	computed PSI	corrected PSI	total head (ft)	river elevation
2002	234	1600	234.67	8/22/2002	16:00	-0.612	-0.612	3947.59	9.720	3944.33	23.230	23.166	3942.01	13.12	13.18	16.9	15.68	15.85	9029	9065.1	7582	1.02	0.957	3951.24	11.45	11.406	3948.22	24.69	24.649	3945.28	3951.92
2002	234	2000	234.83	8/22/2002	20:00	-0.626	-0.626	3947.45	9.730	3944.25	23.230	23.166	3941.91	12.88	13.12	16.9	15.68	15.84	9029.6	9064.5	7582.1	1.00	0.957	3951.24	11.45	11.406	3948.22	24.69	24.649	3945.28	3951.92
2002	235	0	235.00	8/23/2002	0:00	-0.58	-0.614	3947.58	9.740	3944.30	23.230	23.196	3941.99	12.76	12.88	16.92	15.69	15.86	9027.6	9064.3	7582	1.05	1.013	3951.34	11.46	11.401	3948.21	24.71	24.662	3945.31	3952.04
2002	235	400	235.17	8/23/2002	4:00	-0.549	-0.609	3947.59	9.750	3944.26	23.240	23.180	3941.99	12.64	12.75	16.91	15.68	15.85	9026.3	9064	7581.6	1.08	1.018	3951.35	11.46	11.401	3948.21	24.66	24.597	3945.27	3952.08
2002	235	800	235.33	8/23/2002	8:00	-0.568	-0.634	3947.54	9.690	3944.11	23.200	23.134	3941.79	12.64	12.75	16.91	15.68	15.85	9027.1	9065.5	7583.3	1.06	0.993	3951.29	11.40	11.336	3948.06	24.66	24.597	3945.16	3952.15
2002	235	1200	235.50	8/23/2002	12:00	-0.557	-0.650	3947.50	9.720	3944.12	23.240	23.147	3941.79	12.64	13.45	16.93	15.67	15.87	9026.6	9065.3	7581.7	1.07	0.977	3951.26	11.43	11.337	3948.06	24.70	24.610	3945.19	3952.11
2002	235	1600	235.67	8/23/2002	16:00	-0.623	-0.699	3947.39	9.720	3944.12	23.230	23.154	3941.83	13.11	13.16	16.93	15.68	15.85	9029.4	9065.1	7582.1	1.01	0.929	3951.14	11.44	11.359	3948.11	24.69	24.617	3945.21	3952.13
2002	235	2000	235.83	8/23/2002	20:00	-0.626	-0.644	3947.51	9.730	3944.31	23.220	23.202	3941.94	12.87	13.11	16.93	15.68	15.84	9029.6	9064.6	7582.4	1.00	0.983	3951.27	11.45	11.429	3948.27	24.69	24.668	3945.33	3952.09
2002	236	0	236.00	8/24/2002	0:00	-0.59	-0.611	3947.59	9.740	3944.33	23.220	23.199	3941.94	12.73	12.87	16.94	15.68	15.85	9028.6	9064.4	7582.4	1.04	1.017	3951.35	11.45	11.431	3948.28	24.69	24.665	3945.32	3952.12
2002	236	400	236.17	8/24/2002	4:00	-0.557	-0.597	3947.62	9.740	3944.28	23.230	23.190	3941.92	12.65	12.73	16.93	15.68	15.85	9026.6	9064.2	7582.1	1.07	1.030	3951.38	11.46	11.417	3948.25	24.69	24.573	3945.29	3952.10
2002	236	800	236.33	8/24/2002	8:00	-0.577	-0.637	3947.53	9.740	3944.28	23.170	23.110	3941.73	12.59	13.58	16.96	15.71	15.85	9027.5	9065.1	7584.4	1.05	0.989	3951.28	11.39	11.326	3948.04	24.64	24.556	3945.11	3952.19
2002	236	1200	236.50	8/24/2002	12:00	-0.553	-0.647	3947.51	9.710	3944.09	23.240	23.146	3941.81	13.16	13.57	16.93	15.68	15.84	9026.5	9065.4	7581.9	1.07	0.979	3951.26	11.43	11.334	3948.06	24.70	24.604	3945.18	3952.10
2002	236	1600	236.67	8/24/2002	16:00	-0.597	-0.679	3947.43	9.720	3944.14	23.240	23.158	3941.84	13.11	13.16	16.96	15.68	15.85	9028.3	9065.1	7581.9	1.03	0.948	3951.19	11.44	11.353	3948.10	24.70	24.616	3945.21	3952.09
2002	236	2000	236.83	8/24/2002	20:00	-0.599	-0.654	3947.49	9.730	3944.23	23.240	23.185	3941.90	12.86	13.11	16.96	15.68	15.84	9028.4	9064.6	7581.8	1.03	0.973	3951.25	11.45	11.392	3948.19	24.70	24.646	3945.27	3952.03
2002	237	0	237.00	8/25/2002	0:00	-0.549	-0.605	3947.60	9.740	3944.25	23.250	23.194	3941.92	12.7	12.86	16.96	15.68	15.85	9026.2	9064.3	7581.5	1.08	1.023	3951.36	11.45	11.398	3948.20	24.71	24.652	3945.29	3952.08
2002	237	400	237.17	8/25/2002	4:00	-0.522	-0.608	3947.60	9.750	3944.20	23.260	23.174	3941.88	12.61	12.7	16.99	15.68	15.85	9025.1	9064	7581.1	1.10	1.018	3951.35	11.46	11.375	3948.15	24.72	24.632	3945.24	3952.16
2002	237	800	237.33	8/25/2002	8:00	-0.553	-0.647	3947.51	9.670	3944.00	23.190	23.096	3941.70	12.56	13.64	16.98	15.7	15.87	9026.4	9067.2	7583.6	1.07	0.980	3951.26	11.38	11.290	3947.95	24.66	24.562	3945.08	3952.15
2002	237	1200	237.50	8/25/2002	12:00	-0.536	-0.658	3947.48	9.720	3944.05	23.250	23.128	3941.77	13.18	13.64	16.95	15.67	15.84	9025.7	9065.3	7581.2	1.09	0.969	3951.24	11.43	11.309	3948.00	24.72	24.594	3945.15	3952.12
2002	237	1600	237.67	8/25/2002	16:00	-0.598	-0.694	3947.40	9.720	3944.11	23.240	23.144	3941.81	13.08	13.18	17	15.69	15.85	9025.3	9065	7581.6	1.03	0.933	3951.15	11.44	11.341	3948.07	24.71	24.610	3945.19	3952.08
2002	237	2000	237.83	8/25/2002	20:00	-0.609	-0.646	3947.51	9.730	3944.27	23.230	23.193	3941.92	12.88	13.09	16.99	15.71	15.87	9028.8	9064.5	7582	1.02	0.981	3951.26	11.45	11.411	3948.23	24.70	24.658	3945.30	3952.04
2002	238	0	238.00	8/26/2002	0:00	-0.574	-0.606	3947.60	9.740	3944.30	23.230	23.198	3941.93	12.72	12.87	16.99	15.68	15.85	9027.3	9064.2	7582.1	1.05	1.021	3951.36	11.46	11.425	3948.26	24.69	24.661	3945.31	3952.12
