FINAL

2011 NEBRASKA ORDNANCE PLANT GROUNDWATER REPORT

METROPOLITAN UTILITIES DISTRICT WELL FIELD, NEBRASKA

SEPTEMBER 2012

Prepared For:

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STANDARD LIST - GLOSSARY OF TERMS AND ABBREVIATIONS

Alluvium: Unconsolidated terrestrial sediment composed of sorted or unsorted sand, gravel, and clay that has been deposited by water.

ARM: Absolute residual mean error. The ARM error represents the average of the absolute values of the differences between forecast and the corresponding observation.

Aquifer: An underground geological formation, or group of formations, containing water. Are sources of groundwater for wells and springs.

bgs: Below Ground Surface

CENWK: Kansas City District Corps of Engineers

CENWO: Omaha District Corps of Engineers

Drawdown: The drop in the water table or level of water in the ground when water is being pumped from a well.

Flood plain: The flat or nearly flat land along a river or stream or in a tidal area that is covered by water during a flood.

FNOP: Former Nebraska Ordnance Plant

gpm: Gallons per minute

Hydraulic conductivity (K): The rate at which water can move through a permeable medium. (i.e. the coefficient of permeability.)

Hydrogeology: The geology of ground water, with particular emphasis on the chemistry and movement of water.

LPNNRD: Lower Platte North Natural Resources District

LWS: Lincoln Water System

mgd: Million gallons per day

MODFLOW: Groundwater flow model developed by McDonald and Harbaugh (1988) with the USGS.

MODPATH: Groundwater particle tracking model developed by Pollock (1989) with the USGS.

MUD: Metropolitan Utilities District

NDNR: Nebraska Department of Natural Resources

NOPGR: Nebraska Ordnance Plant Groundwater Report

NRMS: Normalized root mean square error. The NRMS error is the standard deviation of a series of measurements divided by the range of observed values.

NWIS: National Water Information System

Potentiometric surface: The surface to which water in an aquifer can rise by hydrostatic pressure.

RDX: Hexahydro-1,3,5-trinitro-1,3,5-triazine

Riverbed conductance: A numerical parameter used by MODFLOW to calculate the leakage between the river and the aquifer.

TCE: Trichloroethylene

Unconfined aquifer: An aquifer containing water that is not under pressure; the water level in a well is the same as the water table outside the well.

UNLCSD: University of Nebraska – Lincoln Conservation and Survey

USACE: U.S. Army Corp of Engineers

USEPA: United States Environmental Protection Agency

USGS: U.S. Geological Survey

1 INTRODUCTION

The Metropolitan Utilities District (MUD) is responsible for providing potable water to the Greater Omaha (Nebraska) Metropolitan area. Based on the continuing growth in population and water demands in Greater Omaha, and constraints on supplies, MUD previously determined that a potential long term shortage in water existed. To remedy this situation, the District studied various alternatives and selected a source of water from the Platte River valley west of Omaha as the best alternative, known as the Platte West Well Field (well field). Construction of the well field and associated water treatment facilities was completed in July 2008. As a result, this project has increased MUD's peak day raw water capacity by 100 million gallons per day (mgd) to the current maximum of approximately 334 mgd.

The installation of transmission pipelines for the well field necessitated crossing the Platte River, Elkhorn River, and associated wetlands; therefore, MUD obtained a Clean Water Act Section 404 Permit (No. 199910085), referred to as Permit in this document. The Permit is administered by the Omaha District Corps of Engineers (CENWO). One of the Permit's requirements is an annual report concerning the Former Nebraska Ordnance Plant (FNOP). The FNOP site occupies approximately 17,250 acres located one-half mile south of Mead, in Saunders County, Nebraska. Groundwater contaminants in the form of explosives (associated with loading, assembling, and packing of munitions at four bomb load lines) and chlorinated solvents (associated with Atlas missile activities), underlie portions of the FNOP site. These groundwater contaminants are contained on site by a battery of pumping wells, maintained by the United States Army Corps of Engineers (USACE).

The purpose of this document, the Nebraska Ordnance Plant Groundwater Report (NOPGR), is to fulfill the annual reporting requirement. The objective of the NOPGR is to use available hydrogeologic data, both physical and chemical, as well as groundwater modeling to evaluate the impact of the operations of the well field on the aquifer and, more specifically, on the contaminant plumes and remediation efforts at the FNOP. The remainder of this section provides a general discussion of the project background and describes the overall purpose of work presented within this report. The report is organized as follows:

- **Section 1** – Introduction
- **Section 2** – Well Field Pumping
- **Section 3** – Hydrologic Data Analysis
- **Section 4** – Water Quality Data Analysis
- **Section 5** – Groundwater Model Simulations
- **Section 6** – Summary and Conclusions

1.1 PROJECT LOCATION

The well field is located on 2,230 acres of land in southeastern Nebraska encompassing both sides of the Platte River in Douglas and Saunders Counties. The well field consists of 42 production wells that pump water from the Platte River alluvial aquifer. The raw water is delivered to a new treatment plant in western Douglas County through a 3.5 mile long, 72-inch diameter pipeline. Treatment plant construction was completed in the summer of 2008. The treatment plant is located on a 158 acre site northeast of the intersection of Q and 216th Streets. The well field and study are locations are shown of Figure 1-1.

1.2 PERMIT REPORTING REQUIREMENTS

Section H of the Permit describes specific post-start up conditions that are required for operation of the well field. This NOPGR was developed to address Section H Permit Condition 62, which relates to the

.annual reporting of water quality and hydraulic groundwater data collected from wells within the well field's monitoring network. An additional requirement of the permit is semi-annual updating of the existing groundwater model and reporting of those updates in the annual groundwater report (NOPGR). The general purpose of the Permit Conditions described in Section H are to ensure that the operations of the well field do not impact the contaminant plumes or the remediation efforts at the FNOP. The following section presents a summary of Section H Permit Condition 62, as they relate to the development of the NOPGR:

- Condition 62a – MUD will collect potentiometric surface elevation data on a monthly basis, for a period of at least one year after the startup of the well field. The potentiometric data will be obtained from monitoring wells located in coordination with the USACE.
- Condition 62b – MUD will collect groundwater samples for chemical analysis on a semi-annual basis from monitoring wells located in coordination with the USACE.
- Condition 62c – MUD will update the existing groundwater model on a semi-annual basis using data collected from the monitoring program to evaluate the potential impact of the well field on the operations at the FNOP.
- Condition 62f – MUD will develop the NOGPR to summarize the activities described in the above conditions. The NOPGR will be submitted on an annual basis for review by the Corps of Engineers, with the first NOPGR due within one year of well field startup.

1.3 SUMMARY OF PREVIOUS MODELING

The groundwater modeling activities presented in this NOPGR are a continuation of previous well field modeling activities that started in 1993 with the development of the Pre-Design model documented in the *Preliminary Engineering Study and Pre-Design Report* (HDR, 1993). The Pre-Design model was modified and improved during the Environmental Impact Statement (EIS) process, ultimately evolving into the model presented in the Final Environmental Impact Statement (FEIS) (Burns & McDonnell, 2002).

Prior to well field construction and startup, a more comprehensive groundwater modeling effort was undertaken by MUD. This effort used the results of the work presented in the FEIS as a point of departure to develop a groundwater model capable of depicting the influence, if any, of the well field on the FNOP contaminant plumes, the FNOP operating remedial system, and other area water users. The groundwater model was developed to simulate various operating scenarios and estimate the impact of an operational well field on water levels in the aquifer. This modeling effort was undertaken in phases, with the phases of work and associated major deliverables summarized below:

- Phase I - Well Field Installation and Assessment, completed December 2004.
- Phase II - Operations Assessment and Planning, January 2005 through December 2005.
- Phase III - Well Field Pre-Start-Up Support July 2005 through August 2008.
- Phase IV - Well Field Operations 2008 and Post Start-Up (ongoing).

The Permit describes specific numerical groundwater modeling tasks which are presented in Conditions 61 (c) and 62 (c) of Section H of the Permit. To date, two major groundwater modeling efforts have been developed to satisfy the requirements of the Permit and to develop an operational tool for MUD. The Phase I modeling effort is summarized in the *Well Field Groundwater Modeling Study* (Chatman and Associates, Inc., 2004). The Phase II modeling effort is summarized in the *Platte West Well Field/Groundwater Modeling Study* (Chatman and Associates, Inc., 2005).

As part of the Phase III project activities, the transmissivity of the aquifer near the well field was better quantified by analyzing the 48-hour aquifer tests performed on the 32 new production wells. These tests

were performed using a minimum of three (3) observation wells and were analyzed using the Cooper-Jacob distance drawdown method (Cooper-Jacob, 1946). The results of this analysis were presented as an Appendix to the 2008 NOPGR (Layne Christensen, 2009).

Also part of the Phase III activities, a detailed aquifer test and groundwater modeling exercise was performed to better quantify the degree of interconnection between the Platte River and the alluvial aquifer. The results of this activity were presented in *Induced Infiltration Aquifer Test - Riverbed Conductance Summary Report Saunders County Test* (Layne Christensen, 2008a), and were included as an Appendix to the 2008 NOPGR.

1.3.1 PHASE IV – GROUNDWATER MODEL POST AUDIT

1.3.1.1 2009 NOPGR SUMMARY

The 2009 NOPGR was structured as a model post audit to evaluate the ability of the groundwater model to reproduce the observed aquifer response to the first eight (8) months of well field pumping (February through September, 2009). During this period, the well field pumping rate averaged 36.8 mgd. To accomplish this objective, the monthly average flow rate for each of the 42 production wells was input into the model and the model was run to simulate transient conditions, using twelve one month stress periods that represented the October 2008 to September 2009 reporting period. The model-predicted drawdown was compared to the observed drawdown at 19 monitoring well sites equipped with pressure transducers/data loggers.

The results of the 2009 NOPGR post audit showed that the groundwater model accurately predicted the impact of well field operations on the Platte River alluvial aquifer. The transient drawdown hydrographs generated for 19 monitoring wells showed that the model accurately reproduced both the observed rate of expansion and the overall magnitude of the cone of depression created by operating the well field. Most observed drawdown values fell near or within the appropriate contour interval of the model-predicted drawdown for the end of September 2009 pumping period (Figure 5-4 in 2009 NOPGR). The groundwater model post audit conducted as part of the 2009 NOPGR validated the ability of the groundwater model to accurately reproduce the impact of well field pumping on the water level elevations in the Platte River alluvial aquifer.

1.3.1.2 2010 NOPGR SUMMARY

The predictive capability of the model was evaluated a second time through the 2010 NOPGR. The 2010 NOPGR was conducted as extension of the model post audit performed in 2009 by increasing the length of the model simulation to 24 one month stress periods, representing the groundwater conditions from October 2008 to September 2010. To further test the predictive capabilities of the groundwater model MUD shut off all nine pumping wells located in section 19 (in Saunders County) from the beginning of November 2009 through the end of February 2010. Before that time, the section 19 wells had operated from February 11, 2009 through November 2009.

The observed aquifer recovery, and the model simulation of the prolonged shut down of the section 19 wells, was presented in hydrographs that were summarized on Figure 5-3 of the 2010 NOPGR. These hydrographs illustrated the groundwater models accurate reproduction of both the drawdown in the aquifer that was induced when the well field began operations in February 2009, and the recovery in the aquifer that occurred when all wells in Section 19 (Saunders County) were shut off from November 2009 through the end of February 2010. This extended model post audit confirmed that the groundwater model accurately predicts the magnitude and pattern of groundwater elevation changes around the well field. These analyses provide confirmation that the aquifer parameters and degree of interconnection between the river boundary and the aquifer used in the groundwater model are appropriate.

1.4 SCOPE OF SERVICES

In accordance with the Permit, a third party consultant is to assist MUD in the preparation of the NOPGR. This scope of services includes evaluation of hydraulic and water quality data to determine the impact of the well field on both the groundwater elevations and chemistry of the aquifer, as well as updating the existing groundwater flow model. In accordance with the Permit, the groundwater model was developed to depict the influence, if any, of the well field on the FNOP contaminant plumes, the FNOP operating remedial system, and other area water users. Additionally, the groundwater model was developed to simulate various operating scenarios and estimate the impact of an operational well field on water levels in the aquifer.

1.4.1 REFERENCES TO PREVIOUS MODELING REPORTS

As previously stated, the NOPGR is a submittal required by the Permit and is a continuation of a series of modeling studies and reports, of which the first report was developed in 2004. The NOPGRs are a summary of the hydrogeologic data collected during a one year monitoring period and a summary of the update of an existing groundwater model. Given the ongoing nature of the modeling activities and the numerous modeling related submittals that have been completed during the life cycle of the well field project, it is not practical to include a detailed summary of all model construction/calibration/sensitivity/post audit analyses performed from 2003 through 2010. If specific questions related to model construction, calibration, or sensitivity analysis arise during the review of the NOPGR, it is assumed the reviewers of this document have access to copies of the previous groundwater modeling reports. The most comprehensive reference on model construction, model calibration, sensitivity analyses (both of calibration residuals and model predictions), and predictive analyses performed can be found in the Phase II modeling report, the *Platte West Well Field/Groundwater Modeling Study* (Chatman and Associates, Inc., 2005).

If copies are not available to the reviewer, the documents can be downloaded on the MUD website, at the following URL:

- Phase I report:http://www.mudomaha.com/plattewest/documents/2004/11.04/report1.pdf
- Phase II report:http://www.mudomaha.com/plattewest/documents/2005/10.05/report.pdf
- 2008 NOPGR:http://www.mudomaha.com/plattewest/documents/2009/08.groundwater.report.pdf
- 2009 NOPGRhttp://www.mudomaha.com/plattewest/documents/2010/09.report.figures.tables.pdf
- 2010 NOPGRhttp://www.mudomaha.com/plattewest/documents/2011/10.report.figures.tables.pdf

1.4.2 REPORTING PERIOD

The reporting period for this NOPGR coincides with the United States Geological Survey (USGS) 2011 Water Year, from October 1(of 2010) to September 30 of the following year (2011). This reporting period structure will be used in future model update reports.

2 WELL FIELD PUMPING

Intermittent well field pumping began in July 2008 from both the Douglas and Saunders County sides of the well field. Much of the well field pumping conducted in July and August 2008 was related to: filling plant basins, testing plant equipment, and shakedown testing of the overall well field, piping, and treatment process. Pumping associated with shakedown testing continued through the middle of October 2008. The well field did not operate from mid-November 2008 to mid-February 2009.

The well field began pumping operations on February 11, 2009 and has continued operations through the end of the reporting period of September 2010. Each supply well in the well field is equipped with an individual flow meter, which allows for accurate measurement of individual well flow rates. The well field Supervisory Control and Data Acquisition (SCADA) system tracks total flow from each well in mgd. Those daily data are provided by MUD to HDR and are used to calculate the pumping rates input into the NOPGR modeling update. A chart illustrating the monthly well field pumping rate for the duration of well field operations, including the 2011 water year, has been included as Figure 2-1.

For the 2011 water year, the total daily pumping rate fluctuated from a low of 23.9 mgd, recorded in March 2011, to a high of 60.3 mgd recorded in September 2011. The average monthly pumping rate for the 2011 water year was 37.2, which is up from the 2010 average pumping rate of 32.6 mgd. Average monthly flow rates are summarized in the table below.

Table 2-1 Average Well Field Pumping Rate by Month (Oct 2010 to Sep 2011)

Month	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep
Douglas Co. Monthly Average Pumping (mgd)	11.7	5.0	2.0	9.5	8.3	6.7	7.1	8.4	12.4	16.4	14.4	18.0
Saunders Co. Monthly Average Pumping (mgd)	24.3	25.6	34.3	27.1	18.2	17.2	18.9	20.6	29.0	35.6	33.3	42.3
Totalized Well Field Monthly Average Pumping, (mgd)	36.0	30.6	36.3	36.7	26.4	23.9	26.0	29.1	41.4	52.0	47.8	60.3
Percentage of Well Field Flow from Douglas Co.	32.4	16.4	5.5	26.0	31.3	27.9	27.3	29.0	29.9	31.6	30.2	29.9

2.1 PUMPING DISTRIBUTION

The operational plan for well field was to simultaneously pump water from both the Douglas County and Saunders County sides of the well field at an approximate distribution of 35 and 65 percent of total pumping, respectively. As shown in the table above (Table 2-1), the pumping distribution for the 2011 water year remained close to the design distribution, with an average of 26.9 percent of the total flow

being supplied by the Douglas County side of the well field. As operated, the average daily pumping distribution was 10 mgd from the Douglas County wells and 27.2 mgd from the Saunders County wells.

3 HYDROLOGIC DATA ANALYSIS

The following section presents an analysis of the hydrologic data collected as part of the monitoring program associated with the operation of the well field. The data includes pre and post-well field startup conditions and are comprised of water levels collected at observation wells and stream stage and flow data collected at existing USGS stream gauges.

MUD began collecting water levels from monitoring wells located in Douglas, Sarpy, and Saunders Counties in 1990. The monitoring well network was expanded in Douglas and Saunders Counties in 1995, and later expanded again with the addition of new monitoring wells in 2004 through 2006. All monitoring wells currently located in MUD's groundwater monitoring network are illustrated on Figure 3-1. Initially, water levels were measured manually at regular time intervals using electronic water level indicators; however, in 2004 MUD began equipping all the monitoring wells with pressure transducers/data loggers. Each pressure transducer/data logger collects and records a water level measurement at least once per day. Presently, MUD continues to make manual water level measurements at least twice yearly to check the accuracy of the pressure transducers/data loggers. The more recent water level data collection program, initiated as part of the Permit operating conditions, supplements the historical data collected by MUD and was evaluated in context with the more than 15 to 20 years of historical water level data collected prior to operation of the well field. Appendix 3-1 includes updated historical hydrographs from seven (7) monitoring wells in Douglas County (MW90-5, MW 90-6, MW 90-7, MW 90-12, MW 90-13, MW 94-1, and MW 94-2) and six (6) monitoring wells in Saunders County (MW 90-10, MW 94-3, MW 94-4, MW 94-5, MW 94-6, and MW 94-7). The updated hydrographs presented in Appendix 3-1 include water level data through the end of the NOPGR reporting period.

The objective of the analysis presented in the NOPGR is to use the hydrologic data and analyses presented in this section to evaluate potential impacts to the FNOP contaminant plumes and hydraulic containment system which could occur as a result of well field pumping. Because the FNOP contaminant plumes and hydraulic containment system are located in Saunders County, and the Platte River forms a hydraulic divide between Saunders and Douglas Counties, only hydrologic data from Saunders County were incorporated into the analysis of well field impact. Data collected from the Douglas County side of the well field have been included in the NOPGR to evaluate the overall performance of the groundwater model. However, these data are not relevant to issues related to the FNOP site.

3.1 NEW HYDROLOGIC DATA

Water level measurements were collected and recorded at all wells located in the monitoring network that was developed in cooperation with the USACE, as prescribed by Permit condition 62a. The monitoring network is shown on Figure 3-1 and consists of 41 monitoring wells equipped with pressure transducers. The monitoring wells are operated and maintained by one of three organizations: Lower Platte North Natural Resource District (LPNNRD), MUD, or the USACE. The following sections describe the hydrologic data that were utilized to evaluate the impact of the well field on the Platte Valley alluvial aquifer.

3.1.1 HYDROGRAPH INTERPRETATIONS

A water level hydrograph was plotted for each monitoring well equipped with a pressure transducer. In Douglas County, these wells include: MW90-5, MW90-6, MW90-7, MW90-12, MW90-13, MW94-1, MW94-2, MW05-24, MW05-25, MW05-26, and MW06-29. In Saunders County, these wells include: MW90-10, MW94-3, MW94-4, MW94-5, MW94-6, MW94-7, MW04-17, MW05-22, MW05-23, MW06-27, MW06-28, MW06-30, and MW06-31. These wells are all operated and maintained by MUD.

Monitoring wells MW90-6, MW94-1, MW94-2, MW90-10, MW94-4, MW94-7, and MW04-17 experienced either a transducer failure or other form of data collection error during the 2011 reporting

period. Where transducer failures occurred, new pressure transducers/data loggers were installed in each of these wells after the failure of the installed equipment was noted; however, due to the transducer failures, some data gaps exist in the hydrographs generated for these wells.

Hydrographs were also generated for wells located in Saunders County that are not operated and maintained by MUD. These include the following wells, which are operated and maintained by the USACE: MW38-A, MW39A, MW46A, MW-56A, MW-106A, MW-110A, and MW-112A. Additionally, wells MW06-18 and MW06-20, which are operated and maintained by the LPNNRD, were included in the analysis. LPNNRD monitoring wells MW06-19 and MW06-21 have previously been included in the NOPGR, however data for these monitoring wells was not provided to MUD in time to include with the 2011 NOPGR.

Some gaps exist in the data sets available for the wells that are not owned or maintained by MUD. All data provided to HDR as of December 29, 2011 has been used to develop the hydrographs presented in this section.

3.1.1.1 RESPONSE OF WELLS NEAR WELL FIELD

Hydrographs for the monitoring wells located less than one mile from the well field have been included in Appendix 3-1 or Appendix 3-2. These hydrographs clearly show the impact of well field pumping on the groundwater elevations of the Platte River alluvial aquifer through the cycle of drawdown and recovery that can be observed in many of the hydrographs. For the 2011 water year, water levels were at their highest during the period of March through May, which corresponded to the period of lowest pumping from the Saunders County wells (less than 20 mgd per month). As the pumping from the Saunders County wells increased, up to 42 mgd in September, the water levels in the aquifer declined in response. This pattern of observations is most easily seen on the hydrographs for wells MW94-3, MW 94-4, MW05-22, and MW05-23.

3.1.1.2 RESPONSE OF WELLS OVER ONE MILE FROM WELL FIELD

Monitoring wells located more than one mile from the boundary of the well field that are owned and operated by MUD include MW94-5, MW 94-6, MW94-7, MW06-27, and MW06-28. The hydrographs developed for these wells show little to no long term changes in water level elevation that can be attributed to well field pumping. Rather, these monitoring well hydrographs illustrate a water level signal that is typical of alluvial wells. The variability in groundwater elevations observed in the three 94 series wells are within the natural water level fluctuations observed from 1994 to 2008, before the well field began pumping. For the pumping that has occurred to date, this group of monitoring wells provides a delineation of the maximum extent of the cone of depression created by well field pumping.

Most of the monitoring wells operated and maintained by the USACE and LPNNRD are impacted by local irrigation pumping, and show no signs of being impacted by well field operations. In most of these wells, pumping associated with the irrigation season causes the water level elevations to decline, followed by a period of water level recovery after the irrigation season is complete. Careful review of these hydrographs shows that no long term decline in water level elevation has occurred since the well field began pumping in 2009. In several of these monitoring wells, the water level elevation has actually increased, sometimes significantly, since the well field began pumping.

3.1.2 POTENTIOMETRIC SURFACE

Contours of the potentiometric surface of the Platte River alluvial aquifer and the Todd Valley aquifer were developed using data collected during the LPNNRD coordinated water level monitoring event, using data collected at the end of March 2011. Water level measurements are taken by the following organizations in an effort to better document the potentiometric surface within Saunders County:

- LPNNRD,

- MUD,
- Kansas City District Corps of Engineers (CENWK), and
- United States Geological Survey (USGS).

Approximately 180 monitoring wells were used to develop the potentiometric surface map of the study area, the locations of which are shown on Figure 3-2. The magnitude and direction of the hydraulic gradient presented on Figure 3-2 are very similar to previous pre-pumping potentiometric surface maps generated by others, including:

- Souders, 1967. Availability of Water in Eastern Saunders County, Nebraska;
- Nebraska Department of Natural Resources (NDNR), 1995. Configuration of the Water Table, 1995;
- Chatman and Associates, Inc., 2005. Phase II Platte West Well Field Groundwater Modeling Study; and
- URS, 2006. 2006 Groundwater Modeling Report Operable Unit No. 2.

The potentiometric surface of the Platte Valley and Todd Valley aquifers presented on Figure 3-2 illustrates that the well field continues to remain hydraulically cross-gradient of the FNOP site after two years of continuous pumping at an average flow rate of 33 mgd, including 24 mgd from Saunders County wells. The pattern and shape of the potentiometric surface in the Todd Valley, where the majority of the FNOP site is located, has not changed due to the operation of the well field. Groundwater flow directions along the eastern perimeter of the FNOP site have not changed as a result of well field pumping.

Potentiometric surface maps created as part of previous NOPGR submittals have been included in Appendix 3-3 for comparison. As shown, the magnitude and direction of the hydraulic gradient as interpreted for March 2011 are consistent with previous interpretations from October 2008, March 2009, and March 2010.

3.1.3 CONTINGENCY PLAN ACTION LEVELS

Table 3-1 compares the observed water level elevations at each Well Field Contingency Plan monitoring well to the Tier 1 and Tier 2 action levels identified in that document (Layne Christensen, 2008b). In the Well Field Contingency Plan, a Tier 1 trigger level was defined as the water surface elevation that is one (1) foot lower than the anticipated post-startup groundwater elevation and a Tier 2 trigger level included the plausible additional lowering of the water surface elevation due to the natural seasonal changes on the groundwater levels. It is assumed the reviewers of this report have access to a copy of the Well Field Contingency Plan. If a copy is not available, the document can be downloaded on the MUD website, at the following URL:

- http://www.mudomaha.com/plattewest/documents/2008/wellfield.contingency.10.10.pdf

As shown on Table 3-1, three water level elevations, observed at MW90-10, MW06-18, and MW06-31 were below the well specific Tier 1 value. Careful review of the hydrographs of these wells indicates that the groundwater elevation at these monitoring wells is likely impacted by seasonal irrigation pumping. Also, the water level elevation at these wells never dropped below the Tier 2 trigger level, therefore no further action is required by MUD at this time. The evaluation process followed to reach this conclusion is presented on the Tier 1 flow chart in the Well Field Contingency Plan (Layne Christensen, 2008b).

3.1.4 STREAMFLOW CONDITIONS

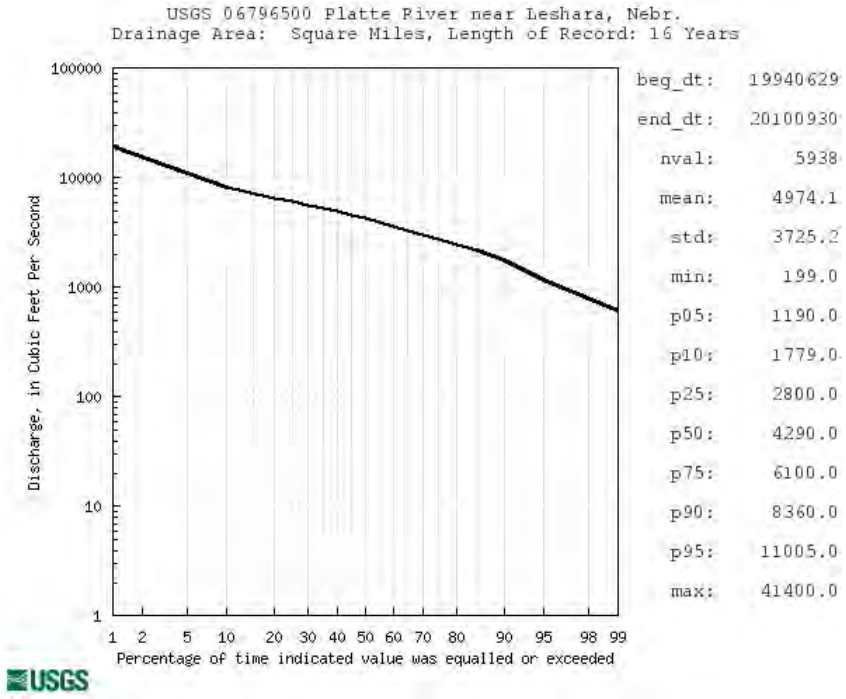
Streamflow conditions within the study area were evaluated using data posted and distributed by USGS National Water Information System (NWIS). To evaluate the streamflow conditions of local water bodies near the well field, hydrologic data was obtained from the following USGS gauging stations:

- Platte River – at Leshara;
- Platte River – at Venice (near the well field);
- Platte River – at Ashland; and
- Elkhorn River at Waterloo.

The locations of the USGS gauging stations are shown on Figure 3-5 of the Phase II modeling report; *Platte West Well Field/Groundwater Modeling Study* (Chatman and Associates, Inc., 2005). The data obtained from the USGS gauging stations were used to develop a streamflow hydrograph and stage elevation hydrograph for each station.

As shown on the hydrographs in Appendix 3-4, stream flow conditions for the 2011 water year can be characterized as much above average for the entire study area. An updated flow duration curve for the Leshara gauge is presented below as Figure 3-3. The average streamflow for the 2011 water year at this gauge was over 10,000 cfs, which places the streamflow conditions between the 90 and the 95 percent exceedance criteria. A comparison for the average streamflow conditions observed in the Elkhorn River at the Waterloo gauge also indicate that the streamflow conditions in the Elkhorn River were between the 90 and 95 percent exceedance criteria.

Figure 3-3 – Updated Flow Duration Curve for the Platte River at Leshara



4 WATER QUALITY DATA ANALYSIS

The following section presents an analysis of the groundwater chemistry data collected as part of the monitoring program associated with the operation of the well field. The groundwater water quality data collected includes pre and post-well field startup data and consists of groundwater samples collected from wells that are part of the monitoring network that was developed in coordination with the USACE. The monitoring network includes wells owned by MUD and wells owned by CENWK. The objective of the analysis presented in this NOPGR is to evaluate the potential impact of well field operations on the travel path of the FNOP contaminant plumes or the remediation efforts at the FNOP site. Because the FNOP contaminant plumes and hydraulic containment system are located in Saunders County, only water quality data from Saunders County were incorporated into the analysis.

4.1 BASELINE FNOP PLUME

A total of seven chemicals were assigned cleanup goals for the FNOP site by the USEPA in the Record of Decision (ROD) document. Three of these chemicals are classified as volatile organic compounds (VOCs) and the other four chemicals are classified as explosives. Trichloroethene (TCE) is the most commonly detected VOC at the site and is used as an indicator for VOCs at the site. Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) is the most commonly detected explosive compound in groundwater at the FNOP site and is used as an indicator for explosives in groundwater at the site. Site specific cleanup goals and details on the use of RDX and TCE as indicator compounds to define the extent of groundwater contamination at the FNOP site can be found in the 2009 Containment Evaluation (ECC, 2010).

As required by the Permit, MUD requested and obtained the most recent interpretation of the extent of the FNOP contaminant plumes. This interpretation of the current understanding of the extent of the FNOP plumes, as provided by CENWK from the 2011 Containment Evaluation (presented in Appendix 4-1).

4.1.1 HISTORICAL WATER QUALITY DATA

A groundwater quality monitoring program was initiated by MUD in 2005 to collect background, pre-well field startup, groundwater chemistry data from wells located within MUD's groundwater monitoring network. These data are summarized in the following monitoring reports:

- 2005 Annual Groundwater Monitoring Report (MUD, 2006);
- 2006 Annual Groundwater Monitoring Report (MUD, 2007); and
- 2007 Annual Groundwater Monitoring Report (MUD, 2008).

The post-startup groundwater chemistry data collection program supplements the historical data collected by MUD since 2005 and was evaluated in context with the data collected prior to the well field startup.

4.1.2 2010 NOPGR WATER QUALITY DATA

Under an agreement with MUD, Olsson Associates (OA) conducted two rounds of groundwater samples during this reporting period: June 2011 and October 2011. The wells sampled by OA include wells: MW-39 A and D, MW06-18 A and B, MW06-30 A and B, and MW06-31 A and B. The locations of these wells are shown on Figure 3-1. The groundwater samples collected from these wells sites were analyzed for volatile organic compounds (VOCs) by Environmental Protection Agency (EPA) SW-846 Method 8260B and for explosives by EPA SW-846 Method 8330. All laboratory analyses were performed by Test America, Inc. The samples were analyzed by Test America of Burlington, Vermont.

The results of each sampling event were summarized by OA in a Quality Control Summary Report (QCSR). The QCSRs for the 2011 sampling events has been included in Appendix 4-2. The FNOP indicator compounds or Contaminants of Concern (COCs), TCE and RDX, were not detected above their

method detection limit in any of the samples collected during either 2011 sampling event. The explosive compound 1,3,5-Trinitrobenzene (TNB), which has a site specific groundwater cleanup goal identified in the ROD, was detected in monitoring well MW39-A during the June 2011 sampling event. This result for the June sample of MW39-A was below the site cleanup standard. TNB was not detected in the subsequent sample collected from MW39-A in October, 2011.

5 GROUNDWATER MODEL SIMULATIONS

As discussed in Section One, a groundwater flow model was developed to help predict the impact of an operating Platte West well field. The model updates performed as part of the 2011 NOPGR incorporated the well field pumping and hydrologic data presented in Sections Two and Three of this report to evaluate the impact of well field operations on the potentiometric surface of the alluvial aquifer. By incorporating pumping and hydrologic data into the model, the model simulations presented in this NOPGR are an extension of the model post audit performed in 2009 and in 2010.

5.1 LOOK BACK AND FORECAST STRUCTURE

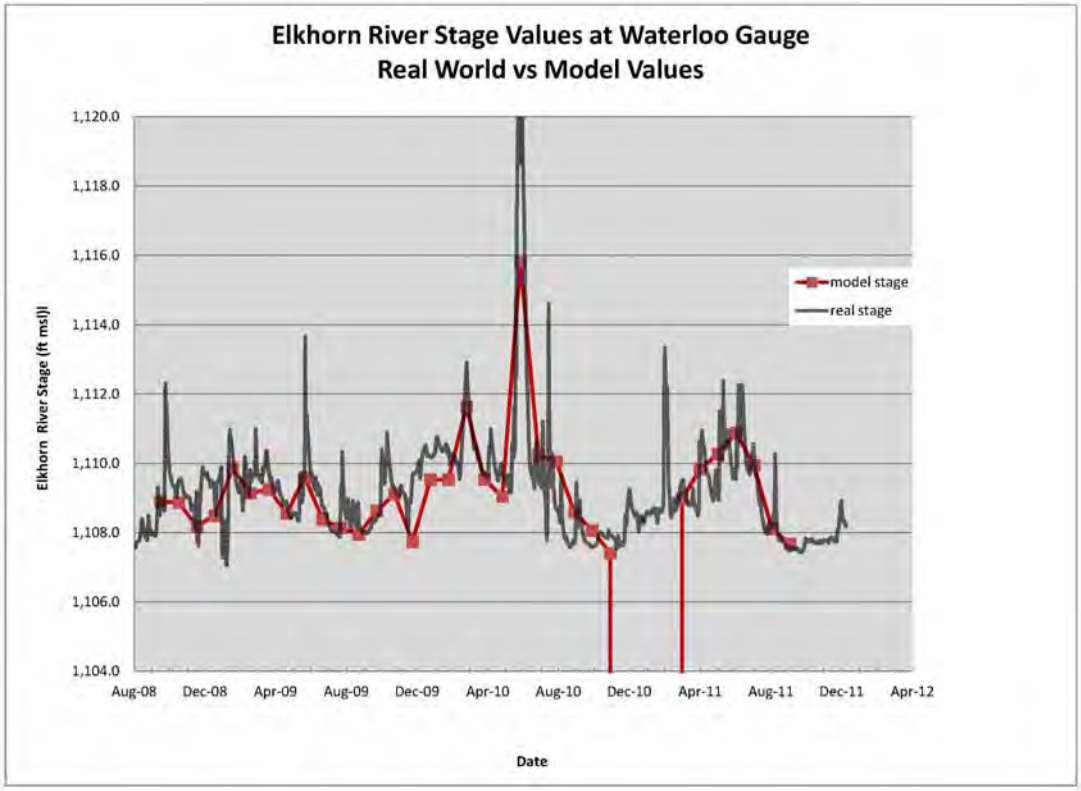
The 2011 NOPGR and other future NOPGR's will continue to evaluate the predictive capabilities of the groundwater model by comparing model predictions to observed data. In addition, MUD plans to also use the NOPGR to forecast the aquifer response to the planned pumping for the upcoming reporting cycle. To accomplish both the comparison (look back) and forecasting objectives, the 2011 NOPGR was structured as follows:

- Look back period – October 2010 to September 2011 of the current reporting period. For this time period the model was updated with the reported monthly pumping rates for the FNOP wells and the Platte West wells, average monthly stage elevations for the Platte and Elkhorn River. The model-predicted results were compared to actual field data. The approach for this portion of the model update will be similar to the post audit approach presented in the 2009 and 2010 NOPGRs.
- Forecast period – October 2011 to April 2012 of the future reporting cycle. This time period will be used to predict aquifer behavior based on estimated future well field flow rates. The well field flow rates will be based on forecasted water demand and the availability of other MUD facilities to provide water. For example, if a large maintenance project is planned for either the Florence or Platte South treatment plants, then higher than normal flow rates will be estimated for the Platte West well field.

