3M Monitoring Well Report
December 2002 through January 2003

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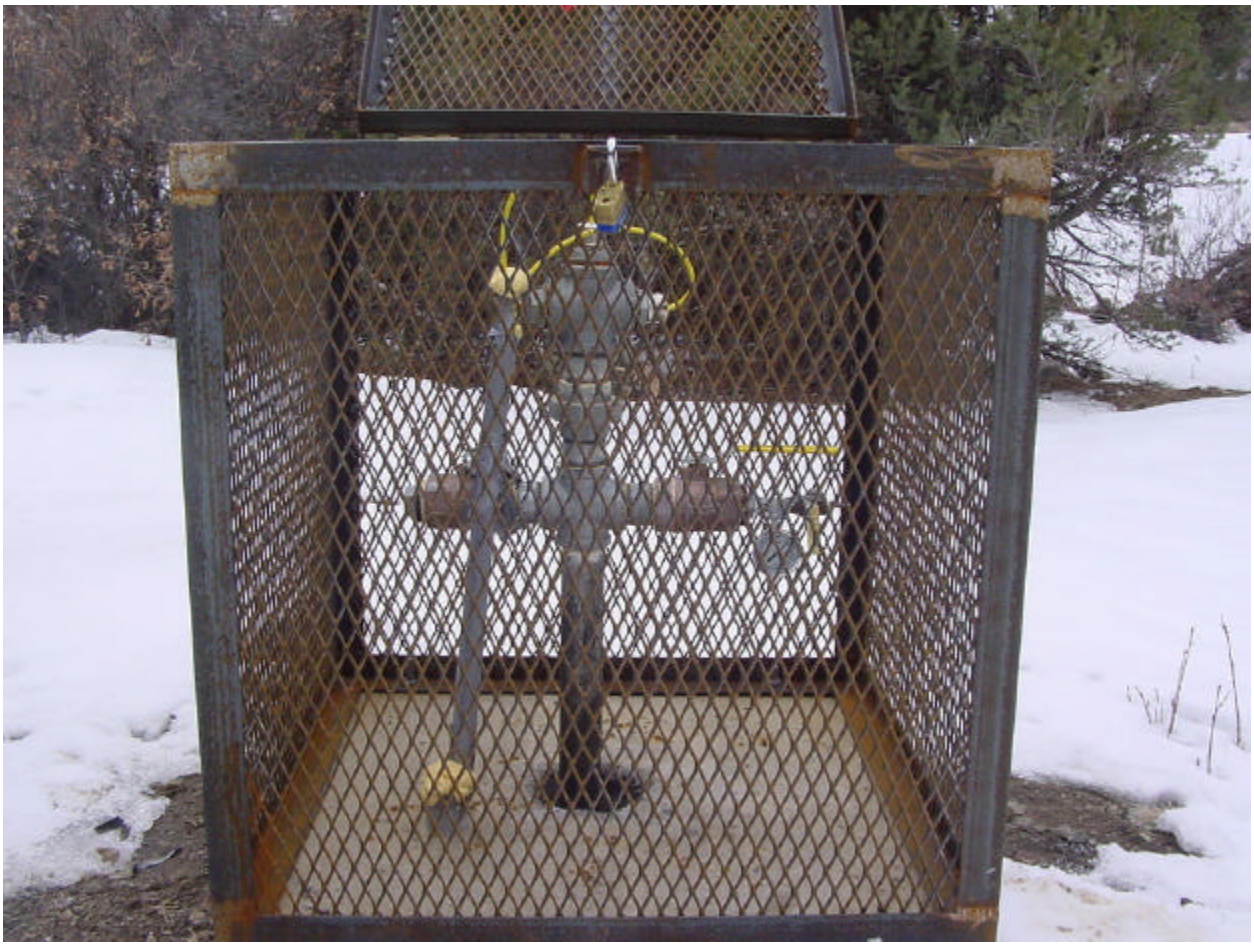

Prepared For:

Colorado Oil and Gas Conservation Commission

Denver, Colorado

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COVER PHOTOGRAPH
Shows the Basin Creek wellhead, January 18, 2002.

1.0 INTRODUCTION

This report describes the results of ground water and gas pressure monitoring activities during the months of December 2002 and January 2003, for the 3M project located in La Plata County, Colorado. This work was carried out by staff of Applied Hydrology Associates, Inc. (AHA) and the Colorado Oil and Gas Conservation Commission (COGCC) on behalf of the COGCC.

Table 1 summarizes the well names and locations, and the depths of completion at the four locations. **Table 2** lists the depth and type of transducers used in each monitoring well.

2.0 DECEMBER 2002 THROUGH JANUARY 2003

2.1 ACTIVITIES

Table 3 provides a chronology of monitoring well installation, operation and maintenance activities since January 2001.

Modem auto power up and datalogger problems developed in December, disabling all of the telemetry systems and causing abnormal ending of Hermit pressure monitoring tests at two of the sites due to battery pack power failure. Work in December included: 1) preparation of the October/November Monitoring Report; 2) troubleshooting monitoring system equipment problems, assisted by In-Situ, Inc and Raymond Construction; and 3) two inspections of Beaver Creek Ranch site MW-35-6-17-2 wellhead for gas leaks by Raymond Construction; no leaks were detected.

Work in January included: 1) re-inspection of Beaver Creek Ranch site MW-35-6-17-2 wellhead for gas leaks by Raymond Construction (Jan. 7- none detected); and 2) comprehensive monitoring systems inspections and corrective actions at all four sites by AHA (Jan. 20-21). In-Situ technicians in Laramie were consulted during performance of corrective actions to confirm re-establishment of telemetry communications and datalogger operations.

Summary of January 20-21 Inspections and Corrective Actions

All sites:

- Inspected Battery Recharge Regulator connections. **Results:** all four regulators had one or more incorrect connection for Hermit external power, solar power, and/or modem. **Action:** All connections were corrected per photo schematic of regulator connections provided by In-Situ, Inc. and verified to be operating properly.
- Checked Hermit lithium battery pack capacity. **Results:** All Hermits indicate low battery life. **Action:** As above, re-wired external power system battery recharge regulator. Lithium battery packs were not replaced per In-Situ (Glenn Carlson) recommendation, since Hermits are adequately powered by solar and external rechargeable lead-acid battery systems (assumes low risk of external power systems failure).
- Checked external lead-acid rechargeable battery pack voltage without solar recharge. **Results:** 15-volt rated batteries metered at 12.9 to 14.3 volts. Lowest readings were at Shamrock Mines and Beaver Creek Ranch sites due to incomplete or no recharge, a result

of incorrect solar panel connection to recharge regulator. **Action:** None at Basin Creek or Texas Creek sites. Solar power connections to recharge regulator were corrected at other two sites and should result in improved solar recharge of external battery packs.

- Checked solar power voltage in sunlight. **Results:** Three panels metered at design power output of 15 volts. So. Fork Texas Creek panel was in late-day shade, but wired correctly. **Action:** None required except, as noted above, solar panel connections to battery recharge regulator were corrected at Shamrock Mines and Beaver Creek sites.
- Replaced Hermit motherboard backup lithium batteries provided by In-Situ at no charge. **Action:** All replaced, starting new two-year life cycle. Original batteries left in place in Hermits because of inconvenient disassembly effort required to remove them. Replacing these batteries is expected to solve problem of datalogger clock and Read Only Memory (ROM) errors.
- Verified power status of modem and cell phone. **Results:** Modem/handset power was off at all sites. Auto power-up function disabled. **Action:** Re-flashed modem memory, verified cellular telephone settings, and enabled and confirmed auto power-up when power is applied.
- Upon completion of above actions, each Hermit was programmed to start running a new monitoring test. In-Situ in Laramie and AHA in Denver were contacted to do remote communications checks. Successful communication via modem was established with all Hermits and transducer pressures were being properly measured and recorded by all Hermits.

Basin Creek MW 34-9-7-1

- **Action:** Installed new PXD-251-30 psig upper transducer, SN 7201. Transducer pressure measurement checked and appeared normal.

Beaver Creek Ranch MW 35-6-17-2

- Inspected again for wellhead gas leaks. **Results:** No fitting or transducer cable leaks detected, and no yellow stains found on fittings. Yellow stains have been evident at the spot of previously detected leaks. A small opening in the upper transducer cable was noticed. This area was closely monitored for leaks, none were detected. **Action:** None

2.2 MONITORING WELL PRESSURE DATA

Pressure is normally measured and recorded twice daily (12-hour interval). However, shorter intervals, i.e., 30 minutes to 2 hours, are used whenever a pressure monitoring test has to be re-started after corrective actions. Well pressure is currently being measured and recorded at 2-hour intervals at all sites to confirm the success of corrective actions implemented in January 2003.