2002	238	400	238.17	8/26/2002	4:00	-0.556	-0.610	3947.59	9.750	3944.28	23.230	23.176	3941.88	12.62	12.72	16.99	15.68	15.85	9026.5	9064	7582	1.07	1.018	3951.35	11.46	11.407	3948.22	24.70	24.661	3945.31	3952.12
2002	238	800	238.33	8/26/2002	8:00	-0.591	-0.647	3947.51	9.680	3944.11	23.170	23.114	3941.74	12.58	13.58	17.02	15.68	15.85	9026.5	9064	7582	1.04	0.980	3951.26	11.39	11.336	3948.06	24.68	24.573	3945.11	3952.14
2002	238	1200	238.50	8/26/2002	12:00	-0.591	-0.668	3947.46	9.710	3944.13	23.220	23.143	3941.81	13.16	13.57	16.98	15.68	15.84	9028	9065.3	7582.7	1.04	0.960	3951.22	11.43	11.353	3948.10	24.68	24.623	3945.22	3952.02
2002	238	1600	238.67	8/26/2002	16:00	-0.66	-0.700	3947.38	9.720	3944.24	23.200	23.160	3941.85	13.07	13.16	17	15.69	15.85	9031	9065.1	7583.3	0.97	0.927	3951.14	11.43	11.353	3948.06	24.68	24.601	3945.17	3952.10
2002	238	2000	238.83	8/26/2002	20:00	-0.681	-0.663	3947.47	9.730	3944.40	23.180	23.198	3941.93	12.87	13.08	17.01	15.71	15.87	9031.9	9064.8	7584.1	0.95	0.909	3951.30	11.45	11.480	3948.39	24.64	24.668	3945.33	3951.95
2002	239	0	239.00	8/27/2002	0:00	-0.659	-0.627	3947.55	9.730	3944.43	23.170	23.120	3941.94	12.75	12.86	17	15.66	15.86	9031	9064.8	7584.4	0.97	0.919	3951.35	11.45	11.470	3948.37	24.64	24.659	3945.30	3951.94
2002	239	400	239.17	8/27/2002	4:00	-0.628	-0.608	3947.60	9.740	3944.42	23.180	23.200	3941.94	12.65	12.75	17.02	15.68	15.85	9029.8	9064.5	7584.3	0.98	0.975	3951.25	11.38	11.383	3948.17	24.57	24.567	3945.09	3951.93
2002	239	800	239.33	8/27/2002	8:00	-0.652	-0.652	3947.50	9.670	3944.22	23.100	23.100	3941.71	12.59	13.57	17.05	15.68	15.85	9030.6	9067.3	7587.2	0.98	0.954	3951.22	11.44	11.386	3948.18	24.63	24.599	3945.17	3951.94
2002	239	1200	239.50	8/27/2002	12:00	-0.641	-0.675	3947.44	9.710	3944.23	23.170	23.136	3941.79	13.15	13.57	17.04	15.7	15.87	9030.1	9065.5	7584.6	0.94	0.924	3951.13	1						

2002	249	1600	249.67	9/6/2002 16:00	-0.67	-0.734	3947.31	9.750	9.686	3944.25	23.150	23.086	3941.68	13	13.28	17.28	15.67	15.83	9031.2	9064	7585.2	0.96	0.893	3951.06	11.46	11.388	3948.20	24.62	24.552	3945.06	3951.98
2002	249	2000	249.83	9/6/2002 20:00	-0.632	-0.661	3947.47	9.770	9.741	3944.38	23.170	23.141	3941.80	12.85	13.23	17.28	15.66	15.86	9029.6	9063.1	7584.4	0.99	0.965	3951.23	11.48	11.455	3948.33	24.64	24.607	3945.19	3951.94
2002	250	0	250.00	9/7/2002 0:00	-0.621	-0.679	3947.43	9.780	9.722	3944.34	23.180	23.122	3941.76	12.74	12.85	17.3	15.68	15.85	9029	9062.8	7584.1	1.01	0.949	3951.19	11.49	11.432	3948.28	24.64	24.586	3945.14	3951.96
2002	250	400	250.17	9/7/2002 4:00	-0.609	-0.650	3947.50	9.780	9.739	3944.37	23.190	23.149	3941.82	12.67	12.75	17.3	15.68	15.85	9028.6	9062.5	7583.9	1.02	0.976	3951.25	11.50	11.456	3948.34	24.65	24.607	3945.19	3951.97
2002	250	800	250.33	9/7/2002 8:00	-0.596	-0.634	3947.54	9.780	9.742	3944.38	23.190	23.152	3941.83	12.65	12.72	17.3	15.68	15.85	9028	9062.6	7583.9	1.03	0.993	3951.29	11.49	11.457	3948.34	24.65	24.610	3945.19	3952.00
2002	250	1200	250.50	9/7/2002 12:00	-0.64	-0.688	3947.41	9.750	9.702	3944.29	23.150	23.102	3941.71	12.74	13.4	17.31	15.66	15.83	9029.9	9064.1	7585.3	0.99	0.938	3951.17	11.46	11.412	3948.23	24.61	24.566	3945.09	3951.95
2002	250	1600	250.67	9/7/2002 16:00	-0.691	-0.731	3947.31	9.750	9.710	3944.33	23.140	23.100	3941.71	13.2	13.28	17.29	15.67	15.84	9032.1	9063.9	7585.7	0.94	0.895	3951.07	11.46	11.424	3948.26	24.60	24.564	3945.09	3951.95
2002	250	2000	250.83	9/7/2002 20:00	-0.61	-0.602	3947.61	9.780	9.788	3944.49	23.190	23.198	3941.93	12.79	13.24	17.33	15.68	15.85	9028.6	9062.7	7583.6	1.02	1.024	3951.36	11.49	11.500	3948.44	24.66	24.604	3945.32	3951.95
2002	251	0	251.00	9/8/2002 0:00	-0.561	-0.606	3947.60	9.780	9.735	3944.37	23.210	23.165	3941.86	12.71	12.79	17.33	15.68	15.85	9026.5	9062.4	7582.8	1.06	1.020	3951.35	11.50	11.455	3948.33	24.68	24.631	3945.24	3951.94
2002	251	400	251.17	9/8/2002 4:00	-0.53	-0.600	3947.62	9.790	9.720	3944.33	23.230	23.160	3941.85	12.65	12.72	17.33	15.68	15.85	9025.1	9062.1	7581.9	1.10	1.027	3951.37	11.51	11.437	3948.29	24.70	24.628	3945.25	3952.00
2002	251	800	251.33	9/8/2002 8:00	-0.508	-0.588	3947.64	9.780	9.700	3944.28	23.250	23.170	3941.86	12.64	12.88	17.33	15.68	15.85	9024.2	9062.5	7581.2	1.12	1.038	3951.40	11.48	11.417	3948.25	24.72	24.658	3945.24	3951.94
2002	251	1200	251.50	9/8/2002 12:00	-0.515	-0.606	3947.60	9.760	9.669	3944.21	23.240	23.149	3941.82	12.91	13.43	17.34	15.66	15.83	9024.5	9063.4	7581.5	1.11	1.020	3951.35	11.48	11.393	3948.19	24.71	24.617	3945.21	3952.00
2002	251	1600	251.67	9/8/2002 16:00	-0.541	-0.632	3947.54	9.770	9.679	3944.24	23.240	23.149	3941.82	13.24	13.29	17.31	15.66	15.83	9025.6	9063.1	7581.5	1.09	0.995	3951.30	11.48	11.393	3948.19	24.71	24.617	3945.21	3952.00