5.2 LOOK BACK PERIOD (OCTOBER 2010 TO SEPTEMBER 2011)

The look back evaluation period of October 2010 through September 2011 was evaluated by extending the transient model simulations presented in the previous NOPGR to include pumping and river stage data up to September 2011. This was done by extending the transient model simulations presented in the 2010 NOPGR from 24 months to 36 months. The SCADA system installed by MUD provides high quality data on the actual pumping distribution in the well field. To best represent the actual well field pumping, the transient groundwater model was discretized into 36, one (1) month stress periods that represent the October 2008 to September 2011 pumping period. Each monthly stress period was further discretized into ten time steps. The addition of 12 stress periods to the model was the first change made to the groundwater model before the look back analysis was performed. The second change made to the groundwater model was to import the river stage elevation for the Platte and Elkhorn rivers to reflect the average monthly river stage values reported at the Leshara and Waterloo gauges, respectively. This change in how the rivers are represented in the model was performed to better represent the high streamflow conditions observed during the 2011 water year, and the short duration flood events observed during the 2010 water year. An example of how the river stage values are represented in the model is presented in the figure below. The changes noted above were the only changes made to the groundwater model that was presented in the previous NOPGR (2010 NOPGR).

Figure 5a – A Comparison of Daily River Stage to Monthly Modeled River Stage for the Elkhorn River at Waterloo



Once the changes to the length of the transient model run and the modification of the river stages were made, the following steps were performed to complete the model look back analysis:

1. Input the actual average monthly pumping rate for each supply well in the Platte West well field. These data were supplied by MUD. Well specific monthly flow rates are presented in Table 5-1.
2. Input the actual average monthly pumping rate for each FNOP hydraulic containment or focused extraction well. These data were supplied by ECC, a subcontractor to the CENWK. Well specific monthly flow rates for the FNOP pumping wells are presented in Table 5-1.
3. Run the groundwater model.
4. Compare the model-predicted groundwater elevations versus the observed groundwater elevations for the March 2011 stress period. Over 180 monitoring well sites were available for this synoptic comparison. The data were collected as part of the March 2011 LPNNRD coordinated groundwater monitoring event and also included water level elevation data from the MUD Douglas County monitoring wells.
5. Compare the model-predicted groundwater elevation hydrographs versus the observed groundwater elevation hydrographs at each monitoring well site within the monitoring network operated and maintained by MUD.
6. Review the model predictions and compare to observed data. Perform a “goodness of fit” evaluation.

7. Look for areas where the model predictions could be improved and modify boundary conditions or aquifer parameters if necessary.
8. Re-run model and re-evaluate results.

5.3 LOOK BACK PERIOD RESULTS

The following sections describe the results of the look back period analysis from October 2010 to September 2011.

5.3.1 COMPARISON TO END OF MARCH WATER LEVEL ELEVATIONS

The data set used to perform the 2011 NOPGR look back calibration check included: over two years of 33 mgd average pumping from the well field, pumping from several FNOP containment wells that were not installed or operating when the original model was constructed and calibrated, and water level data from numerous new FNOP monitoring wells that were not included in the Phase I and Phase II model calibration effort. Water level elevation data collected as part of the LPNNRD coordinated water level monitoring event, performed at the end of March, 2011, were used as the first check of model performance for the look back period. Water level elevations collected from the MUD Douglas County monitoring network were added to the LPNNRD data set to create a data set of over 180 water level elevation measurements available for this comparison. These data were used to check the ability of the model to reproduce post-well field startup water level elevations. The water level elevations were collected after the well field had been operating for 26 months at an average flow rate of 33 mgd (average from February 2009 through March 2011). Figure 5-1 maps a comparison of simulated and observed groundwater levels for March 2011.

The first model run completed to evaluate the model predicted potentiometric surface at the end of March 2011 produced a set of calibration statistics including a normalized root mean square (NRMS) error of 1.5 percent and an absolute residual mean (ARM) error of 1.2 feet. Both of these values are within the pre-established calibration objectives of the Phase II groundwater modeling effort, which specified a NRMS error of less than 5 percent and an ARM error of less than 10 feet, and were similar to the final calibrated values of the Phase II model (NRMS error of 1.4 percent and ARM error of 2.1 feet). Most importantly, near the well field the water level elevations predicted by the model after over one year of pumping were generally within one or two feet of the observed water level elevation.

Table 5-2 presents the final model-predicted and observed water level elevations for March 2011 groundwater elevation data set. Figure 5-1 presents a plot of the observed versus predicted water level elevations for the March 2011 data set. The best fit regression equation presented on Figure 5-2 approximates the ideal conditions in which the observed versus predicted plot is represented by a line with a slope of one and an intercept of zero. Figure 5-2b presents a plot of the residual error versus the observed water level elevation, which should have no bias in the distribution of the error. As with the calibration checks performed as part of previous NOPGR reports, there is no discernable bias in the error distribution presented in Figure 5-2b. Of the 181 calibration targets, 94 have a positive residual (model predicts too low a head value) and 87 have a negative residual (model predicts too high a head value).

5.3.2 MODEL-PREDICTED VS OBSERVED HYDROGRAPHS

Model-predicted versus observed groundwater elevation hydrographs were created for several monitoring well sites, located on both the Douglas and Saunders side of the well field, to evaluate the ability of the groundwater model to predict changes in groundwater elevations caused by well field pumping and changes in the Platte River stage. The observed groundwater elevations were obtained from the pressure transducers/data loggers installed in the monitoring wells. The pressure transducers collect and record, at a minimum, one water level elevation measurements per day. The hydrographs present the observed and model predicted groundwater elevations from February 2009 through September 2011 and are included in

Appendix 5-1. As constructed, the model cannot reflect short term fluctuations in groundwater elevation since the pumping and boundary conditions are changed only on a monthly basis. However, the introduction of variable monthly river stage values has helped to capture more of these short term groundwater changes than in the previous NOPGR. A graphical summary of the comparison hydrographs is presented on Figure 5-3.

Saunders County Monitoring Network

On the Saunders County side of the well field, the model-predicted and observed hydrographs nearly overlap at the monitoring well sites that border the well field (MW90-10 MW94-4, MW05-22, and MW05-23). The Saunders County wells have been operated using a pumping/recovery/pumping/recovery/pumping pattern which is evident in the data presented on Figure 2-1. The hydrographs for the wells that border the well field illustrate that the groundwater model has accurately reproduced the water levels fluctuations near the well field which have resulted from this cyclical pumping pattern, including the aquifer recovery that was observed during the intentional shut down of the Section 19 wells (see 2010 NOPGR for details). The pattern and shape of the model predicted hydrographs closely mimics that of the observed data during these pumping and recovery cycles, indicating that the aquifer parameters and the degree of interconnection between the river and the aquifer used in the model are very accurate.

Further from the well field, the model-predicted hydrograph for MW94-3, MW94-5, MW94-6, and MW06-28 also indicate a good general match between the model predicted and observed groundwater level elevations as the pattern and shape of the model predicted hydrographs closely resembles the observed data. The impact of well field pumping at these well sites is minimal and the minor fluctuation in groundwater elevations observed at these sites is more a result of changes in local stresses, such as variable surface water elevations or irrigation pumping, than in well field pumping. This group of monitoring wells provides a clear delineation of the maximum extent of the cone of depression created by well field pumping.

Douglas County Monitoring Network

On the Douglas County side of the well field, there is generally good agreement between the model-predicted and observed hydrographs at the monitoring well sites that border the well field (MW90-5, MW90-7, MW94-1, MW94-2, MW05-24, MW05-25, and MW06-29). At most of these monitoring well sites, the model predictions closely resemble the observed data. The pattern and shape of the model predicted hydrographs closely mimics that of the observed data for most of the Douglas County well sites during these pumping and recovery cycles, indicating that the aquifer parameters and the degree of interconnection between the river and the aquifer used in the model are accurate. Review of the observed data for all of the well sites that border the Douglas County portion of the well field indicate that the cone of depression generated for these wells is limited and does not extend very far outside of the well field property boundary. However, because the smallest model stress period is one month, the model does not reflect short term fluctuations in groundwater elevation that occur when the river stage increases since the pumping and boundary conditions are changed only on a monthly basis

5.3.3 PARTICLE TRACKING

A transient particle tracking simulation was performed using MODPATH to illustrate the model-predicted travel path of hypothetical groundwater particles located along the perimeter of the FNOP contaminant plumes. The particle tracking simulation was performed using transient conditions for the full length of the reporting period and included the reported pumping from the FNOP wells and Platte West well field wells from October 2008 to September 2011 (Table 5-1). The starting location of the particles was modified from previous NOPGRs to reflect the most up to date interpretation of the FNOP RDX and TCE plumes, as presented in the most recent Containment Evaluation (ECC, 2010). A total of 205 particles

were located on the perimeter of the easternmost TCE/RDX plumes, as shown on Figure 5-4, and these particles were tracked forwards for a period of three (3) years.

As shown, operation of the well field has not altered the well documented historical flow path of the contaminant plumes located on the eastern edge of the FNOP site. In the Todd Valley aquifer, where most of the RDX and TCE plumes are located, the model predicts each particle will travel approximately 800 feet during one year, which equates to an advective groundwater flow rate of approximately 2.2 ft/day. The modeled groundwater flow velocity for the Todd Valley aquifer is consistent with the 2 ft/day value published by CENWK for Todd Valley aquifer near the FNOP site (URS, 2009).

5.4 MODEL FORECAST PREDICTIONS

The forecast model period of October 2011 to April 2012 was used to generate predications on aquifer response to planned well field pumping for this period of time. The model forecast period includes three months, October through December 2011, where actual MUD pumping rates were available for input into the groundwater model. Pumping rates for January 2012 through April 2012 were estimated by MUD based on forecasted water demand and the availability of other MUD facilities to provide water.

Table 5-3
Forecasted Well Field Pumping Rates October 2011 to April 2012

Month	Douglas County Pumping (mgd)	Saunders County Pumping (mgd)	Total Pumping (mgd)
October 2011	8.8	34.7	43.5
November 2011	4.3	20.9	25.2
December 2011	5.5	21.4	26.9
January 2012	6	21	27
February 2012	8	18	26
March 2012	8	21	29
April 2012	10	24	34

For the forecast model scenario, pumping rates for the FNOP well field were held constant at the September 2011 pumping rate reported for those wells. Stage elevations for the river boundaries were input assuming average annual flow conditions, as described in the Phase II model (Chatman and Associates, Inc., 2005).

5.4.1 FORECAST MODEL POTENTIOMETRIC SURFACE MAP

The model-predicted potentiometric surface for the last time step of each stress period is presented in Appendix 5-2. This figure represents the model-predicted potentiometric surface for the end of the last month in the forecast period (April 2012). The model predicted potentiometric surface is a function of the distribution of pumping assumed in the well field and change if wells other than those modeled are used to achieve similar well field flows. The forecast model run assumed that a mix of storage and river wells would be used to achieve the projected well field flow rates.

Review of the predictions indicates that the model predicted potentiometric surface for April 2012 is very similar to the observed potentiometric surface for March 2011 (Figure 3-2). The potentiometric surface predicted by the model for April 2011 indicates that the FNOP plumes will remain hydraulically upgradient/cross gradient of the well field and that the flow direction in the Todd Valley aquifer will not be altered by operation of the well field.

6 SUMMARY AND CONCLUSIONS

The Platte West well field began continuous pumping operations on February 11, 2009 and continued operations until the end of the NOPGR reporting period (September 30, 2011). For the 2011 water year, the total daily pumping rate fluctuated from a low of 23.9 mgd, recorded in March 2011, to a high of 60.3 mgd recorded in September 2011. The average monthly pumping rate for the 2011 water year was 37.2, which is up slightly from the 2010 average pumping rate of 32.6 mgd.

The objective of the 2011 NOPGR is to analyze available hydraulic and water quality data to determine the impact of the Platte West well field on both the groundwater elevations and chemistry of the Platte River and Todd Valley alluvial aquifers, and to determine any potential negative impact on the FNOP contaminant plumes or the FNOP operating remedial system. To achieve this objective, HDR studied: MUD's water supply well pumping records, pressure transducer data from monitoring wells in the MUD, LPNNRD, and USACE monitoring network, one synoptic water level data set which consisted of water level elevations collected from over 180 monitoring wells, Platte River flow and stage data from three (3) stream gauges, Elkhorn River data from one (1) stream gauge, and two rounds of chemical sampling. These data were then used to update the groundwater flow model presented in the 2010 NOPGR with 2011 well field pumping and hydrologic data.

A post audit of the groundwater flow model was presented in the 2009 NOPGR and 2010 NOPGR. Both reports evaluated the capabilities of the groundwater to reproduce observed changes in the aquifer, using operational data from both the Platte West well field and the FNOP containment wells. The results of both post audits showed that the groundwater model accurately reproduced the observed drawdown in the Platte River alluvial aquifer that was induced by well field operations. The 2011 NOPGR continued to evaluate the ability of the groundwater model to reproduce observed conditions in the aquifer by comparing model predictions to observed data during a look back period, which consisted from October 2010 through September 2011. No changes were made to the evapotranspiration and permeability distribution in the model to perform the 2011 NOPGR analysis. The look back analysis presented in this document is an extension of the previous model post audits, and represents actual pumping conditions for both the Platte West well field and the FNOP well field from 2009 through 2011. The following tasks were completed as part of the look back analysis:

1. Extend the model simulation time to include 36 monthly stress periods (October 2008 to September 2011).
2. Input the actual average monthly pumping rate for each supply well in the Platte West well field. These data were supplied by MUD. Well specific monthly flow rates are presented in Table 5-1.
3. Input the actual average monthly pumping rate for each FNOP hydraulic containment or focused extraction well. These data were supplied by ECC, a subcontractor to the CENWK. Well specific monthly flow rates for the FNOP pumping wells are presented in Table 5-1. .
4. Update the river boundary package to reflect average monthly river stage value for the Platte and Elkhorn Rivers, as reported at the Leshara and Waterloo gauges, respectively. This change in how the rivers are represented in the model was performed to better represent the high streamflow conditions observed during the 2011 water year, and the short duration flood events observed during the 2010 water year.
5. Run the groundwater model.
6. Compare the model-predicted groundwater elevations versus the observed groundwater elevations for the March 2011 stress period. Over 180 monitoring well sites were available for

this synoptic comparison. The data were collected as part of the March 2011 LPNNRD coordinated groundwater monitoring event and also included water level elevation data from the MUD Douglas County monitoring wells.

7. Compare the model-predicted groundwater elevation hydrographs versus the observed groundwater elevation hydrographs at each monitoring well site within the monitoring network operated and maintained by MUD.
8. Review the model predictions and compare to observed data. Perform a "goodness of fit" evaluation.

The addition of 12 stress periods to the model and the change to the stage elevations used in the river boundary package are the only changes made to the model before the look back analysis was performed.

6.1 SUMMARY OF RESULTS

The 2011 NOPGR used available hydrogeologic data in the form of groundwater elevations, streamflow values, and groundwater quality data, as well as groundwater modeling to evaluate the impact of the operations of the well field on the Platte River and Todd Valley alluvial aquifers. The hydraulic data and updated groundwater flow model were used to evaluate any potential negative impact on the FNOP contaminant plumes or the FNOP operating remedial system. The following section summarizes the results of the 2011 NOPGR analysis.

6.1.1 SUMMARY OF MODEL PERFORMANCE

The predictive capability of the model was evaluated by comparing model predicted groundwater elevations versus observed values collected within the well field monitoring network, over a three year period from 2008 through 2011. The results of the model review indicate that the model continues to accurately reproduce the transient changes in groundwater elevations that have been observed in the monitoring wells located near the well field. A summary of the groundwater model versus measured data comparisons is presented below.

Hydrograph Comparison for Wells Located Near the Well Field

Hydrographs which illustrate the three years of model predicted versus observed groundwater elevations for monitoring wells located near the well field are presented in Appendix 5-1. A summary comparison of these hydrographs is presented on Figure 5-3. These hydrographs illustrate the ability of the model to reproduce the water level fluctuations near the well field which result from the cyclical pumping/recovery/pumping/recovery/pumping pattern of well field operation. The pattern and shape of the model predicted hydrographs closely resembles the pattern of the observed data during these pumping and recovery cycles, indicating that the aquifer parameters and the degree of interconnection between the river and the aquifer used in the model are very accurate. Included in the post audit data set is an extended period of aquifer recovery that was observed during the intentional shut down of the Saunders County Section 19 wells, which occurred from November 2009 through the end of February 2010 (see 2010 NOPGR for details).

Comparisons of Potentiometric Surfaces After Two Years of Pumping

Evaluating the ability of the groundwater model to predict groundwater elevations away from the well field was checked using data collected as part of the LPNNRD coordinated water level monitoring event, performed at the end of March 2011. Including data from the MUD Douglas County monitoring network, a total of 180 water level elevation data points were available for this comparison. The water level elevations were collected after the well field had been operating for 26 months at an average flow rate of

33 mgd (average from February 2009 through March 2011). Figure 5-1 maps a comparison of simulated and observed groundwater levels for March 2011. The first model run completed to evaluate the model predicted potentiometric surface at the end of March 2011 produced a set of calibration statistics including a normalized root mean square (NRMS) error of 1.5 percent and an absolute residual mean (ARM) error of 1.2 feet. Both of these values are within the pre-established calibration objectives of the Phase II groundwater modeling effort, which specified a NRMS error of less than 5 percent and an ARM error of less than 10 feet, and were similar to the final calibrated values of the Phase II model (NRMS error of 1.4 percent and ARM error of 2.1 feet). Other than inputting the new pumping and hydrologic data into the groundwater model and modifying the river stage values in the river boundary package, no changes to the groundwater model presented in the 2009 NOPGR were made prior to performing these model evaluations.

6.1.2 GROUNDWATER ELEVATION AND CHEMICAL SAMPLING

Groundwater elevation and groundwater chemical sampling data collected from the MUD monitoring well network were evaluated and summarized as part of the 2011 NOPGR. The following presents a summary of those data.

Summary of Contingency Plan Water Levels

The water level elevations observed at each of the Well Field Contingency Plan (Layne Christensen, 2008b) hydraulic monitoring wells were compared to their respective Tier 1 and Tier 2 trigger point. Three water level elevations, observed at MW90-10, MW06-18, and MW06-31 were below the well specific Tier 1 value. Careful review of the hydrographs of these wells indicates that the groundwater elevation at these monitoring wells is likely impacted by seasonal irrigation pumping. Also, the water level elevation at these wells never dropped below the Tier 2 trigger level, therefore no further action is required by MUD at this time. The evaluation process followed to reach this conclusion is presented on the Tier 1 flow chart in the Well Field Contingency Plan (Layne Christensen, 2008b).

Summary of Chemical Data

Chemical data from two rounds of groundwater sampling were reviewed as part of this NOPGR. The wells sampled by as part of this event include the deep and shallow wells located at MW-39, MW06-18, MW06-30, and MW06-31 monitoring sites. The FNOP indicator compounds TCE and RDX were not detected above their method detection limit in any of the samples collected during either 2011 sampling event. The explosive compound 1,3,5-Trinitrobenzene (TNB) was detected in monitoring well MW39-A during the June 2011 sampling event. This result for the June sample of MW39-A was below the site cleanup standard. TNB was not detected in the subsequent sample collected from MW39-A in October, 2011.

6.2 CONCLUSIONS

Since startup in February 2009, the well field has averaged a 34.9 mgd total pumping rate (25 mgd from the Saunders County wells), which is below both the permitted annual average and the maximum design pumping rate of the well field. The hydraulic data collected as part of this and other previous NOPGR were used to develop long term hydrographs from the wells that form the groundwater monitoring network shown on Figure 3-1. These hydrographs clearly show the hydraulic influence of the well field pumping activities that have occurred to date is limited to an area which does not extend beyond the location of wells MW94-3, MW94-5, MW94-6, and MW06-28. The hydrographs from monitoring wells located west of these four (4) wells illustrate a variable water level signal that is typical of alluvial wells and show no long term changes in water level elevations that can be attributed to well field pumping.

The hydraulic data collected as part of this and other previous NOPGR reports clearly show that the groundwater flow direction in the Todd Valley aquifer has not changed due to the operation of the well

field. The interpreted potentiometric surfaces from October 2008, March 2009, March 2010, and March 2011 indicate that the well field continues to remain hydraulically upgradient and cross-gradient of the FNOP site.

Regular chemical groundwater monitoring has been performed at several key monitoring wells located between the well field and the FNOP site. To date, no detections of the FNOP COCs (TCE and RDX), which have been validated through confirmation sampling, have been observed in these wells.

The look back analysis performed, which extended the model post audit presented in the 2009 NOPGR, has shown that the groundwater flow model is a good tool that can be used to accurately predict the response of the alluvial aquifer to changes in well field pumping. The post audit presented in the 2009 and 2010 NOPGR and the look back analysis presented in this 2011 NOPGR have shown that the groundwater modeling predictions presented in the Phase II *Platte West Well Field/Groundwater Modeling Study* (Chatman and Associates, Inc., 2005) were reasonable approximations of how the aquifer would respond to the pumping from the Platte West well field. The hydraulic and chemical data collected to date, as well as the modeling analyses performed, support the conclusion that pumping from the Platte West well field is not adversely impacting the FNOP containment system efforts.

6.3 FUTURE UPDATES

The 2012 NOPGR will continue to review the available hydraulic and water quality data to evaluate the impact of the Platte West well field pumping on both the groundwater elevations and chemistry of the Platte River and Todd Valley alluvial aquifers. The 2012 NOPGR will also continue to test the predictive capabilities of the groundwater model by comparing model predictions to observed data. It is anticipated that the comparison (look back) and forecasting periods in the 2012 NOPGR will be structured as follows:

- Look back period - April to October of the current reporting period.
- Forecast period – October to April of the future reporting cycle.

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TABLES

Table 3-1
Well Field Contingency Plan
Trigger Level Comparison
Nebraska Ordnance Plant Groundwater Report

Monitoring Well ID	Priority Well Designation	Measured (Feb/10/2009) Pre-Startup Groundwater Elevation (ft msl)	Lowest Measured Water Level Elevation for 2011 Reporting Period	Water Level Elevation 10/1/2011	Tier 1 Trigger Level (ft msl)	Is Lowest Measured Post Startup Water Level Elevation Below Tier 1 (Y/N)	Tier 2 Trigger Level (ft msl)	Is Lowest Measured Post Startup Water Level Elevation Below Tier 2 (Y/N)	Notes
MW 90-10	Priority Three	1095.5	1,089.2	1,089.2	1,091.0	**Y**	1,089.0	N	Impacted by nearby irrigation well
MW 94-3	Priority One	1080.2	1,080.2	1,080.2	1,076.5	N	1,074.5	N	
MW 94-4	Priority Three	1090.3	1,080.4	1,080.4	1,079.0	N	1,077.0	N	
MW 94-5	Priority One	1094.4	1,092.4	1,092.6	1,091.5	N	1,089.5	N	
MW 94-6	Priority One	1083.8	1,081.5	1,081.5	1,080.0	N	1,078.0	N	
MW 94-7	Priority Two	1075.4	1,074.5	1,074.5	1,073.5	N	1,071.5	N	
MW 04-17[A]	Priority Three	1100.8	1,095.4	1,096.7	1,094.5	N	1,092.5	N	
MW 05-22	Priority Three	1087.4	1,082.4	1,082.4	1,080.0	N	1,078.0	N	
MW 05-23	Priority Three	1085.7	1,080.3	1,080.3	1,078.0	N	1,076.0	N	
MW 06-18[B]	Priority Two	1086.8	1,082.5	1,085.7	1,084.0	**Y**	1,082.0	N	Lowest water level elevation in 2011 is a result of nearby irrigation well
MW 06-19[B]	Priority Two	1105.3	x	1,104.5	1,100.0	N	1,098.0	N	October 2011 water level is from LPNNRD monitoring event (Oct 28, 2011). Transducer data not available.
MW 06-20[B]	Priority Two	1144.7	1,147.5	1,149.7	1,137.0	N	1,135.0	N	Well appears to be in a recovery cycle
MW 06-21[B]	Priority Two	1152.7	x	1,154.7	1,143.0	N	1,141.0	N	October 2011 water level is from LPNNRD monitoring event (Oct 28, 2011). Transducer data not available.
MW 06-27[B]	Priority One	1086.8	1,084.5	1,084.7	1,081.8	N	1,079.8	N	
MW 06-28[B]	Priority One	1088.4	1,086.3	1,086.3	1,085.0	N	1,083.0	N	
MW 06-30[B]	Priority Two	1128.1	1,131.5	1,131.5	1,125.5	N	1,123.5	N	Well appears to be in a recovery cycle
MW 06-31[B]	Priority Two	1099.0	1,095.3	1,099.2	1,096.7	**Y**	1,094.7	N	Lowest water level elevation in 2011 is a result of nearby irrigation well

Notes:
Tier 1 Trigger Level =The Anticipated Post Startup Groundwater Elevation minus one foot.
Tier 2 Trigger Level = The Tier 1 Trigger Level minus the Natural Groundwater Fluctuation
A) Transducer failure June 2009 - April 2010
B) Hydrograph shows impact of local irrigation
x = transducer data not provided by LPNNRD for this well

Table 5-1
Average Monthly Flow Rate (gpm)
Wells in Transient Simulation
Nebraska Ordnance Plant Groundwater Report

Year	2008			2009												2010										2011										
Model Stress Period Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Stress Period Month	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP
USACE FNOP Wells (rate in gpm)																																				
EW-1	361	206	193	193	203	212	217	212	208	167	169	185	167	174	170	166	161	156	150	145	142	136	165	167	166	121	168	162	176	176	171	179	141	190	214	196
EW-2	157	158	155	151	152	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EW-3	277	279	277	277	277	285	292	289	283	298	286	284	305	271	302	306	296	299	303	304	305	139	309	305	273	177	229	293	297	299	290	303	293	296	297	298
EW-4	99	94	95	93	86	93	92	93	91	88	87	86	79	82	81	81	79	79	78	78	77	310	78	78	71	39	78	94	95	95	93	98	93	97	97	93
EW-5	185	183	181	180	179	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EW-6	265	264	262	263	264	267	275	272	272	69	68	74	60	68	70	71	71	65	57	58	54	77	55	56	59	45	50	58	58	59	55	57	62	61	52	50
EW-7	318	317	311	320	323	333	307	303	307	299	298	304	290	291	294	296	289	291	292	293	295	40	306	302	274	292	288	287	292	292	284	277	270	289	172	285
EW-9	163	163	163	165	162	167	172	170	172	144	143	145	147	141	141	142	141	144	146	148	147	300	149	149	126	146	142	141	143	144	140	145	135	130	84	140
EW-10	417	413	415	417	418	419	420	420	413	415	408	390	560	394	399	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FEW-11	567	566	558	560	553	548	541	535	534	543	545	539	265	542	542	539	533	540	547	545	537	144	543	563	536	547	534	534	535	489	512	518	432	501	245	514
EW-12	325	325	325	325	325	325	325	325	325	214	214	214	207	325	325	325	325	323	324	325	312	557	284	270	237	120	255	306	323	323	310	315	306	306	291	279
FEW-14	0	0	0	0	0	0	0	0	193	199	196	191	493	187	189	191	188	190	193	195	196	306	207	209	205	205	171	188	192	194	189	195	186	190	189	192
FEW-15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	374	374	374	397	493	221	495	480	489	487	496	474	344	304	297	319	458
EW-16	0	0	0	0	0	0	0	0	163	102	97	97	112	88	95	93	88	86	86	88	92	368	120	122	111	105	90	103	101	98	95	96	95	99	98	97
Platte West Douglas County Wells (rate in gpm)																																				
2	0	0	0	0	0	0	0	483	0	0	5	0	4	0	1	0	0	0	18	568	1,487	2,341	2,352	2,281	1,044	0	89	261	932	1,496	1,838	2,142	947	1,453	1,784	1,422
3	0	0	0	0	0	0	0	884	704	764	0	0	0	0	0	0	0	0	3	473	604	1,015	34	449	1,054	0	0	0	0	0	0	0	236	173	0	2
4	0	0	0	0	0	0	0	398	579	24	332	0	1	0	0	0	0	0	16	3	88	78	0	1	18	16	0	0	0	0	0	24	0	14	11	12
5	0	0	0	0	241	215	414	7	0	33	4	3	0	0	172	0	0	0	14	3	75	69	0	1	12	6	17	0	0	0	0	13	42	17	13	20
6	0	0	0	0	0	1	436	1,248	998	454	1,313	575	700	0	623	194	1,349	0	1,019	265	866	447	1,447	355	586	586	0	434	127	0	0	0	586	1,476	1,888	760
7	0	0	0	0	0	0	0	129	260	343	0	507	0	0	0	0	0	0	9	1,070	0	207	69	122	12	0	0	43	0	0	0	8	571	0	0	0
8	0	0	0	0	0	51	125	390	25	119	710	468	532	268	234	0	625	1,297	0	410	0	18	36	23	18	0	0	0	0	0	0	94	0	1	79	892
9	0	0	0	0	0	0	147	44	359	102	0	1,081	224	0	0	0	0	0	0	6	68	1,843	547	0	21	0	0	0	0	0	0	334	52	68	39	1
10	0	0	0	0	0	0	0	191	103	1,188	1,341	810	0	0	0	2	0	0	14	1,173	90	755	2,144	95	927	150	564	2,307	129	1	1,206	1,793	785	964	218	1,306
11	0	0	0	0	0	563	0	38	1,316	2,078	424	1,590	0	0	867	0	0	490	1,459	447	111	4	266	387	52	98	0	0	1,710	2,343	1,008	4	994	1,404	1,990	1,956
12	0	0	0	0	644	154	689	1,840	1,983	1,855	388	1,848	669	0	1,194	2,988	270	0	248	938	468	440	1,398	1,959	1,925	0	118	18	880	0	0	243	1,295	2,696	769	1,547
13	0	0	0	0	100	0	91	383	420	0	5	0	0	0	0	0	0	0	274	293	2,420	416	384	743	157	757	0	15	135	0	0	0	52	1,346	769	578
14	0	0	0	0	772	0	0	652	236	1,306	1,112	409	311	0	468	0	2,094	2,257	0	6	891	1,697	299	57	751	0	0	1,468	1,463	0	227	250	705	1,001	412	741
15	0	0	0	0	433	0	690	248	428	181	233	639	0	0	109	0	0	0	1	1,312	1,578	401	712	431	45	0	598	1,960	109	782	659	698	1,397	610	1,629	1,647
16	0	0	0	0	0	702	845	1,044	849	1,116	787	1,055	1,102	2,133	2,500	2,321	427	0	903	5	0	290	757	1,091	1,467	1,861	0	14	139	0	0	250	918	181	428	1,616
17	0	0	0	0	134	1,991	809	706	1,453	545	1,194	0	0	0	832	2,515	225	104	2,443	359	0	319	505	0	22	0	0	108	128	0	0	0	0	0	0	0

Table 5-1
Average Monthly Flow Rate (gpm)
Wells in Transient Simulation
Nebraska Ordnance Plant Groundwater Report

Year	2008			2009												2010										2011											
Model Stress Period Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Stress Period Month	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP
Platte West Saunders County Wells (rate in gpm)																																				
30	0	0	0	0	9	0	478	1,159	543	799	581	0	0	0	0	0	0	0	1,431	2,113	2,499	271	484	864	239	0	0	0	285	51	337	609	116	1,286	681	729
31	0	0	0	0	270	2,174	697	159	682	1,252	1,002	0	1,417	1,884	202	1,876	2,071	435	0	310	190	0	504	1,873	54	0	1,539	0	0	0	555	422	909	2,272	604	1,944
32	0	0	0	0	0	0	610	782	1,378	544	1,071	1,611	0	0	0	0	156	351	162	1,810	749	1,082	917	1,021	1,128	574	2,313	2,244	0	0	0	0	291	876	827	343
33	0	0	0	0	0	0	87	1,022	1,216	0	1,213	2,282	897	493	1,412	0	0	1,485	1,218	1,416	979	2,111	1,712	1,442	806	9	0	0	1,513	1,388	569	1,299	1,152	2,236	1,544	2,105
34	0	0	0	0	0	0	607	1,734	1,301	1,603	1,204	0	341	1,441	167	1,776	0	695	1,068	672	2,124	1,375	964	950	1,628	2,151	2,223	2,192	0	0	0	0	0	0	0	0
35	0	0	0	0	0	0	739	1,513	1,251	712	819	1,219	2,113	0	83	2,393	2,499	1,738	0	1	66	1,030	2,397	1,326	1,222	2,463	2,438	2,425	153	0	63	1,272	1,256	453	776	1,487
36	0	0	0	0	483	596	1,549	525	1,448	1,241	1,780	725	0	1,512	0	0	116	1,071	952	2,719	154	365	0	952	823	152	2,225	2,691	2,495	2,399	2,559	0	1,781	1,434	1,647	2,370
37	0	0	0	0	935	554	1,293	1,489	721	737	0	1,784	1,453	1,012	625	0	0	1,341	1,298	266	2,534	1,401	1,309	2,132	993	2,624	540	26	164	0	0	9	0	0	5	0
38	0	0	0	0	837	1,406	238	0	260	519	901	617	1,621	0	0	2,124	2,467	556	0	153	0	1,176	1,963	49	789	0	185	2,302	35	1,144	1,771	1,133	1,416	2,357	1,823	956
39	0	0	0	0	136	0	0	934	1,266	0	1,097	0	353	2,300	1,463	0	0	0	880	816	378	947	2,234	1,690	1,015	559	2,288	2,160	0	290	695	1,910	1,100	1,706	1,296	1,919
40	0	0	0	0	606	1,864	259	565	351	1,384	105	1,853	45	1,167	1,030	1,448	409	0	0	1,078	2,047	1,656	682	1,799	804	0	15	82	2,070	1,395	0	1,054	1,128	675	1,205	2,317
41	0	0	0	0	914	0	603	337	1,203	847	949	299	73	0	0	0	0	146	296	48	0	230	912	1,686	1,201	2,220	1,905	0	21	0	70	357	252	158	0	187
42	0	0	0	0	247	0	0	1,254	533	1,308	553	0	1,233	1,120	1,518	0	0	0	783	1,009	122	193	1,057	573	0	0	248	435	2,266	2,400	2,213	178	763	154	815	909
43	0	0	0	0	838	0	0	540	675	660	533	1,606	595	1,159	0	0	0	0	0	7	1,015	2,218	1,244	0	1,455	2,337	823	0	0	0	0	0	97	0	0	1,220
44	0	0	0	0	513	0	229	506	1,275	1,394	819	632	0	1,142	838	0	1,595	756	494	739	861	0	670	0	0	0	0	74	258	0	156	1,667	1,214	1,267	1,677	1,129
45	0	0	0	0	841	0	666	1,192	1,720	1,506	869	228	1,097	59	630	0	0	460	0	1,136	1,998	2,381	1,967	916	2,146	2,398	2,013	0	0	0	360	1,268	1,883	1,976	2,044	1,397
46	0	0	0	0	0	0	592	940	502	500	412	1,044	717	253	0	0	353	836	601	882	2,068	960	1,700	1,410	1,235	441	1,218	236	1,688	1,550	843	512	1,430	1,570	1,552	1,878
47	0	0	0	0	0	962	844	675	1,134	771	938	0	533	0	0	0	0	521	607	38	647	724	539	112	33	22	1,048	0	239	0	26	44	32	541	681	1,062
48	0	0	0	0	231	1,528	0	827	1,216	877	893	918	554	0	71	0	0	196	0	592	453	579	807	254	171	626	262	1,492	18	0	0	0	1,131	807	208	425
49	0	0	0	0	705	517	1,112	520	491	491	1,174	1,062	379	766	864	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,303	2,274	1,456	1,839	2,236	1,972	1,944
50	0	0	0	0	444	990	0	330	72	1,208	403	814	152	0	0	0	0	67	839	467	461	0	528	1,165	72	0	0	0	0	0	0	406	525	82	998	29
51	0	0	0	0	207	518	0	0	0	0	1,205	2,244	1,530	0	0	0	0	553	1,098	405	38	1,011	1,172	2	109	0	0	0	557	49	0	449	302	311	188	1,370
52	0	0	0	0	0	0	0	0	335	1,036	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	243	2,076	349	0	616	218	855	914	1,762	1,280
53	0	0	0	0	0	0	528	1,583	1,744	424	849	0	0	71	0	0	0	321	0	195	225	998	605	108	221	499	1,282	0	233	0	0	78	576	567	601	571
54	0	0	0	0	0	437	1,096	370	1,253	379	768	1,173	153	0	0	0	0	95	995	0	0	588	144	649	310	389	524	0	232	0	17	0	0	501	0	941
55	0	0	0	0	195	454	492	1,207	875	824	759	594	906	0	0	0	0	0	314	995	238	0	385	39	453	295	510	394	32	0	0	0	94	326	249	840

Note: Well flow rate in gpm

Table 5-2
Transient Calibration Check
End of March 2010 Data Set
Nebraska Ordnance Plant Groundwater Report