Data for all of the monitoring wells were downloaded via cellular modem on February 2, 2003. Data for each of the monitoring wells are plotted on the attached annotated graphs.

2.2.1 BASIN CREEK

Figures 1 and **1a** chart the pressure transducer (xd) data for both the upper and lower transducers in well MW-34-9-7-1. **Figure 1** also shows the change in the depth to water over the same time period, based on the depth of the lower transducer and the difference between upper and lower well pressures.

On November 27, the up-hole pressure transducer recorded a relatively rapid seven ponds per square inch (psi) drop in the up-hole pressure without a corresponding drop in the lower transducer pressure measurements. This unilateral drop, followed by erratic pressure measurements seemed to indicate an upper transducer malfunction. On January 20, 2002, the well was vented to install a new upper transducer and then shut-in again. The data logger was reprogrammed to start a new monitoring test.

Both Figure 1 and the following table indicate a declining trend in the overall reservoir pressure. Shut-in pressures have not equilibrated since the well was vented on January 20 to replace the upper transducer. Thus, additional time is required in order to verify this apparent trend.

Well and Transducer	Period	Initial Pressure (psia)	Ending Pressure (psia)	Change in Pressure (psi)	Ending Depth to Water (fbgs) and Change (ft)
MW-34-9-7-1 - Lower	12/01/02 to 02/02/03	243.6	241.3	-2.3	45.2 *
MW-34-9-7-1 - Upper	12/01/02 to 02/02/03	Invalid, xd malfunction	13.4	-6.3	-
MW-34-9-7-2 - Lower	12/01/02 to 02/02/03	240.3	239.0	-1.3	5.1 (-0.1)
MW-34-9-7-2 - Upper	12/01/02 to 02/02/03	32.5	31.0	-1.5	-

*Change was not calculated for specified period because no valid data were collected from upper transducer (due to malfunction) in MW-34-9-7-1 until Jan. 20, 2003.

The pressure data for well MW-34-9-7-2 are plotted on **Figures 2** and **2a**. Figure 2a and the table above indicate a pressure decline of about 1.5 psi. for the 2-month period, which is consistent with the apparent trend of a gradual decline in pressure since August 2002. The water level remains near the upper transducer depth of 5.0 feet below ground surface (fbgs). If it is assumed that the upper transducer is only detecting gas pressure (i.e. water level is below the transducer), then the calculated water level is 5.1 fbgs, which represents an apparent decline of about 0.1 ft for the period and about 0.4 ft for the 8-month period of record.

2.2.2 SOUTH FORK TEXAS CREEK

Data for well MW-35-7-8-1 are summarized on **Figures 3** and **3a**. As discussed above, no pressure measurements were recorded between December 4, 2002 and January 20, 2003 due to loss of power to datalogger. Upper transducer data recorded since January 20, 2003 indicate a 0.2 psi pressure drop at the end of the report period. Additional measurements are required to assess the significance of this change in pressure.

The lower transducer measured a 0.5 psi increase in pressure to 146.1 psi, which, for the second period in a row, is a new high for this well. This trend, shown in the figures and table below, indicates a rising ground-water level, since the upper transducer data does not indicate an increase in gas pressure.

Well and Transducer	Period	Initial Pressure (psia)	Ending Pressure (psia)	Change in Pressure (psi)	Ending Depth to Water (fbgs) and Change (ft)
MW-35-7-8-1 - Lower	12/01/02 to 02/02/03	145.6	146.1	0.5	83.3 (1.5)
MW-35-7-8-1 - Upper	12/01/02 to 02/02/03	13.3	13.1	-0.2	-
MW-35-7-8-2 - Lower	12/01/02 to 02/02/03	84.7	83.3	-1.4	Below lower transducer, if any
MW-35-7-8-2 - Upper	12/01/02 to 02/02/03	84.3	82.6	-1.7	-

Figure 4 plots the pressure data against time for MW-35-7-8-2. Well MW-35-7-8-2 exhibits an entirely different pressure regime than the deeper monitoring well, MW-35-7-8-1. **Figure 4** and the table above indicate that the entire well casing above the lower transducer is filled with gas at a pressure of about 83 psia. There is a small differential of 0.7 psia between the two transducer measurements. Since monitoring began, the upper and lower transducers have generally read within less than one percent of one another. This consistent pressure differential is most likely due to slight differences in instrument accuracy between the two transducers, rather than an indicator of water above the lower transducer. Thus, it is assumed that pressure data for this well indicates that there is no ground water above the depth of the lower transducer, which is at 225 fbgs.

The summary table above shows a 1.4 to 1.7 psi drop in gas pressure for the report period. This trend for the period matches the slope of the overall trend line, which shows a consistent, gradual gas pressure decline since January 2002 (Figure 4). Over the past 13-month period, the gas pressure has declined approximately 9 psi, from 92 psia on January 10, 2002 to 83 psia on February 2, 2003.

2.2.3 BEAVER CREEK RANCH

As discussed above, no pressure measurements for both wells were recorded between December 1, 2002 and December 13, 2002 and between December 19, 2002 and January 7, 2003 due to loss of power to datalogger. This problem seems to have been solved by the corrective action taken on January 21, 2003.

The data for well MW-35-6-17-1 are summarized on **Figures 5** and **5a** for the entire period of record and in the table below for the current period. Gas pressure decreased form 13.4 to 13.0 psi, which is consistent with an apparent gradual decline in gas pressure since July 2002.

The pressure differential of 594 psia between the transducers indicates the water level is about 195 fbgs, a decline of 1.2 ft for the current period. However, since July 2002, the recorded water level has fluctuated within a range of three feet, from approximately 193.5 to 196.5 fbgs.

Well and Transducer	Period	Initial Pressure (psia)	Ending Pressure (psia)	Change in Pressure (psia)	Ending Depth to Water (fbgs) and Change (ft)
MW-35-6-17-1 - Lower	12/01/02 to 02/02/03	607.6	606.7	-0.9	195.3 (-1.2)
MW-35-6-17-1 - Upper	12/01/02 to 02/02/03	13.4	13.0	-0.4	-
MW-35-6-17-2 - Lower	12/01/02 to 02/02/03	623.3	620.6	-2.7	1,379.3 (-0.4)
MW-35-6-17-2 - Upper	12/01/02 to 02/02/03	605.5	602.9	-2.6	

Figure 6 plots the pressure data against time for well MW-35-6-17-2. The data indicate a measured decrease in gas pressure of 2.7 psi for the period, as shown in the above summary table. The differential pressure of 17+ psi indicated by the up-hole and down-hole transducers has not changed since November 20, 2002, when the well was vented and wellhead fittings were tightened to mitigate a small gas leaks. The slight change in water level is within the relatively flat range of fluctuations observed since November 20, 2002.

Prior periods without gas leaks indicate a peak wellhead pressure potential of 622 to 625 psia. This level of pressure has not been repeated since July 2002. Although no wellhead leaks were detected during the four inspections conducted since November 20, 2002, the maximum recorded wellhead pressure measured by the upper transducer was 606 psia in December 2002, and it has been declining ever since. This well will continued to be monitored for gas leaks.

2.2.4 SHAMROCK MINES

Well MW-35-6-13-1 monitoring data are plotted on **Figures 7** and **7a** for the entire period of record and summarized in the table below for this report period. The data indicate a gradual decline of 0.5 psi in both up-hole and down-hole pressure for the current period. This decline essentially matches the trend of gradually decreasing pressures observed since July 2002. The consistent 200 psi difference between the up-hole and down-hole pressures indicates that the water level remains stable at about 40 fbgs.

Well and Transducer	Period	Initial Pressure (psia)	Ending Pressure (psia)	Change in Pressure (psia)	Ending Depth to Water (fbgs) and Change (ft) (fbgs)
MW-35-6-13-1 - Lower	12/01/02 to 02/02/03	211.0	210.5	-0.5	39.8 (nc)
MW-35-6-13-1 - Upper	12/01/02 to 02/02/03	11.5	11.0	-0.5	-

3.0 FUTURE WORK

In addition to this report, work planned for the month of February will include routine checks of the remote monitoring systems and data downloads, and re-programming the dataloggers to record pressures at 12-hour intervals. At the direction of COGCC, the 30 psi transducer removed from Basin Creek well MW-34-9-7-1 will be returned to In-Situ, Inc. for bench testing. No other work is planned.