2002	251	2000	251.83	9/8/2002 20:00	-0.515	-0.571	3947.68	9.790	9.734	3944.36	23.250	23.194	3941.92	12.87	13.26	17.34	15.66	15.83	9024.5	9062.1	7581.1	1.11	1.055	3951.43	11.51	11.451	3948.33	24.72	24.662	3945.31	3952.05
2002	252	0	252.00	9/9/2002 0:00	-0.475	-0.552	3947.73	9.800	9.723	3944.34	23.270	23.193	3941.92	12.87	12.88	17.33	15.68	15.85	9022.4	9061.7	7580.5	1.15	1.076	3951.48	11.52	11.439	3948.30	24.73	24.656	3945.30	3952.03
2002	252	400	252.17	9/9/2002 4:00	-0.444	-0.546	3947.74	9.810	9.708	3944.30	23.290	23.188	3941.91	12.7	12.78	17.33	15.68	15.85	9021.4	9061.3	7579.7	1.18	1.091	3951.53	11.53	11.410	3948.23	24.76	24.645	3945.27	3952.44
2002	252	800	252.33	9/9/2002 8:00	-0.413	-0.531	3947.77	9.810	9.692	3944.27	23.300	23.182	3941.90	12.63	12.71	17.36	15.68	15.85	9021.9	9061.2	7579.3	1.17	1.076	3951.48	11.51	11.352	3948.10	24.74	24.596	3945.16	3952.75
2002	252	1200	252.50	9/9/2002 12:00	-0.455	-0.599	3947.62	9.780	9.636	3944.14	23.280	23.136	3941.79	12.7	13.49	17.34	15.66	15.83	9021.9	9062.2	7580.2	1.21	1.091	3951.53	11.50	11.366	3948.13	24.73	24.594	3945.16	3952.59
2002	252	1600	252.67	9/9/2002 16:00	-0.497	-0.633	3947.54	9.790	9.654	3944.18	23.270	23.134	3941.79	13.22	13.28	17.34	15.66	15.83	9021.9	9061.2	7579.3	1.17	1.076	3951.48	11.51	11.352	3948.10	24.74	24.596	3945.16	3952.75
2002	252	2000	252.83	9/9/2002 20:00	-0.498	-0.601	3947.61	9.810	9.707	3944.30	23.270	23.167	3941.86	12.87	13.27	17.36	15.66	15.83	9023.7	9061.3	7580.5	1.13	1.094	3951.29	11.50	11.366	3948.13	24.73	24.594	3945.16	3952.59
2002	253	0	253.00	9/10/2002 0:00	-0.481	-0.576	3947.67	9.820	9.725	3944.34	23.270	23.175	3941.88	12.78	12.87	17.36	15.66	15.83	9023.7	9061.3	7580.5	1.15	1.051	3951.42	11.53	11.439	3948.30	24.73	24.638	3945.23	3952.17
2002	253	400	253.17	9/10/2002 4:00	-0.482	-0.587	3947.65	9.820	9.715	3944.32	23.270	23.165	3941.86	12.67	12.97	17.36	15.68	15.85	9023.3	9061.4	7581	1.14	1.044	3951.41	11.52	11.428	3948.27	24.72	24.625	3945.23	3952.18
2002	253	800	253.33	9/10/2002 8:00	-0.487	-0.582	3947.66	9.810	9.715	3944.32	23.260	23.165	3941.86	12.71	12.78	17.36	15.66	15.83	9023.7	9061.3	7580.5	1.15	1.041	3951.40	11.54	11.436	3948.29	24.73	24.628	3945.23	3952.17
2002	253	1200	253.50	9/10/2002 12:00	-0.509	-0.616	3947.58	9.800	9.693	3944.27	23.250	23.143	3941.81	12.97	13.4	17.36	15.68	15.85	9023.3	9061.4	7581	1.14	1.044	3951.41	11.52	11.428	3948.27	24.72	24.625	3945.23	3952.18
2002	253	1600	253.67	9/10/2002 16:00	-0.558	-0.658	3947.46	9.800	9.658	3944.46	23.240	23.140	3941.80	13.16	13.24	17.38	15.68	15.84	9026.3	9061.6	7581.7	1.07	1.069	3951.24	11.52	11.419	3948.25	24.70	24.603	3945.18	3952.16
2002	253	2000	253.83	9/10/2002 20:00	-0.56	-0.609	3947.59	9.820	9.700	3944.28	23.240	23.140	3941.80	12.88	13.17	17.37	15.67	15.83	9025.1	9060.7	7581.5	1.10	1.037	3951.39	11.54	11.482	3948.40	24.71	24.649	3945.28	3952.15
2002	254	0	254.00	9/11/2002 0:00	-0.53	-0.589	3947.64	9.830	9.720	3944.33	23.250	23.143	3941.81	12.71	12.79	17.39	15.66	15.86	9024.5	9060.4	7581.3	1.11	1.038	3951.40	11.55	11.476	3948.38	24.71	24.641	3945.26	3952.16
2002	254	400	254.17	9/11/2002 4:00	-0.517	-0.589	3947.64	9.830	9.711	3944.45	23.240	23.181	3941.89	12.79	12.88	17.39	15.66	15.83	9025.1	9060.7	7581.5	1.10	1.037	3951.39	11.54	11.482	3948.40	24.71	24.649	3945.28	3952.15
2002	254	800	254.33	9/11/2002 8:00	-0.489	-0.567	3947.69	9.840	9.762	3944.43	23.260	23.182	3941.90	12.65	12.72	17.38	15.68	15.85	9023.3	9060.2	7580.9	1.14	1.060	3951.45	11.55	11.474	3948.38	24.72	24.645	3945.27	3952.20
2002	254	1200	254.50	9/11/2002 12:00	-0.529	-0.623	3947.56	9.790	9.696	3944.28	23.220	23.126	3941.77	12.65	13.44	17.39	15.66	15.86	9023.5	9062	7582.3	1.10	1.005	3951.32	11.51	11.416	3948.24	24.69	24.594	3945.16	3952.18
2002	254	1600	254.67	9/11/2002 16:00	-0.547	-0.631	3947.54	9.800	9.716	3944.32	23.230	23.146	3941.81	13.3	13.38	17.39	15.66	15.83	9025.8	9061.7	7582.3	1.08	0.996	3951.30	11.52	11.433	3948.28	24.69	24.604	3945.16	3952.20
2002	254	2000	254.83	9/11/2002 20:00	-0.524	-0.576	3947.67	9.830	9.778	3944.46	23.240	23.188	3941.91	12.87	13.35	17.39	15.66	15.86	9024.8	9060.6	7581.6	1.10	1.051	3951.43	11.54	11.491	3948.42	24.71	24.653	3945.29	3952.21
2002	255	0	255.00	9/12/2002 0:00	-0.504	-0.557	3947.71	9.830	9.777	3944.46	23.250	23.197	3941.93	12.78	12.88	17.41	15.68	15.85	9023.9	9060.3	7581.4	1.12	1.071	3951.47	11.55	11.497	3948.43	24.71	24.652	3945.30	3952.22
2002	255	400	255.17	9/12/2002 4:00	-0.497	-0.558	3947.71	9.840	9.779	3944.47	23.250	23.199	3941.91	12.7	12.79	17.41	15.68	15.85	9023.6	9060	7581.3	1.13	1.070	3951.47	11.56	11.496	3948.43	24.71	24.652	3945.31	3952.23