Calibration Target Name	Water Level Data Provided By	Simulation Time (Days)	Measured Groundwater Elevation (ft msl)	Model Computed Groundwater Elevation (ft msl)	Residual (feet)
MW06-27	MUD	900	1,086.22	1,084.01	2.21
MW06-28	MUD	900	1,088.13	1,086.21	1.92
MW06-30	MUD	900	1,131.12	1,129.61	1.51
MW06-31	MUD	900	1,100.13	1,099.72	0.41
MW90-13	MUD	900	1,090.42	1,091.68	-1.25
MW90-5	MUD	900	1,101.42	1,100.10	1.32
MW90-7	MUD	900	1,106.34	1,105.92	0.42
MW05-24	MUD	900	1,097.55	1,098.62	-1.07
MW05-25	MUD	900	1,104.09	1,102.29	1.79
MW05-26	MUD	900	1,108.61	1,107.74	0.87
MW90-12	MUD	900	1,097.04	1,095.61	1.43
MW06-29	MUD	900	1,095.77	1,097.43	-1.67
MUD94-7	LPNNRD	900	1,076.26	1,076.62	-0.36
S.Wann	LPNNRD	900	1,072.26	1,073.57	-1.31
M90-01	LPNNRD	900	1,072.34	1,073.56	-1.22
Frahm	LPNNRD	900	1,091.72	1,089.87	1.85
M90-05R	LPNNRD	900	1,065.80	1,066.91	-1.11
M90-04	LPNNRD	900	1,068.45	1,069.78	-1.33
TV-17A	LPNNRD	900	1,088.12	1,082.26	5.86
M90-09	LPNNRD	900	1,064.80	1,066.50	-1.70
LPN06-01	LPNNRD	900	1,064.96	1,065.65	-0.69
M90-16R	LPNNRD	900	1,060.83	1,060.43	0.40
M90-15	LPNNRD	900	1,060.74	1,063.29	-2.55
M90-21	LPNNRD	900	1,057.75	1,059.79	-2.04
M90-22R	LPNNRD	900	1,056.54	1,055.44	1.10
M90-02	LPNNRD	900	1,071.58	1,073.99	-2.41
M90-12R	LPNNRD	900	1,063.94	1,065.40	-1.46
M90-17R	LPNNRD	900	1,060.56	1,062.33	-1.77
M90-23R	LPNNRD	900	1,052.70	1,049.72	2.98
M90-20R	LPNNRD	900	1,059.08	1,059.51	-0.43
M90-24R	LPNNRD	900	1,049.43	1,050.62	-1.19
M90-36R	LPNNRD	900	1,053.34	1,053.52	-0.18
M90-26R	LPNNRD	900	1,052.47	1,047.49	4.98
M90-37	LPNNRD	900	1,052.11	1,051.55	0.56
LPN06-21	LPNNRD	900	1,154.72	1,154.68	0.04
LPN06-20	LPNNRD	900	1,148.83	1,145.51	3.32
N.Wann	LPNNRD	900	1,104.84	1,105.06	-0.22
PV-38	LPNNRD	900	1,095.01	1,094.07	0.94
PV-37	LPNNRD	900	1,090.97	1,091.83	-0.86
PV-41	LPNNRD	900	1,091.09	1,091.12	-0.02
MUD94-5	LPNNRD	900	1,093.60	1,093.56	0.04
LPN06-19	LPNNRD	900	1,105.17	1,104.09	1.08
MUD94-6	LPNNRD	900	1,083.18	1,081.52	1.66
LPN06-18	LPNNRD	900	1,086.77	1,083.27	3.50
PV-39	LPNNRD	900	1,083.04	1,081.90	1.14
N.Keiser	LPNNRD	900	1,081.42	1,080.86	0.56
S.Keiser	LPNNRD	900	1,080.59	1,079.67	0.92
MUD90-10	LPNNRD	900	1,091.19	1,093.46	-2.27
MUD94-4	LPNNRD	900	1,084.93	1,086.03	-1.10
PV-40	LPNNRD	900	1,081.55	1,082.52	-0.97
MUD94-3	LPNNRD	900	1,079.77	1,080.64	-0.87
TV-16	LPNNRD	900	1,094.32	1,093.11	1.21
Hanson	LPNNRD	900	1,095.24	1,094.58	0.66
Brabec	LPNNRD	900	1,100.45	1,099.35	1.11
MW02A	USACE	900	1,135.41	1,133.27	2.14
MW03A	USACE	900	1,134.50	1,132.78	1.72
MW04A	USACE	900	1,132.77	1,130.11	2.66
MW05A	USACE	900	1,133.93	1,131.22	2.71
MW07A	USACE	900	1,127.36	1,126.85	0.51
MW08A	USACE	900	1,119.34	1,118.36	0.98
MW09A	USACE	900	1,119.67	1,118.57	1.10
MW10A	USACE	900	1,110.72	1,109.82	0.90
MW11	USACE	900	1,125.03	1,119.74	5.29
MW16B	USACE	900	1,155.77	1,148.32	7.45
MW17B	USACE	900	1,121.00	1,118.26	2.74
MW18B	USACE	900	1,103.75	1,105.22	-1.47
MW19B	USACE	900	1,148.62	1,147.63	0.99
MW20B	USACE	900	1,101.14	1,101.27	-0.13

Table 5-2
Transient Calibration Check
End of March 2010 Data Set
Nebraska Ordnance Plant Groundwater Report

Calibration Target Name	Water Level Data Provided By	Simulation Time (Days)	Measured Groundwater Elevation (ft msl)	Model Computed Groundwater Elevation (ft msl)	Residual (feet)
MW21A	USACE	900	1,129.73	1,127.33	2.40
MW24A	USACE	900	1,122.64	1,122.32	0.32
MW25A	USACE	900	1,131.15	1,129.54	1.61
MW28A	USACE	900	1,121.66	1,120.93	0.73
MW29A	USACE	900	1,110.68	1,111.71	-1.03
MW31A	USACE	900	1,119.20	1,118.43	0.77
MW32A	USACE	900	1,105.54	1,107.03	-1.49
MW33A	USACE	900	1,108.99	1,110.20	-1.21
MW34A	USACE	900	1,097.18	1,097.72	-0.54
MW35A	USACE	900	1,085.80	1,085.32	0.48
MW38A	USACE	900	1,076.39	1,077.24	-0.85
MW39A	USACE	900	1,079.01	1,078.58	0.43
MW40A	USACE	900	1,131.53	1,130.99	0.54
MW41A	USACE	900	1,130.64	1,129.65	0.99
MW42A	USACE	900	1,095.25	1,094.25	1.00
MW43A	USACE	900	1,099.15	1,099.73	-0.58
MW44A	USACE	900	1,084.54	1,083.31	1.23
MW46A	USACE	900	1,078.86	1,078.56	0.30
MW52A	USACE	900	1,119.18	1,116.57	2.61
MW53A	USACE	900	1,110.70	1,112.43	-1.73
MW54A	USACE	900	1,112.65	1,114.68	-2.03
MW55A	USACE	900	1,110.81	1,112.42	-1.61
MW56A	USACE	900	1,110.16	1,111.69	-1.53
MW60A	USACE	900	1,092.83	1,090.44	2.39
MW61A	USACE	900	1,102.72	1,099.59	3.13
MW65A	USACE	900	1,131.69	1,129.08	2.61
MW72A	USACE	900	1,130.78	1,131.40	-0.62
MW73A	USACE	900	1,130.42	1,130.78	-0.36
MW74A	USACE	900	1,130.43	1,130.82	-0.39
MW75A	USACE	900	1,130.36	1,130.86	-0.50
MW76A	USACE	900	1,130.39	1,130.89	-0.50
MW77A	USACE	900	1,130.40	1,130.93	-0.53
MW78A	USACE	900	1,130.47	1,130.97	-0.50
MW79A	USACE	900	1,100.15	1,098.24	1.91
MW80A	USACE	900	1,099.95	1,097.99	1.96
MW81A	USACE	900	1,100.24	1,099.56	0.68
MW82A	USACE	900	1,099.41	1,098.81	0.60
MW83A	USACE	900	1,096.22	1,096.68	-0.46
MW84A	USACE	900	1,094.65	1,094.68	-0.03
MW85A	USACE	900	1,088.33	1,087.62	0.71
MW86A	USACE	900	1,082.18	1,080.86	1.32
MW87A	USACE	900	1,074.26	1,076.49	-2.23
MW88A	USACE	900	1,075.53	1,076.57	-1.04
MW89A	USACE	900	1,105.06	1,103.03	2.03
MW90A	USACE	900	1,105.89	1,103.13	2.76
MW91A	USACE	900	1,105.77	1,103.54	2.23
MW92A	USACE	900	1,100.67	1,098.85	1.82
MW93A	USACE	900	1,104.41	1,102.25	2.16
MW94A	USACE	900	1,104.64	1,105.84	-1.20
MW95A	USACE	900	1,102.51	1,102.35	0.16
MW96A	USACE	900	1,096.73	1,096.37	0.36
MW97A	USACE	900	1,094.20	1,093.82	0.38
MW98A	USACE	900	1,091.69	1,090.39	1.30
MW99A	USACE	900	1,093.14	1,093.68	-0.54
MW100A	USACE	900	1,086.28	1,084.90	1.38
MW101A	USACE	900	1,099.61	1,097.55	2.06
MW102A	USACE	900	1,136.46	1,137.41	-0.95
MW103A	USACE	900	1,132.59	1,133.54	-0.95
MW104A	USACE	900	1,078.57	1,080.64	-2.07
MW105A	USACE	900	1,075.89	1,078.26	-2.37
MW106A	USACE	900	1,101.25	1,101.88	-0.63
MW107A	USACE	900	1,097.38	1,098.33	-0.95
MW108A	USACE	900	1,096.28	1,096.46	-0.18
MW109A	USACE	900	1,084.12	1,082.57	1.55
MW110A	USACE	900	1,088.62	1,086.42	2.20
MW111A	USACE	900	1,078.81	1,079.25	-0.44
MW112A	USACE	900	1,081.82	1,080.10	1.72
MW113A	USACE	900	1,080.33	1,079.16	1.17

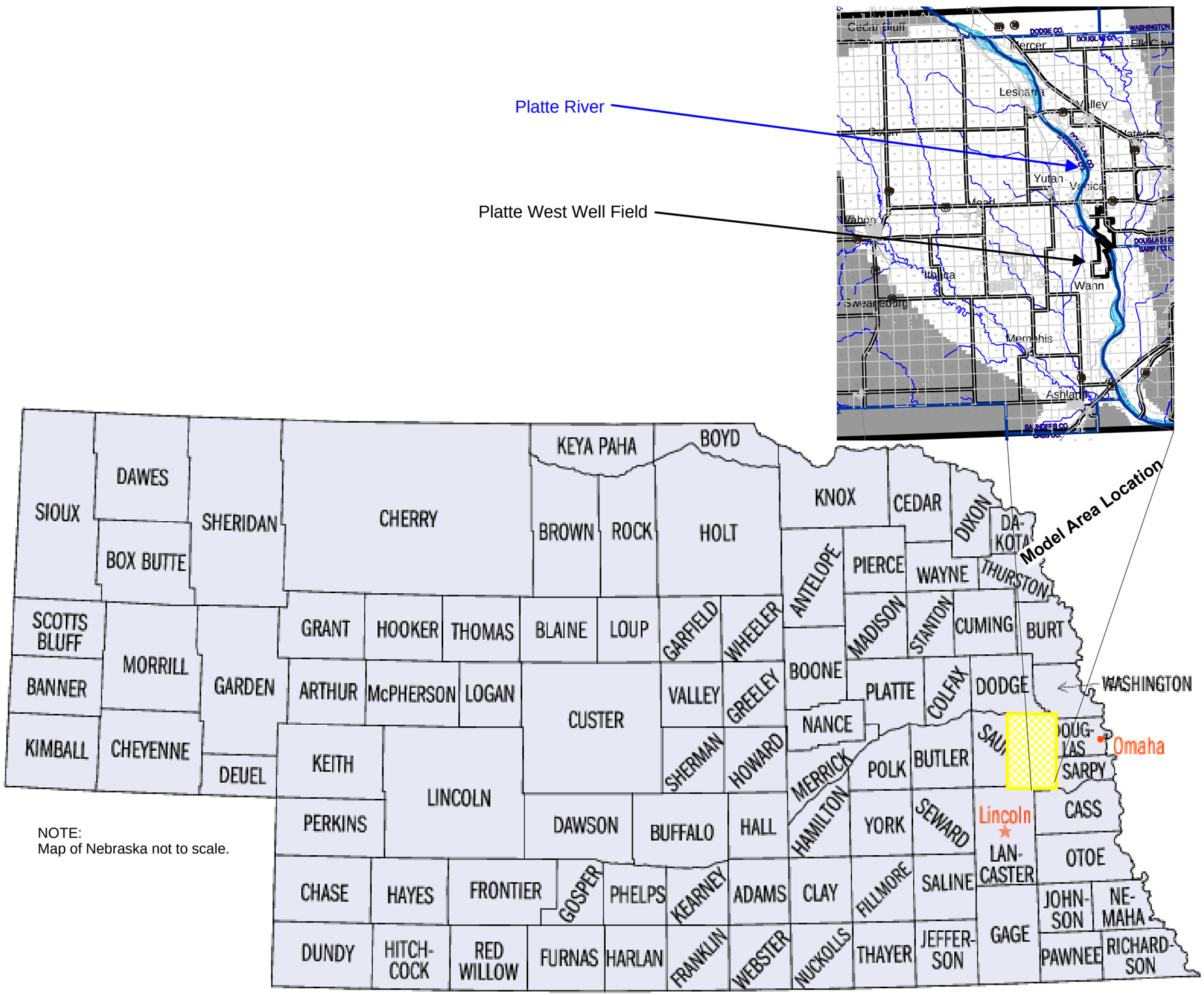
Table 5-2
Transient Calibration Check
End of March 2010 Data Set
Nebraska Ordnance Plant Groundwater Report

Calibration Target Name	Water Level Data Provided By	Simulation Time (Days)	Measured Groundwater Elevation (ft msl)	Model Computed Groundwater Elevation (ft msl)	Residual (feet)
MW114A	USACE	900	1,076.83	1,077.56	-0.73
MW115A	USACE	900	1,076.05	1,076.98	-0.93
MW116A	USACE	900	1,075.60	1,077.18	-1.58
MW117A	USACE	900	1,084.02	1,082.93	1.09
MW118A	USACE	900	1,092.76	1,092.77	-0.01
MW119A	USACE	900	1,115.69	1,116.25	-0.56
MW120A	USACE	900	1,114.19	1,114.66	-0.47
MW120E	USACE	900	1,114.12	1,114.67	-0.55
MW121A	USACE	900	1,115.37	1,116.15	-0.78
MW122A	USACE	900	1,112.24	1,112.66	-0.42
MW123A	USACE	900	1,114.63	1,114.66	-0.03
MW124A	USACE	900	1,119.82	1,120.60	-0.78
MW125A	USACE	900	1,116.75	1,117.65	-0.90
MW126A	USACE	900	1,131.09	1,129.28	1.81
MW127A	USACE	900	1,136.88	1,134.90	1.98
MW128A	USACE	900	1,095.92	1,096.13	-0.21
MW129A	USACE	900	1,089.01	1,089.42	-0.41
MW130A	USACE	900	1,086.55	1,086.62	-0.07
MW131A	USACE	900	1,092.04	1,092.53	-0.49
MW132A	USACE	900	1,094.24	1,094.62	-0.38
MW133A	USACE	900	1,123.59	1,123.39	0.20
MW134A	USACE	900	1,122.43	1,122.01	0.42
MW135A	USACE	900	1,122.72	1,122.48	0.24
MW136A	USACE	900	1,125.50	1,125.65	-0.15
MW137A	USACE	900	1,130.81	1,130.39	0.42
MW138A	USACE	900	1,133.83	1,134.13	-0.30
MW139A	USACE	900	1,136.94	1,138.65	-1.71
MW140A	USACE	900	1,086.68	1,084.40	2.28
MW141A	USACE	900	1,124.80	1,124.14	0.66
MW142A	USACE	900	1,107.71	1,106.36	1.35
MW144A	USACE	900	1,124.15	1,123.16	0.99
MW145A	USACE	900	1,112.75	1,113.35	-0.60
MW146A	USACE	900	1,100.04	1,101.06	-1.02
MW147A	USACE	900	1,098.24	1,098.75	-0.51
MW149A	USACE	900	1,107.08	1,108.61	-1.53
MW150A	USACE	900	1,099.47	1,100.37	-0.90
MW151A	USACE	900	1,115.93	1,115.24	0.69
MW153A	USACE	900	1,102.37	1,103.86	-1.49
MW154A	USACE	900	1,094.79	1,095.03	-0.24
MW155A	USACE	900	1,095.97	1,095.64	0.33
MW157A	USACE	900	1,083.59	1,082.74	0.85
MW158A	USACE	900	1,074.79	1,077.10	-2.31
MW159A	USACE	900	1,116.46	1,116.34	0.12
MW 05-23	MUD	900	1,084.80	1,083.59	1.21
MW 05-22	MUD	900	1,086.46	1,087.02	-0.55

Summary Statistics

Residual Mean	0.33
Abs. Res. Mean	1.24
Res. Std. Dev.	1.59
RMS Error	1.63
Min. Residual	-2.55
Max. Residual	7.45
Range in Observations	107.18
Scaled Abs. Mean	1.15%
Scaled RMS	**1.48%**

FIGURES



NOTE:
Map of Nebraska not to scale.

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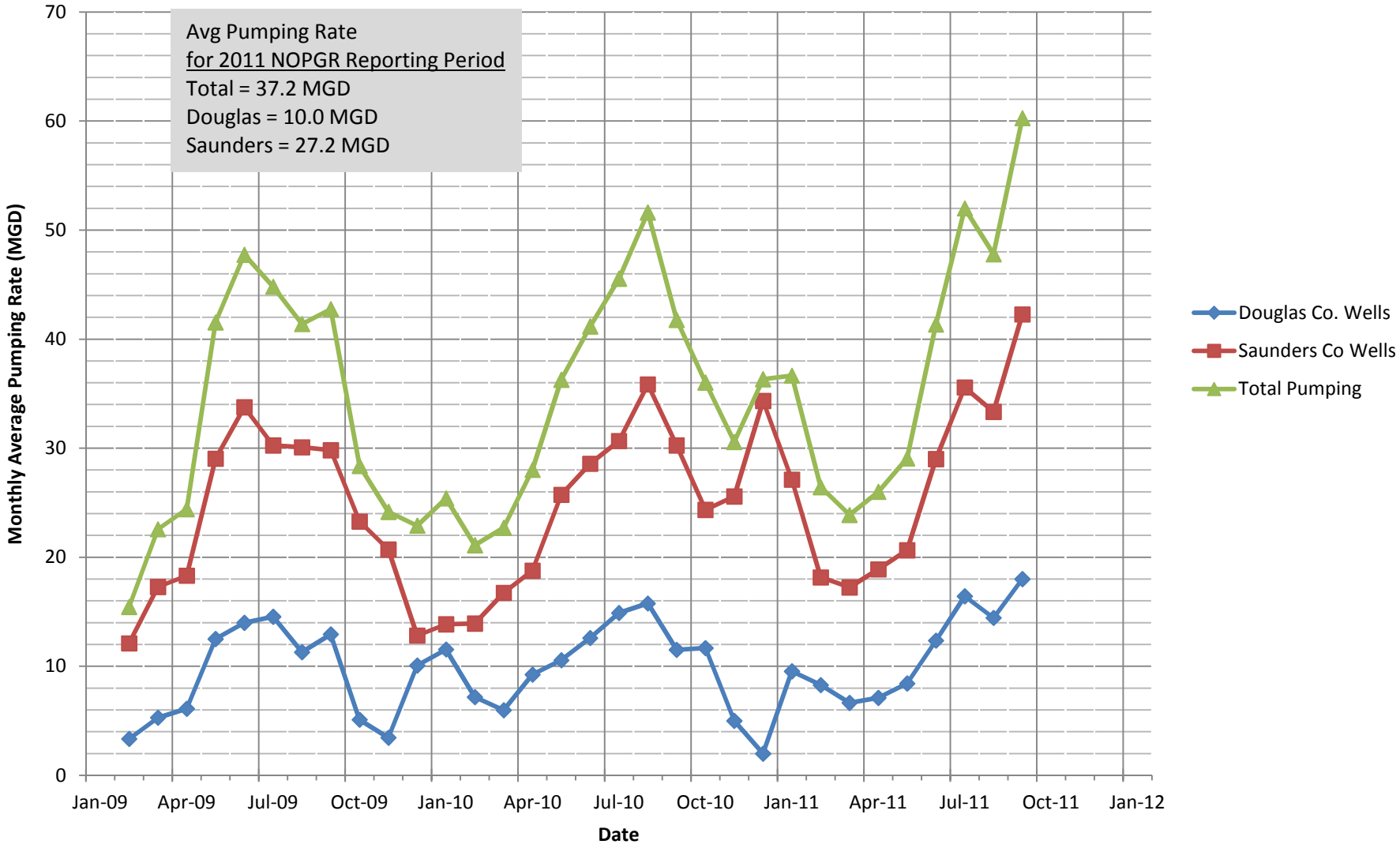
Platte West Well Field
Nebraska Ordnance Plant
Groundwater Report

Figure 1-1
Platte West Well Field
Groundwater Model Boundaries

HDR

January 2012

Figure 2-1
Monthly Average Pumping Rate
February 2009 through September 2011
MUD Platte West Well Field



Note:
All wells shown are equiped with pressure transducer/data logger to measure water level elevations

Platte West Well Field
Nebraska Ordnance Plant
Groundwater Report

Figure 3-1:
Groundwater Monitoring Network

Legend

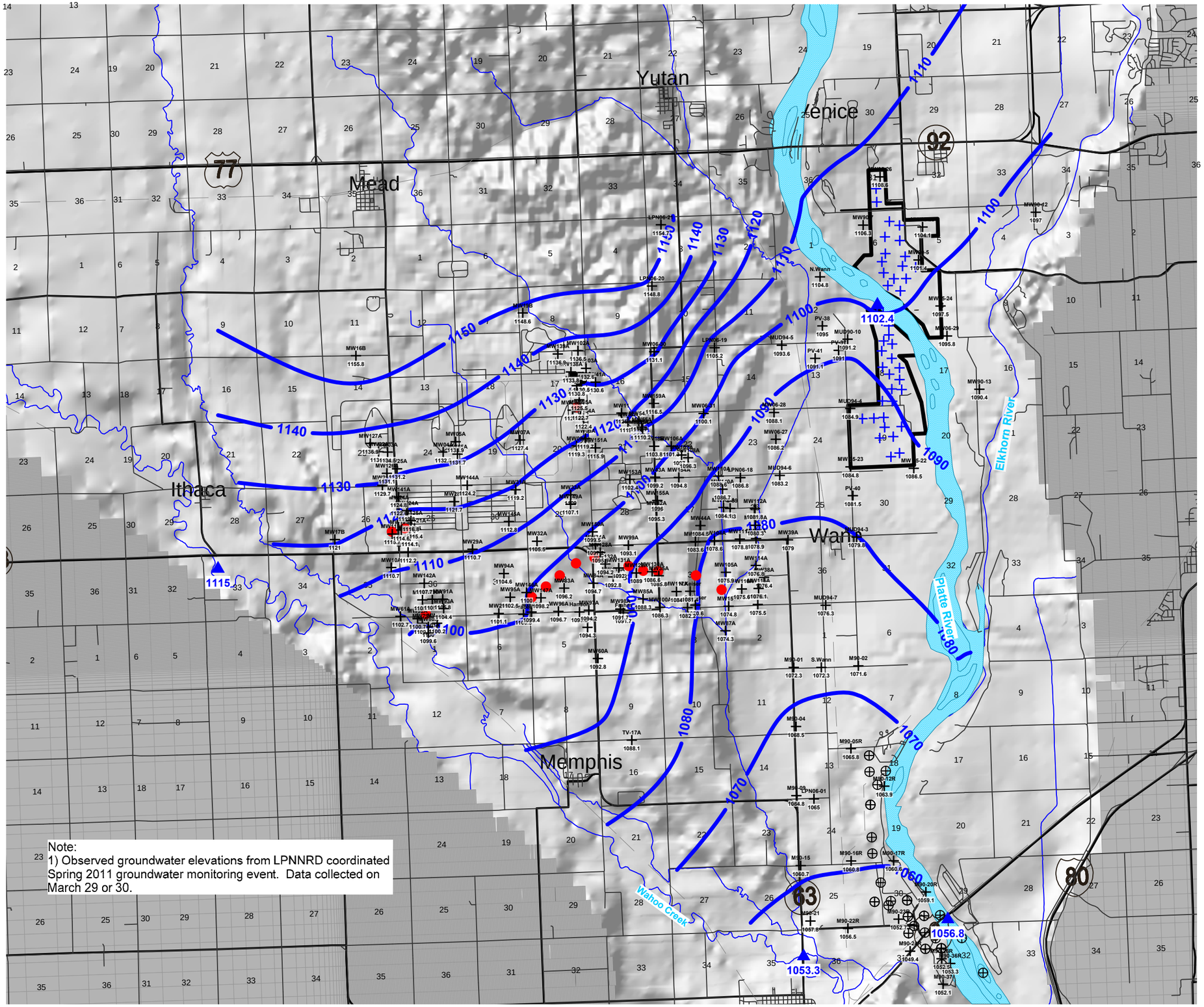
- Monitoring Wells Maintain by LPNNRD or USACE
- Monitoring Wells Maintain by MUD
- FNOP Pumping Wells
- MUD Pumping Wells
- Stream
- MUD Well Field
- Railroad

Highway

- Interstate
- US
- State
- Local
- County Boundary
- City

0 0.5 1 Miles

January 2011



Note:
1) Observed groundwater elevations from LPNNRD coordinated Spring 2011 groundwater monitoring event. Data collected on March 29 or 30.

Platte West Well Field
Nebraska Ordnance Plant
Groundwater Report

Figure 3-2
March 2011 Observed
Potentiometric Surface (ft msl)

LEGEND:

- MW94-5 / 1093.6 — Observation Well with Measured Water Level Elevation in ft msl
- Interpreted Potentiometric Surface Elevation Contour (ft msl)
- Contour Interval = 10 feet
- 1102.4 — USGS Gauging Station with Stream Elevation (ft msl)

Pumping Wellfields Operating During March 2011 Water Level Event

- Platte West Well Field Boundary
- Platte West Well Field Well
- FNOP Containment/Focused Extraction Well
- Ashland City Well/Lincoln Well Field Well

MAP SCALE (feet)
0 4000 8000

January 2012

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Platte West Well Field
Nebraska Ordnance Plant
Groundwater Report

Figure 5-1
Comparison of Simulated and Observed Potentiometric Surfaces (ft msl) for March 2011

LEGEND:

MW94-5
1093.6
Observation Well with Measured Water Level Elevation in ft msl

Interpreted Potentiometric Surface Elevation Contour (ft msl)

Simulated Potentiometric Surface Elevation Contour (ft msl)

Contour Interval = 10 feet

1102.4
USGS Gauging Station with Stream Elevation (ft msl)

Pumping Wellfields Operating During March 2011 Water Level Event

Platte West Well Field Boundary

Platte West Well Field Well

FNOP Containment/Focused Extraction Well

Ashland City Well/Lincoln Well Field Well

MAP SCALE (feet)
0 4000 8000

N

Note:
1) Observed groundwater elevations from LPNNRD coordinated Spring 2011 groundwater monitoring event. Data collected on March 29 or 30.
2) Simulated data from final time step of stress period 30
3) Contour intervals = 10 feet

HDR

January 2012

Figure 5-2
Comparison of Predicted vs Observed Water Level Elevations
End of March 2011 Calibration Check

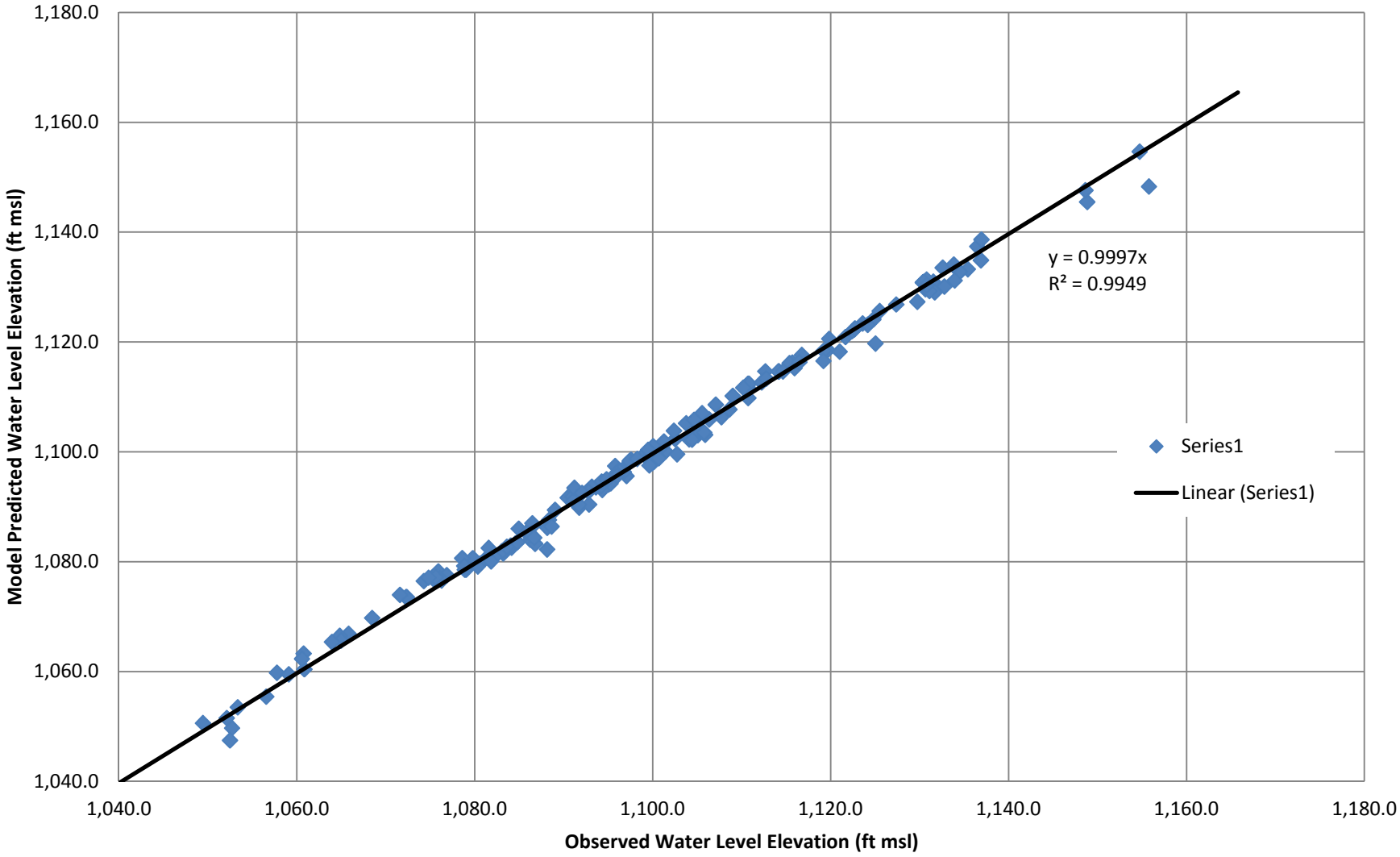
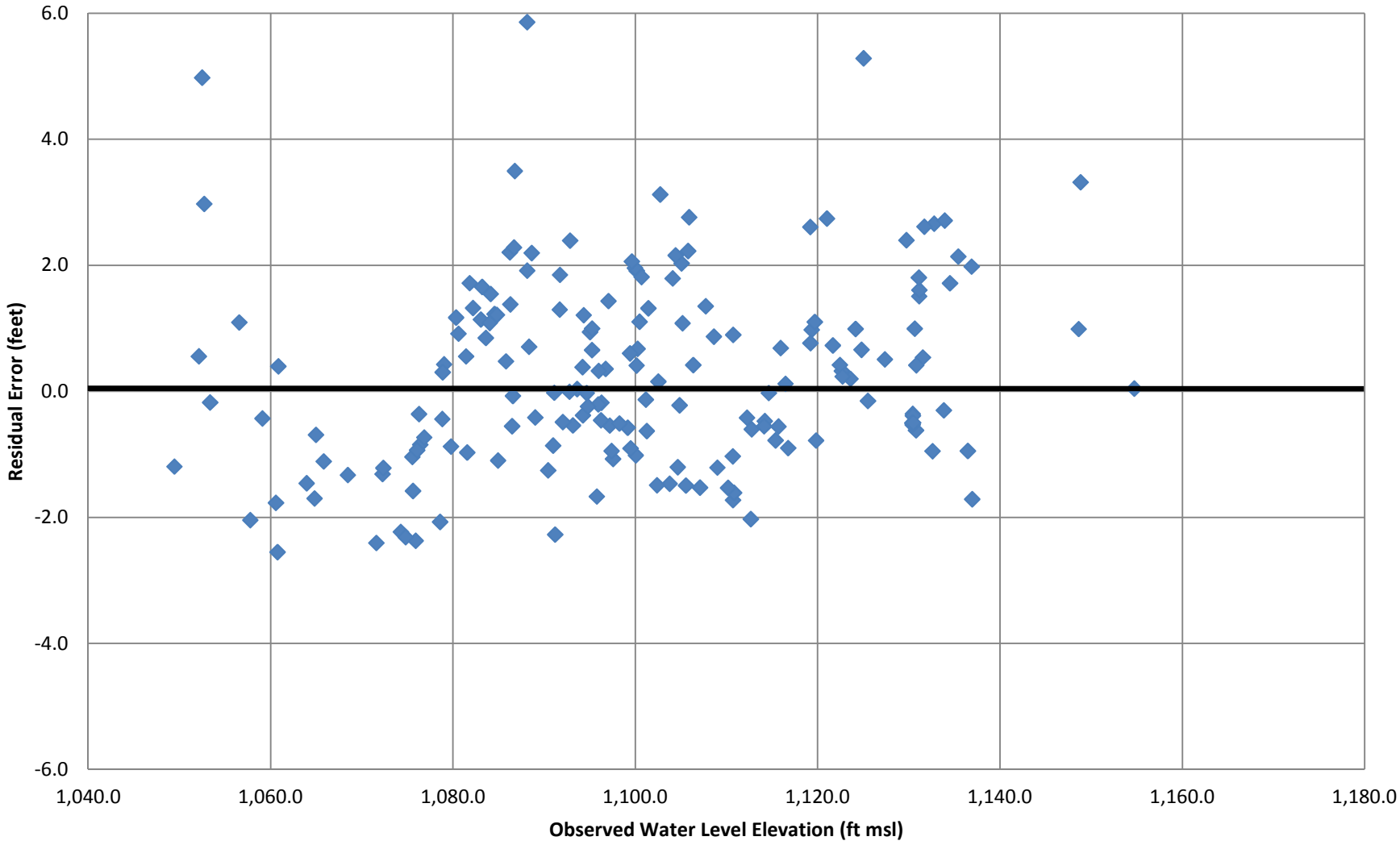


Figure 5-2b
Comparison of Residual Error vs Observed Water Level Elevation
End of March 2011 Calibration Check



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MW05-26
MW94-1
MW90-7
MW05-25
MW94-2
MW90-5
MW05-24
MW 04-17
MW06-29
MW 90-10
MW 94-5
MW90-13
MW 06-28
MW 94-4
MW 06-18
MW 94-6
MW 05-23
MW 05-22
MW 94-3
MW 94-7

35 31 2 6 5 11 13 18 17 24 19 20 25 35 36

Note:
1) Full size hydrographs presented in Appendix 5-1.
2) Hydrographs show measured groundwater elevation in blue and model predicted groundwater elevation in red.
3) Hydrographs developed for two year simulation.