Table 1
Monitoring Well Completion Summary

Location	Well ID	Construction Completion Date	Drilled Depth (fbgs)	Cored Intervals (fbgs)	Casing Depth (fbgs)	Casing Stickup (ft)	Well Casing Material	Perforated Interval(s) - Coal seam(s) (fbgs)	Wellhead Design (Figure Number - Cons. Rpt.)	Log Type	Logged Depth (fbgs)	Log Date
Basin Creek	MW 34-9-7-1	01/28/01	820		802	1	Schedule 40 galvanized steel pipe	578 - 609	2-1	gamma ray, bulk density, caliper, resistance	819	01/27/01
										64" normal resistivity, 16" normal resistivity, SP	822	01/27/01
										temperature, differential temperature	822	01/27/01
										gamma ray, casing collar locator	763	09/27/01
	MW 34-9-7-2	04/25/02	570	359 - 374 498 - 513 578 - 593	561	1.5	Oilfield steel tubing	496 - 526	2-2	gamma ray, casing collar locator	550	05/02/02
South Fork Texas Creek	MW 35-7-8-1	09/20/01	486		463	1.6	Schedule 40 galvanized steel pipe	403 - 416	2-1	gamma ray, bulk density, caliper, resistance	485	09/19/01
										64" normal resistivity, 16" normal resistivity, SP	485	09/19/01
										temperature, differential temperature	485	09/19/01
										gamma ray, casing collar locator	462	09/27/01
	MW 35-7-8-2	09/21/01	420	410 - 425	425	1.6	Schedule 40 galvanized steel pipe	235 - 241 254 - 258 264 - 274	2-1	gamma ray, casing collar locator	420	09/27/01
Beaver Creek Ranch	MW 35-6-17-1	04/04/02	1,645	1,457 - 1,467 1,564 - 1,572	1,631	1.5	Oilfield steel tubing	1,572 - 1,576 1,582 - 1,584	2-4	64" normal resistivity, 16" normal resistivity, SP	1,645	04/03/02
										temperature, differential temperature	1,640	04/03/02
										gamma ray, bulk density, caliper, resistance	1,643	04/03/02
										gamma ray, casing collar locator	1,618	05/02/02
	MW 35-6-17-2	10/04/01	1,550		1,500	2	Schedule 40 galvanized steel pipe	1,437 - 1,449 1,458 - 1,472	2-3	gamma ray, neutron	1,499	10/10/01
										temperature, 4Pi density	1,493	11/14/01
										signal amplitude, travel time \ D T, VDL	1,484	11/14/01
										gamma ray, casing collar locator	1,483	11/27/01
Shamrock Mines	MW 35-6-13-1	05/07/02	627		606	1.5	Oilfield steel tubing	507 - 511 517 - 533 539 - 562	2-2	gamma ray, bulk density, caliper, resistance	626	05/06/02
										64" normal resistivity, 16" normal resistivity, SP	626	05/06/02
										gamma ray, casing collar locator	626	05/10/02

Table 2
Monitoring Well Equipment Installation

Location	Well ID	Upper Transducer		Lower Transducer		
		Depth (fbgs)	Type and Rating	Depth (fbgs)	Feet above Perforated Interval	Type and Rating
Basin Creek	MW 34-9-7-1	0.5	PXD-261-30 psig	570	8	PXD-461-500 psia
	MW 34-9-7-2	5	PXD-461-500 psia	485	11	PXD-461-500 psia
South Fork Texas Creek	MW 35-7-8-1	5	PXD-261-30 psig	390	13	PXD-461-500 psia
	MW 35-7-8-2	4	PXD-461-500 psia	225	10	PXD-461-500 psia
Beaver Creek Ranch	MW 35-6-17-1	5	PXD-461-500 psia	1,565	7	PXD-461-1,000 psia
	MW 35-6-17-2	5	PXD-461-1,000 psia	1,420	17	PXD-461-1,000 psia
Shamrock Mines	MW 35-6-13-1	5	PXD-461-500 psia	500	7	PXD-461-1,000 psia

Tabel 3. 3M Monitoring Well Chronology

Location	Well	January 2001	February 2001 thru August 2001 September 2001	October 2001 November 2001	December 2001	January 2002	February 2002	March 2002	April 2002	May 2002	June 2002	July 2002	August 2002 thru October 2002 November 2002	December 2002	January 2003
Basin Creek	MW 34-9-7-1	Jan. 24-28: Drill/install well	Sept. 27: Perforate well	Nov. 28: Set up telemetry unit; Replace bad xds cables	Surveyed	Jan. 18:Tighten wellhead fittings; Rewire telemetry system	Install new batteries in telemetry unit with In-Situ							Lost telmetry communitcation with Hermit due to faulty modem memory prgram	Jan 20: MW34-9-7-1- install new 30 psig xd (sn 7201); move Hermit ext pwr + wire to + pole on batt charger regul.; replace Hermit bkup lith. batt; re-flash modem memory; enable modem auto pwr-up; start new Hermit test
	MW 34-9-7-2								April 24-25: Drill/install well	May 5: Perforate well May 9: Fish out cable May 22: Install xds	Surveyed				
South Fork Texas Creek	MW 35-7-8-1		Sept. 17-20: Drill/install well; Sept. 27: Perforate well	Nov. 29: Set up telemetry unit; Replace bad xds cables	Surveyed	Jan. 18: Tighten wellhead fittings; Rewire telemetry unit	Install new batteries in telemetry unit with In-Situ			May 21: Ck for leaks				Dec. 4: Data lost through end of year due to Hermit internal battery failure; Lost telmetry communitcation with Hermit due to faulty modem memory prgram	Jan 20: Move Hermit ext pwr + wire to + pole on batt charger regul.; replace Hermit bkup lith. batt; re-flash modem memory; enable modem auto pwr-up; start new Hermit test
	MW 35-7-8-2		Sept. 20-21: Drill/install well Sept. 27: Perforate well	Nov. 29: Set up telemetry unit; Replace bad xds cables	Surveyed	Jan. 18: Tighten wellhead fittings				May 21: Ck for leaks					
Beaver Creek Ranch	MW 35-6-17-1						Install new batteries in telemetry unit with In-Situ	Mar. 5-Apr 4: Drill/install well		May 2: Perforate well May 20, 21: Install xds	Surveyed	July 10: Replace lower xd cable with unvented cable		Dec 13: Insp by Raymond Const.- no wellhead gas leak; solar pwr @14.8 v; Hermit internal batt pack @ 0% capacity; modem pwr off (auto pwr-up disabled or modem memory prob); Dec. 19: Data lost through end of year due to Hermit internal battery failure; Lost telmetry communitcation with Hermit due to faulty modem	Jan 7 & Jan 21: No well-head gas leak detected @ MW35-6-17-2; Jan 21: Move Hermit,modem & solar panel pwr common wires to charger regul. common poles; replace Hermit bkup lith. batt; re-flash modem memory; enable modem auto pwr-up; start new Hermit test
	MW 35-6-17-2		Sept. 22-Oct. 4: Drill/install well	Nov. 26: Perforate well Nov. 27: Set up telemetry unit	Surveyed	Jan. 17 - Install new xds cables with swage fittings; Rewire telemetry unit				May 20, 21 - Install unvented xd cable		Gas leak @ top bushing; July 10: Vent well & ck bushing galls; July 11: Reseal well		Nov. 14: Vent well; Replace valve and reseal all connections	
Shamrock Mines	MW 35-6-13-1									May 3-7: Drill/install well; May 10: Perforate well; May 20, 21: Install pad, telemetry equip. & xds	Surveyed			Lost telmetry communitcation with Hermit due to faulty modem memory prgram	Jan 21: Move solar pwr common wire to common pole on charger regul.; replace Hermit bkup lith. batt; re-flash modem memory; enable modem auto pwr-up; start new Hermit test