2002	255	800	255.33	9/12/2002 8:00	-0.484	-0.540	3947.75	9.840	9.784	3944.48	23.250	23.194	3941.92	12.64	12.71	17.41	15.68	15.85	9023.9	9060.3	7581.4	1.14	1.086	3951.51	11.56	11.501	3948.44	24.72	24.652	3945.31	3952.24
2002	255	1200	255.50	9/12/2002 12:00	-0.532	-0.594	3947.63	9.810	9.748	3944.40	2																				

2002	266	2000	266.83	9/23/2002 20:00	12.86	13.19	17.65	15.69	15.86	9020.2	9055.3	7579	1.20	1.133	3951.61	11.67	11.596	3948.66	24.77	24.698	3945.40	3952.53
2002	267	0	267.00	9/24/2002 0:00	12.7	12.86	17.67	15.71	15.85	9019	9054.9	7579	1.23	1.168	3951.70	11.68	11.613	3948.70	24.77	24.706	3945.41	3952.26
2002	267	400	267.17	9/24/2002 4:00	12.59	12.71	17.66	15.7	15.84	9018.7	9054.7	7578.9	1.24	1.160	3951.68	11.68	11.602	3948.67	24.77	24.693	3945.38	3952.43
2002	267	800	267.33	9/24/2002 8:00	12.54	12.6	17.65	15.7	15.84	9017.7	9054.5	7578.6	1.26	1.187	3951.74	11.69	11.611	3948.69	24.78	24.704	3945.41	3952.33
2002	267	1200	267.50	9/24/2002 12:00	12.59	13.72	17.65	15.66	15.83	9020.3	9056.3	7579.8	1.20	1.101	3951.54	11.65	11.544	3948.54	24.75	24.648	3945.28	3952.35
2002	267	1600	267.67	9/24/2002 16:00	13.15	13.28	17.66	15.68	15.85	9022.5	9055.8	7580.2	1.15	1.073	3951.48	11.66	11.579	3948.62	24.74	24.662	3945.31	3952.33
2002	267	2000	267.83	9/24/2002 20:00	12.86	13.16	17.68	15.66	15.83	9023	9055.4	7580.7	1.14	1.124	3951.59	11.67	11.652	3948.79	24.73	24.713	3945.43	3952.36
2002	268	0	268.00	9/25/2002 0:00	12.71	12.86	17.67	15.68	15.85	9022.1	9055.1	7580.8	1.16	1.151	3951.68	11.67	11.664	3948.82	24.73	24.716	3945.44	3952.32
2002	268	400	268.17	9/25/2002 4:00	12.65	12.71	17.67	15.68	15.85	9022.1	9055	7580.9	1.16	1.142	3951.64	11.68	11.658	3948.80	24.72	24.705	3945.41	3952.33
2002	268	800	268.33	9/25/2002 8:00	12.63	12.68	17.67	15.68	15.85	9021.6	9055.1	7581	1.17	1.168	3951.70	11.67	11.669	3948.83	24.69	24.684	3945.32	3952.27
2002	268	1200	268.50	9/25/2002 12:00	12.7	13.47	17.68	15.66	15.83	9023.8	9056.7	7582.4	1.12	1.099	3951.54	11.64	11.614	3948.70	24.68	24.666	3945.32	3952.25
2002	268	1600	268.67	9/25/2002 16:00	13	13.31	17.68	15.66	15.83	9024.6	9056.6	7582.8	1.10	1.092	3951.52	11.64	11.628	3948.73	24.69	24.686	3945.32	3952.25
2002	268	2000	268.83	9/25/2002 20:00	12.86	13.29	17.67	15.69	15.83	9023.6	9055.8	7581.9	1.13	1.131	3951.61	11.66	11.661	3948.81	24.70	24.703	3945.41	3952.20
2002	269	0	269.00	9/26/2002 0:00	12.76	12.87	17.69	15.68	15.85	9021.7	9055.5	7581.4	1.17	1.161	3951.69	11.66	11.656	3948.80	24.71	24.702	3945.41	3952.17
2002	269	400	269.17	9/26/2002 4:00	12.68	12.77	17.69	15.68	15.85	9022.1	9055.3	7581.2	1.16	1.110	3951.65	11.67	11.619	3948.71	24.72	24.685	3945.32	3952.16
2002	269	800	269.33	9/26/2002 8:00	12.61	12.68	17.72	15.68	15.85	9021.4	9055.2	7581	1.12	1.110	3951.65	11.67	11.645	3948.77	24.72	24.694	3945.39	3952.06
2002	269	1200	269.50	9/26/2002 12:00	12.64	13.55	17.7	15.66	15.83	9023.7	9056.7	7582.4	1.12	1.080	3951.49	11.63	11.591	3948.65	24.69	24.643	3945.27	3952.08
2002	269	1600	269.67	9/26/2002 16:00	12.85	13.21	17.7	15.69	15.86	9026.1	9056.4	7583.2	1.08	1.051	3951.43	11.64	11.606	3948.68	24.68	24.646	3945.28	3952.15
2002	269	2000	269.83	9/26/2002 20:00	13.21	13.29	17.68	15.67	15.84	9025.5	9056.4	7583.1	1.07	1.085	3951.50	11.64	11.660	3948.81	24.67	24.686	3945.37	3952.12
2002	270	0	270.00	9/27/2002 0:00	12.85	13.21	17.7	15.68	15.85	9025.6	9056.4	7583.2	1.08	1.113	3951.57	11.64	11.677	3948.85	24.67	24.701	3945.40	3952.11
2002	270	400	270.17	9/27/2002 4:00	12.71	12.85	17.72	15.71	15.85	9025.6	9056.4	7583.3	1.08	1.107	3951.55	11.64	11.670	3948.83	24.66	24.692	3945.38	3952.13
2002	270	800	270.33	9/27/2002 8:00	12.62	12.71	17.72	15.68	15.85	9025.6	9056.4	7583.3	1.09	1.132	3951.61	11.64	11.679	3948.85	24.66	24.703	3945.41	3952.04
2002	270	1200	270.50	9/27/2002 12:00	12.58	12.62	17.72	15.71	15.85	9025.6	9056.5	7583.3	1.09	1.132	3951.61	11.64	11.679	3948.85	24.66	24.703	3945.41	3952.04
2002	270	1600	270.67	9/27/2002 16:00	12.57	13.64	17.73	15.69	15.83	9027.8	9058.5	7585.7	1.03	1.061	3951.45	11.59	11.626	3948.73	24.60	24.638	3945.26	3952.10
2002	270	2000	270.83	9/27/2002 20:00	13.2	13.35	17.71	15.67	15.84	9029.6	9058.8	7585.8	0.99	1.039	3951.40	11.59	11.640	3948.76	24.60	24.655	3945.30	3952.15
2002	271	0	271.00	9/28/2002 0:00	12.89	13.21	17.73	15.66	15.83	9029.6	9059.4	7586	0.98	1.097	3951.53	11.57	11.684	3948.86	24.60	24.709	3945.42	3952.09
2002	271	400	271.17	9/28/2002 4:00	12.79	12.89	17.73	15.69	15.83	9027.8	9058.9	7585.5	1.03	1.139	3951.63	11.58	11.695	3948.89	24.61	24.721	3945.45	3952.18
2002	271	800	271.33	9/28/2002 8:00	12.69	12.79	17.72	15.68	15.85	9026.5	9058	7584.7	1.06	1.125	3951.60	11.60	11.672	3948.84	24.63	24.697	3945.39	3952.10