MAP SCALE (feet)

0 3000 6000

LEGEND:

MW90-5 + Transducer Equipped Observation Well

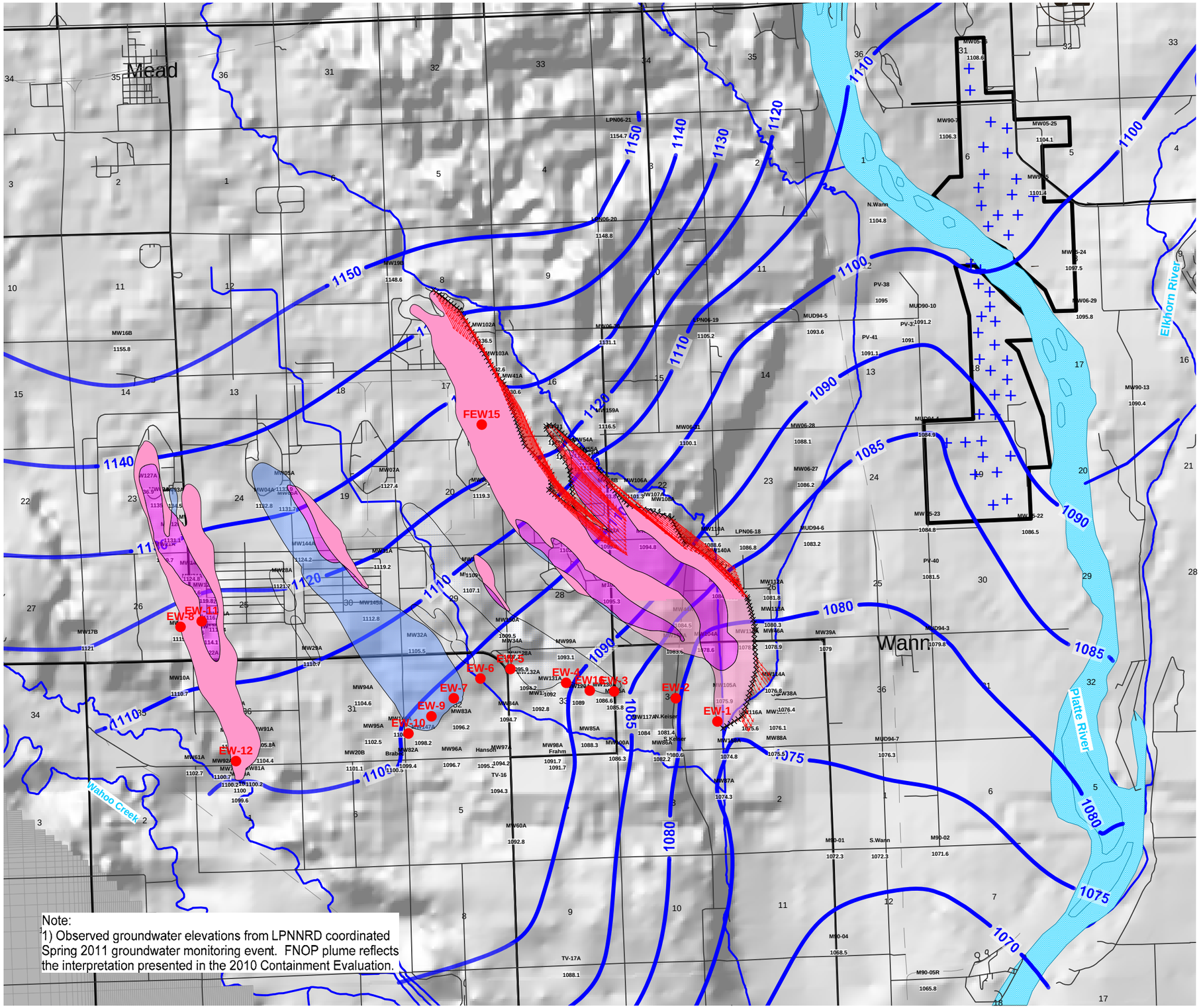
Platte West Well Field Boundary

+ Platte West Well Field Pumping Well

Figure 5-3
Summary of Model Predicted and Observed Hydrographs for MUD Observation Wells Near Well Field

HDR

January 2012



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Platte West Well Field
Nebraska Ordnance Plant
Groundwater Report

Figure 5-6
Transient Particle Tracking Results
(October 2008 to September 2011)

LEGEND:

- 1079.8 — Observation Well with Measured Water Level Elevation in ft msl (March 2011)
- Interpreted Potentiometric Surface Elevation Contour (ft msl) - March 2011
- MODPATH Particle Starting Location
- Three Year Particle Trace (MODPATH)
- TCE Plume
- Overlapping RDX/TCE Plume
- RDX Plume

Pumping Wellfields Operating During MODFLOW/MODPATH Simulation

- Platte West Well Field Boundary
- Platte West Well Field Well
- FNOP Containment/Focused Extraction Well

MAP SCALE (feet)

0 5000 10000

HDR

January 2012

APPENDICES

Appendix 3-1: Historical Monitoring Well Hydrographs

Appendix 3-2: 2008 – 2010 Data Monitoring Well Hydrographs

Appendix 3-3: Previous Interpreted Potentiometric Surface Maps

Appendix 3-4: Platte River Streamflow/Stage Data

Appendix 4-1: FNOP Plume Baseline

Appendix 4-2: Groundwater Chemical Sampling Data

Appendix 5-1: Groundwater Elevation Comparison Hydrographs

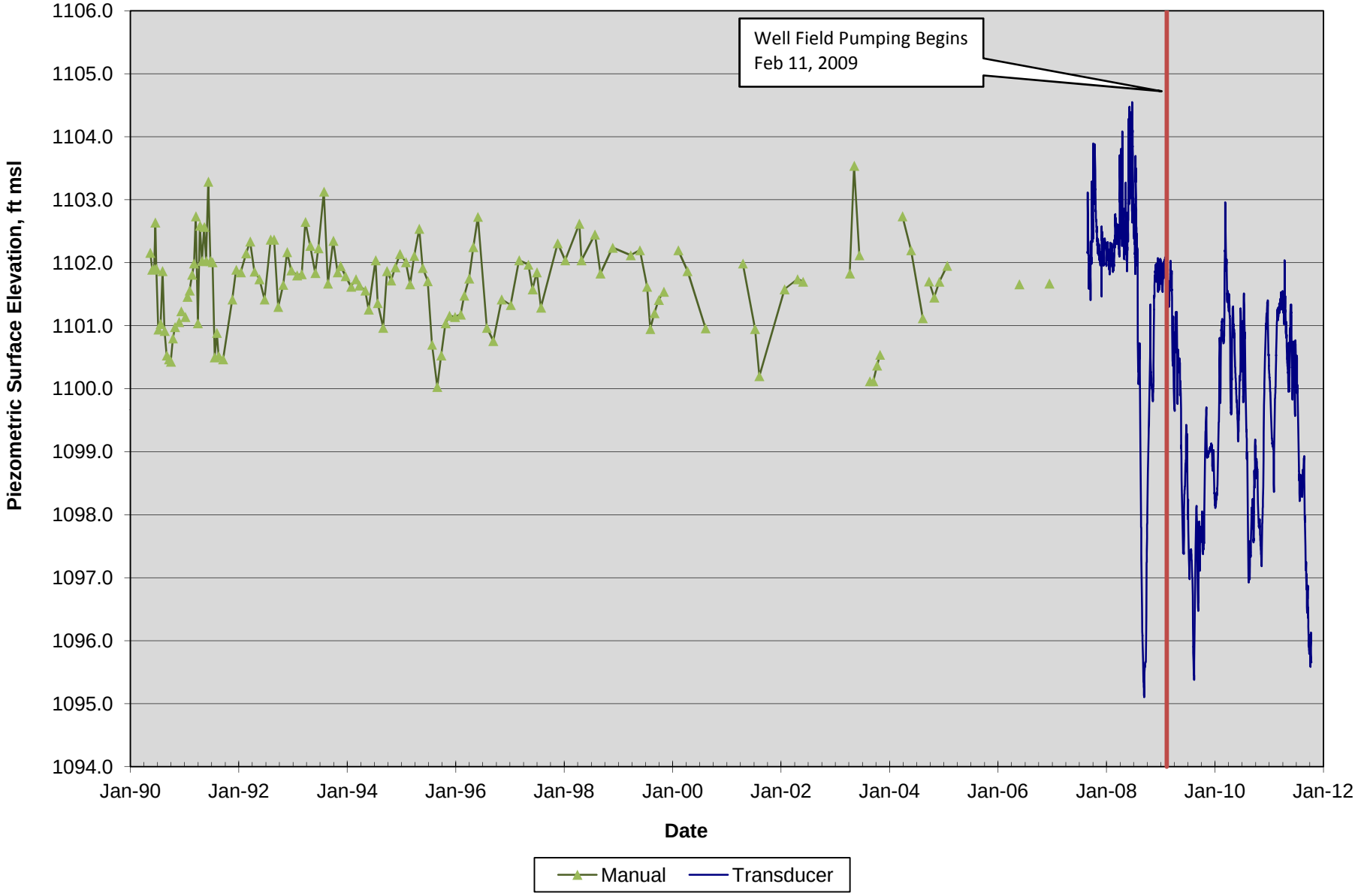
Appendix 5-2: Forecast Model Simulation – Predicted Potentiometric Surface Map

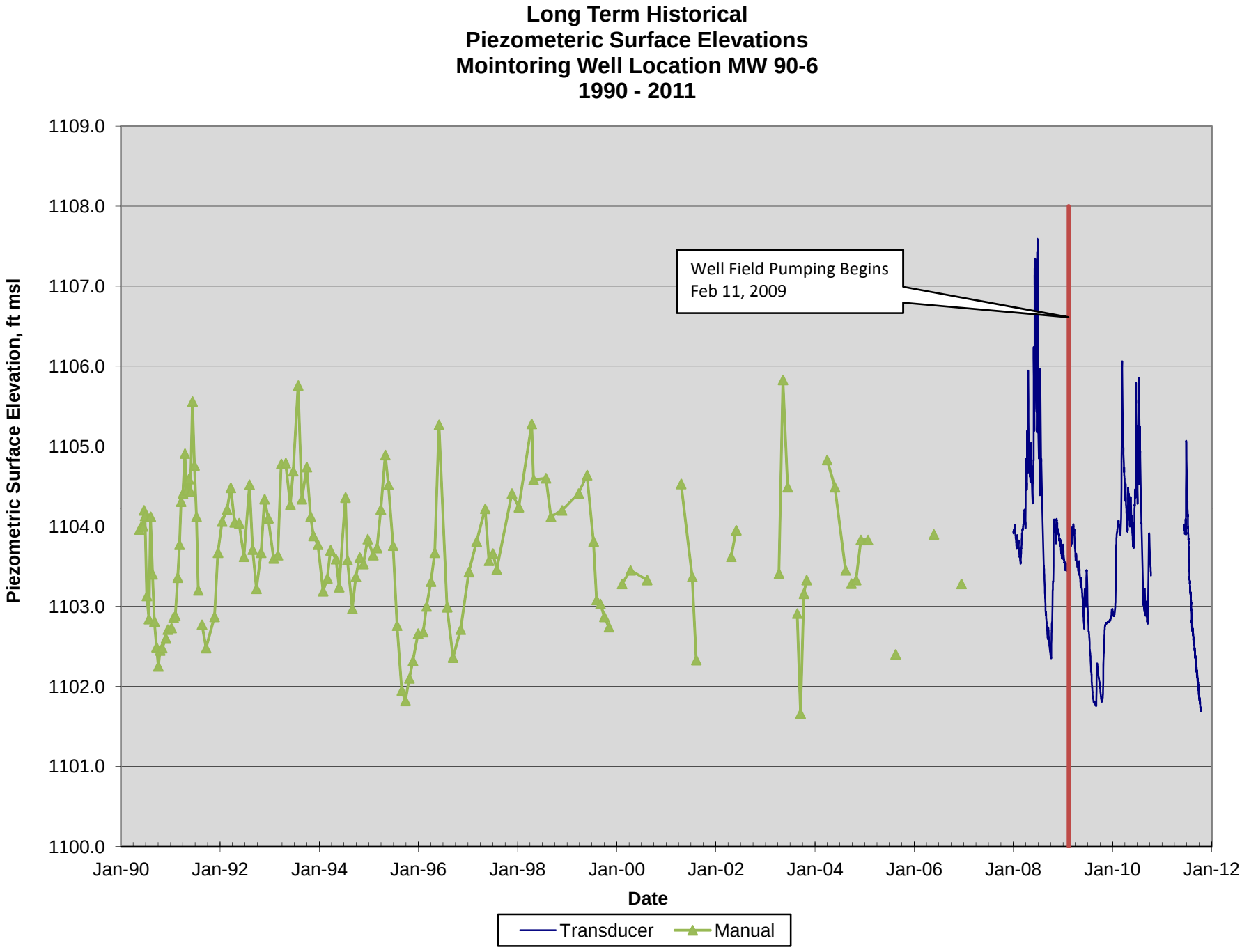
Appendix 3-1

Historical Monitoring Well Hydrographs

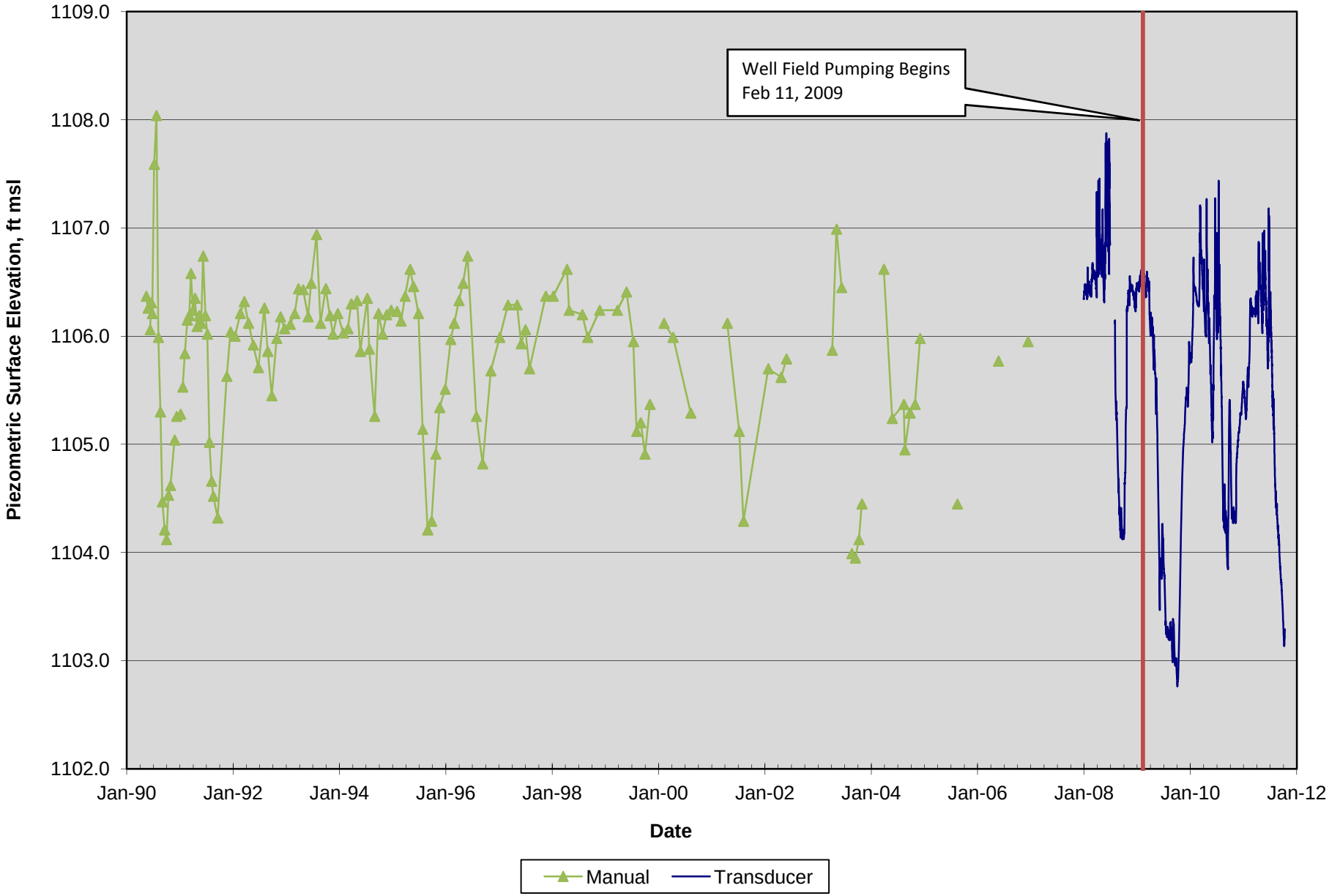
Douglas County Monitoring Wells

Long Term Historical
Piezometeric Surface Elevations
Mointoring Well Location MW 90-5
1990 - 2011

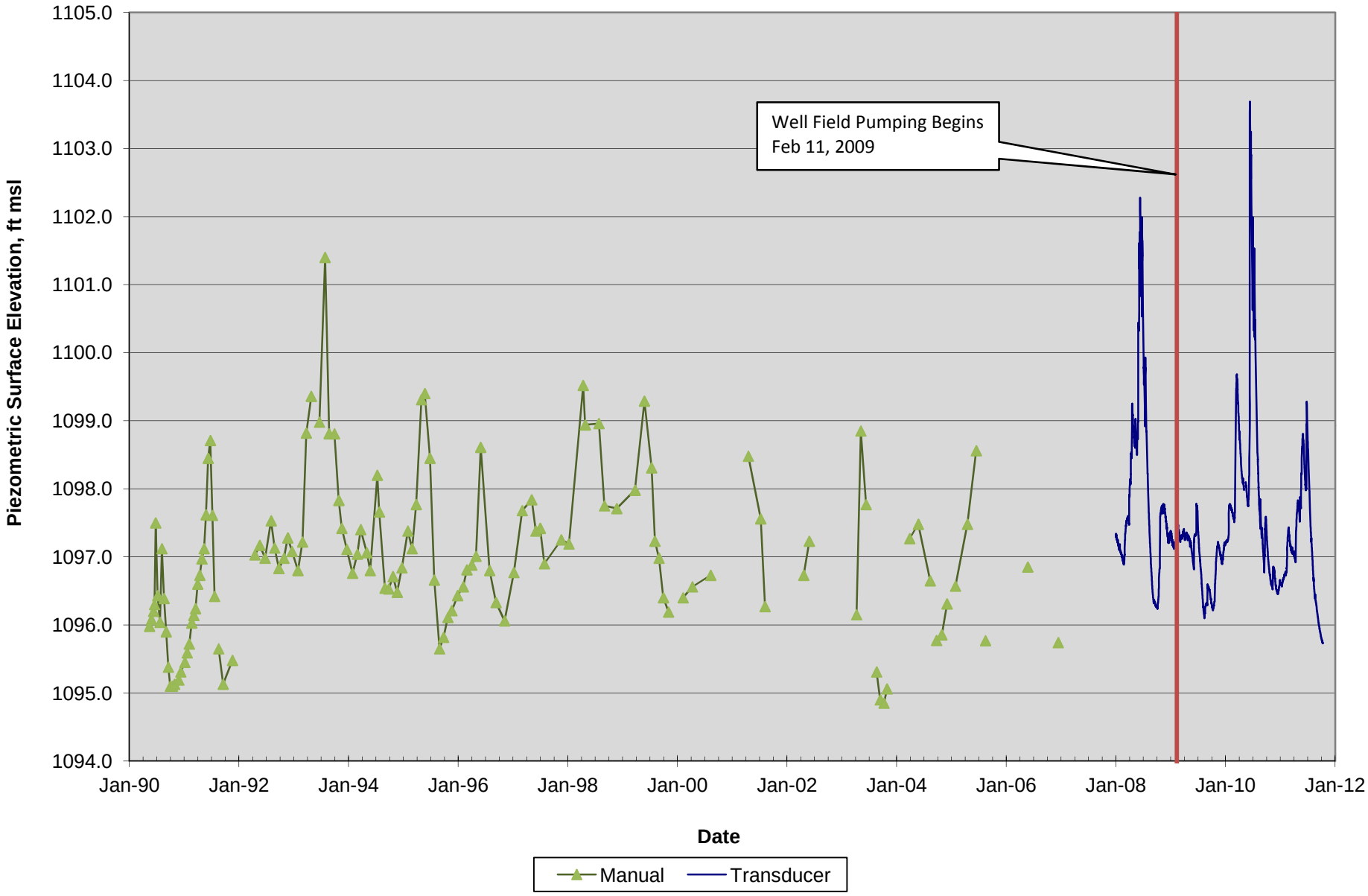



Long Term Historical
Piezometeric Surface Elevations
Mointoring Well Location MW 90-6
1990 - 2011
Piezometric Surface Elevation, ft msl
1109.0
1108.0
1107.0
1106.0
1105.0
1104.0
1103.0
1102.0
1101.0
1100.0
Well Field Pumping Begins
Feb 11, 2009
Jan-90
Jan-92
Jan-94
Jan-96
Jan-98
Jan-00
Jan-02
Jan-04
Jan-06
Jan-08
Jan-10
Jan-12
Date
Transducer
Manual

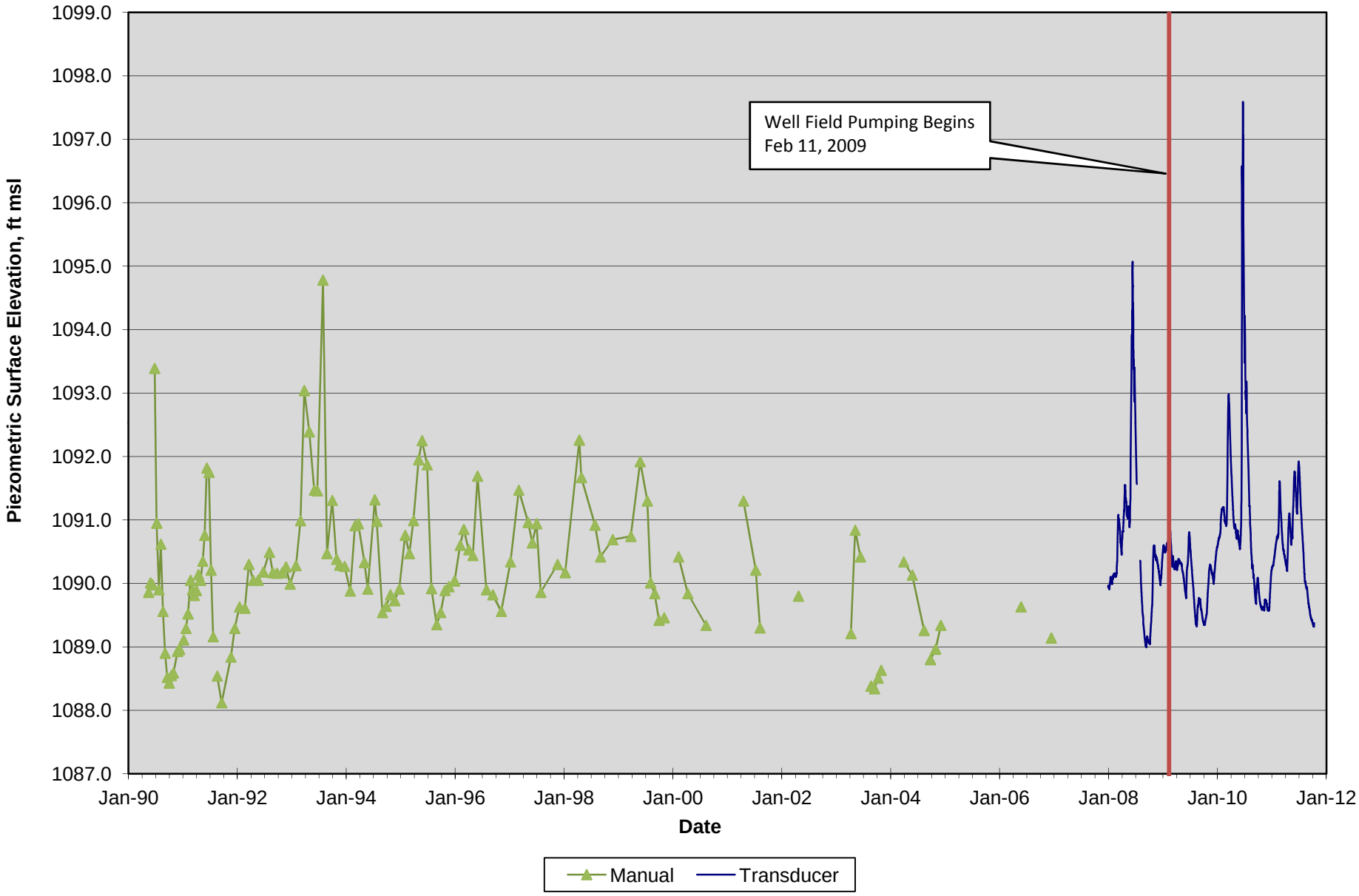
Long Term Historical
Piezometeric Surface Elevations
Mointoring Well Location MW 90-7
1990 - 2011



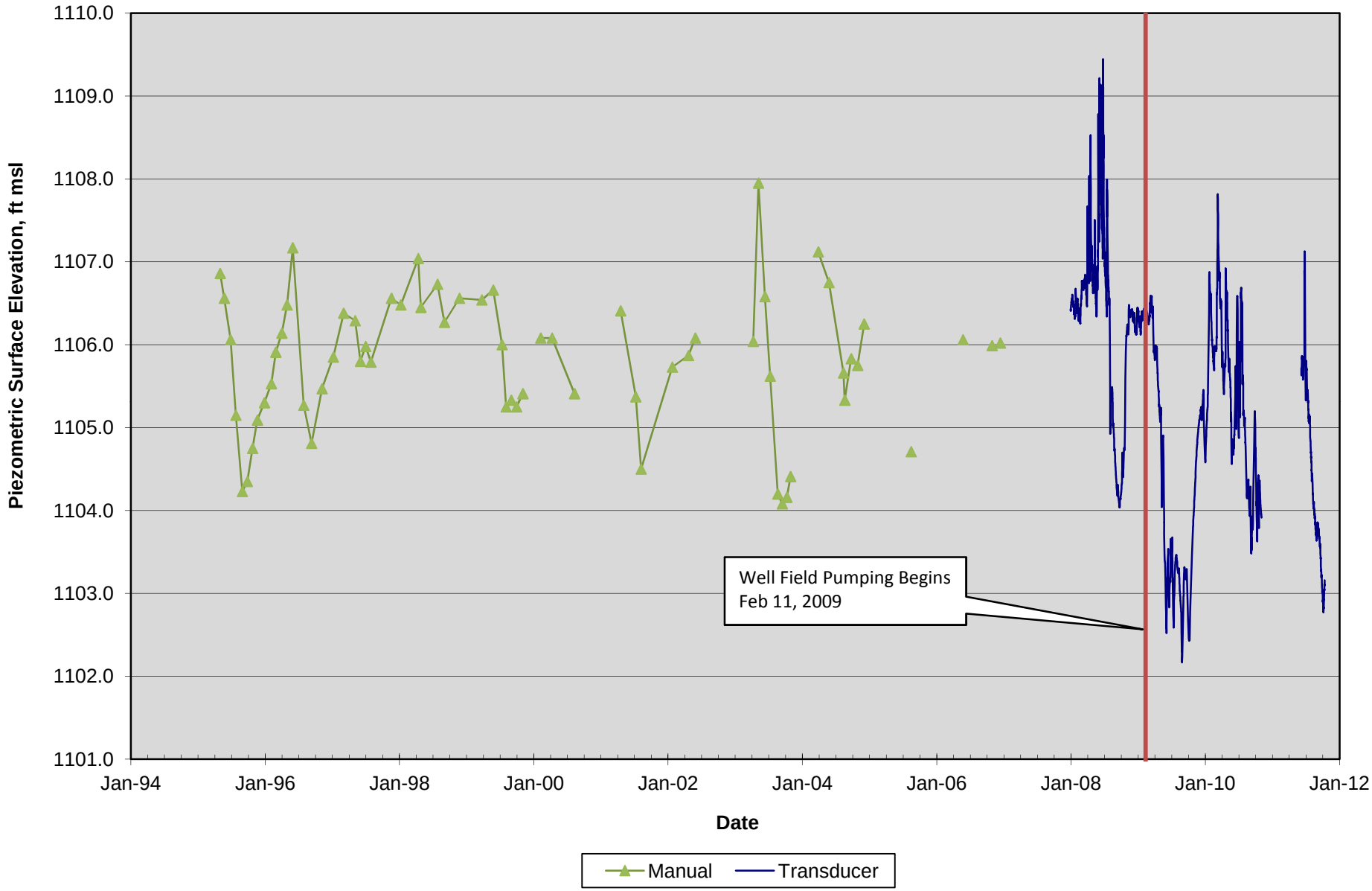
Long Term Historical
Piezometeric Surface Elevations
Mointoring Well Location MW 90-12
1990 - 2011



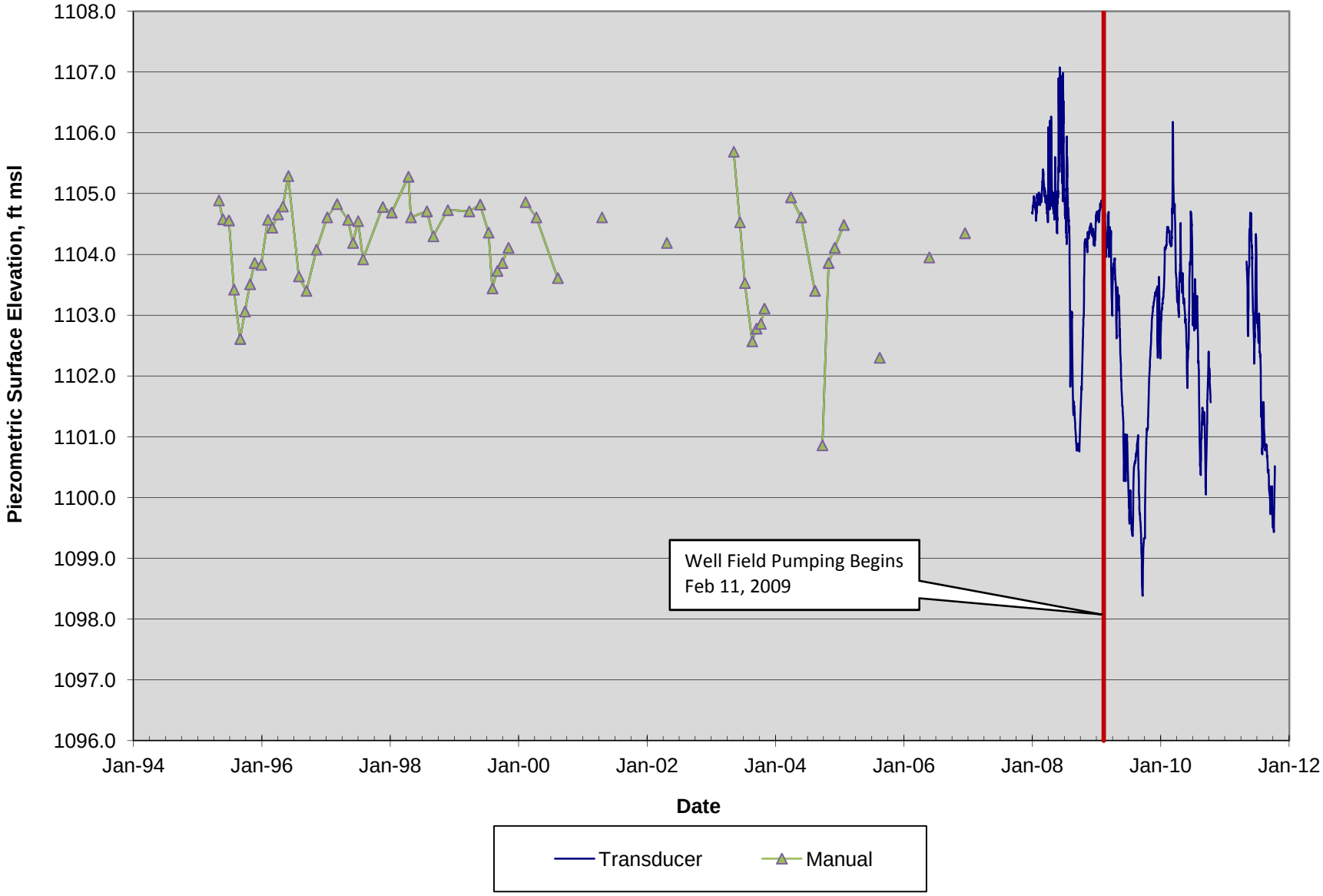
Long Term Historical
Piezometeric Surface Elevations
Mointoring Well Location MW 90-13
1990 - 2011



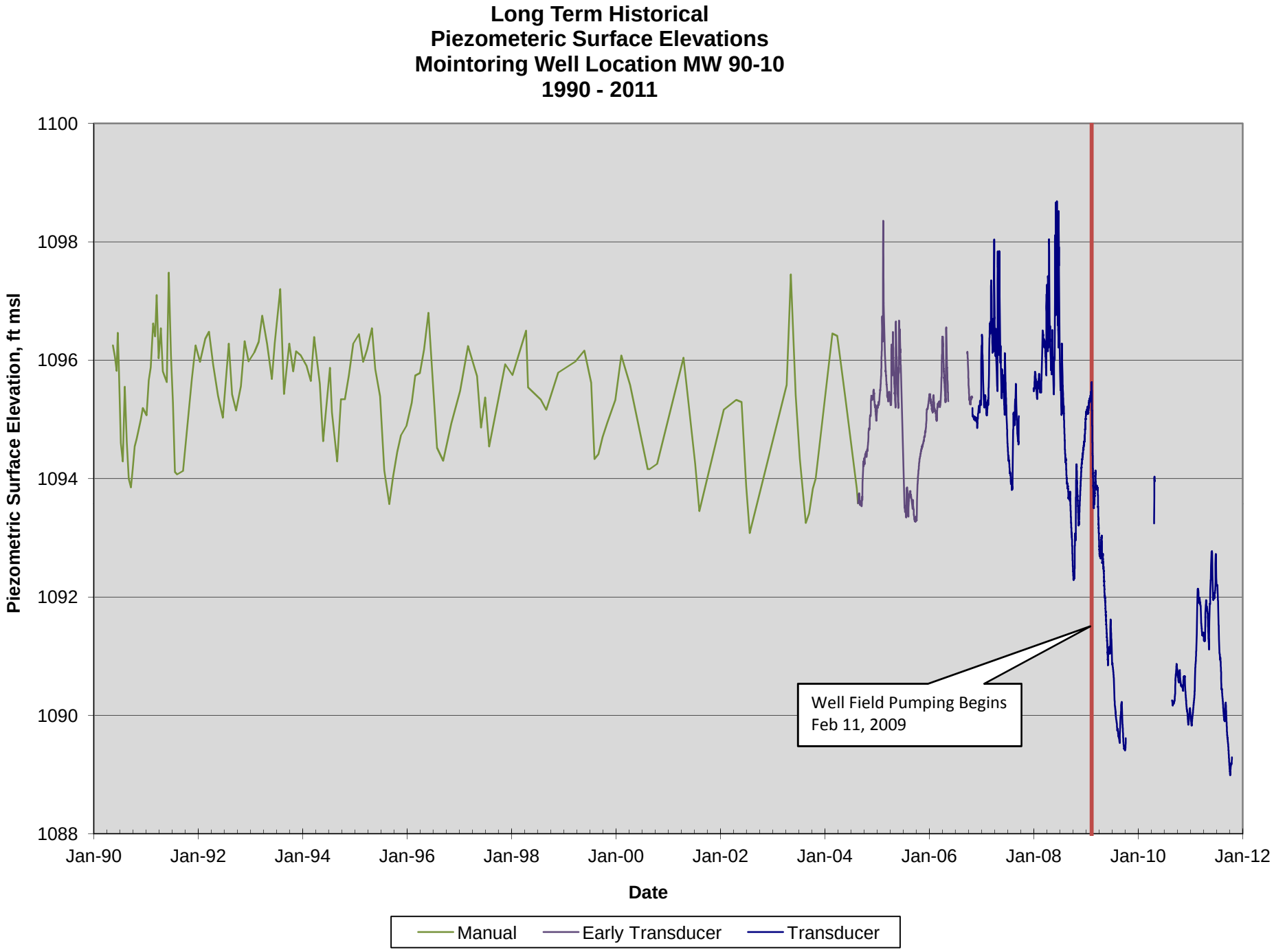
Long Term Historical
Piezometeric Surface Elevations
Mointoring Well Location MW 94-1
1995 - 2011



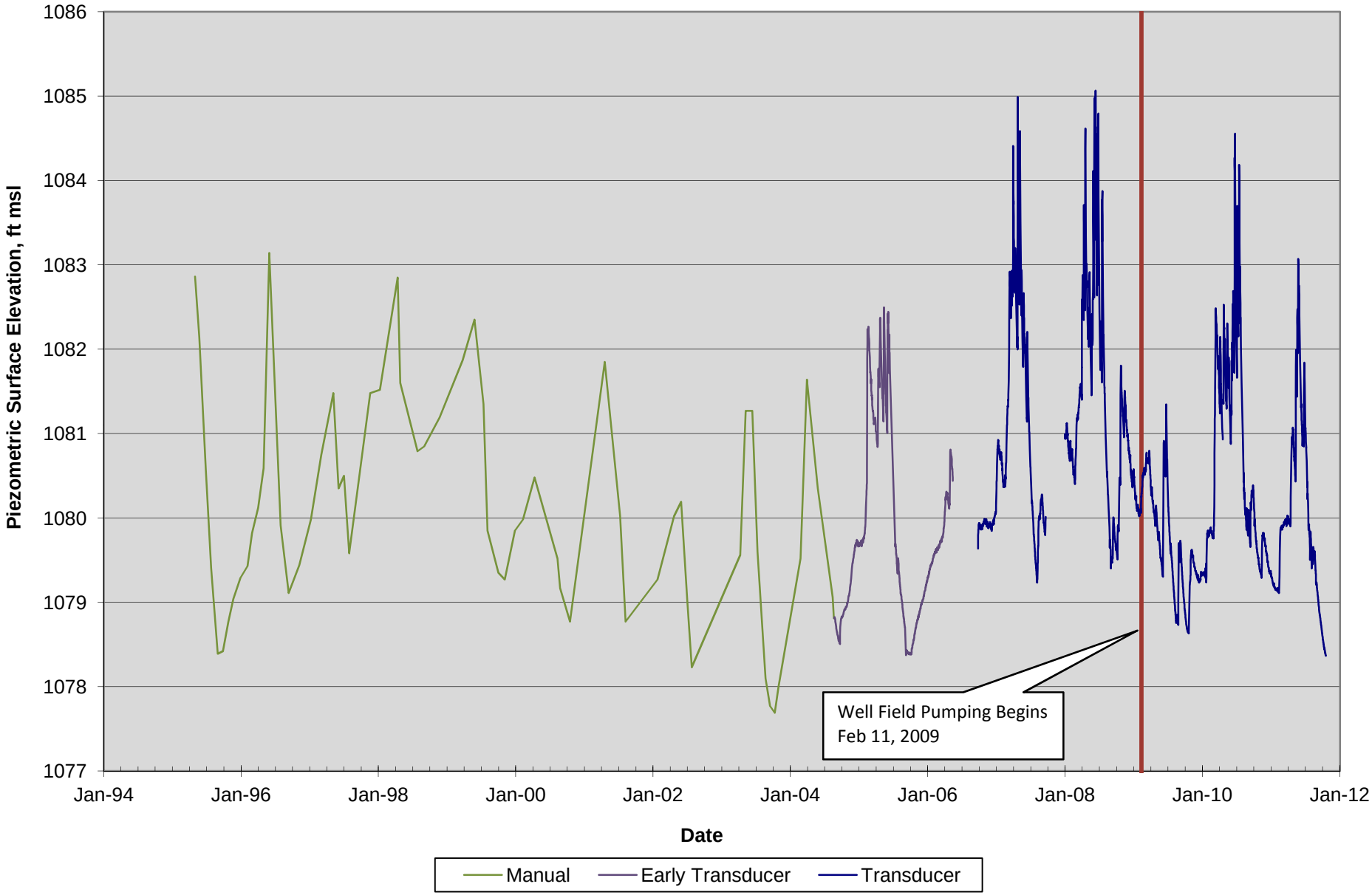
Long Term Historical
Piezometeric Surface Elevations
Mointoring Well Location MW 94-2
1995 - 2011