Figure 1.
Pressure Transducer Data Basin Creek MW-34-9-7-1

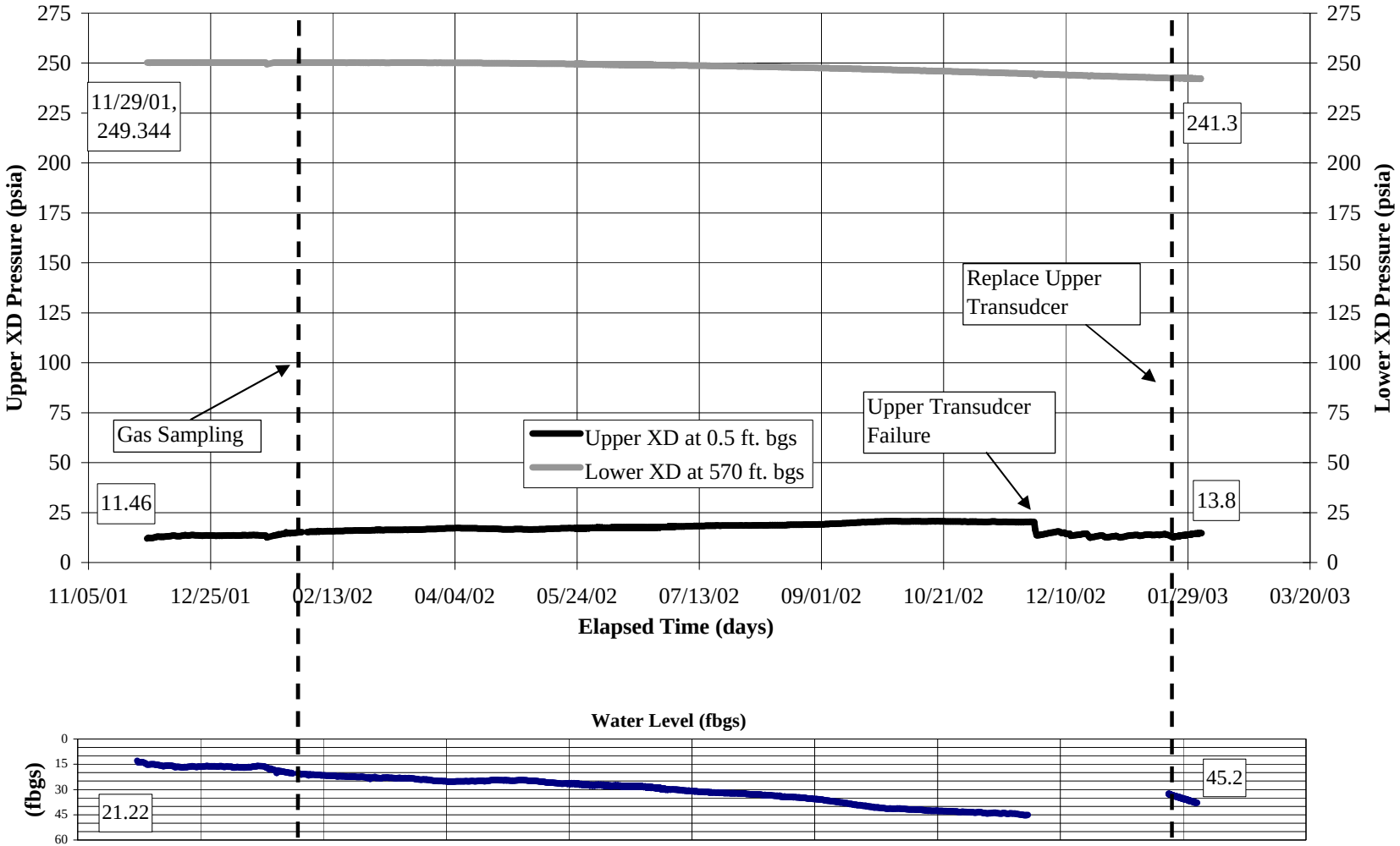


Figure 1a.
Pressure Transducer Data for Basin Creek MW-34-9-7-1

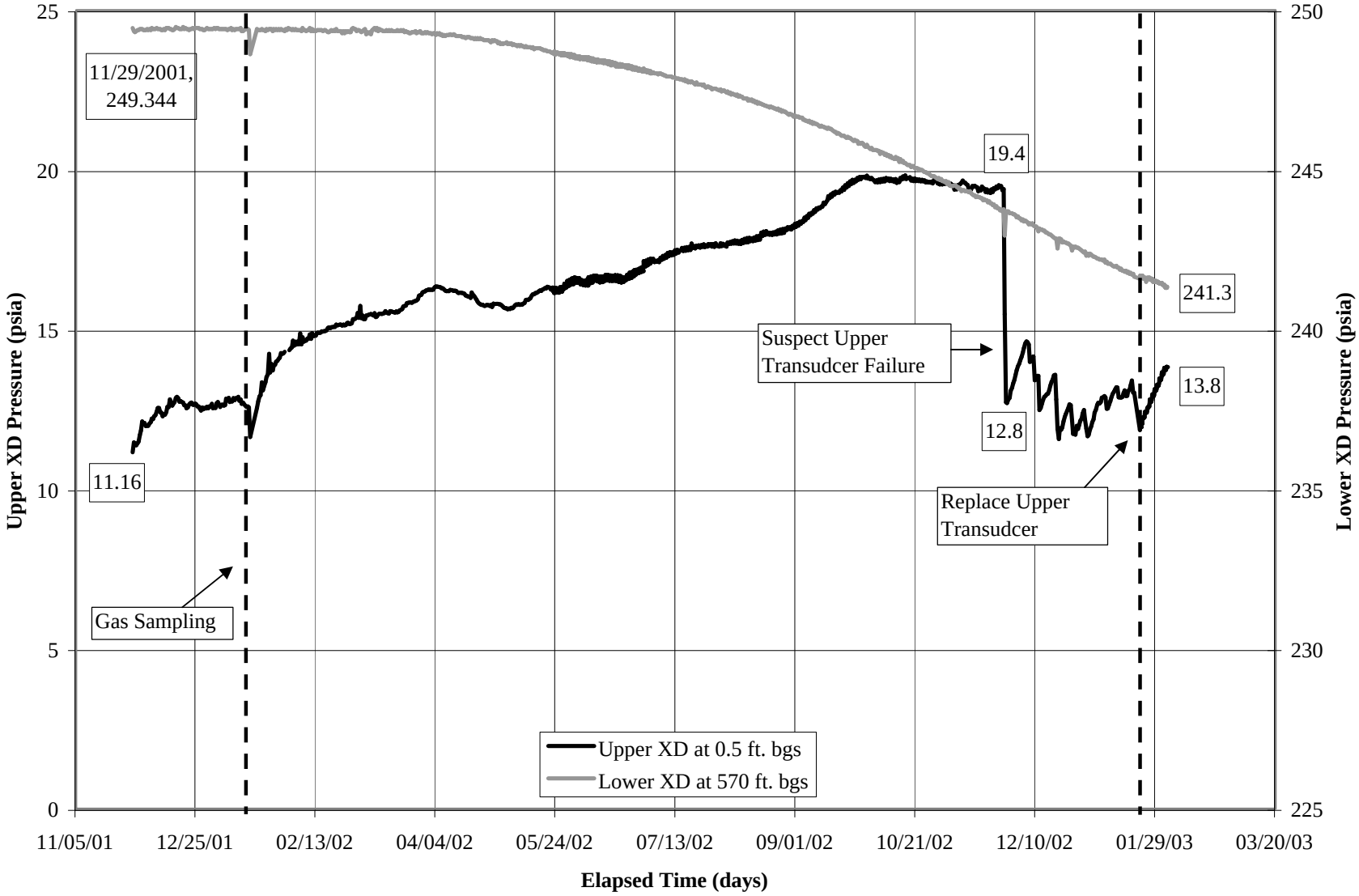


Figure 2.
Pressure Transducer Data for Basin Creek MW-34-9-7-2