2002	271	1200	271.50	9/28/2002 12:00	12.66	12.9	17.72	15.68	15.85	9025.5	9058	7584.5	1.08	1.122	3951.59	11.60	11.646	3948.78	24.63	24.676	3945.34	3952.15
2002	271	1600	271.67	9/28/2002 16:00	12.92	13.42	17.73	15.69	15.83	9026.1	9058.7	7584.9	1.07	1.070	3951.47	11.59	11.591	3948.65	24.62	24.628	3945.23	3952.17
2002	271	2000	271.83	9/28/2002 20:00	13.25	13.31	17.73	15.66	15.83	9026.8	9058.5	7584.3	1.05	1.037	3951.39	11.59	11.580	3948.62	24.64	24.626	3945.23	3952.17
2002	272	0	272.00	9/29/2002 0:00	12.83	13.27	17.75	15.68	15.85	9024	9057.3	7582.7	1.11	1.116	3951.57	11.62	11.622	3948.72	24.68	24.679	3945.35	3952.15
2002	272	400	272.17	9/29/2002 4:00	12.74	12.83	17.75	15.68	15.85	9022.7	9057	7581.8	1.14	1.094	3951.52	11.63	11.577	3948.62	24.70	24.679	3945.28	3952.14
2002	272	800	272.33	9/29/2002 8:00	12.64	12.74	17.75	15.71	15.85	9022.7	9056.6	7581.4	1.14	1.078	3951.49	11.64	11.570	3948.60	24.71	24.645	3945.27	3952.13
2002	272	1200	272.50	9/29/2002 12:00	12.6	12.8	17.75	15.71	15.85	9022.6	9057	7581.7	1.15	1.096	3951.53	11.63	11.576	3948.61	24.70	24.645	3945.28	3952.13
2002	272	1600	272.67	9/29/2002 16:00	12.82	13.56	17.75	15.68	15.85	9025.1	9058.5	7583.3	1.09	1.030	3951.38	11.59	11.533	3948.52	24.66	24.604	3945.18	3952.17
2002	272	2000	272.83	9/29/2002 20:00	12.99	13.43	17.76	15.69	15.85	9024.6	9057.5	7582.6	1.10	1.076	3951.48	11.62	11.591	3948.65	24.68	24.656	3945.30	3952.30
2002	273	0	273.00	9/30/2002 0:00	12.83	13.55	17.78	15.71	15.85	9023.8	9057	7582.2	1.12	1.090	3951.51	11.63	11.611	3948.70	24.71	24.685	3945.37	3952.53
2002	273	400	273.17	9/30/2002 4:00	12.74	12.83	17.78	15.71	15.85	9022.3	9056.7	7581.5	1.15	1.131	3951.61	11.64	11.602	3948.67	24.73	24.683	3945.36	3952.97
2002	273	800	273.33	9/30/2002 8:00	12.64	12.75	17.77	15.71	15.84	9021.5	9056.3	7580.8	1.17	1.168	3951.69	11.65	11.612	3948.70	24.76	24.716	3945.44	3953.80
2002	273	1200	273.50	9/30/2002 12:00	12.55	12.64	17.76	15.7	15.83	9019.9	9055.9	7579.5	1.21	1.120	3951.59	11.61	11.555	3948.56	24.74	24.686	3945.37	3953.42
2002	273	1600	273.67	9/30/2002 16:00	12.55	13.71	17.78	15.68	15.85	9021.5	9057.9	7580.3	1.17	1.127	3951.60	11.62	11.587	3948.64	24.74	24.706	3945.41	3953.07
2002	273	2000	273.83	9/30/2002 20:00	13.27	13.41	17.76	15.66	15.85	9022.1	9057.4	7580.3	1.16	1.127	3951.60	11.62	11.587	3948.64	24.74	24.706	3945.41	3953.07
2002	274	0	274.00	10/1/2002 0:00	12.87	13.28	17.78	15.68	15.85	9021.5	9056.4	7580.5	1.17	1.189	3951.74	11.64	11.659	3948.81	24.73	24.750	3945.51	3952.84
2002	274	400	274.17	10/1/2002 4:00	12.71	12.88	17.78	15.71	15.85	9020.9	9056.1	7580.7	1.19	1.208	3951.79	11.65	11.670	3948.83	24.73	24.750	3945.51	3952.74
2002	274	800	274.33	10/1/2002 8:00	12.61	12.72	17.77	15.7	15.84	9020.6	9055.8	7580.8	1.19	1.211	3951.80	11.66	11.674	3948.84	24.73	24.743	3945.50	3952.70
2002	274	1200	274.50	10/1/2002 12:00	12.61	12.65	17.78	15.71	15.85	9020.3	9055.7	7580.8	1.20	1.223	3951.82	11.66	11.681	3948.86	24.73	24.748	3945.51	3952.77
2002	274	1600	274.67	10/1/2002 16:00	12.62	13.5	17.79	15.69	15.83	9023	9057.5	7582.5	1.14	1.149	3951.65	11.62	11.628	3948.73	24.68	24.695	3945.39	3952.77
2002	274	2000	274.83	10/1/2002 20:00	13.27	13.31	17.76	15.66	15.83	9025.4	9057.5	7583.2	1.08	1.119	3951.58	11.62	11.654	3948.79	24.67	24.703	3945.41	3952.75
2002																						



2002	284	0	284.00	10/11/2002 0:00	12.75	12.88	17.89	15.71	15.85	9019	9052.7	7579.1	1.23	1.222	3951.82	11.73	11.723	3948.95	24.77	24.781	3945.54	3952.53
2002	284	400	284.17	10/11/2002 4:00	12.71	12.76	17.9	15.71	15.85	9018.9	9052.7	7579.1	1.23	1.219	3951.81	11.73	11.718	3948.94	24.77	24.758	3945.53	3952.53
2002	284	800	284.33	10/11/2002 8:00	12.66	12.71	17.89	15.71	15.82	9018.5	9052.6	7579	1.24	1.235	3951.85	11.73	11.727	3948.96	24.77	24.755	3945.55	3952.51
2002	284	1200	284.50	10/11/2002 12:00	12.66	13.41	17.9	15.69	15.83	9020	9054.2	7580.1	1.20	1.189	3951.74	11.69	11.678	3948.85	24.74	24.727	3945.46	3952.47
2002	284	1600	284.67	10/11/2002 16:00	13.23	13.3	17.88	15.7	15.83	9020.4	9054	7580	1.20	1.176	3951.71	11.70	11.679	3948.85	24.77	24.766	3945.55	3952.48
2002	284	2000	284.83	10/11/2002 20:00	12.85	13.29	17.9	15.69	15.83	9018.4	9053.1	7579	1.24	1.238	3951.86	11.72	11.717	3948.94	24.79	24.735	3945.48	3952.49
2002	285	0	285.00	10/12/2002 0:00	12.74	12.86	17.92	15.71	15.85	9016.1	9052.8	7578	1.29	1.235	3951.82	11.74	11.823	3948.72	24.75	24.725	3945.46	3952.49
2002	285	400	285.17	10/12/2002 4:00	12.61	12.75	17.93	15.72	15.83	9014.7	9052.3	7576.9	1.33	1.211	3951.80	11.75	11.595	3948.66	24.85	24.703	3945.41	3952.46
2002	285	800	285.33	10/12/2002 8:00	12.51	12.61	17.93	15.72	15.86	9012.7	9052	7575.6	1.37	1.223	3951.82	11.74	11.523	3948.82	24.82	24.706	3945.41	3952.50