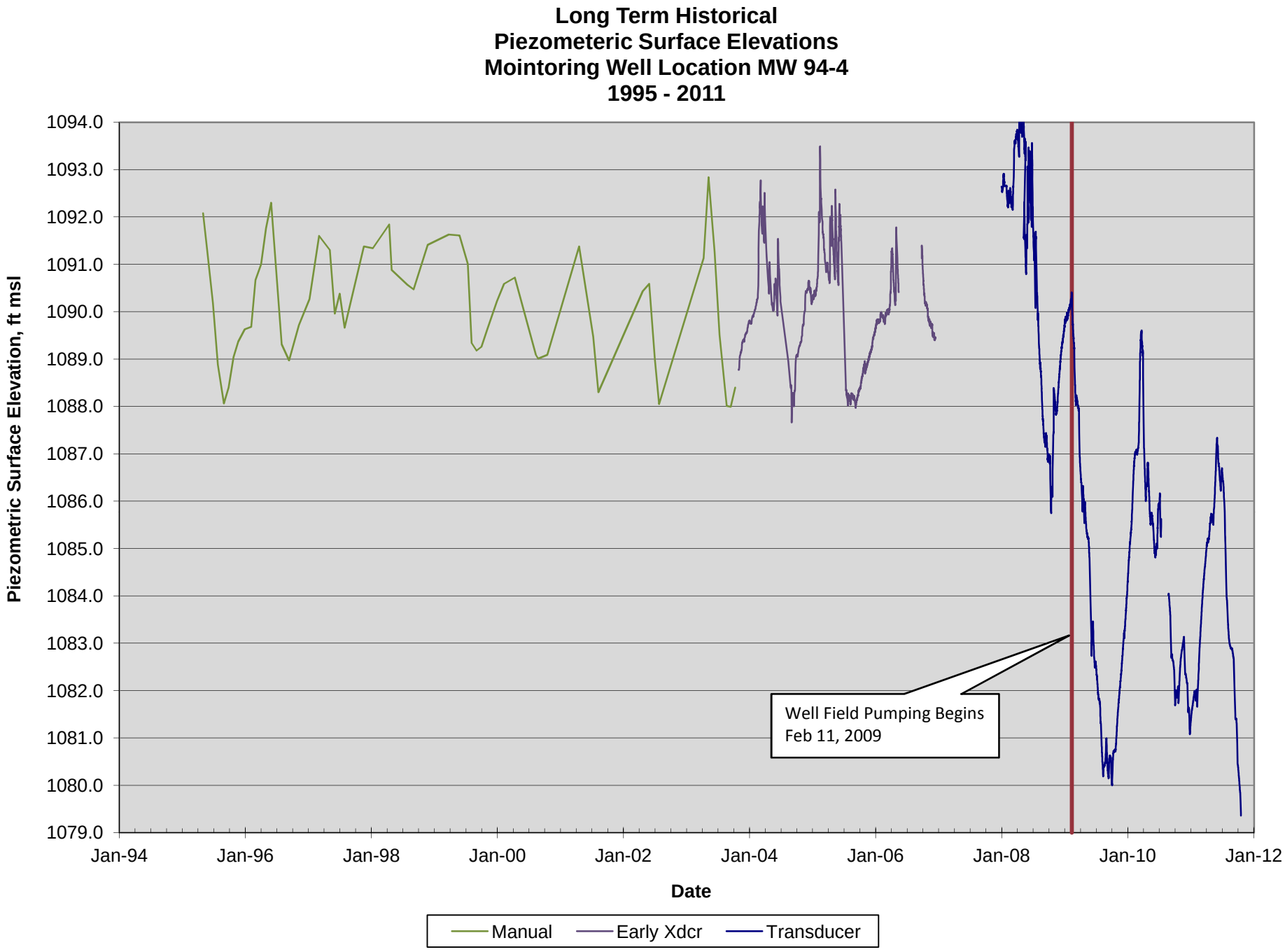


Saunders County Monitoring Wells

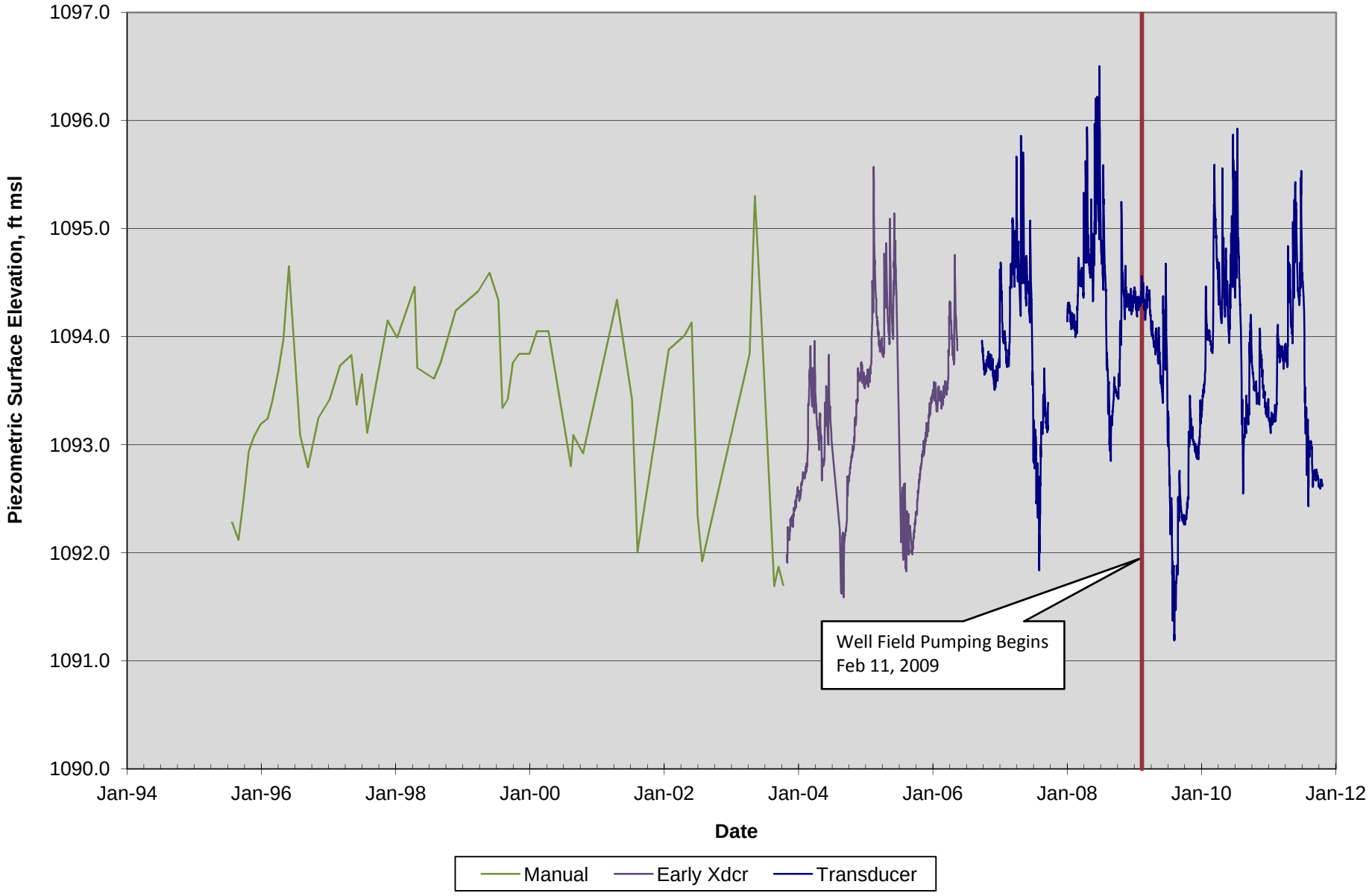

Long Term Historical
Piezometeric Surface Elevations
Mointoring Well Location MW 90-10
1990 - 2011
Piezometric Surface Elevation, ft msl
1100
1098
1096
1094
1092
1090
1088
Jan-90
Jan-92
Jan-94
Jan-96
Jan-98
Jan-00
Jan-02
Jan-04
Jan-06
Jan-08
Jan-10
Jan-12
Date
Well Field Pumping Begins
Feb 11, 2009
Manual
Early Transducer
Transducer

Long Term Historical
Piezometeric Surface Elevations
Mointoring Well Location MW 94-3
1995 - 2011

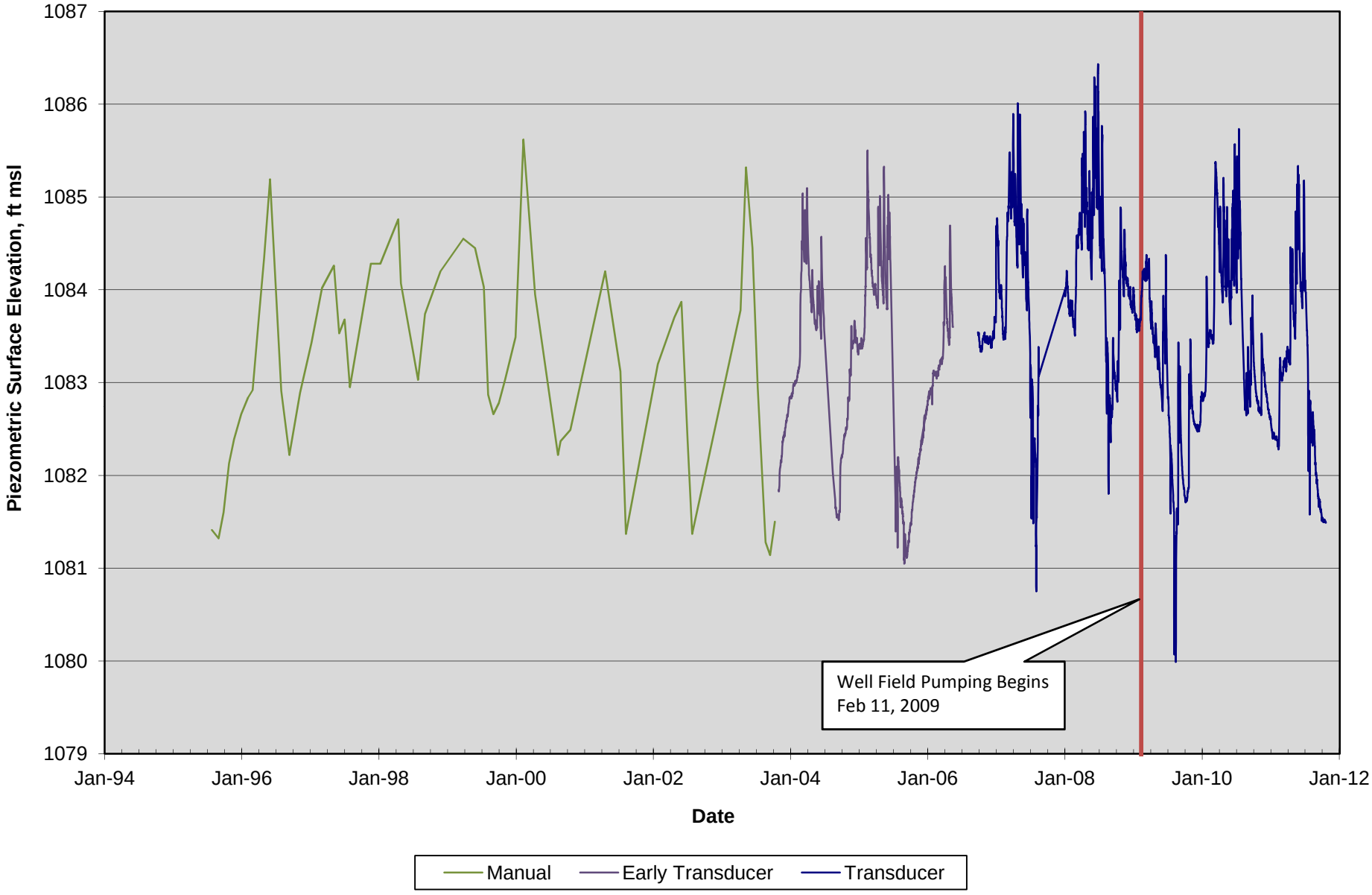


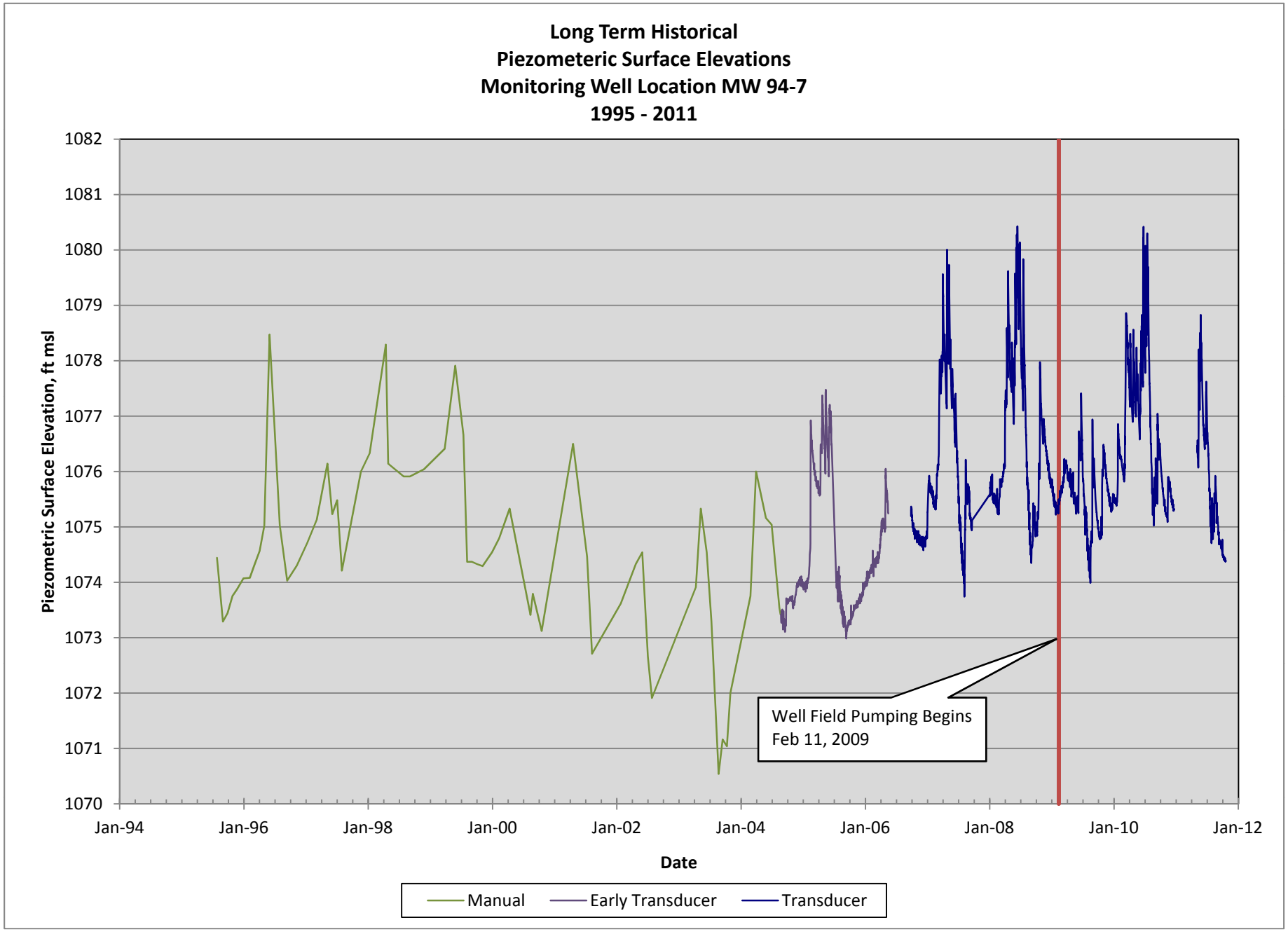

Long Term Historical
Piezometeric Surface Elevations
Mointoring Well Location MW 94-4
1995 - 2011
Piezometric Surface Elevation, ft msl
1094.0
1093.0
1092.0
1091.0
1090.0
1089.0
1088.0
1087.0
1086.0
1085.0
1084.0
1083.0
1082.0
1081.0
1080.0
1079.0
Jan-94
Jan-96
Jan-98
Jan-00
Jan-02
Jan-04
Jan-06
Jan-08
Jan-10
Jan-12
Date
Well Field Pumping Begins
Feb 11, 2009
Manual
Early Xdcr
Transducer

Long Term Historical
Piezometeric Surface Elevations
Mointoring Well Location MW 94-5
1995 - 2011



Long Term Historical
Piezometeric Surface Elevations
Monitoring Well Location MW 94-6
1995 - 2011




Long Term Historical
Piezometeric Surface Elevations
Monitoring Well Location MW 94-7
1995 - 2011
Piezometric Surface Elevation, ft msl
1082
1081
1080
1079
1078
1077
1076
1075
1074
1073
1072
1071
1070
Jan-94
Jan-96
Jan-98
Jan-00
Jan-02
Jan-04
Jan-06
Jan-08
Jan-10
Jan-12
Date
Well Field Pumping Begins
Feb 11, 2009
Manual
Early Transducer
Transducer