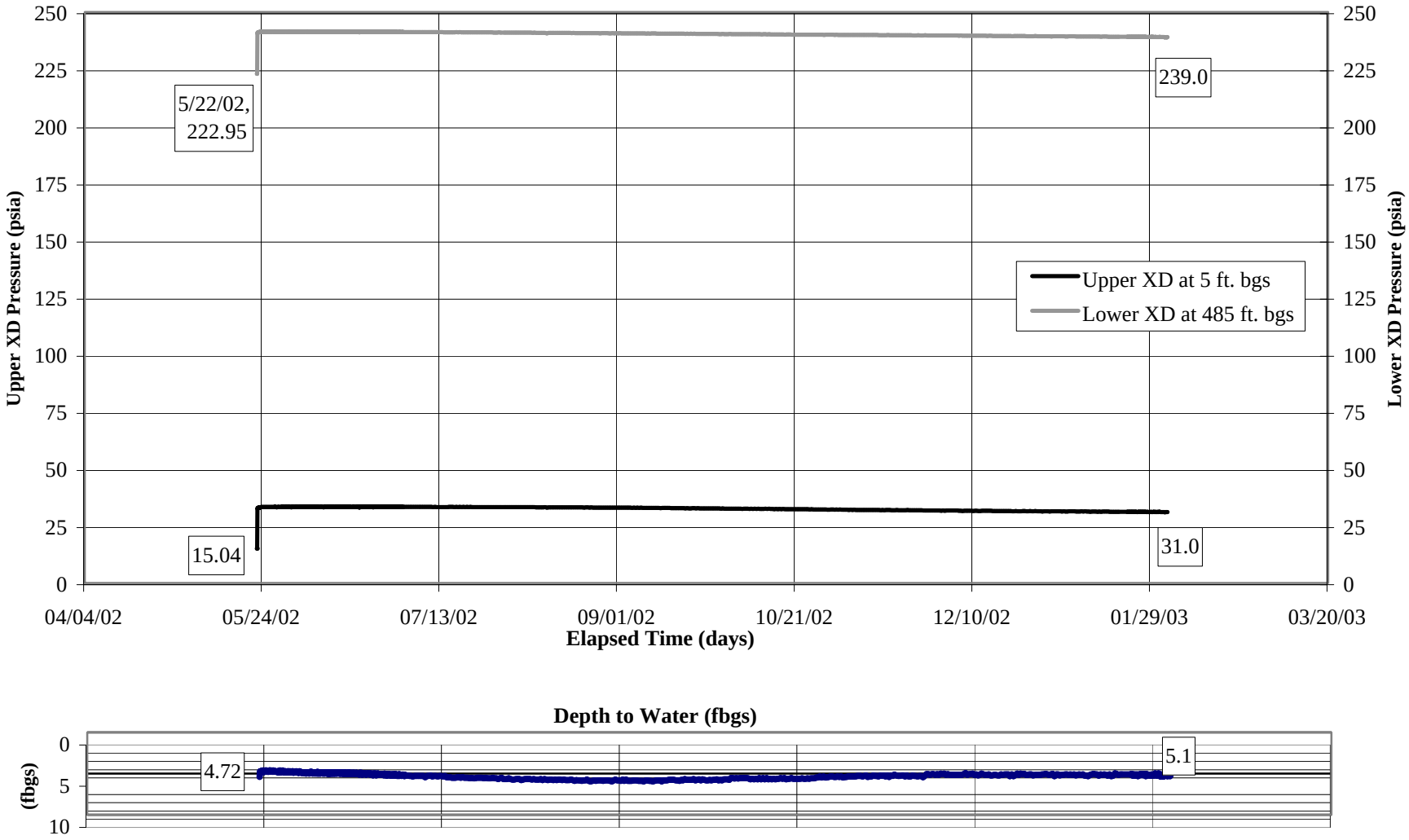


Figure 2a.
Pressure Transducer Data for Basin Creek MW-34-9-7-2

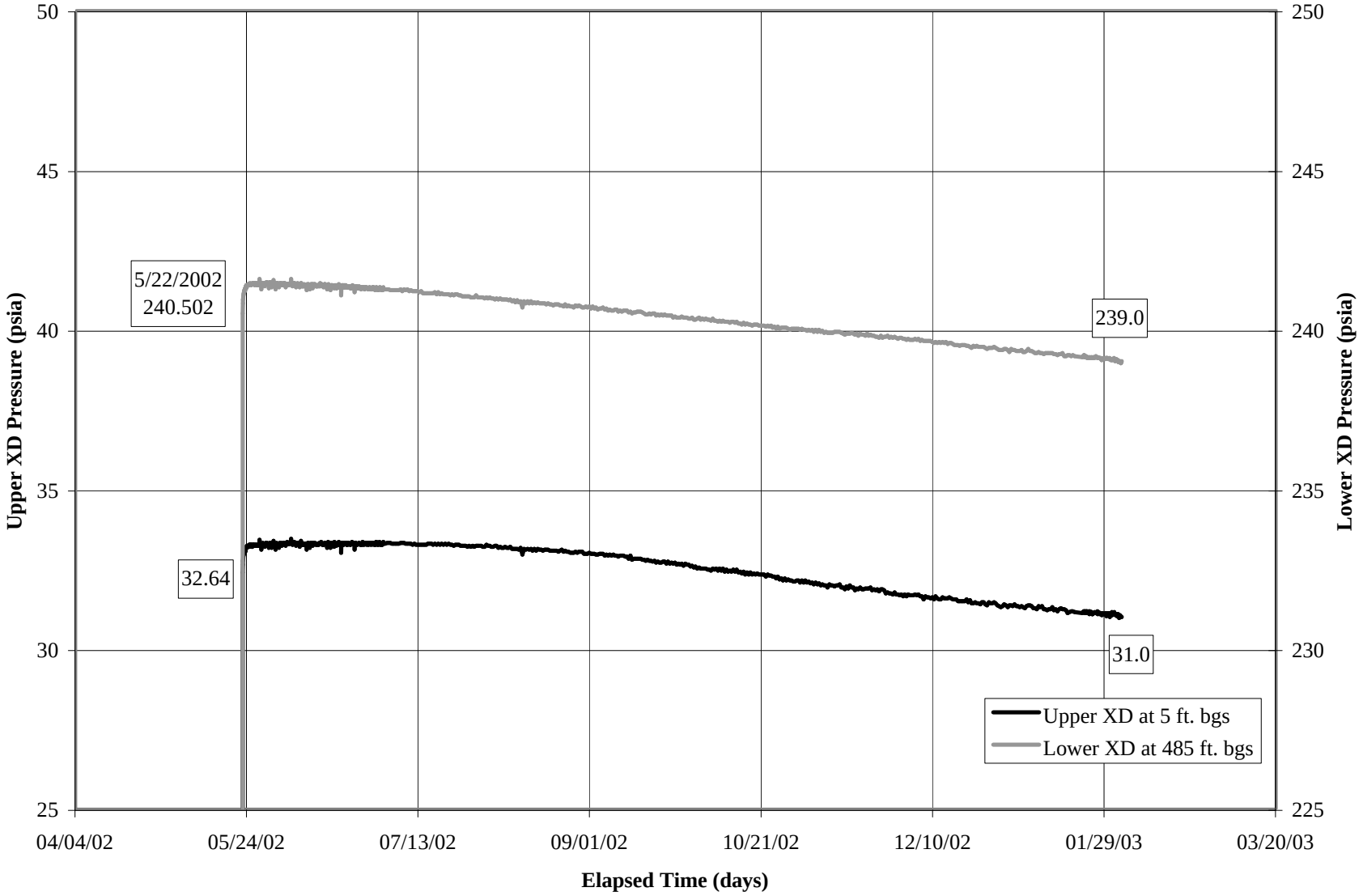


Figure 3.
Pressure Transducer Data for South Fork of Texas Creek MW-35-7-8-1