2002	285	1200	285.50	10/12/2002 12:00	12.53	13.83	17.92	15.71	15.85	9014.3	9054	7576.3	1.34	1.31	3951.83	11.71	11.502	3948.44	24.84	24.638	3945.26	3952.46
2002	285	1600	285.67	10/12/2002 16:00	13.3	13.41	17.9	15.69	15.83	9015.4	9053.6	7576	1.31	1.105	3951.55	11.74	11.572	3948.60	24.86	24.692	3945.38	3952.45
2002	285	2000	285.83	10/12/2002 20:00	12.85	13.32	17.92	15.71	15.85	9014.2	9052.4	7575.5	1.37	1.185	3951.73	11.75	11.565	3948.59	24.87	24.687	3945.37	3952.44
2002	286	0	286.00	10/13/2002 0:00	12.71	12.86	17.94	15.7	15.84	9013	9052	7575	1.39	1.181	3951.73	11.76	11.551	3948.56	24.89	24.682	3945.36	3952.43
2002	286	400	286.17	10/13/2002 4:00	12.56	12.71	17.93	15.72	15.86	9012.2	9051.6	7574.3	1.40	1.188	3951.74	11.76	11.549	3948.55	24.90	24.691	3945.38	3952.38
2002	286	800	286.33	10/13/2002 8:00	12.47	12.56	17.96	15.72	15.86	9011.5	9051.3	7573.6	1.34	1.110	3951.56	11.71	11.477	3948.38	24.86	24.628	3945.23	3952.39
2002	286	1200	286.50	10/13/2002 12:00	12.47	13.94	17.92	15.71	15.83	9014.2	9053.7	7575.5	1.34	1.092	3951.52	11.72	11.511	3948.40	24.85	24.639	3945.26	3952.42
2002	286	1600	286.67	10/13/2002 16:00	13.31	13.45	17.95	15.71	15.85	9015.6	9052.1	7575.8	1.31	1.163	3951.68	11.74	11.601	3948.67	24.85	24.706	3945.41	3952.39
2002	286	2000	286.83	10/13/2002 20:00	12.85	13.31	17.93	15.72	15.83	9014.7	9051.7	7575.9	1.33	1.187	3951.74	11.75	11.613	3948.70	24.85	24.707	3945.42	3952.35
2002	287	0	287.00	10/14/2002 0:00	12.55	12.68	17.96	15.72	15.86	9014.4	9051.4	7575.7	1.33	1.185	3951.73	11.76	11.611	3948.69	24.85	24.703	3945.41	3952.37
2002	287	400	287.17	10/14/2002 4:00	12.47	12.55	17.93	15.69	15.83	9013.9	9051.2	7575.5	1.35	1.199	3951.77	11.77	11.619	3948.71	24.86	24.710	3945.42	3952.35
2002	287	800	287.33	10/14/2002 8:00	12.48	13.92	17.95	15.71	15.85	9016.8	9053.6	7577.3	1.28	1.122	3951.59	11.71	11.552	3948.56	24.81	24.656	3945.30	3952.36
2002	287	1200	287.50	10/14/2002 12:00	13.3	13.45	17.93	15.69	15.83	9017.7	9053.1	7577.3	1.26	1.121	3951.59	11.72	11.584	3948.63	24.81	24.675	3945.34	3952.40
2002	287	1600	287.67	10/14/2002 16:00	12.84	13.32	17.95	15.71	15.85	9017.1	9052.1	7577.2	1.27	1.178	3951.72	11.74	11.651	3948.79	24.81	24.722	3945.45	3952.39
2002	287	2000	287.83	10/14/2002 20:00	12.68	12.84	17.96	15.72	15.83	9016.3	9051.8	7577.2	1.29	1.199	3951.77	11.75	11.660	3948.81	24.81	24.724	3945.45	3952.37
2002	288	0	288.00	10/15/2002 0:00	12.56	12.68	17.96	15.72	15.86	9015.8	9051.5	7576.9	1.30	1.197	3951.76	11.76	11.654	3948.79	24.82	24.718	3945.44	3952.38
2002	288	400	288.17	10/15/2002 4:00	12.47	12.57	17.96	15.72	15.86	9015	9051.2	7576.6	1.32	1.217	3951.81	11.76	11.662	3948.81	24.83	24.726	3945.46	3952.35
2002	288	800	288.33	10/15/2002 8:00	12.47	13.95	17.95	15.71	15.85	9018.1	9053.7	7578.3	1.25	1.128	3951.60	11.71	11.586	3948.64	24.79	24.689	3945.38	3952.37
2002	288	1200	288.50	10/15/2002 12:00	13.27	13.46	17.93	15.69	15.83	9019.2	9053.1	7578.3	1.22	1.125	3951.60	11.72	11.623	3948.72	24.79	24.740	3945.50	3952.41
2002	288	1600	288.67	10/15/2002 16:00	12.83	13.28	17.95	15.74	15.85	9018.3	9052.2	7578.3	1.24	1.200	3951.77	11.74	11.697	3948.89	24.79	24.740	3945.49	3952.39
2002	288	2000	288.83	10/15/2002 20:00	12.66	12.83	17.96	15.72	15.86	9017.9	9051.9	7578.2	1.25	1.202	3951.77	11.75	11.698	3948.90	24.79	24.746	3945.51	3952.37
2002	289	0	289.00	10/16/2002 0:00	12.55	12.67	17.96	15.72	15.86	9017.4	9051.7	7578	1.26	1.215	3951.80	11.75	11.704	3948.91	24.79	24.746	3945.51	3952.37
2002	289	400	289.17	10/16/2002 4:00	12.47	12.55	17.96	15.72	15.86	9016.7	9051.5	7577.8	1.28	1.224	3951.83	11.76	11.702	3948.90	24.80	24.744	3945.50	3952.30
2002	289	800	289.33	10/16/2002 8:00	12.47	12.55	17.96	15.72	15.86	9016.7	9051.5	7577.8	1.28	1.224	3951.83	11.70	11.628	3948.73	24.76	24.682	3945.36	3952.33
2002	289	1200	289.50	10/16/2002 12:00	12.47	13.9	17.95	15.71	15.85	9019.4	9053.9	7579.6	1.22	1.145	3951.64	11.71	11.654	3948.79	24.76	24.698	3945.39	3952.38
2002	289	1600	289.67	10/16/2002 16:00	13.28	13.44	17.93	15.69	15.83	9020.6	9053.4	7579.5	1.19	1.130	3951.64	11.73	11.728	3948.96	24.76	24.756	3945.53	3952.39
2002	289	2000	289.83	10/16/2002 20:00	12.84	13.29	17.98	15.71	15.85	9019.7	9052.6	7579.4	1.21	1.206	3951.78	11.74	11.727	3948.96	24.77	24.753	3945.52	3952.38
2002	290	0	290.00	10/17/2002 0:00	12.68	12.84	17.96	15.72	15.83	9018.8	9052.3	7579.2	1.24	1.214	3951.80	11.75	11.717	3948.94	24.77	24.746	3945.51	3952.38
2002	290	400	290.17	10/17/2002 4:00	12.56	12.68	17.96	15.72	15.86	9018.3	9052.3	7579.2	1.24	1.214	3951.80	11.75	11.715	3948.93	24.78	24.749	3945.51	3952.31