Appendix 3-2

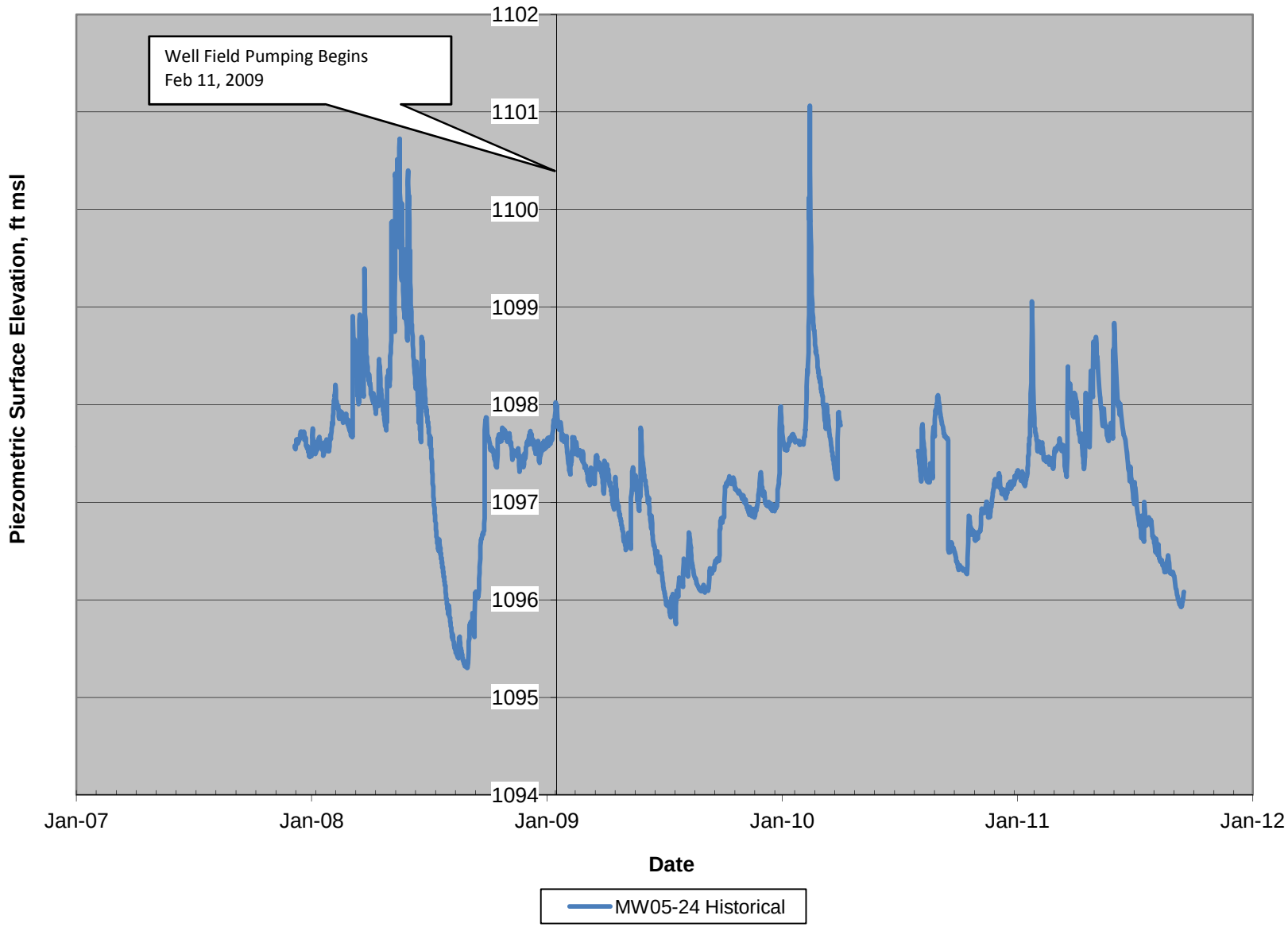
2008 – 2009 Data

Monitoring Well Hydrographs

Douglas County Monitoring Wells

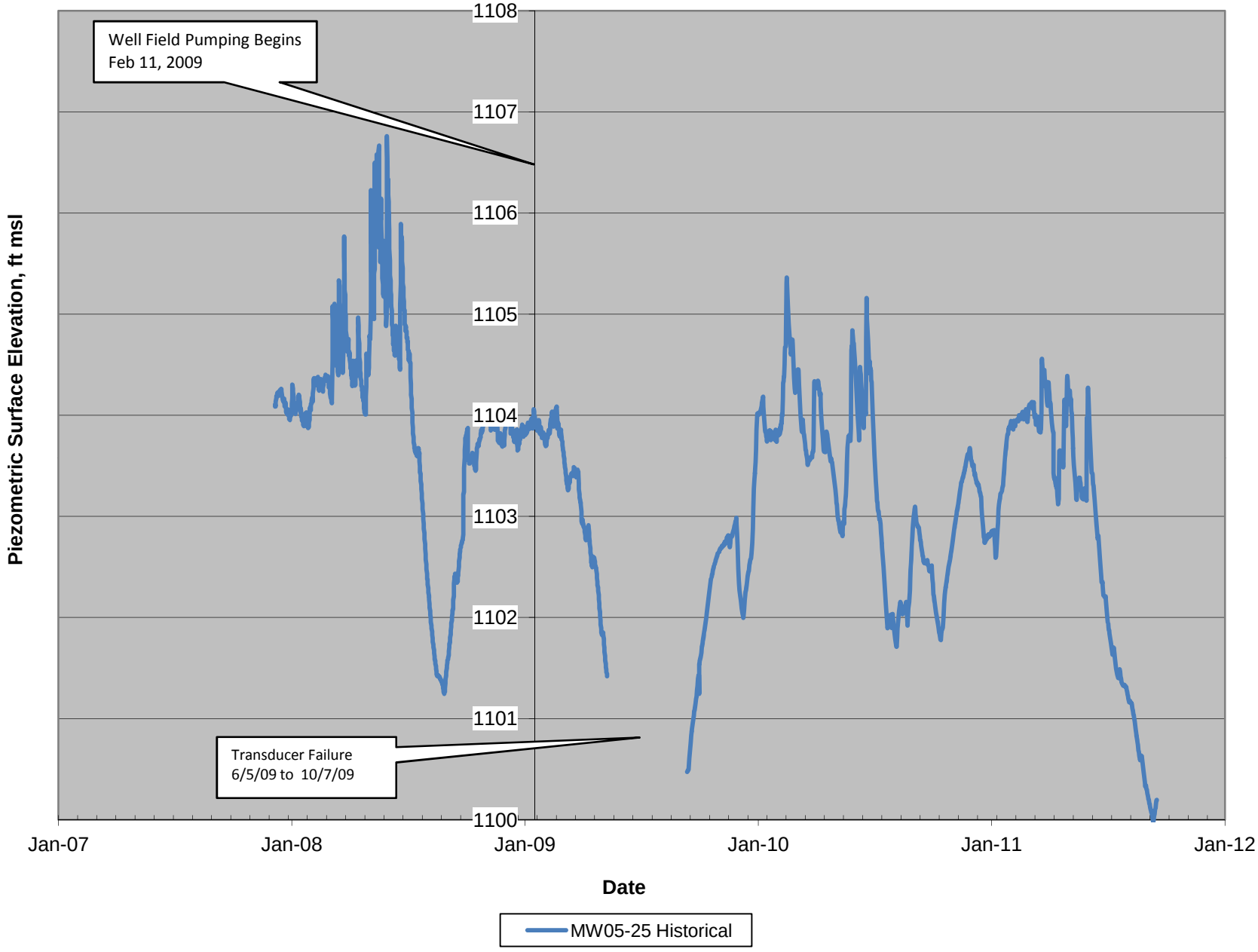
DRAFT

MW05-24 Piezometric Surface Elevations



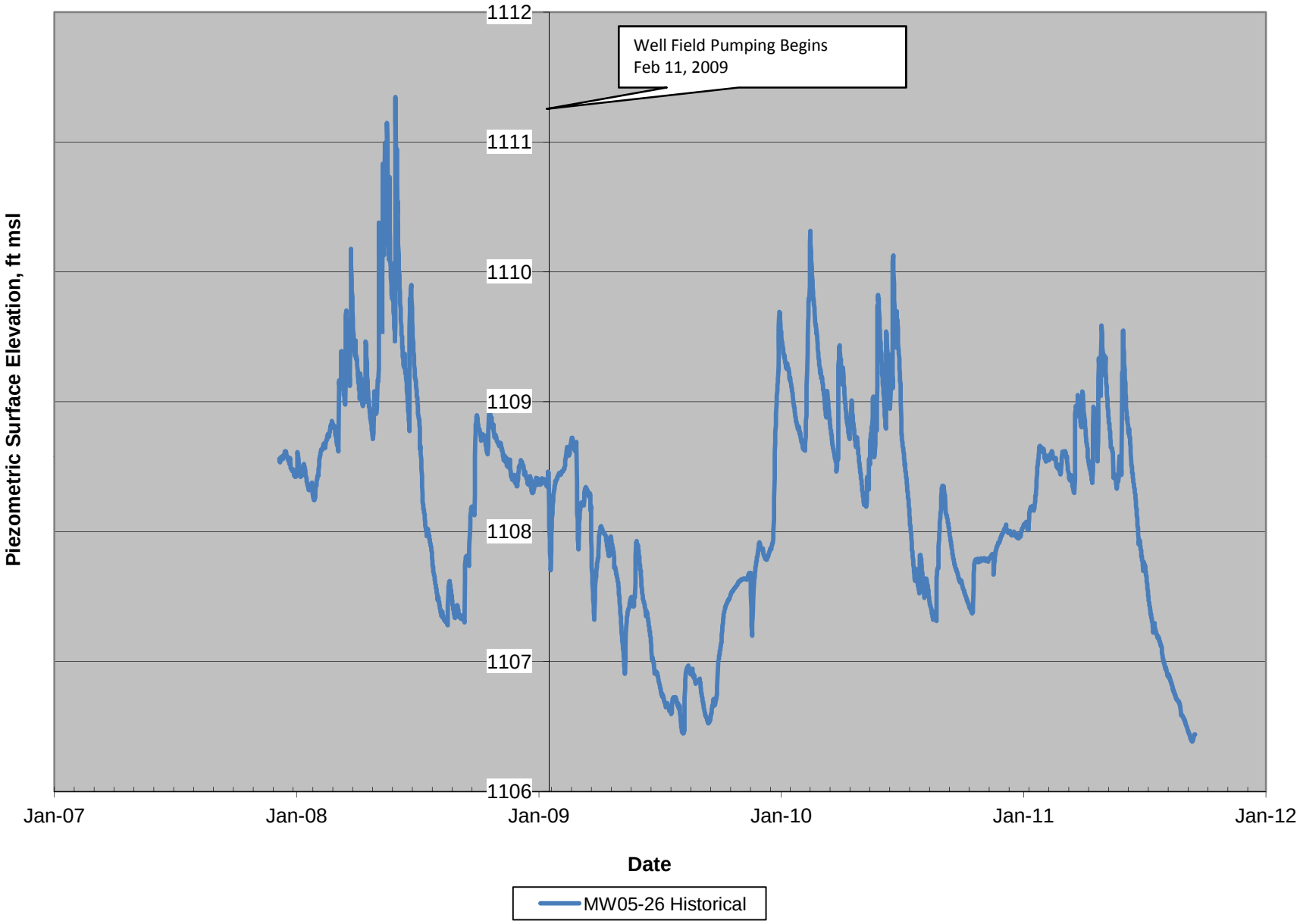
DRAFT

MW05-25 Piezometric Surface Elevations



DRAFT

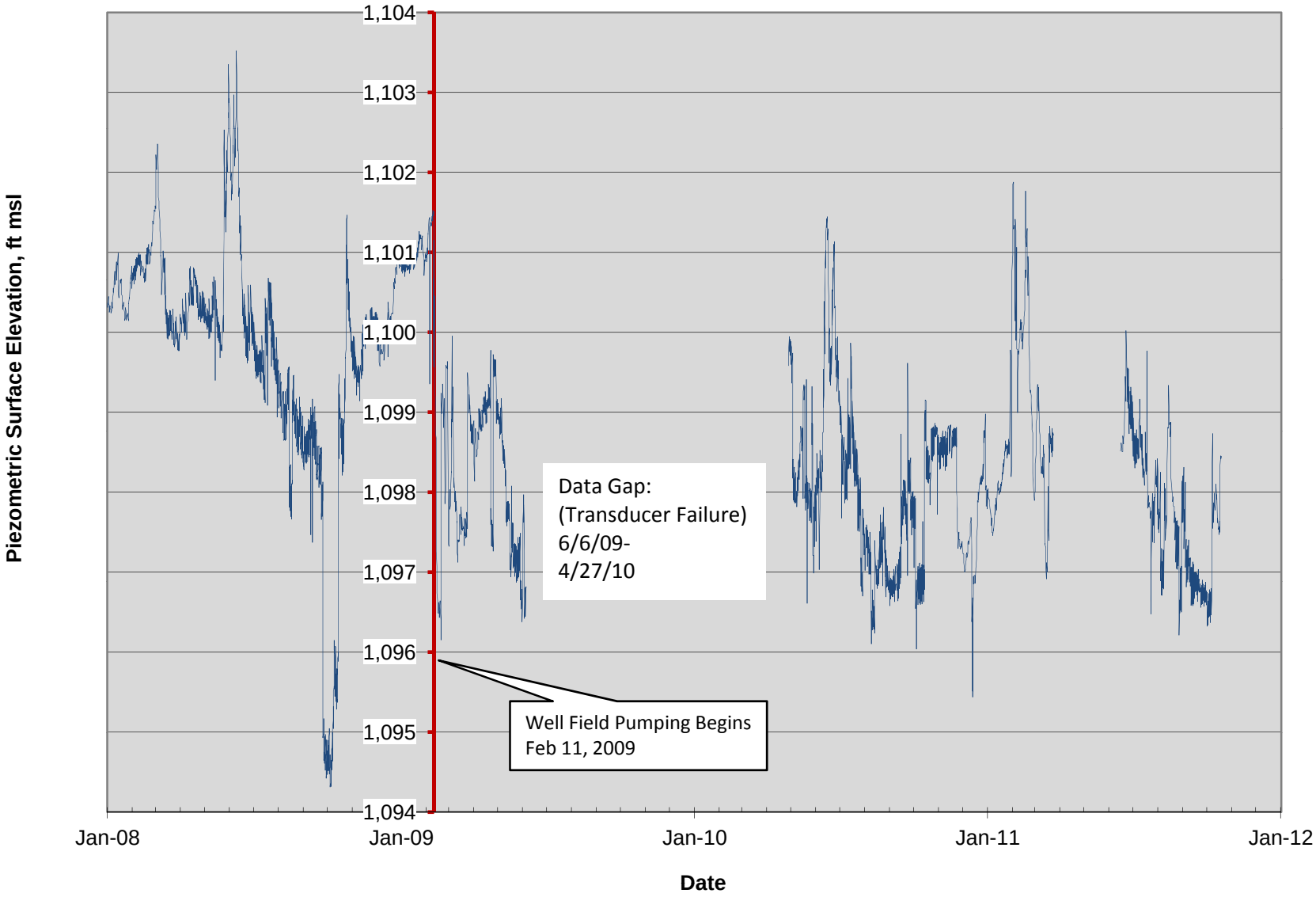
MW05-26 Piezometric Surface Elevations



Saunders County Monitoring Wells

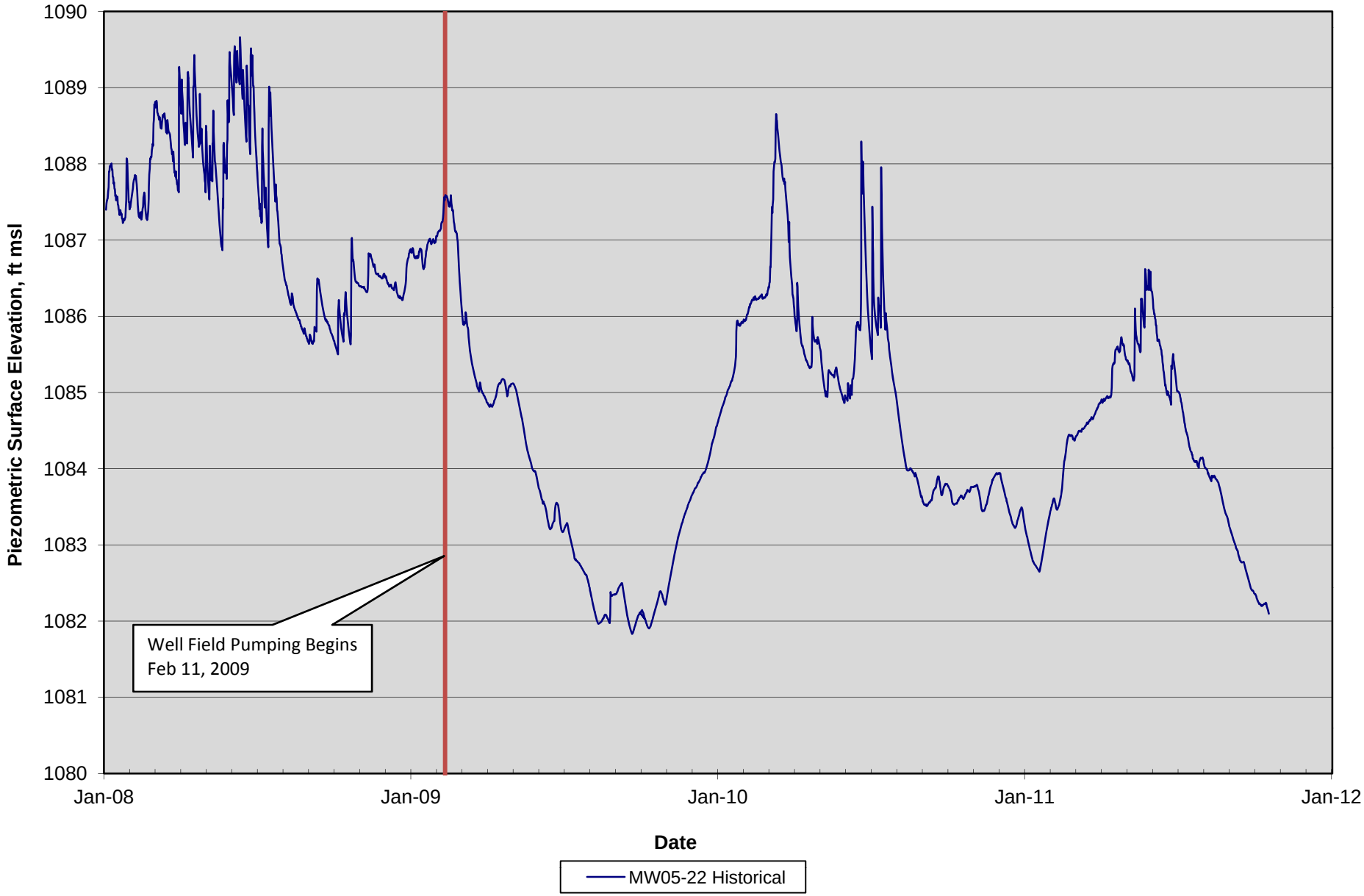
DRAFT

MW04-17 Piezometric Surface Elevations



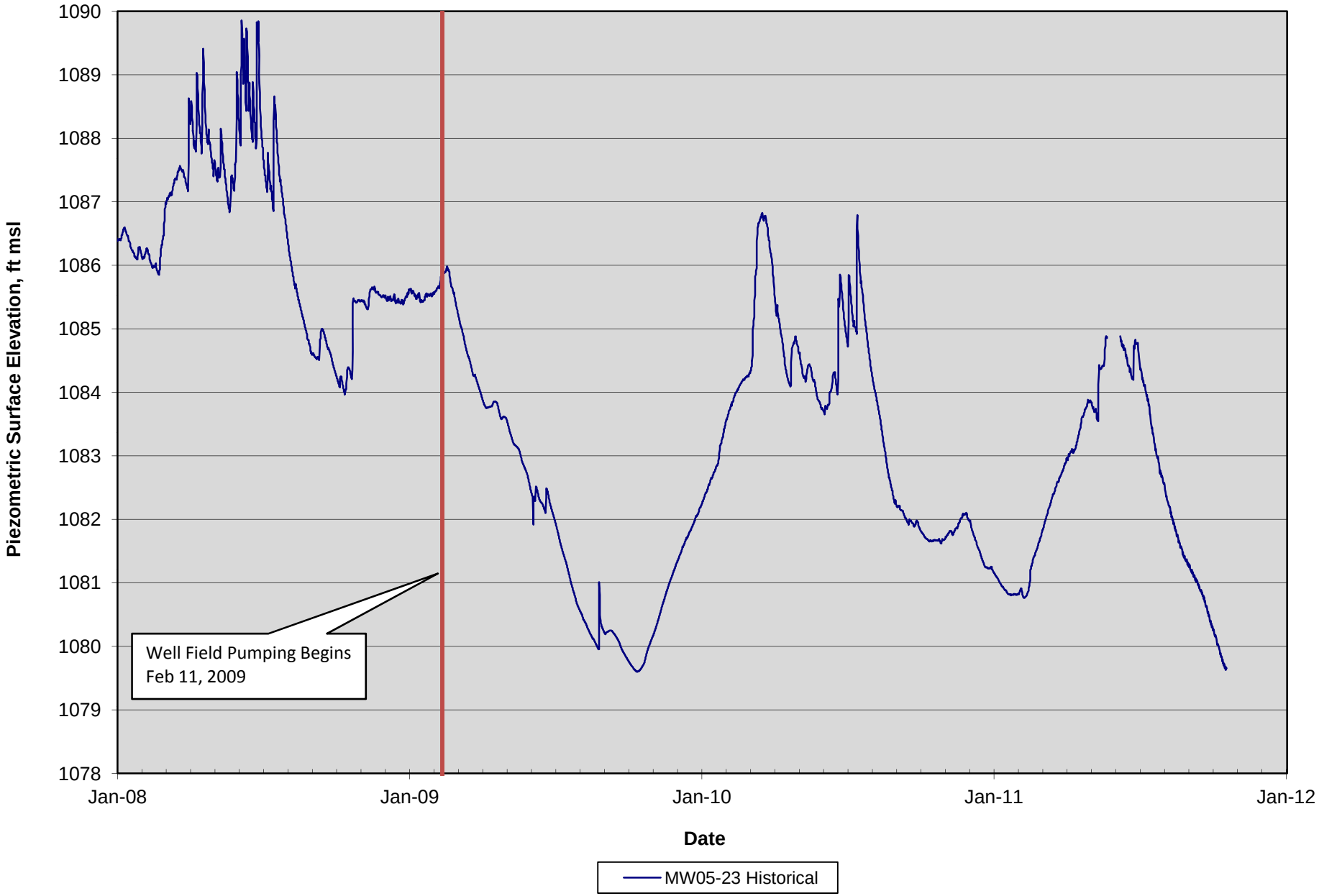
DRAFT

MW05-22 Piezometric Surface Elevations



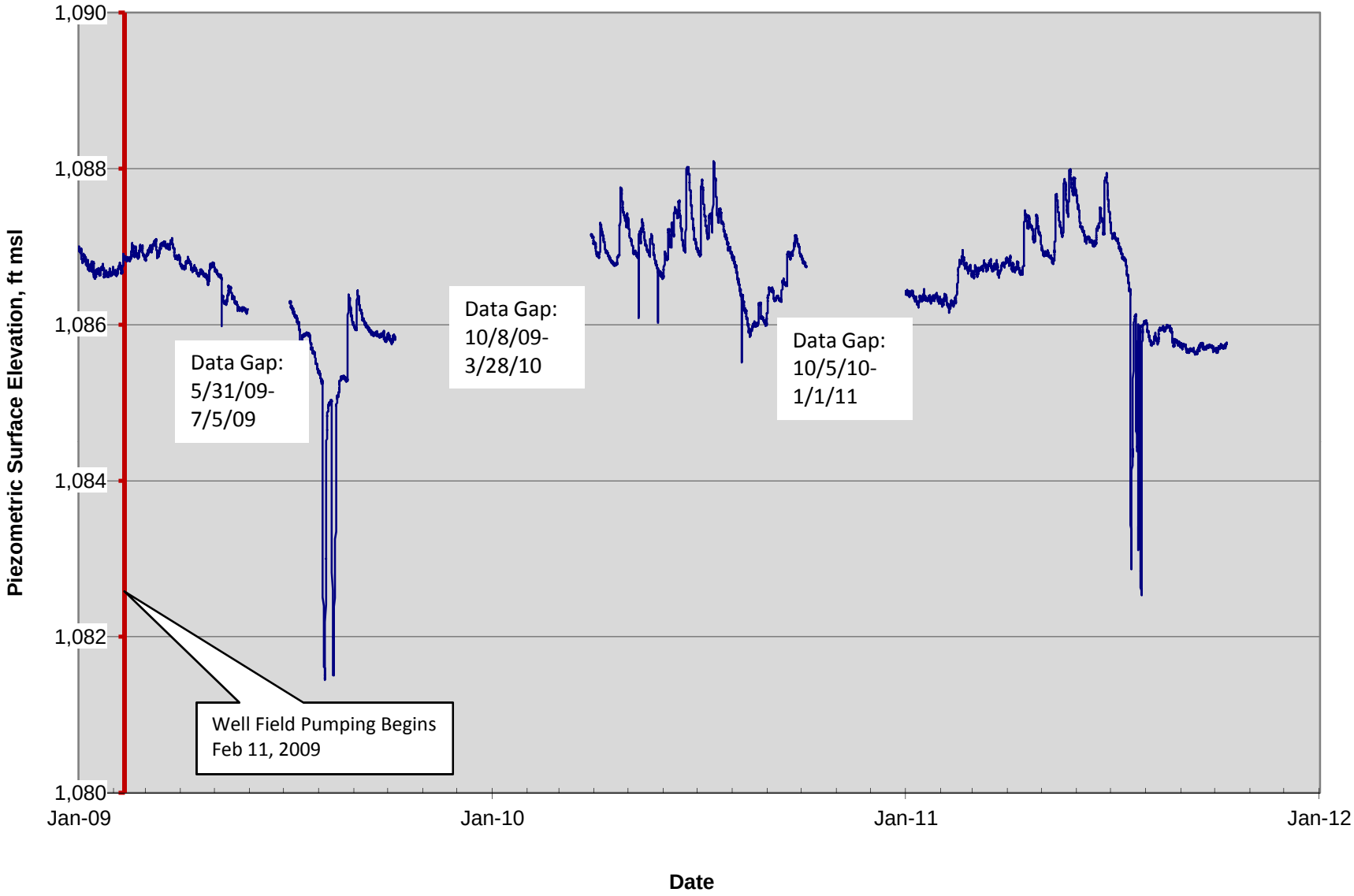
DRAFT

MW05-23 Piezometric Surface Elevations



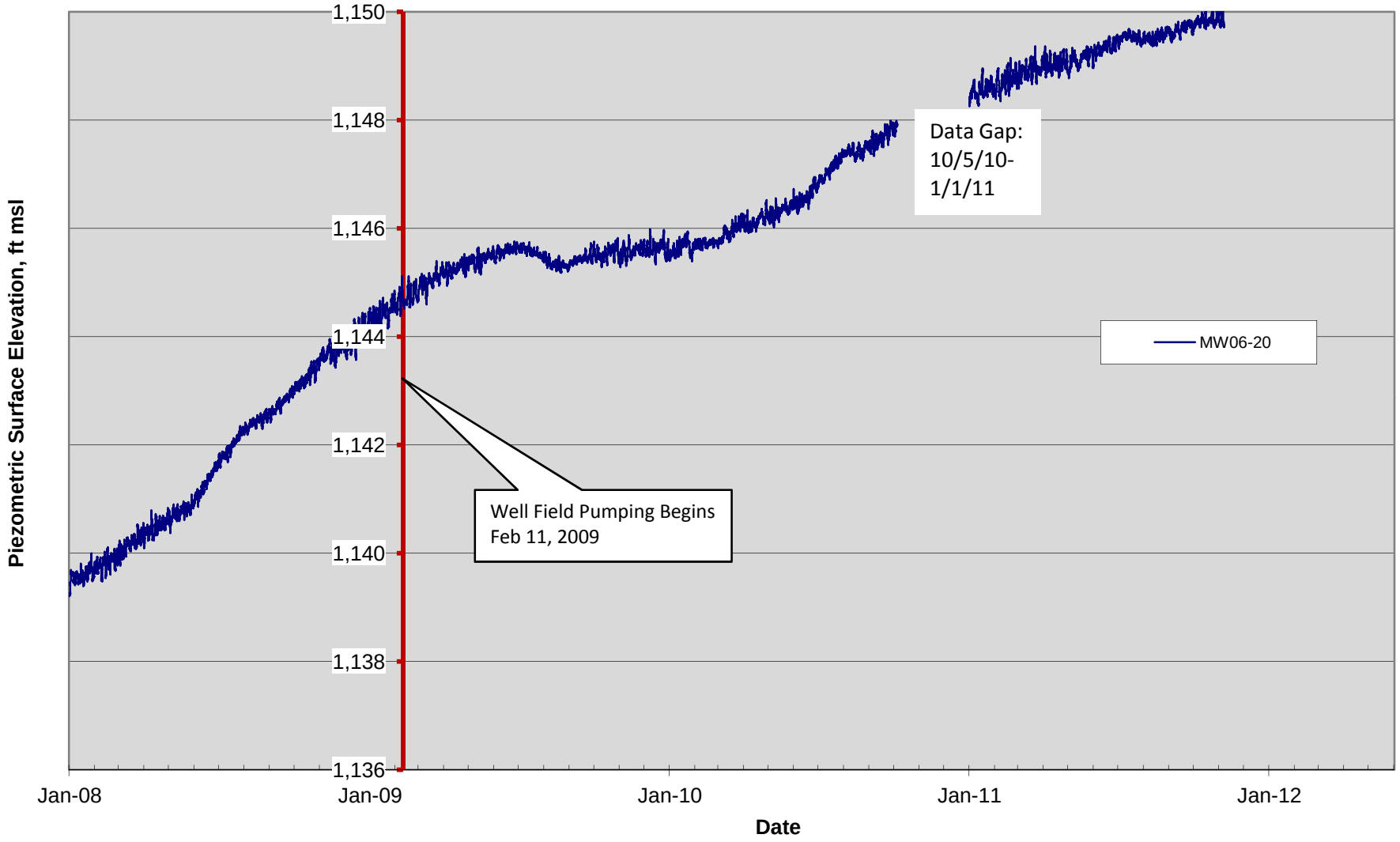
DRAFT

MW06-18 Piezometric Surface Elevations



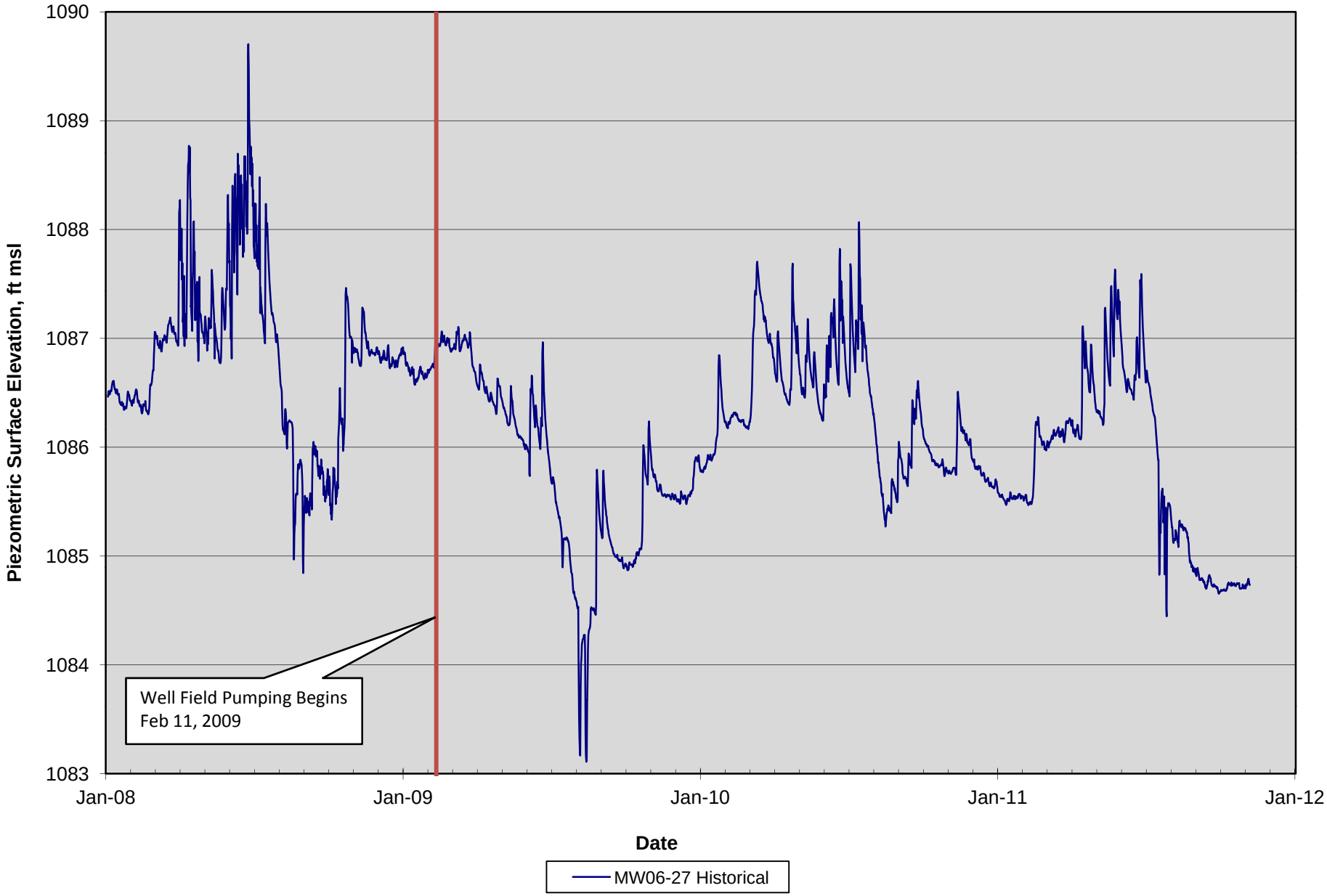
DRAFT

MW06-20 Piezometric Surface Elevations



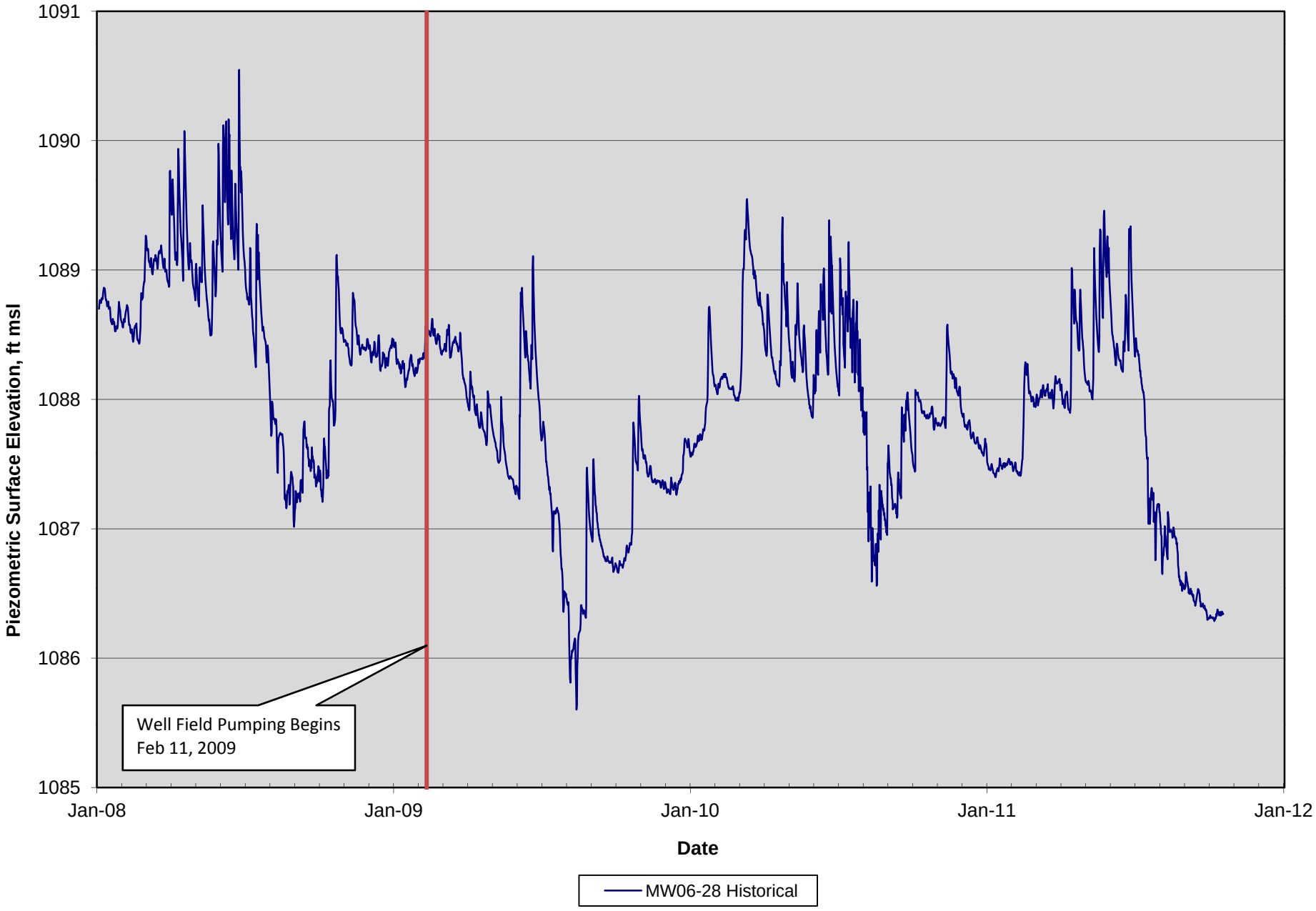
DRAFT

MW06-27 Piezometric Surface Elevations



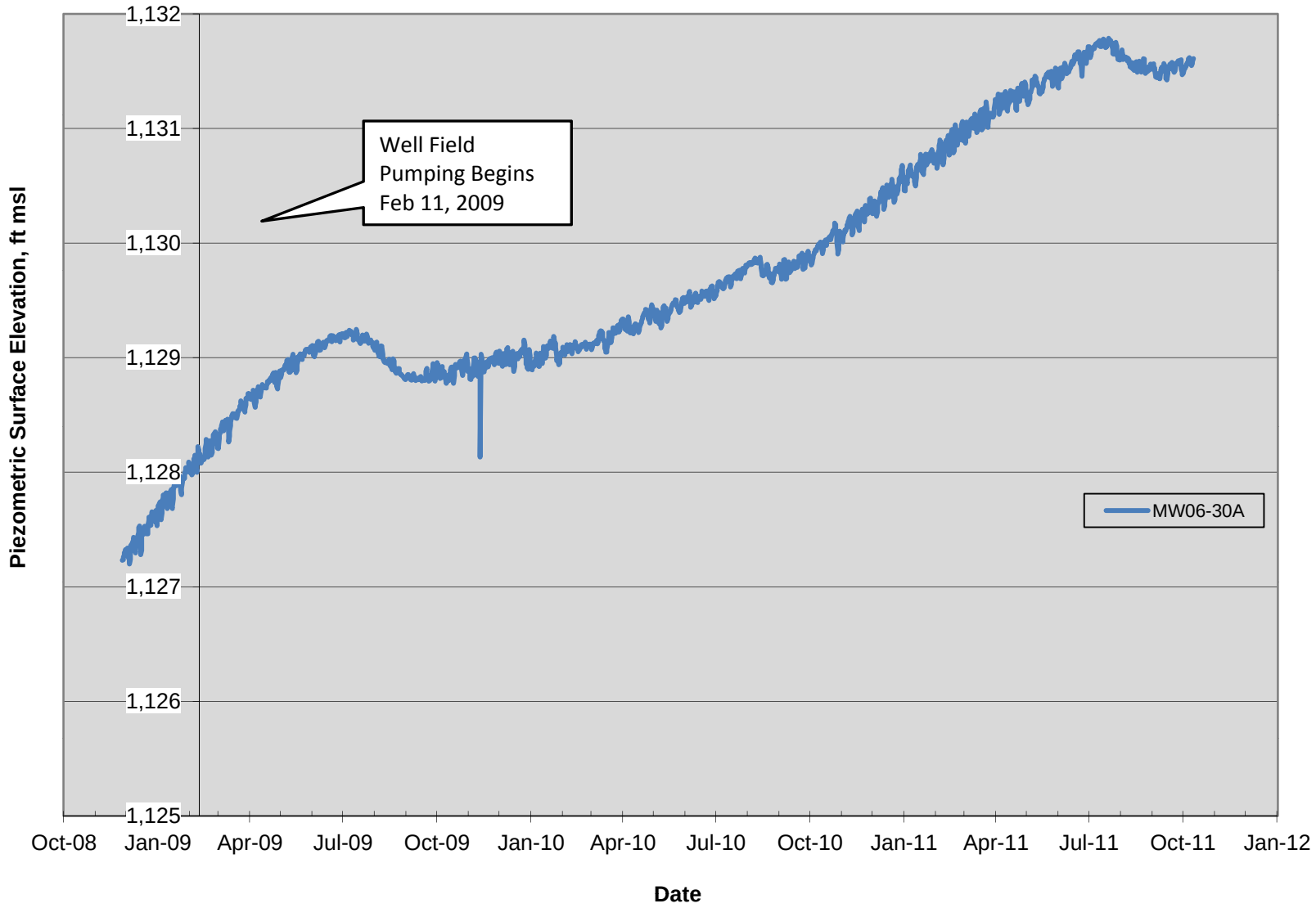
DRAFT

MW06-28 Piezometric Surface Elevations



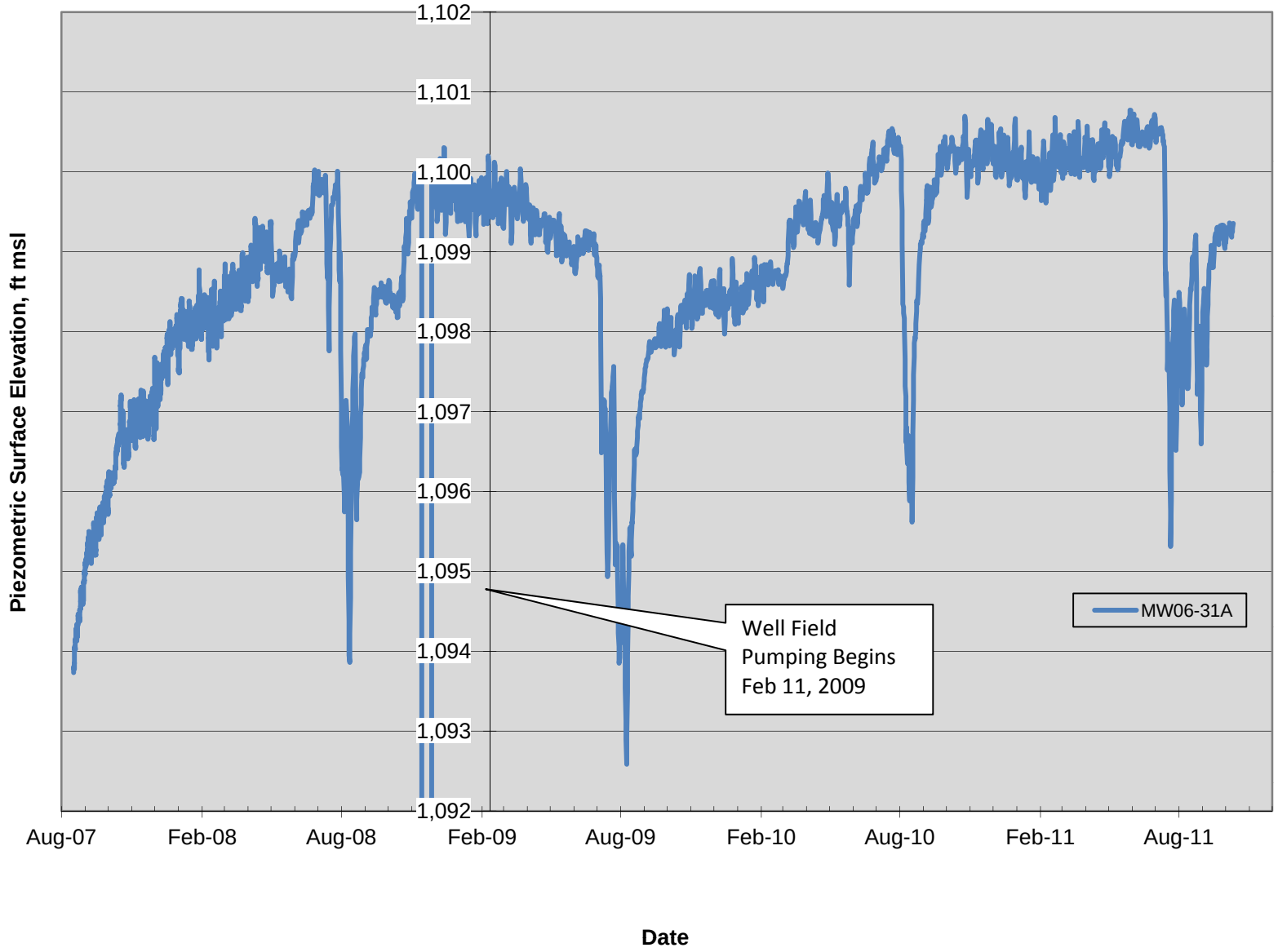
DRAFT

MW06-30A Piezometric Surface Elevations



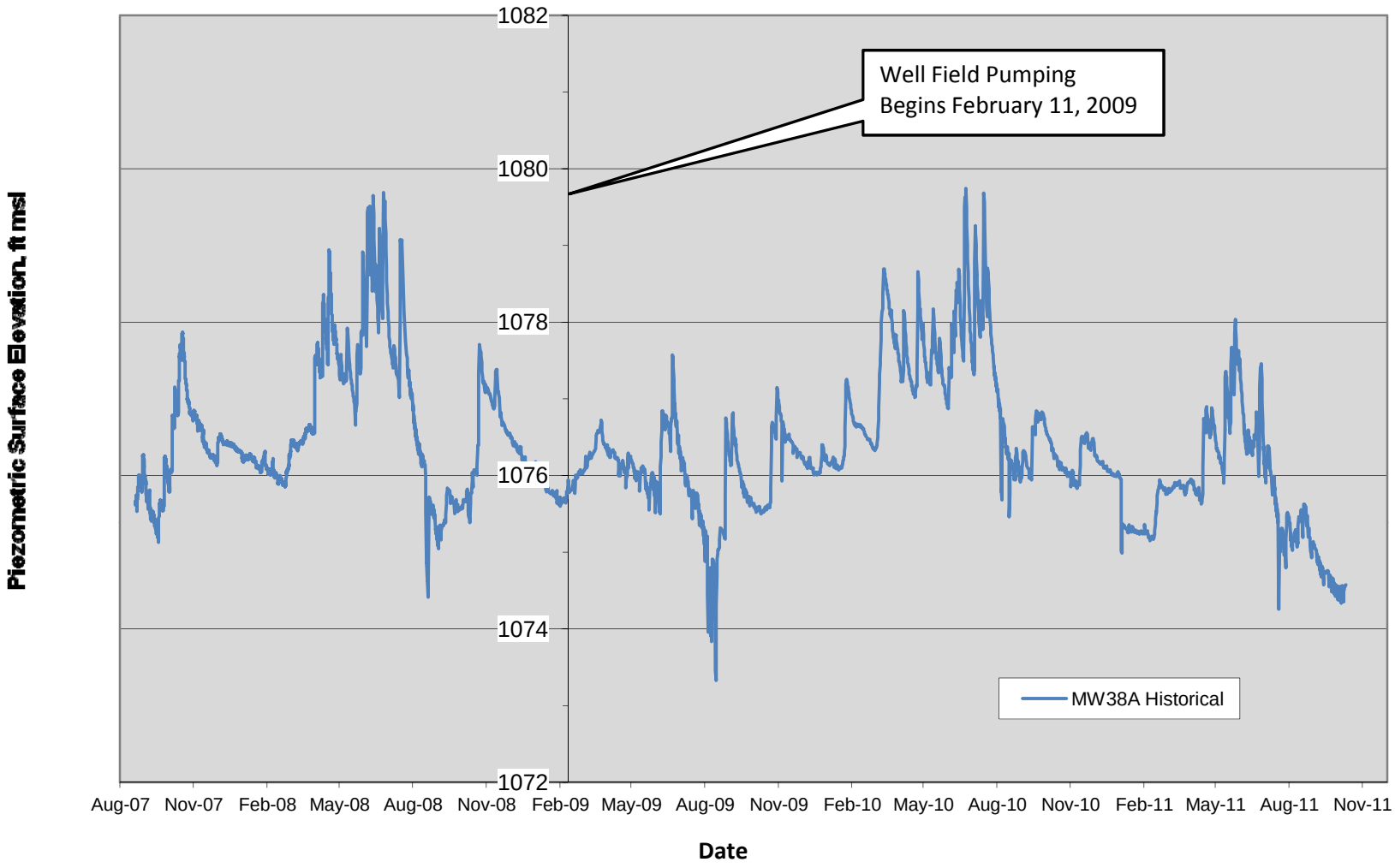
DRAFT

MW06-31A Piezometric Surface Elevations



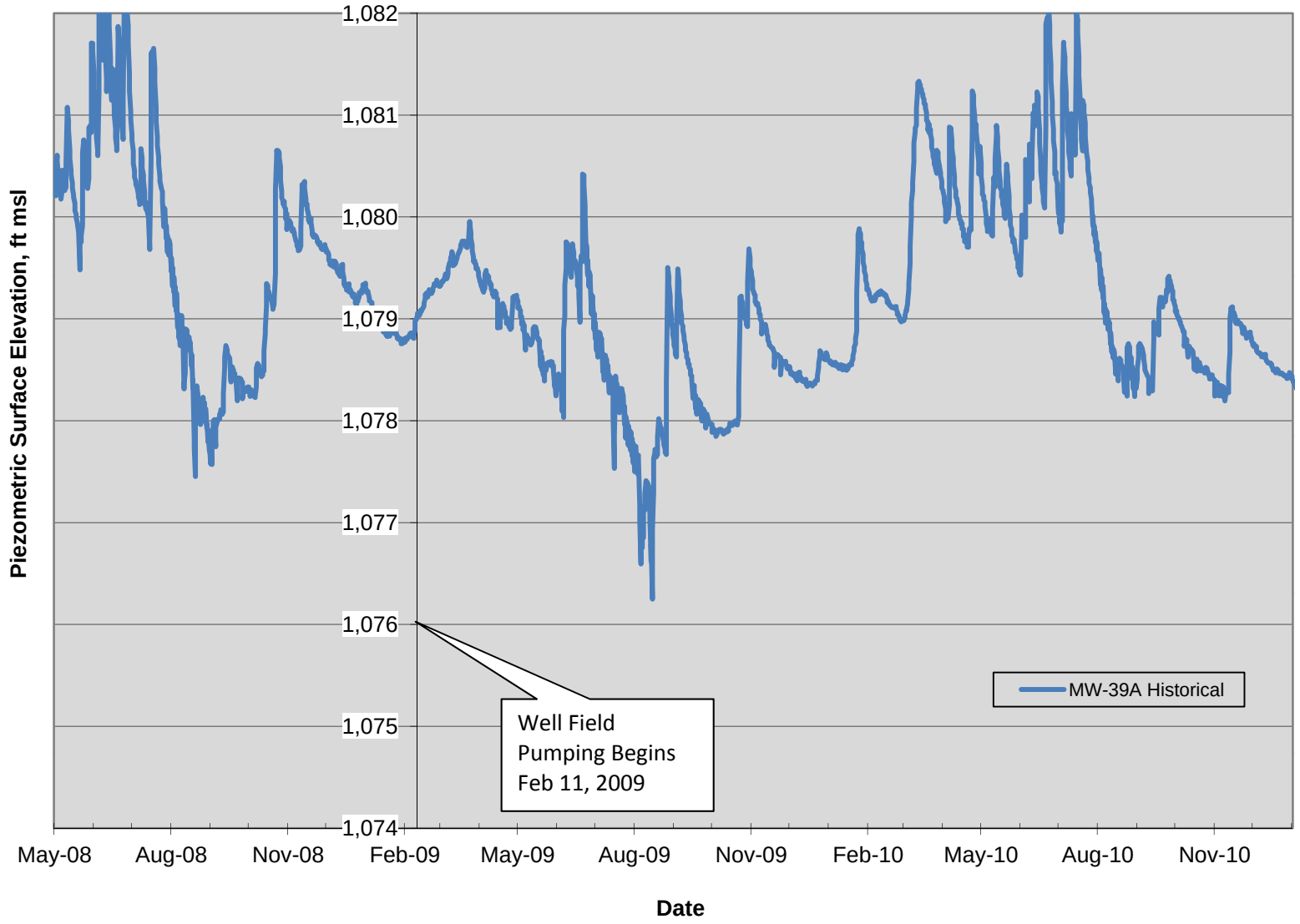
DRAFT

MW38A Piezometric Surface Elevations



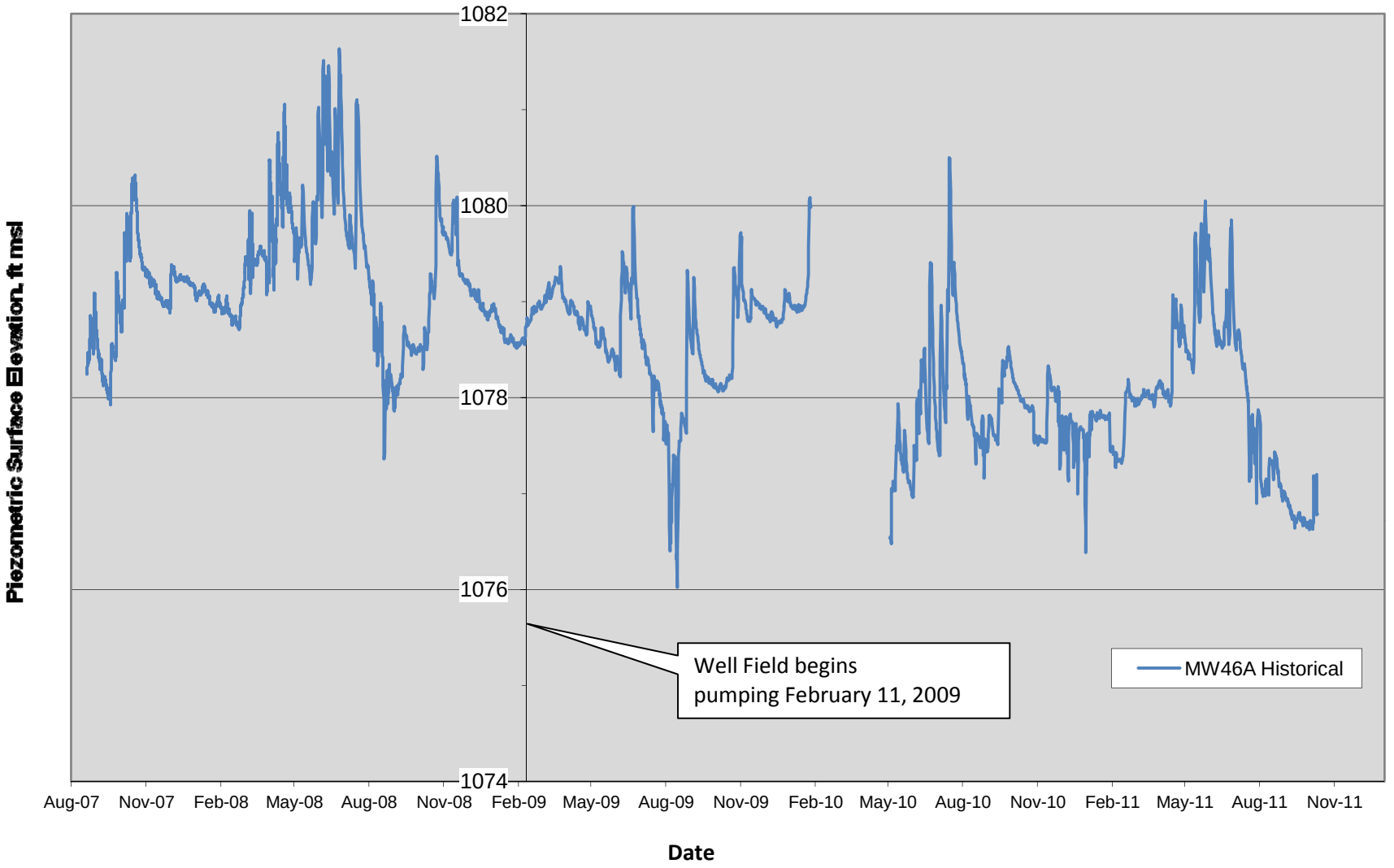
DRAFT

MW-39A Piezometric Surface Elevations



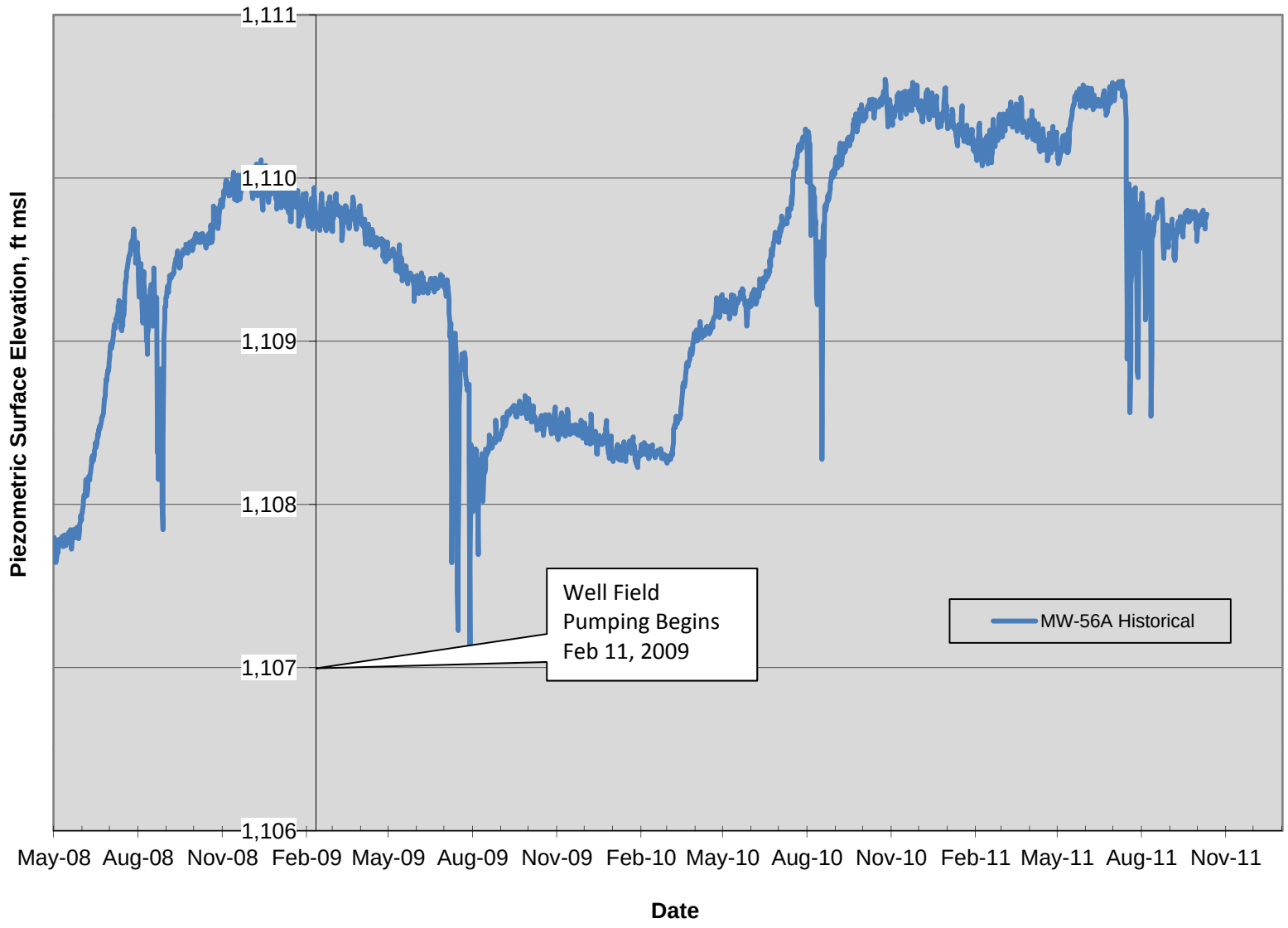
DRAFT

MW46A Piezometric Surface Elevations



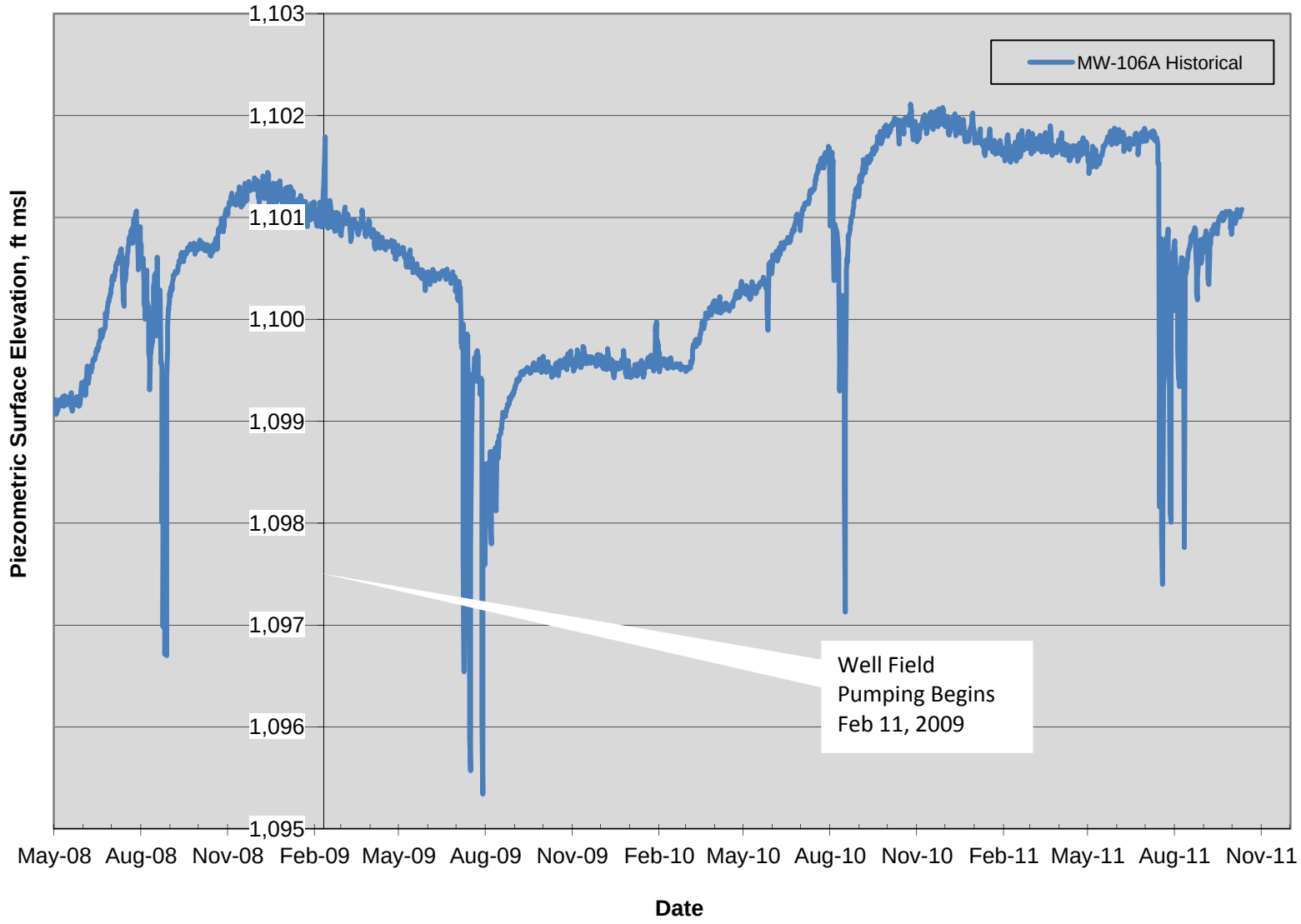
DRAFT

MW-56A Piezometric Surface Elevations



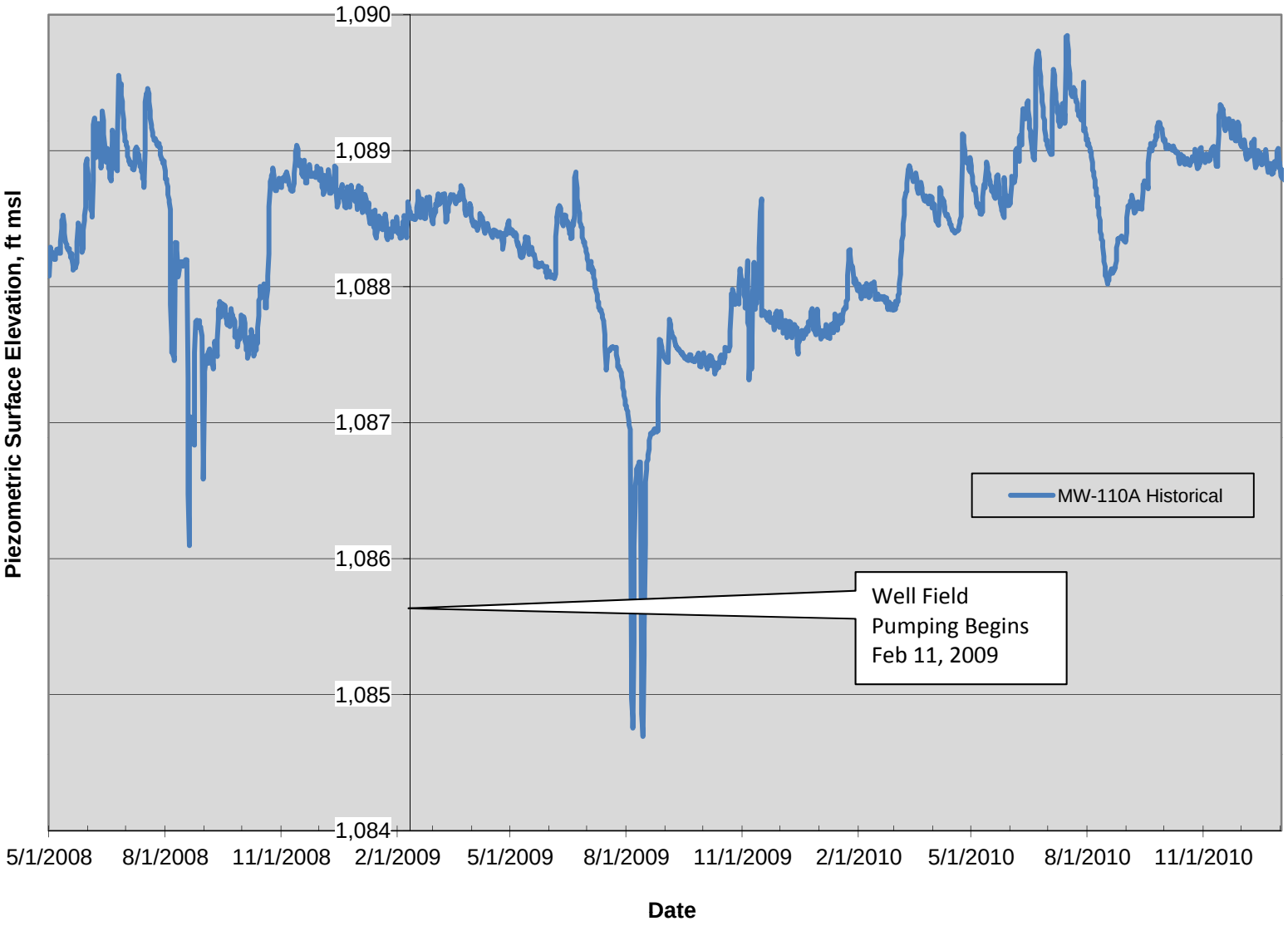
DRAFT

MW-106A Piezometric Surface Elevations



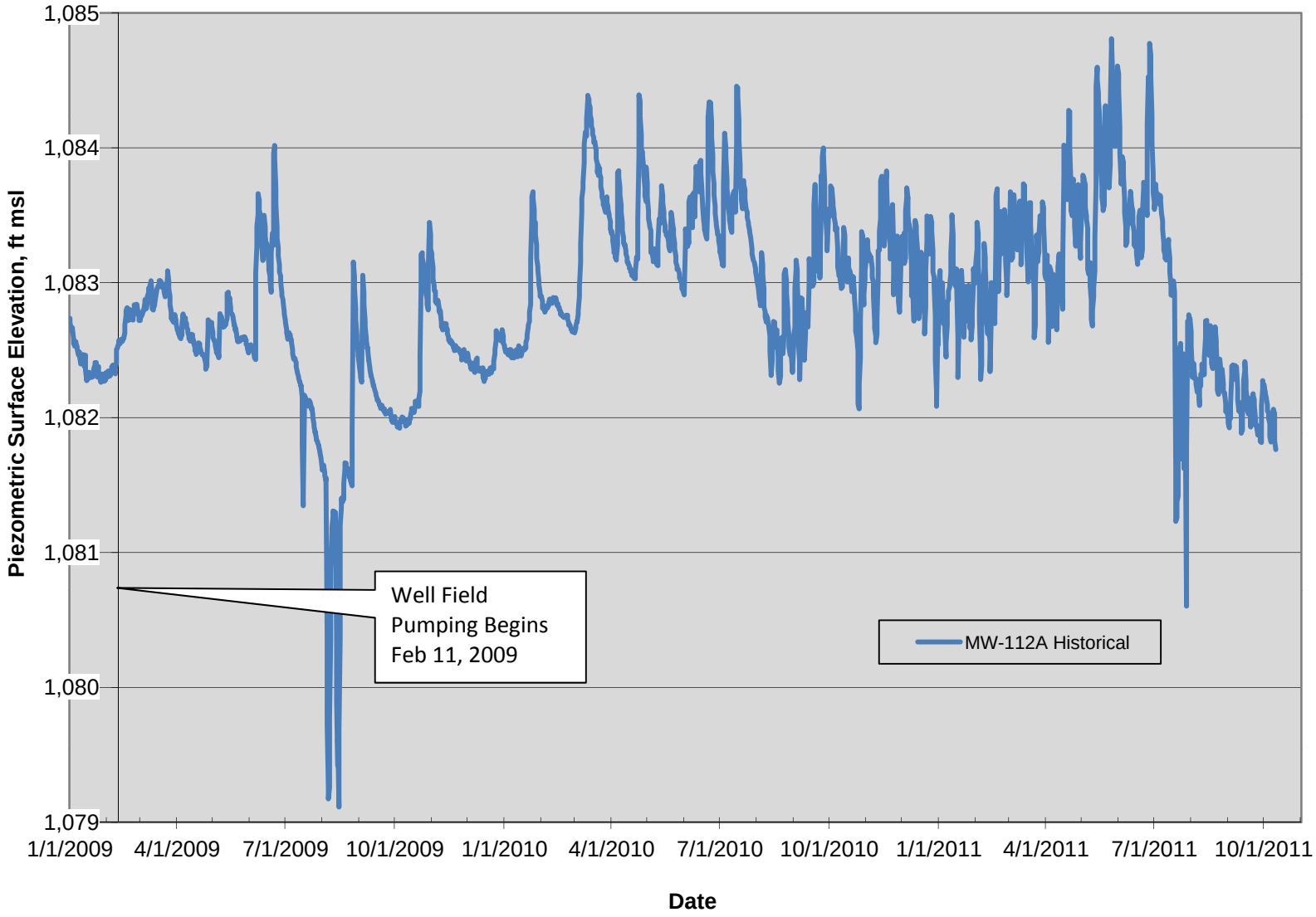
DRAFT

MW-110A Piezometric Surface Elevations



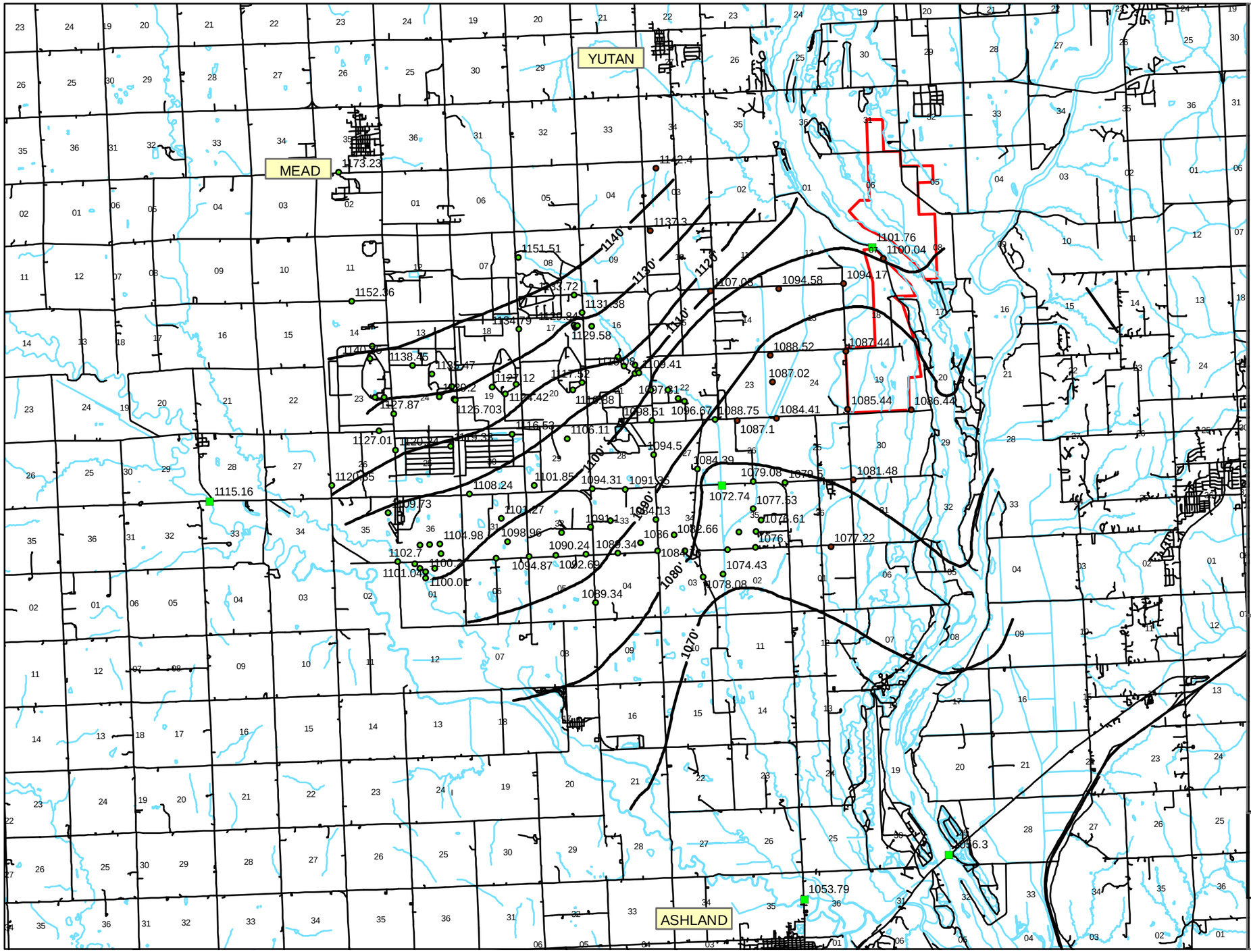
DRAFT

MW-112A Piezometric Surface Elevations



Appendix 3-3

Previous Interpreted Potentiometric Surface Maps



LEGEND:

1070' — Contoured Groundwater Surface October 2003 (ft asl)