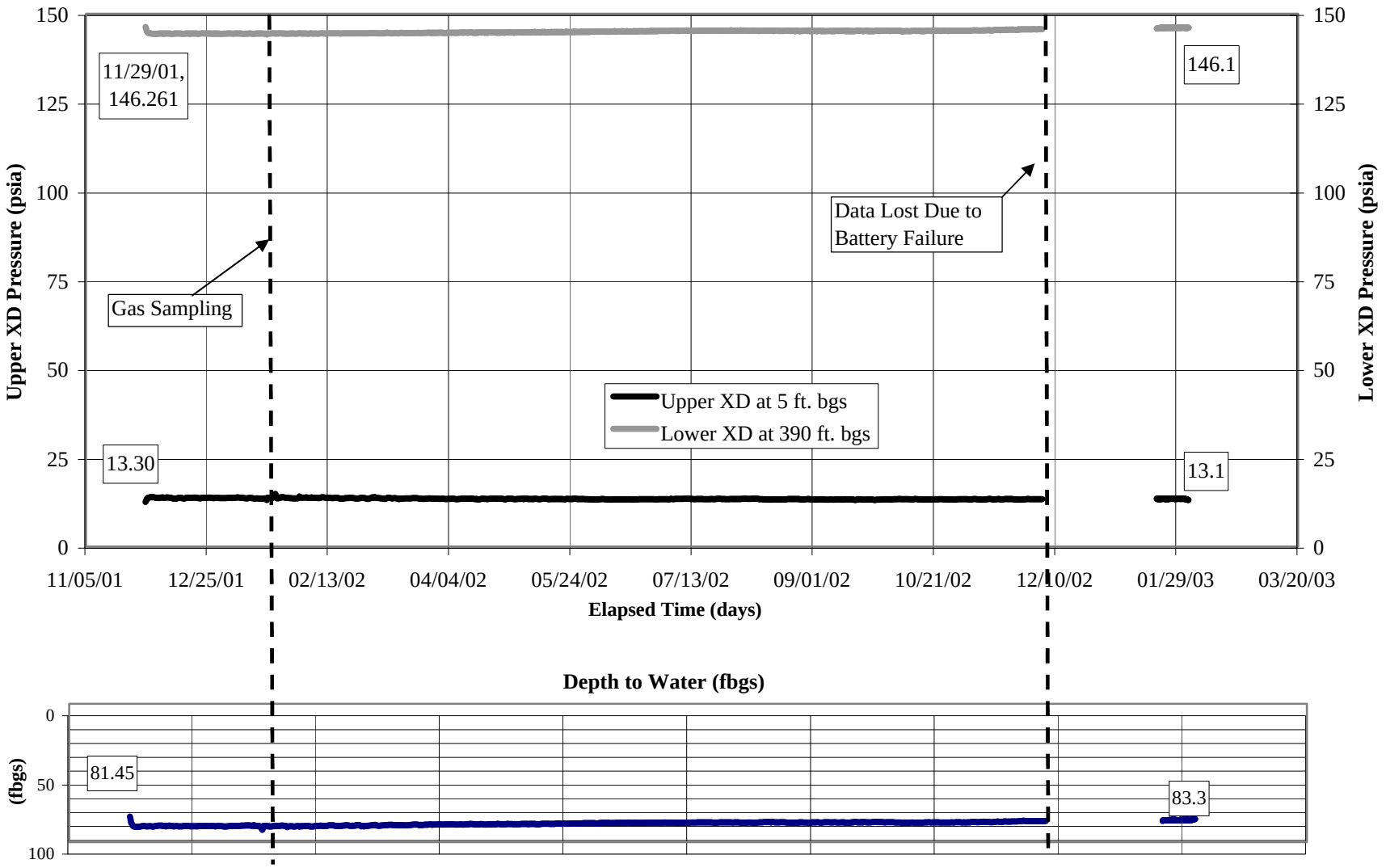


Figure 3a.
Pressure Transducer Data for South Fork of Texas Creek MW-35-7-8-1

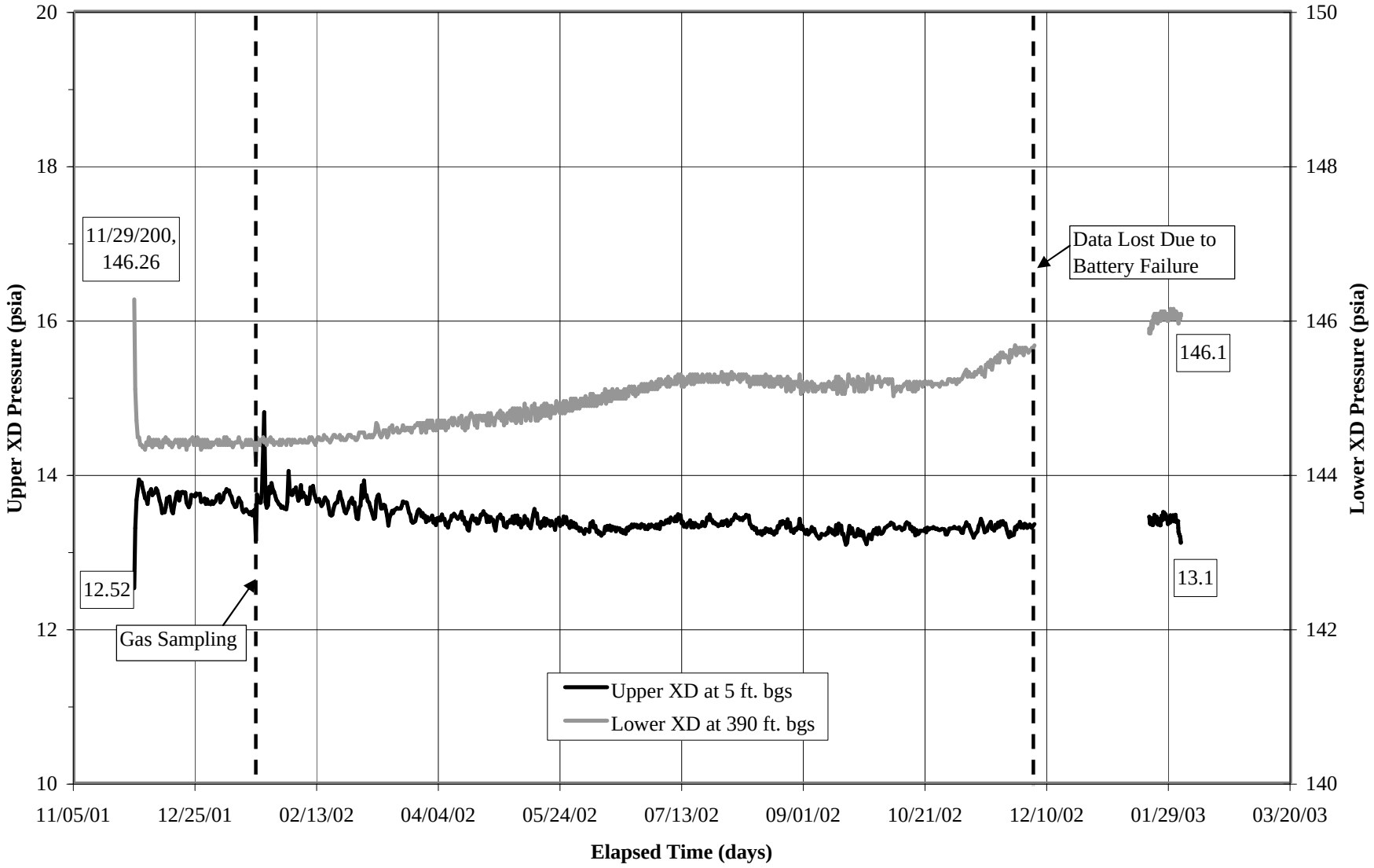


Figure 4.
Pressure Transducer Data for South Fork of Texas Creek Well MW-35-7-8-2