2002	290	800	290.33	10/17/2002 8:00	12.48	12.57	17.99	15.72	15.86	9017.6	9051.9	7578.5	1.26	1.226	3951.83	11.75	11.715	3948.93	24.78	24.749	3945.51	3952.31
2002	290	1200	290.50	10/17/2002 12:00	12.47	13.92	17.95	15.71	15.86	9017.6	9051.9	7578.5	1.26	1.226	3951.83	11.75	11.715	3948.93	24.78	24.749	3945.51	3952.31
2002	290	1600	290.67	10/17/2002 16:00	12.48	12.57	17.99	15.72	15.86	9017.6	9051.9	7578.5	1.26	1.226	3951.83	11.75	11.715	3948.93	24.78	24.749	3945.51	3952.31
2002	290	2000	290.83	10/17/2002 20:00	13.27	13.42	17.96	15.72	15.83	9019.9	9054.2	7579.3	1.21	1.149	3951.65	11.69	11.646	3948.77	24.74	24.690	3945.38	3952.33
2002	291	0	291.00	10/18/2002 0:00	12.85	13.29	17.95	15.71	15.85	9020.9	9053.1	7580.2	1.18	1.132	3951.61	11.70	11.672	3948.83	24.74	24.650	3945.38	3952.39
2002	291	400	291.17	10/18/2002 4:00	12.72	12.82	17.95	15.71	15.85	9021.8	9053.9	7580.4	1.16	1.132	3951.61	11.70	11.672	3948.83	24.74	24.650	3945.38	3952.39
2002	291	800	291.33	10/18/2002 8:00	12.62	12.72	17.97	15.73	15.85	9019.4	9052.9	7579.9	1.22	1.125	3951.80	11.72	11.752	3949.02	24.74	24.772	3945.57	3952.38
2002	291	1200	291.50	10/18/2002 12:00	12.55	12.63	17.96	15.72	15.83	9018.5	9052.5	7579.3	1.24	1.234	3951.85	11.73	11.730	3948.97	24.76	24.759	3945.54	3952.24
2002	291	1600	291.67	10/18/2002 16:00	12.55	13.75	17.95	15.71	15.82	9020.7	9054.6	7580.9	1.19	1.161	3951.68	11.68	11.658	3948.80	24.72	24.742	3945.50	3952.33
2002	291	2000	291.83	10/18/2002 20:00	13.3	13.4	17.96	15.72	15.83	9021.7	9054.4	7580.8	1.16	1.139	3951.63	11.69	11.664	3948.82	24.73	24.697	3945.39	3952.24
2002	292	0	292.00	10/19/2002 0:00	12.84	13.31	17.98	15.74	15.85	9020.2	9053.4	7580.1	1.20	1.214	3951.80	11.71	11.727	3948.96	24.74			

2002	301	400	301.17	10/28/2002 4:00	12.6	12.7	18.02	15.75	15.83	9015.7	9053.5	7577.3	1.30	1.246	3951.88	11.71	11.653	3948.79	24.81	24.756	3945.53	3952.51
2002	301	800	301.33	10/28/2002 8:00	12.53	12.6	18.02	15.75	15.83	9015.7	9053.3	7577.2	1.30	1.250	3951.89	11.71	11.662	3948.81	24.81	24.763	3945.54	3952.48
2002	301	1200	301.50	10/28/2002 12:00	12.53	13.81	18.01	15.74	15.85	9019.2	9056.1	7579.7	1.22	1.176	3951.71	11.65	11.602	3948.67	24.75	24.708	3945.42	3952.54
2002	301	1600	301.67	10/28/2002 16:00	13.44	13.58	18.01	15.74	15.82	9020.6	9055.6	7579.8	1.19	1.165	3951.69	11.66	11.635	3948.75	24.75	24.726	3945.46	3952.63
2002	301	2000	301.83	10/28/2002 20:00	12.86	13.48	18.03	15.77	15.85	9018.9	9054.3	7579.1	1.23	1.263	3951.91	11.69	11.724	3948.96	24.77	24.802	3945.64	3952.64
2002	302	0	302.00	10/29/2002 0:00	12.74	12.86	18.03	15.76	15.84	9018	9054	7578.9	1.25	1.278	3951.95	11.70	11.726	3948.96	24.78	24.789	3945.61	3952.60
2002	302	400	302.17	10/29/2002 4:00	12.62	12.74	18.02	15.75	15.83	9018	9053.8	7578.8	1.25	1.263	3951.91	11.70	11.716	3948.94	24.78	24.801	3945.63	3952.60
2002	302	800	302.33	10/29/2002 8:00	12.52	12.63	18.02	15.75	15.86	9017.4	9053.6	7578.6	1.26	1.284	3951.96	11.71	11.728	3948.96	24.72	24.729	3945.47	3952.59
2002	302	1200	302.50	10/29/2002 12:00	12.53	13.84	18	15.76	15.85	9020	9056.4	7581	1.20	1.212	3951.80	11.64	11.648	3948.78	24.73	24.735	3945.48	3952.61
2002	302	1600	302.67	10/29/2002 16:00	13.52	13.59	18.01	15.74	15.85	9020.5	9056.2	7580.8	1.19	1.201	3951.77	11.64	11.655	3948.80	24.77	24.804	3945.64	3952.63
2002	302	2000	302.83	10/29/2002 20:00	12.84	13.6	18.03	15.76	15.85	9017.8	9054.4	7578.9	1.25	1.285	3951.97	11.69	11.719	3948.94	24.79	24.788	3945.60	3952.66
2002	303	0	303.00	10/30/2002 0:00	12.72	12.85	18.02	15.75	15.83	9016.9	9054.1	7578.4	1.27	1.277	3951.95	11.69	11.698	3948.89	24.80	24.786	3945.60	3952.63
2002	303	400	303.17	10/30/2002 4:00	12.61	12.72	18.02	15.75	15.83	9016.4	9053.9	7577.8	1.29	1.272	3951.94	11.70	11.685	3948.87	24.80	24.790	3945.61	3952.66
2002	303	800	303.33	10/30/2002 8:00	12.51	12.61	18.02	15.75	15.86	9015.7	9053.6	7577.4	1.30	1.282	3951.96	11.71	11.687	3948.87	24.81	24.790	3945.61	3952.63
2002	303	1200	303.50	10/30/2002 12:00	12.5	13.9	18.03	15.76	15.84	9018.4	9056.6	7579.6	1.24	1.205	3951.78	11.63	11.601	3948.67	24.75	24.716	3945.44	3952.63
2002	303	1600	303.67	10/30/2002 16:00	13.43	13.65	18.01	15.75	15.83	9019.7	9055.9	7579.3	1.24	1.178	3951.72	11.65	11.620	3948.71	24.76	24.731	3945.47	3952.67
2002	303	2000	303.83	10/30/2002 20:00	12.86	13.5	18.03	15.77	15.85	9017.7	9054.5	7578.4	1.26	1.281	3951.96	11.68	11.709	3948.92	24.78	24.810	3945.65	3952.65
2002	304	0	304.00	10/31/2002 0:00	12.74	12.86	18.03	15.76	15.84	9016.6	9054.2	7578.1	1.28	1.291	3951.98	11.69	11.702	3948.90	24.79	24.802	3945.64	3952.65
2002	304	400	304.17	10/31/2002 4:00	12.62	12.74	18.02	15.75	15.83	9015.8	9053.9	7577.5	1.30	1.288	3951.97	11.70	11.687	3948.87	24.81	24.795	3945.62	3952.64