1067.44 — MUD Monitoring Wells with Observed Groundwater Levels October 2008 (ft asl)

1101.76 — USGS River Gauges with Surface Water Levels October 2008 (ft asl)

1129.58 — USACE Monitoring Wells with Observed Groundwater Levels October 2008 (ft asl)

Boundaries of MUD Well Field

0 4,250 8,500 17,000 Feet

N

Scale = 1:99,600

Nebraska State Plane NAD 83

Layne

Title: October 2008 Potentiometric Surface Map

DRAFT

Drawing No. Figure 3-3

metropolitan UTILITIES DISTRICT

Platte West Well Field
Nebraska Ordnance Plant
Groundwater Report

Figure 3-2:
March 2009 Observed Potentiometric Surface (ft, msl)

MW-13B
1153.3
Observation Wells with Obserbed Water Level

Stream Gage

MUD Pumping Wells

Potentiometric Surface Contour (ft, msl)

Stream

MUD Well Field

Railroad

Highway

Interstate

US

State

Local

County Boundary

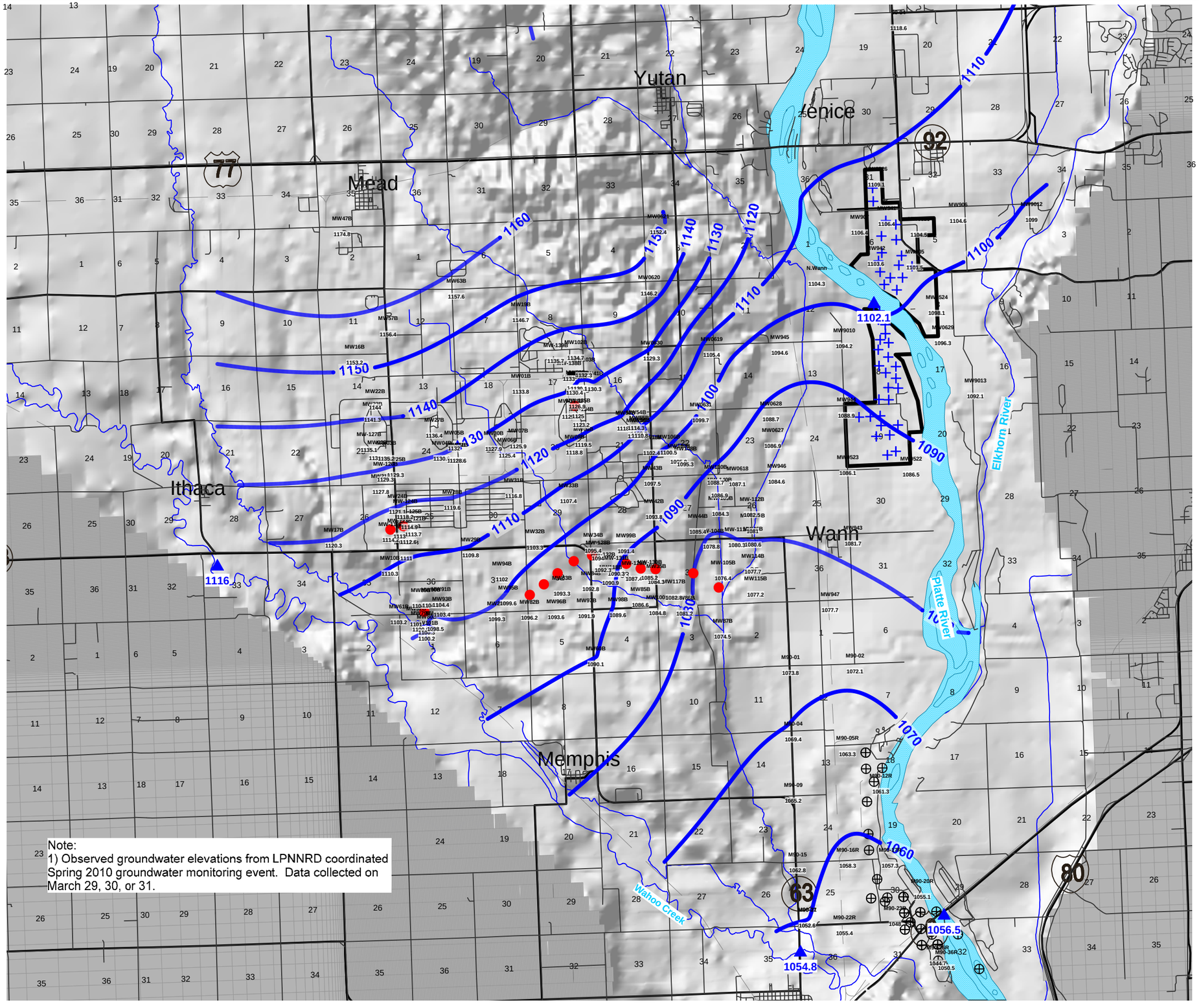
City

0 1 2 Miles

HDR

January 2010

Note:
1. Observed data from LPNNRD coordinated monitoring effort. Data collected on March 30 and 31, 2009



Note:
1) Observed groundwater elevations from LPNNRD coordinated Spring 2010 groundwater monitoring event. Data collected on March 29, 30, or 31.

metropolitan UTILITIES DISTRICT

Platte West Well Field
Nebraska Ordnance Plant
Groundwater Report

Figure 3-2
March 2010 Observed
Potentiometric Surface (ft msl)

LEGEND:

- MW94-5 / 1094.6 — Observation Well with Measured Water Level Elevation in ft msl
- Interpreted Potentiometric Surface Elevation Contour (ft msl)
- Contour Interval = 10 feet
- 1102.1 — USGS Gauging Station with Stream Elevation (ft msl)

Pumping Wellfields Operating During March 2010 Water Level Event

- Platte West Well Field Boundary
- Platte West Well Field Well
- FNOP Containment/Focused Extraction Well
- Ashland City Well/Lincoln Well Field Well

MAP SCALE (feet)
0 4000 8000

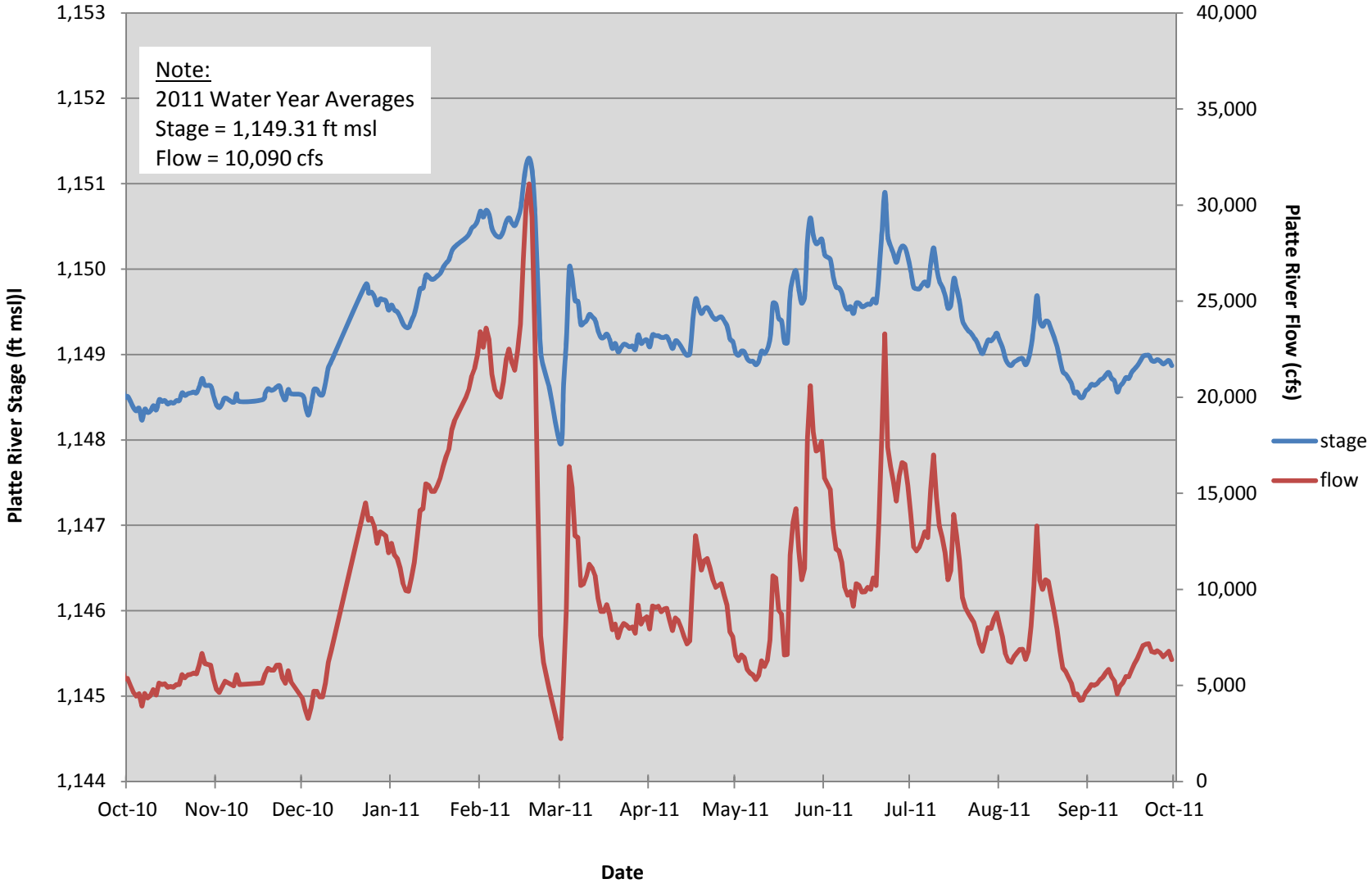
HDR

January 2011

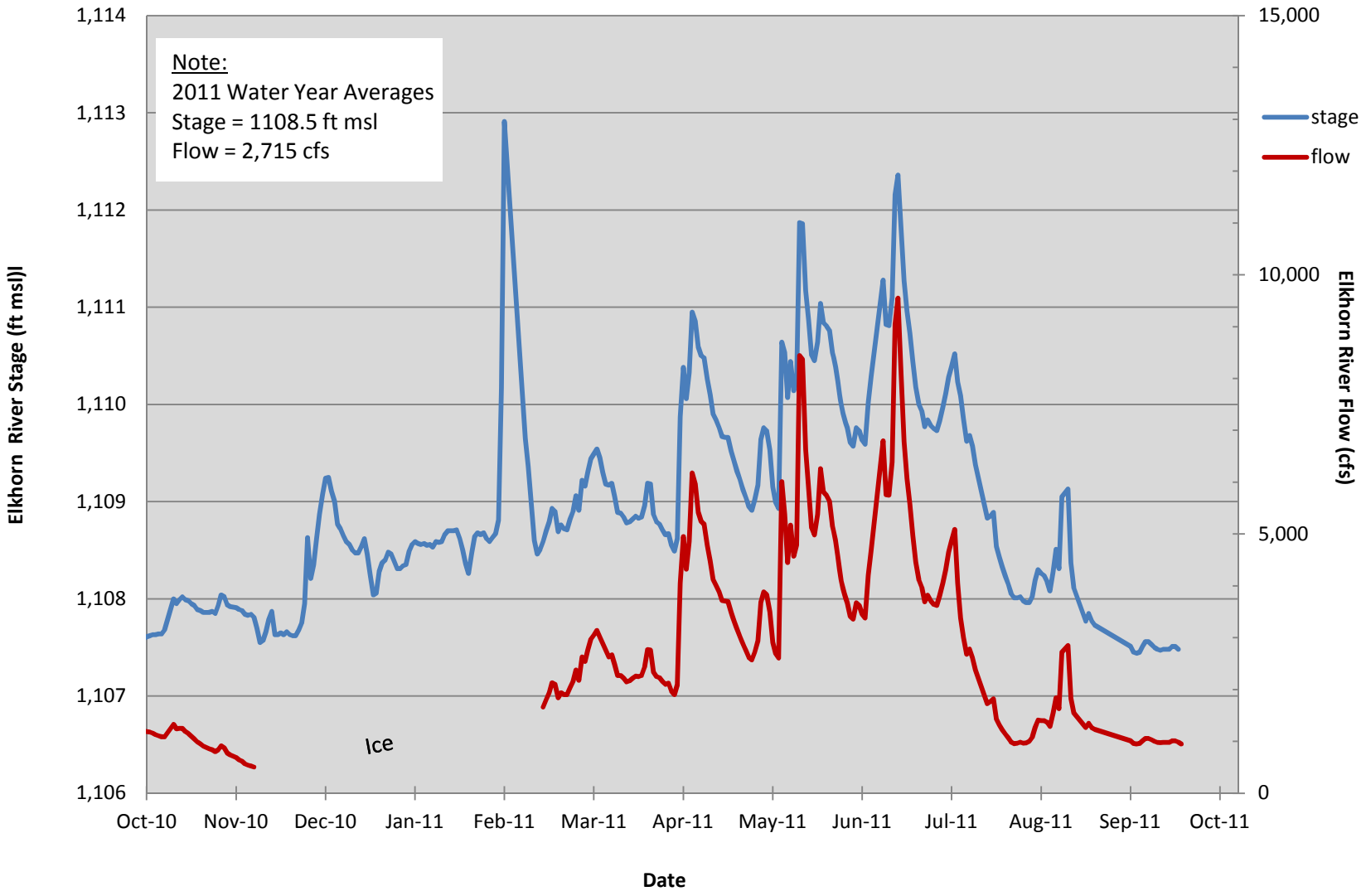
Appendix 3-4

Platte River Streamflow/Stage Data

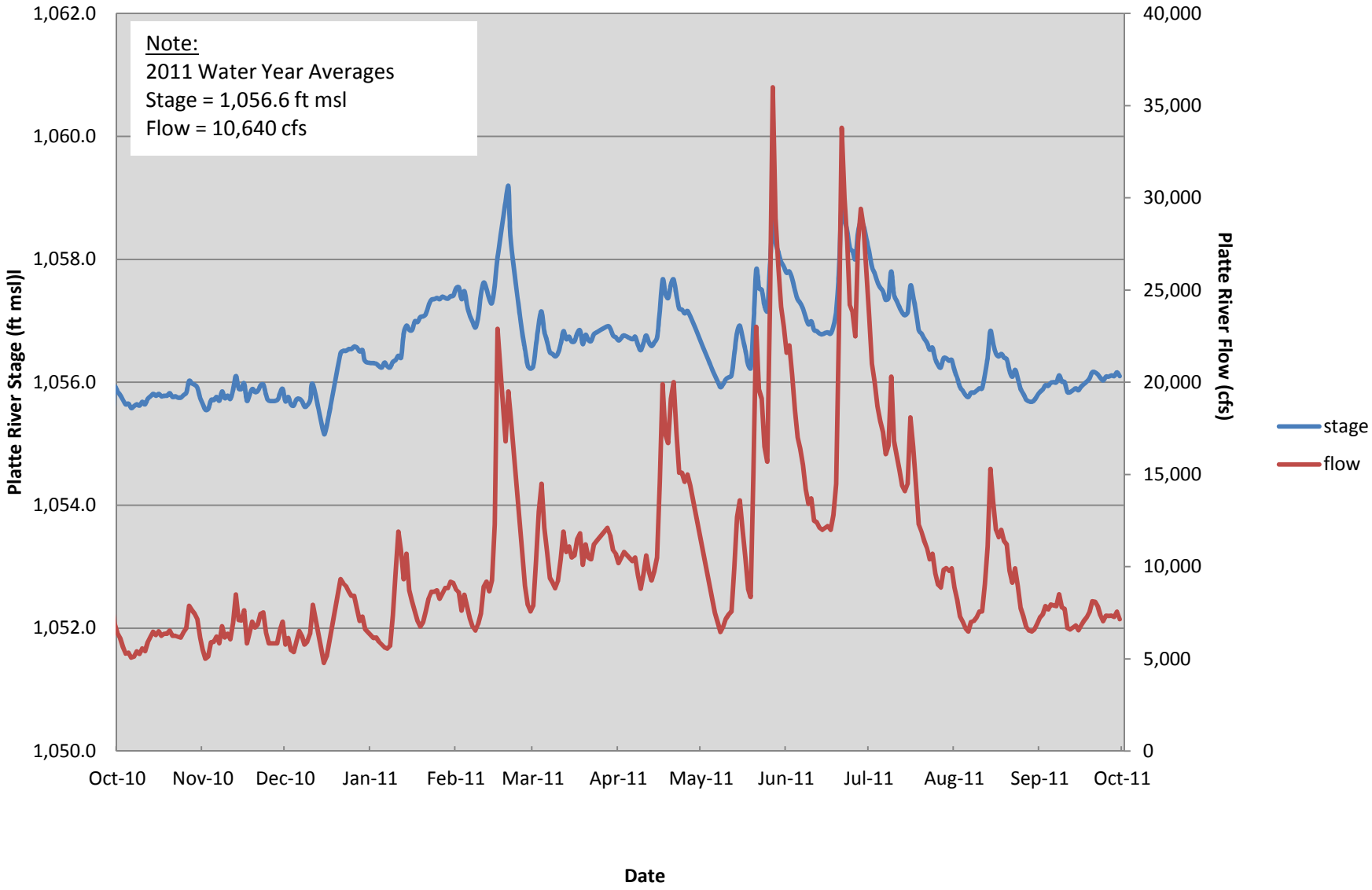
Platte River Flow Conditions
for Water Year 2011 at Leshara Gauge