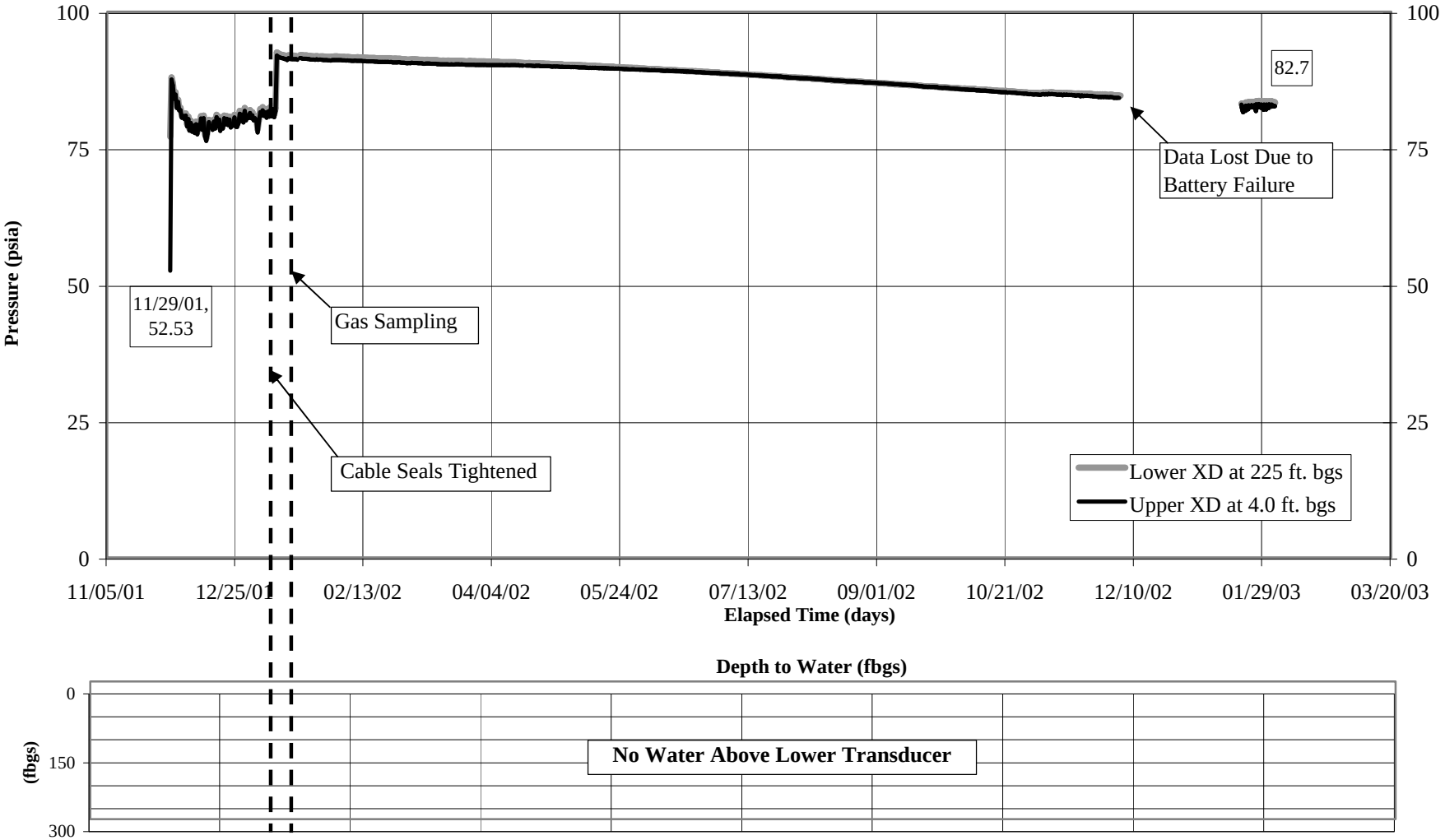


Figure 5.
Pressure Transducer Data for Beaver Creek MW-35-6-17-1

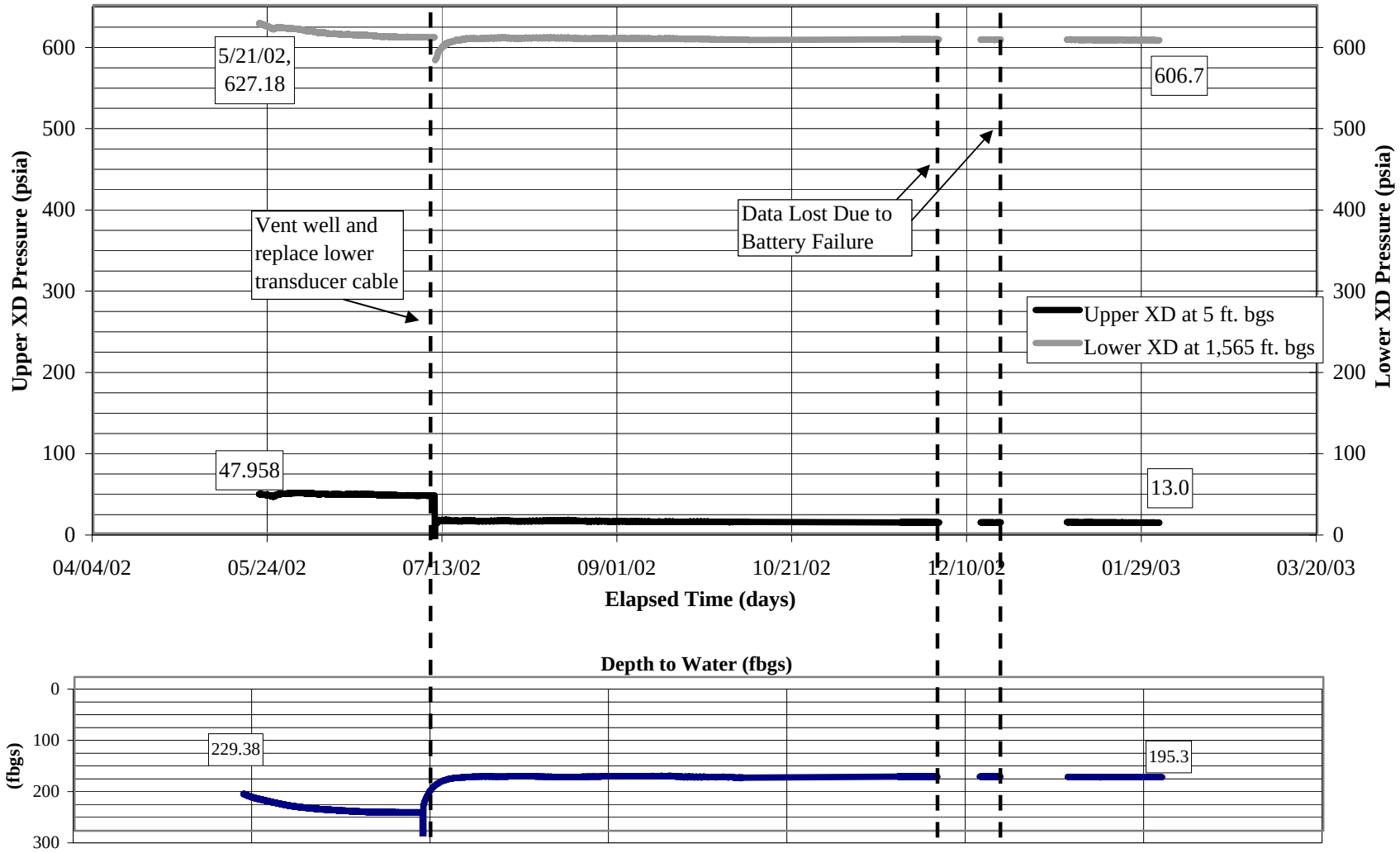


Figure 5a.
Pressure Transducer Data for Beaver Creek MW-35-6-17-1

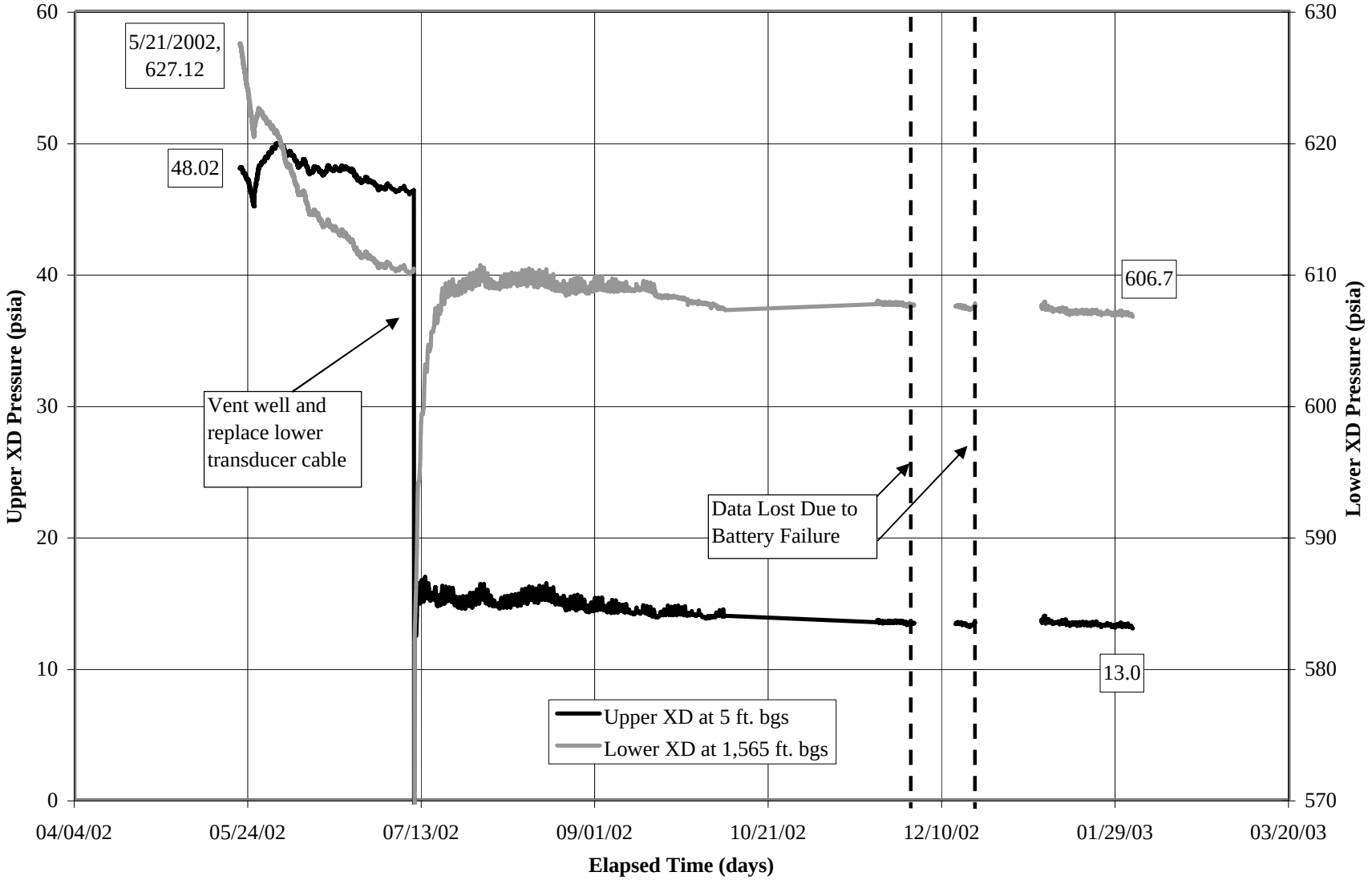


Figure 6.