2002	304	800	304.33	10/31/2002 8:00	12.5	12.62	18.02	15.75	15.86	9015.1	9053.6	7577.7	1.32	1.289	3951.98	11.71	11.680	3948.85	24.82	24.792	3945.61	3952.63
2002	304	1200	304.50	10/31/2002 12:00	12.49	13.9	18	15.76	15.85	9018.3	9056.4	7579.3	1.24	1.201	3951.77	11.64	11.598	3948.67	24.76	24.722	3945.45	3952.64
2002	304	1600	304.67	10/31/2002 16:00	13.43	13.59	18.01	15.75	15.83	9019.6	9055.9	7579.2	1.21	1.190	3951.75	11.65	11.630	3948.74	24.77	24.743	3945.50	3952.62
2002	304	2000	304.83	10/31/2002 20:00	12.86	13.43	18.01	15.77	15.85	9017.8	9054.5	7578.5	1.25	1.284	3951.96	11.68	11.714	3948.93	24.78	24.812	3945.66	3952.62
2002	305	0	305.00	11/1/2002 0:00	12.74	12.86	18.03	15.76	15.85	9016.1	9054.3	7578.1	1.29	1.316	3952.04	11.69	11.712	3948.93	24.79	24.815	3945.67	3952.62
2002	305	400	305.17	11/1/2002 4:00	12.64	12.75	18.03	15.76	15.84	9015	9054	7577.2	1.32	1.294	3951.99	11.70	11.673	3948.84	24.81	24.791	3945.61	3952.62
2002	305	800	305.33	11/1/2002 8:00	12.55	12.64	18.02	15.75	15.83	9014.1	9053.7	7576.5	1.34	1.293	3951.98	11.70	11.658	3948.80	24.83	24.786	3945.60	3952.60
2002	305	1200	305.50	11/1/2002 12:00	12.55	13.77	18.01	15.77	15.85	9016.6	9056.3	7578.2	1.28	1.216	3951.81	11.64	11.575	3948.61	24.79	24.724	3945.45	3952.59
2002	305	1600	305.67	11/1/2002 16:00	13.44	13.56	18.01	15.74	15.83	9017.4	9055.9	7577.8	1.26	1.192	3951.75	11.65	11.581	3948.63	24.80	24.729	3945.47	3952.59
2002	305	2000	305.83	11/1/2002 20:00	12.84	13.5	18.03	15.76	15.85	9015.6	9054.4	7576.9	1.30	1.273	3951.94	11.69	11.666	3948.80	24.82	24.791	3945.61	3952.80
2002	306	0	306.00	11/2/2002 0:00	12.74	12.84	18.03	15.76	15.84	9015	9054.1	7576.7	1.32	1.285	3951.97	11.69	11.661	3948.81	24.83	24.794	3945.62	3952.79
2002	306	400	306.17	11/2/2002 4:00	12.66	12.75	18.03	15.76	15.84	9014.7	9053.9	7576.3	1.33	1.283	3951.96	11.70	11.657	3948.80	24.84	24.794	3945.62	3952.85
2002	306	800	306.33	11/2/2002 8:00	12.55	12.67	18.02	15.78	15.83	9013.6	9053.6	7575.7	1.35	1.308	3952.02	11.71	11.662	3948.81	24.84	24.809	3945.65	3952.83
2002	306	1200	306.50	11/2/2002 12:00	12.55	13.71	18	15.76	15.84	9016.1	9056.5	7577.9	1.29	1.230	3951.84	11.64	11.574	3948.61	24.85	24.794	3945.62	3952.80
2002	306	1600	306.67	11/2/2002 16:00	13.51	13.64	18.01	15.77	15.85	9016.6	9056	7577.2	1.28	1.204	3951.78	11.65	11.571	3948.60	24.81	24.734	3945.48	3952.85
2002	306	2000	306.83	11/2/2002 20:00	12.81	13.51	18.02	15.75	15.83	9013.8	9054.2	7575.8	1.35	1.300	3952.00	11.69	11.646	3948.78	24.85	24.737	3945.48	3952.88
2002	307	0	307.00	11/3/2002 0:00	12.7	12.81	18.02	15.78	15.83	9011.4	9053.8	7574.7	1.40	1.321	3952.05	11.70	11.620	3948.71	24.88	24.796	3945.62	3952.87
2002	307	400	307.17	11/3/2002 4:00	12.55	12.71	18.02	15.78	15.86	9010	9053.4	7573.4	1.43	1.288	3951.99	11.71	11.573	3948.61	24.91	24.772	3945.57	3952.81
2002	307	800	307.33	11/3/2002 8:00	12.47	12.56	18.02	15.78	15.86	9008.4	9053	7572.1	1.47	1.268	3951.99	11.71	11.554	3948.56	24.94	24.775	3945.57	3952.81
2002	307	1200	307.50	11/3/2002 12:00	12.47	13.94	18.03	15.78	15.84	9011.8	9056.2	7574.4	1.38	1.151	3951.66	11.66	11.462	3948.35	24.88	24.683	3945.36	3952.71
2002	307	1600	307.67	11/3/2002 16:00	13.56	13.7	18.01	15.77	15.85	9013.8	9055.6	7574.6	1.35	1.277	3951.95	11.70	11.590	3948.65	24.90	24.783	3945.59	3952.70
2002	307	2000	307.83	11/3/2002 20:00	12.81	13.58	18.02	15.75	15.83	9011.9	9053.7	7573.9	1.39	1.277	3951.95	11.71	11.594	3948.65	24.89	24.775	3945.57	3952.71
2002	308	0	308.00	11/4/2002 0:00	12.67	12.82	18.02	15.78	15.86	9011.7	9053.3	7574	1.40	1.276	3951.95	11.71	11.604	3948.68	24.89	24.776	3945.58	3952.70
2002	308	400	308.17	11/4/2002 4:00	12.58	12.66	18.02	15.78	15.86	9012.5	9053.1	7574.2	1.38	1.264	3951.92	11.72	11.604	3948.68	24.89	24.776	3945.58	3952.70
2002	308	800	308.33	11/4/2002 8:00	12.45	12.56	18.02	15.78	15.86	9012.7	9053.3	7574	1.37	1.294	3951.99	11.73	11.647	3948.78	24.89	24.808	3945.65	3952.65
2002	308	1200	308.50	11/4/2002 12:00	12.44	14.03	18	15.76	15.84	9016.3	9056	7577.4	1.29	1.216	3951.81	11.65	11.576	3948.61	24.81	24.737	3945.48	3952.67
2002	308	1600	308.67	11/4/2002 16:00	13.51	13.66	18.01	15.77	15.85	9017.3	9055.6	7577.5	1.27	1.205	3951.78	11.66	11.598	3948.66	24.81	24.747	3945.51	3952.68
2002	308	2000	308.83	11/4/2002 20:00	12.81	13.52	18.02	15.75	15.83	9014.8	9053.8	7576.5	1.32	1.310	3952.02	11.70	11.689	3948.87	24.83	24.819	3945.67	3952.67
2002	309	0	309.00	11/5/2002 0:00	12.65	12.81	18.02	15.78	15.86	9012.9	9053.4	7575.8	1.37	1.328	3952.07	11.71	11.671	3948.83	24.85	24.810	3945.65	3952.66
2002	309	400	309.17	11/5/2002 4:00	12.53	12.65	17.99	15.75	15.83	9012	9053.1	7574.8	1.39	1.303	3952.01	11.72	11.632	3948.74	24.87	24.788	3945.60	3952.67