Pressure Transducer Data for Beaver Creek MW-35-6-17-2

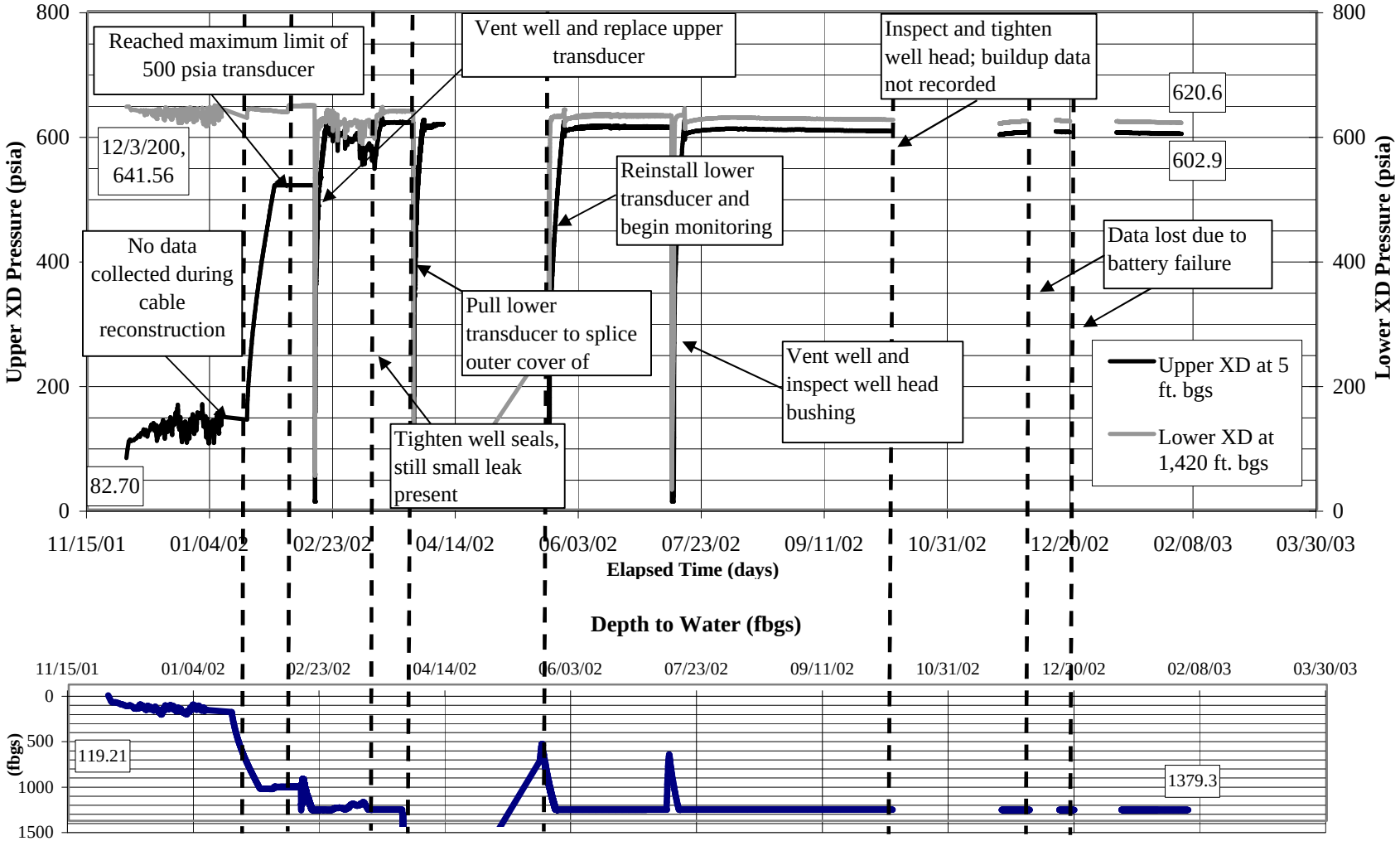
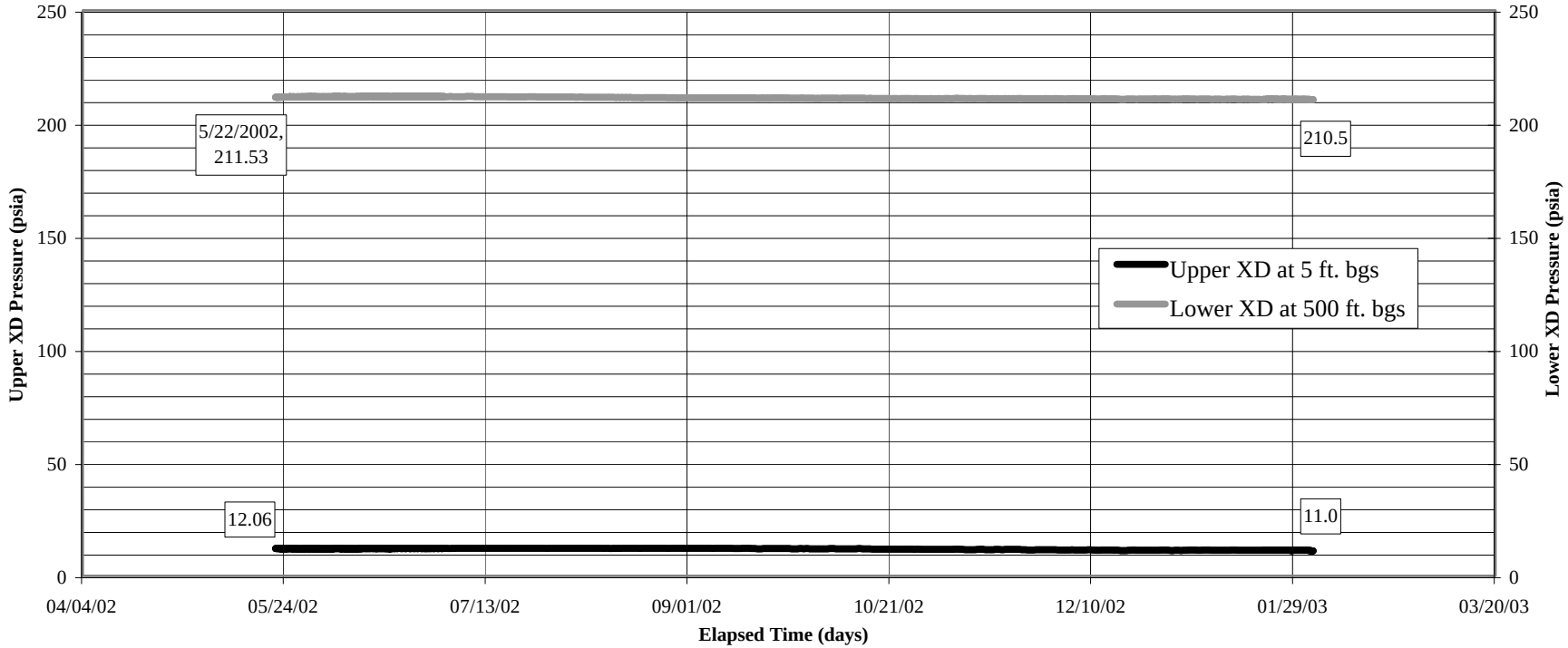


Figure 7.
Pressure Transducer Data for Shamrock Mines MW-35-6-13-1



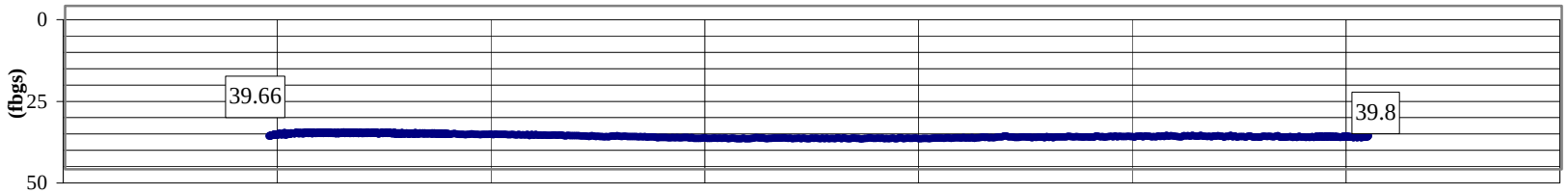


Figure 7a.
Pressure Transducer Data for Shamrock Mines MW-35-6-13-1