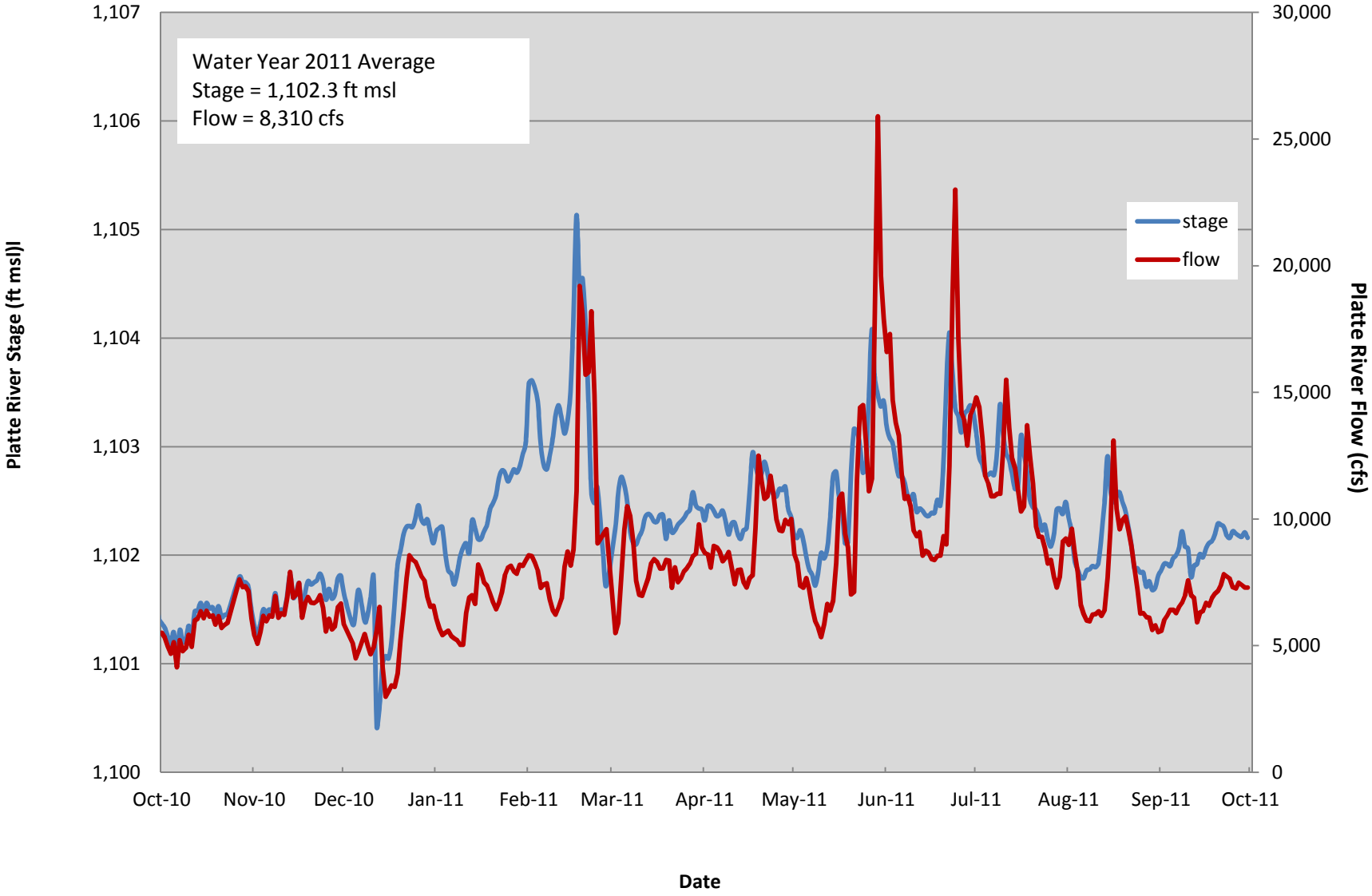
Elkhorn River Flow Conditions
for Water Year 2011 Waterloo Gauge



Platte River Flow Conditions
for Water Year 2011 at Ashland Gauge



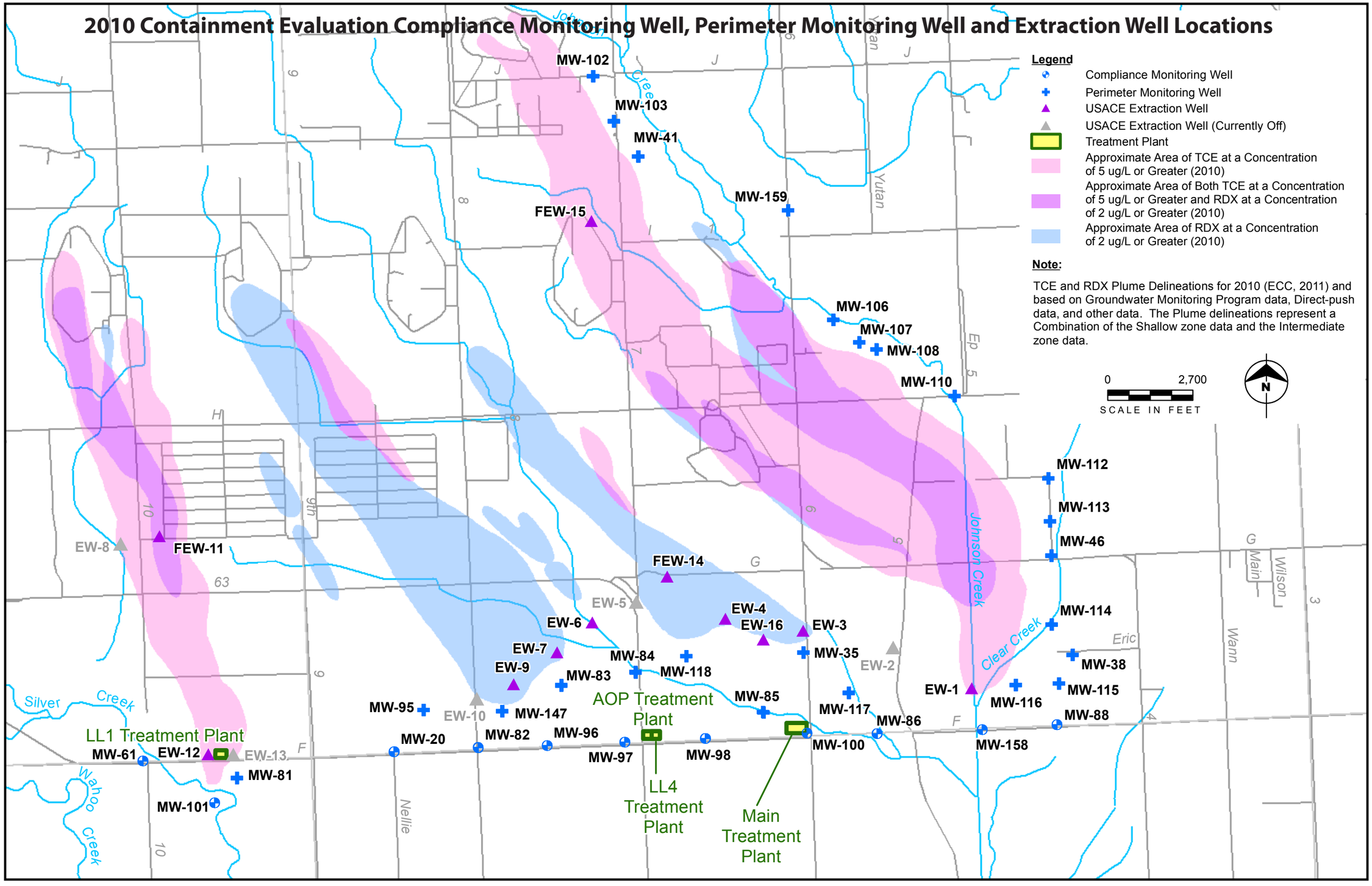
Platte River Stage Conditions for Water Year 2011 at Venice Gauge



Appendix 4-1:

FNOP Plume Baseline

2010 Containment Evaluation Compliance Monitoring Well, Perimeter Monitoring Well and Extraction Well Locations



K:\ENV\ECC\site\51469\Data\GIS\CE 2010\FigX-2010FactSheetFigure.mxd jmf sos Sep 7, 2011

Appendix 4-2

Groundwater Chemical Sampling Data

FINAL
QUALITY CONTROL SUMMARY REPORT
JUNE 2011 MONITORING WELL SAMPLING EVENT

METROPOLITAN UTILITIES DISTRICT OF OMAHA
PLATTE WEST WELL FIELD
MEAD, NEBRASKA

PREPARED FOR
METROPOLITAN UTILITIES DISTRICT OF OMAHA

PREPARED BY
OLSSON ASSOCIATES

SEPTEMBER 2011

OLSSON ASSOCIATES

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LIST OF APPENDICES

1.0 INTRODUCTION

The Metropolitan Utilities District of Omaha (MUD) provides potable water for a metropolitan area of over three-quarters of a million people. To meet projected water demands from continued population growth in the greater Omaha area in the coming decades, MUD completed construction of the Platte West Well Field (PWWF) in 2008. The PWWF consists of 42 wells constructed along and adjacent to the Platte River approximately 7 miles east of the town of Mead in Saunders County, Nebraska. The well field began operations in July of 2008 and currently has the capacity to provide 334 million gallons per day (mgd). Because the PWWF transmits water across the Platte River from wells on the west bank eastward via a pipeline, the well field is subject to U.S. Army Corp of Engineers (USACE) Omaha District (CENWO) Section 404 Permit regulations. This permit requires MUD to monitor any influence the well field activity may have on remediation efforts at the former Nebraska Ordnance Plant (NOP) south of Mead, which is under the jurisdiction of the USACE Kansas City District (CENWK). Two overlapping plumes of contaminants (trichloroethylene and RDX) from former munitions and missile plants are found in the subsurface south/southeast of Mead and follow the ambient groundwater gradient from the northwest to the southeast. USACE monitoring of the aquifer conditions consists of tracking both physical parameters (water table elevations and gradient) and changes in contaminant concentrations in the groundwater in both the plume area and the well field. Data obtained from these activities will be used by MUD and the USACE to determine if any impacts have occurred by assessing changes in any concentrations of any contaminants present in monitoring wells. Water levels will also be used to verify the groundwater model of the well field area.

Olsson Associates was contracted by the MUD to monitor the aquifer conditions in accordance with the USACE requirements. This Quality Control Summary Report (QCSR) provides the results of data validation for the data resulting from the Spring 2011 sampling event at the PWWF completed on June 24, 2011.

2.0 FIELD SAMPLING ACTIVITIES

In accordance with the Field Sampling Plan (Olsson, 2011), samples were collected from eight monitoring wells and analyzed for volatile organic and explosive compounds as listed in Table 2-1. Additionally, three quality control (QC) samples were collected:

1. One field duplicate
2. One matrix spike/matrix spike duplicate
3. One field blank

An error was made in the field and the trip a field blank was prepared in lieu of analyzing the laboratory prepared trip blank. For this reason, no trip blanks were prepared or analyzed during the June 2011 sampling event. More discussion on this error is provided below in Section 3.5.

Table 2-2 provides an explanation of all abbreviations, laboratory qualifiers and notes associated with the tables in this QCSR report. Table 2-3 provides information on sample collection, laboratory numbering and analyses requested as listed below:

- Quality control sample information including duplicate sample locations
- A cross reference between field sample and laboratory sample IDs
- Sample delivery group numbers
- Dates of sample collection and sample receipt at the laboratory
- List of analyses requested

3.0 ANALYTICAL RESULTS

The samples were analyzed by TestAmerica, Inc. in Burlington, Vermont for volatile organic and explosive compounds. A summary of the analytical results is presented in Table 3-1 for Volatile Organic Compounds and Table 3-2 for Explosive Compounds. As listed in Table 3-3, there were no organic detections above the reporting limit. For the explosive compounds, 3-Nitrotoluene was detected just above the reporting limit in wells MW06-031A and MW-39D. All detections of explosive compounds are presented in Table 3-4.

The following subsections present results of the data quality evaluation. The evaluation was performed in accordance with the Quality Assurance Project Plan developed specifically for this monitoring program (Olsson, 2011). Qualifiers were assigned by the laboratory in accordance to their quality control program.

3.1 Summary of Receipt in the Laboratory

The samples were received on June 28, 2011 as noted on the Chain-of-Custody (COC) included in Appendix A. The samples arrived in good condition, properly preserved and on ice. The temperature of the coolers was within the acceptable range.

One error was noted on the COC. The container label for one sample did not match the information listed on the COC. The container label listed the sample ID as DMW-039-062411. The COC listed the sample ID as BMW-039-062411. The laboratory contacted Olsson Associates and the error on the COC was noted. The sample was logged as DMW-039-062411as listed on the container label as confirmed by Olsson Associates.

3.2 Holding Times

All samples were extracted and analyzed within the method specific holding times as noted in the QAPP (Olsson, 2011):

- 14-days to extraction for VOCs
- 7-days to extraction and 40-days to analysis for Explosives

3.3 Tuning and Calibration

Assessment of tune and calibration data was validated by reviewing the case narrative and analytical report. Tuning and calibration outliers are to be detailed by the laboratory in Final Analytical Report. No deviations from method specifications for the calibration and tuning of pertinent instrumentation were reported by TestAmerica. This was confirmed by Jim Madison, project manager for the MUD Platte West Well Field Project SDG Number 200-5753-1 via email on August 25, 2011. The tuning and calibration requirements were met.

3.4 Laboratory Method Blanks

Method blanks were prepared and analyzed as per the requirements of the QAPP (Olsson, 2011). Method blanks are sample containers filled by the laboratory with analyte-free water that is carried through the entire preparation and analysis sequence for the purpose of identifying potential contamination. Method blanks were analyzed with each sample batch for all analyses.

No target analytes for VOCs or explosives were detected in the method blanks; however, napthalene was detected in method blanks MB-200-21011/5 and MB-200-21345/5 at a level that was above the method detection limit but below the reporting limit. The value is

considered as an estimated value and was flagged with a "J". Additionally, naphthalene was detected in the field blank TRB-239-062411 and was flagged with a "B" due to the presence of the compound in the method blanks. According to Jim Madison, Project Manager for TestAmeriaca, the trace of naphthalene identified in the method blanks was likely artificially introduced in the laboratory.

3.5 Trip Blanks

Trip blanks are required when samples are collected for analysis of VOCs. Trip blanks are prepared in the laboratory with analyte-free water and are shipped to the site with the regular sample containers. The blanks are kept unopened in the field during site sampling activities and are shipped for analysis with the project samples. Trip blanks are designed to evaluate VOC contamination encountered during sampling, transportation, and storage. One trip blank sample was placed in each sample cooler containing samples to be analyzed for VOCs, and was to be analyzed with the samples selected for VOC analysis.

On June 24, 2011, an error occurred in the field. A field blank was prepared and analyzed instead of analyzing the trip blanks. A Corrective Action Report was filled out by the field sampling crew and signed by the project manager/supervisor to ensure that this error does not occur during subsequent sampling rounds. The fact that trip blanks were not analyzed for the June 2011 sampling event does not compromise the sample results because, as noted in Table 3-1, no detections for VOCs were noted in the investigative samples. Therefore, there was no possibility of cross contamination by VOCs during sample shipment.

3.6 Rinsate Blanks

Rinsate blank samples serve as a quality control check on the cleanliness of the sampling device and the equipment decontamination process. Rinsate blanks are prepared in the field using analyte-free or organic-free water. The samples are used to evaluate if contaminants have been introduced through contact with the sampling equipment. Rinsate blanks are only required when non-dedicated sampling equipment is used to collect groundwater samples, as specified in the QAPP (Olsson, 2011). For the MUD Platte West Monitoring program, rinsate samples were not required because dedicated sampling equipment, specifically, Hydrasleeves, were used to collect the groundwater samples.

3.7 Surrogates

Surrogates are compounds that are added (spiked) into samples prior to sample extraction or analysis, depending on the method. The compounds are not normally found in the environment and therefore can be analyzed for their percent recovery as part of the quality control process. The percent recovery (%REC) of each surrogate is used to assess the success of the sample preparation process for each sample.

For the 8260B VOC analyses (GC/MS), four surrogate analytes were introduced:

- 1,2-Dichloroethane-d4 (80-115%)
- Toluene-d8 (80-115%)
- Bromofluorobenzene (85-120%)
- 1,2-Dichlorobenzene-d4 (80-115%)

All four surrogates were recovered within their acceptable range as noted above.

For the 8330B Nitroaromatic and nitramines (HPLC) analyses, the surrogate 1,2-dinitrobenzene was introduced. The surrogate recoveries were within the TestAmerica control limits of 40-150%.

3.8 Laboratory Control Sample/Laboratory Control Sample Duplicate

The laboratory control sample (LCS) consists of a matrix similar to the field sample. The LCS is spiked with known concentrations of analytes. As with the surrogates, the LCS %REC is a measure of the method accuracy. If % REC results are outside the laboratory criteria, then the data is flagged with a laboratory qualifier "F" meaning the recovery (REC) or Relative Percent Difference (RPD) exceeds the control limits.

For the VOCs, no qualifiers were noted in the Quality Control Results of the Final Analytical Report (TestAmerica, 2011) because the % RECs were within the acceptable laboratory limits. For the Explosive analyses, four compounds were qualified with "p" qualifiers because the RPD between the primary and confirmation columns differed by more than 40%. The compounds are Tetryl, 2,4-Dinitrotoluene, 4-Nitrotoluene, and 3-Nitrotoluene. Data from the primary column was reported in the final analytical data.

3.9 Matrix Spike/Matrix Spike Duplicate

Matrix Spike/Matrix Spike Duplicate (MS/MSD) analyses measure method accuracy and precision for a project-specific matrix. A field sample is split into three portions (original, MS, and MSD) and known amounts of analytes are spiked into the MS and MSD portions of the sample. The analytical results of these two portions are compared to each other for reproducibility using the RPD. The results are also compared against the unspiked portion of the sample for % REC of the spiked analytes. Typically, MS/MSD samples are analyzed for each SDG for all analytes. For this sample event, there was only one SDG and therefore only one MS/MSD was analyzed for each analysis. All results that are qualified with J this round are due to MS/MSD % REC or RPD outliers. Results for contaminants of concern are R-coded if the MS/MSD %REC is less than 10%.

All MS/MSD % REC were within laboratory limits for VOCs. For explosive analyses, 1,3-Dinitrobenzene, 2,4-Dinitrotoluene and 2-Amino-4,6-dinitrotoluene failed the recovery criteria low for the MS of sample BMW06-018-062411MS (200-5753-3) in batch 200-20513. All other quality control parameters were within the acceptance limits.

3.10 Field Duplicate Results

Field duplicate results provide information on the reproducibility of field sample results and account for error introduced from handling, shipping, storage, preparation, and analysis of field samples. One field duplicate pair was collected during the June 2011 groundwater sampling event. The field duplicate pair is AMW06-018-062411 and AMW06-218-062411. The pair were analyzed for VOCs and explosives.

Along with QC evaluations presented in other sections of this QCSR, the results of the field duplicate pair are compared to one another. Results within a factor of two of each other are considered to be in agreement. Results between a factor of two to three of each other are considered a minor discrepancy and results greater than a factor of three are considered a major discrepancy. Table 3-5 and 3-6 present the results of the field duplicate pair for organics and explosive compounds (respectively). Field duplicate comparisons between AMW06-018-062411 and AMW06-218-062411 are considered to be in agreement.

3.11 Dilutions and Re-analyses

As noted on the data tables presented in this QCSR, the VOC and explosive samples did not require dilution (dilution factor = 1). The data reported in the tables are usable as reported.

3.12 Other QC Parameters

A column comparison between the detected explosive results was made using explosive identification summary forms. The RPDs were calculated by the laboratory on the appropriate Form X, Identification Summary (See Appendix C). All detected explosives reported were confirmed by a second column. The value from the primary column was reported. The percent difference between the two columns did not exceed 40% with the exception of four compounds. As stated above, four compounds were qualified with "p" qualifiers because the RPD between the primary and confirmation columns differed by more than 40%. The compounds are 1,3,5-Trinitrotoluene, 1,3-Dinitrotoluene, and 3-Nitrotoluene. These three compounds were not detected in the previous sampling event and based on their detections at levels that are near reporting limits, the results from the subsequent sampling round will be carefully evaluated.

3.13 Laboratory Qualifiers

Analytes detected below the quantitation limit or reporting limit but above the lowest level of detection were quantified and results were assigned an estimate (J) qualifier by the laboratory. The qualifiers are identified in Tables 3-1 and 3-2. These qualifiers were carried over and were not used to evaluate analytical completeness or project completeness.

4.0 OVERALL ASSESSMENT

The following sections present the field completeness, analytical completeness and project completeness for the June 2011 monitoring well sampling event.

4.1 Field Completeness

Field completeness for sample collection is assessed by comparing the number of samples collected to the number of samples originally planned for collection. Table 4-1 presents the field completeness values for the June 2011 monitoring event. Field completeness for explosives was 100%. Field completeness for the VOCs was 92% due to the fact that the trip blank was not analyzed as required by the QAPP. The overall field completeness was 96% which is above the goal of 95%.

4.2 Analytical Completeness

Acceptable data is a measure of contract laboratory compliance. Acceptable data includes data that has not been rejected or qualified as estimated (J). Qualified data is considered acceptable if appropriate corrective actions were taken by the laboratory. The acceptable data completeness percentage for VOCs was 99% and for explosives was 85%. The overall acceptable data completeness is 92% which is above the overall acceptable data completeness goal of 85%.

Quality data is a measure of the percentage of usable data. Quality data includes all data except rejected data points, and does not include analyses for which replacement data points are available. There was no rejected data and therefore quality data completeness percentages for VOCs and explosives were 100% which exceeds the quality data completeness goals of 80% for each analytical method. Table 4-2 presents acceptable and quality data completeness. Overall quality data completeness is 100%, which exceeds the overall quality data completeness goal of 80%.

4.3 Project Completeness

Project completeness combines sampling and analytical completeness percentages to assess the success in achieving the expectations of the project as a whole. Project completeness is determined by comparing the percentage of usable samples/measurements to the percentage of planned or observed samples/measurements. For the field completeness portion, this involves comparison of the number of samples properly collected to the number of samples planned for collection. For the analytical data completeness portion, this involves comparison of the number of usable data points to the number of observed data points. The field completeness and analytical completeness (quality data) completeness percentages are used to calculate the project completeness percentage. Table 4-3 presents project completeness calculations. For the June 2011 monitoring event, project completeness is 94%, which is above the project completeness goal of 90%.

5.0 CONCLUSIONS

Data are valid for use, as qualified. Overall field completeness is 96%, acceptable data completeness is 92%, quality data completeness is 100%, and project completeness is 94%. No data have been rejected. Data are qualified using the following laboratory qualifiers noted in Tables 3-1 and 3-2:

B = Compound was found in the blank and sample
J = Result is less than the Reporting Limit but greater than or equal to the Method Detection Limit and the concentration reported is an estimated value.
p = The % RPD between the primary and confirmation column/detector is greater than 40 percent.
U = Indicates the analytes was analyzed for but not detected
F = MS/MSD Recovery or RPD exceeded the control limits

6.0 REFERENCES

Olsson Associates, 2011. Final Field Sampling Plan for the Metropolitan Utilities District of Omaha, Platte West Well Field, Monitoring Well Sampling Program, Mead, Nebraska, prepared for the Metropolitan Utilities District of Omaha, July.

Olsson Associates, 2011. Quality Assurance Project Plan for the Metropolitan Utilities District of Omaha, Platte West Well Field, Monitoring Well Sampling Program, Mead, Nebraska, prepared for the Metropolitan Utilities District of Omaha, July.

Table 2-1
Monitoring Wells Samples and Analytical Requirements
June 2011 Monitoring Well Sampling Event
Metropolitan Utility District, Mead, NE

Well Identification	Latitude	Longitude	Analyses
MW06-18A	-96.382036	41.160754	Volatile Organic and Explosive Compounds
MW06-18B	-96.382036	41.160754	Volatile Organic and Explosive Compounds
MW06-30A	-96.405926	41.190157	Volatile Organic and Explosive Compounds
MW06-30B	-96.405926	41.190157	Volatile Organic and Explosive Compounds
MW06-31A	-96.391220	41.175544	Volatile Organic and Explosive Compounds
MW06-31B	-96.391220	41.175544	Volatile Organic and Explosive Compounds
MW-39A	-96.368231	41.146403	Volatile Organic and Explosive Compounds
MW-39D	-96.368231	41.146403	Volatile Organic and Explosive Compounds

Table 2-2
Abbreviations, Data Qualifiers and Notes
June 2011 Monitoring Well Sampling Event
Metropolitan Utility District, Mead, NE

Abbreviations:

Dup	Duplicate sample
ID	Identification
Invest.	Investigative sample
Lab	Laboratory
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NA	Not Analyzed
VOCs	Volatile Organic Compounds

Data Qualifiers:

B	Compound was found in the blank and sample.
J	Result is less than the Reporting Limit but greater than or equal to the Method Detection Limit and the concentration reported is an estimated value.
p	The % RPD between the primary and confimation column/detector is >40%. The results from the primary column have been reported.
U	Indicates the analyte was analyzed for but not detected
F	MS/MSD Recovery or RPD exceeded the control limits

Notes:

All analyses were completed by TestAmerica in Burlington, Vermont

Table 2-3
Sample Collection Summary
June 2011 Monitoring Well Sampling Event
Metropolitan Utility District, Mead, NE

Well Number	Investigative Sample ID	Quality Control Sample ID	MS/MSD Sample ID	Field Blank Sample ID	Date Sampled	Date Received by Lab	COC Record Number	Lab ID	Sample Delivery Group	VOCs	Explosives
MW06-18A	AMW06-018-062411	--	--	--	6/24/2011	6/28/11	None	200-5753-1	200-5753-1	Yes	Yes
MW06-18A	--	AMW06-218-062411	--	--	6/24/2011	6/28/11	None	200-5753-2	200-5753-1	Yes	Yes
MW06-18B	BMW06-018-062411	--	--	--	6/24/2011	6/28/11	None	200-5753-3	200-5753-1	Yes	Yes
MW06-18B	--	--	BMW0-018-062411MS	--	6/24/2011	6/28/11	None	200-5753-3MS	200-5753-1	No	No
MW06-18B	--	--	BMW0-018-062411MSD	--	6/24/2011	6/28/11	None	200-5753-3MSD	200-5753-1	No	No
MW06-30A	AMW06-030-062411	--	--	--	6/24/2011	6/28/11	None	200-5753-4	200-5753-1	Yes	Yes
MW06-30B	BMW06-030-062411	--	--	--	6/24/2011	6/28/11	None	200-5753-5	200-5753-1	Yes	Yes
MW06-31A	AMW06-031-062411	--	--	--	6/24/2011	6/28/11	None	200-5753-6	200-5753-1	Yes	Yes
MW06-31B	BMW06-031-062411	--	--	--	6/24/2011	6/28/11	None	200-5753-7	200-5753-1	Yes	Yes
MW-39A	AMW-39-062411	--	--	--	6/24/2011	6/28/11	None	200-5753-8	200-5753-1	Yes	Yes
MW-39D	DMW-039-062411	--	--	--	6/24/2011	6/28/11	None	200-5753-9	200-5753-1	Yes	Yes
MW-39D	--	--	--	TBR-239-062411	6/24/2011	6/28/11	None	200-5753-10	200-5753-1	Yes	No

Note: See Table 2-2 for laboratory qualifiers, notes, and abbreviations.

Table 3-1 Results - Volatile Organic Compounds
June 2011 Monitoring Well Sampling Event
Metropolitan Utility District, Mead, NE

Sample ID	AMW06-018-062411		BMW06-018-062411		AMW06-030-062411		BMW06-030-062411		AMW06-031-062411		BMW06-031-062411		AMW-039-062411		DMW-039-062411	
Lab Sample Number	200-5753-1		200-5753-3		200-5753-4		200-5753-5		200-5753-6		200-5753-7		200-5753-8		200-5753-9	
Sampling Date	06/24/11		06/24/11		06/24/11		06/24/11		06/24/11		06/24/11		06/24/11		06/24/11	
Matrix	Water		Water		Water		Water		Water		Water		Water		Water	
Dilution Factor	1		1		1		1		1		1		1		1	
Units	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
Analyte																
1,1,1,2-Tetrachloroethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,1,1-Trichloroethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,1,2,2-Tetrachloroethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,1,2-Trichloroethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,1-Dichloroethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,1-Dichloroethene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,1-Dichloropropene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2,3-Trichlorobenzene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2,4-Trichlorobenzene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2,4-Trimethylbenzene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2-Dibromo-3-Chloropropane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2-Dibromoethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2-Dichlorobenzene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2-Dichloroethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2-Dichloroethene, Total	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2-Dichloropropane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,3,5-Trimethylbenzene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,3-Dichlorobenzene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,3-Dichloropropane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,4-Dichlorobenzene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
2-Butanone	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2-Chlorotoluene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
2-Hexanone	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
4-Chlorotoluene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
4-Isopropyltoluene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U

Table 3-1 Results - Volatile Organic Compounds
June 2011 Monitoring Well Sampling Event
Metropolitan Utility District, Mead, NE

Sample ID	AMW06-018-062411		BMW06-018-062411		AMW06-030-062411		BMW06-030-062411		AMW06-031-062411		BMW06-031-062411		AMW-039-062411		DMW-039-062411	
Lab Sample Number	200-5753-1		200-5753-3		200-5753-4		200-5753-5		200-5753-6		200-5753-7		200-5753-8		200-5753-9	
Sampling Date	06/24/11		06/24/11		06/24/11		06/24/11		06/24/11		06/24/11		06/24/11		06/24/11	
Matrix	Water		Water		Water		Water		Water		Water		Water		Water	
Dilution Factor	1		1		1		1		1		1		1		1	
Units	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
Analyte																
4-Methyl-2-pentanone	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
Acetone	5	U	5	U	5	U	1.4	J	5	U	5	U	5	U	5	U
Benzene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Bromobenzene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Bromochloromethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Bromodichloromethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Bromoform	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Bromomethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Carbon disulfide	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Carbon tetrachloride	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Chlorobenzene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Chloroethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Chloroform	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Chloromethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
cis-1,2-Dichloroethene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
cis-1,3-Dichloropropene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Dibromochloromethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Dibromomethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Dichlorodifluoromethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Ethylbenzene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Freon TF	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Hexachlorobutadiene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Isopropylbenzene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
m&p-Xylene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Methyl t-butyl ether	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U

Table 3-1 Results - Volatile Organic Compounds
June 2011 Monitoring Well Sampling Event
Metropolitan Utility District, Mead, NE

Sample ID	AMW06-018-062411		BMW06-018-062411		AMW06-030-062411		BMW06-030-062411		AMW06-031-062411		BMW06-031-062411		AMW-039-062411		DMW-039-062411	
Lab Sample Number	200-5753-1		200-5753-3		200-5753-4		200-5753-5		200-5753-6		200-5753-7		200-5753-8		200-5753-9	
Sampling Date	06/24/11		06/24/11		06/24/11		06/24/11		06/24/11		06/24/11		06/24/11		06/24/11	
Matrix	Water		Water		Water		Water		Water		Water		Water		Water	
Dilution Factor	1		1		1		1		1		1		1		1	
Units	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
Analyte																
Methylene Chloride	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Naphthalene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
n-Butylbenzene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
n-Propylbenzene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
o-Xylene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
sec-Butylbenzene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Styrene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
tert-Butylbenzene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Tetrachloroethene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Toluene	1	U	1	U	1	U	1	U	0.17	J	1	U	1	U	0.19	J
trans-1,2-Dichloroethene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
trans-1,3-Dichloropropene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Trichloroethene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Trichlorofluoromethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Vinyl chloride	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Xylenes, Total	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U

Note: See Table 2-2 for laboratory qualifiers, notes, and abbreviations.

Table 3-2 Results - Explosive Compounds
June 2011 Monitoring Well Sampling Event
Metropolitan Utility District, Mead, NE

Sample ID	AMW06-018-062411		BMW06-018-062411		AMW06-030-062411		BMW06-030-062411		AMW06-031-062411		BMW06-031-062411		AMW-039-062411		DMW-039-062411	
Lab Sample Number	200-5753-1		200-5753-3		200-5753-4		200-5753-5		200-5753-6		200-5753-7		200-5753-8		200-5753-9	
Sampling Date	06/24/11		06/24/11		06/24/11		06/24/11		06/24/11		06/24/11		06/24/11		06/24/11	
Matrix	Water		Water		Water		Water		Water		Water		Water		Water	
Dilution Factor	1		1		1		1		1		1		1		1	
Units	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
Analyte																
1,3,5-Trinitrobenzene	0.2	U	0.21	U	0.21	U	0.016	Jp	0.2	U	0.2	U	0.22	p	0.2	U
1,3-Dinitrobenzene	0.2	U	0.21	U	0.21	U	0.23	p	0.14	Jp	0.2	U	0.2	U	0.089	Jp
2,4,6-Trinitrotoluene	0.2	U	0.21	U	0.21	U	0.063	Jp	0.2	U	0.2	U	0.2	U	0.2	U
2,4-Dinitrotoluene	0.2	U	0.21	U	0.21	U	0.22	U	0.2	U	0.2	U	0.2	U	0.2	U
2,6-Dinitrotoluene	0.2	U	0.21	U	0.032	Jp	0.085	Jp	0.065	Jp	0.2	U	0.2	U	0.051	Jp
2-Amino-4,6-dinitrotoluene	0.2	U	0.21	U	0.21	U	0.22	U	0.2	U	0.2	U	0.2	U	0.2	U
2-Nitrotoluene	0.19	Jp	0.21	U	0.075	Jp	0.073	Jp	0.2	U	0.2	U	0.2	U	0.2	U
3-Nitrotoluene	0.077	J	0.074	Jp	0.21	U	0.22	U	0.23		0.077	J	0.37	p	0.3	
4-Amino-2,6-dinitrotoluene	0.2	U	0.21	U	0.21	U	0.034	Jp	0.2	U	0.2	U	0.2	U	0.034	J
4-Nitrotoluene	0.2	U	0.19	Jp	0.21	U	0.22	U	0.2	U	0.2	U	0.2	U	0.063	Jp
HMX	0.2	U	0.21	U	0.21	U	0.22	U	0.2	U	0.2	U	0.2	U	0.2	U
Nitrobenzene	0.2	U	0.21	U	0.21	U	0.22	U	0.2	U	0.2	U	0.2	U	0.2	U
RDX	0.2	U	0.21	U	0.21	U	0.22	U	0.2	U	0.2	U	0.2	U	0.2	U
Tetryl	0.2	U	0.21	U	0.21	U	0.22	U	0.2	U	0.2	U	0.2	U	0.2	U

Note: See Table 2-2 for laboratory qualifiers, notes, and abbreviations.

Table 3-3 Detections - Volatile Organic Compounds
June 2011 Monitoring Well Sampling Event
Metropolitan Utility District, Mead, NE

Sample ID	AMW06-018-062411	BMW06-018-062411	AMW06-030-062411	BMW06-030-062411	AMW06-031-062411	BMW06-031-062411	AMW-039-062411	DMW-039-062411
Lab Sample Number	200-5753-1	200-5753-3	200-5753-4	200-5753-5	200-5753-6	200-5753-7	200-5753-8	200-5753-9
Sampling Date	06/24/11	06/24/11	06/24/11	06/24/11	06/24/11	06/24/11	06/24/11	06/24/11
Matrix	Water	Water	Water	Water	Water	Water	Water	Water
Dilution Factor	1	1	1	1	1	1	1	1
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Analyte								

There were no detections for volatile organic compounds above the reporting limit.

Note: See Table 2-2 for laboratory qualifiers, notes, and abbreviations.

Table 3-4 Detections - Explosive Compounds
June 2011 Monitoring Well Sampling Event
Metropolitan Utility District, Mead, NE

Sample ID	AMW06-018-062411		BMW06-018-062411		AMW06-030-062411		BMW06-030-062411		AMW06-031-062411		BMW06-031-062411		AMW-039-062411		DMW-039-062411	
Lab Sample Number	200-5753-1		200-5753-3		200-5753-4		200-5753-5		200-5753-6		200-5753-7		200-5753-8		200-5753-9	
Sampling Date	06/24/11		06/24/11		06/24/11		06/24/11		06/24/11		06/24/11		06/24/11		06/24/11	
Matrix	Water		Water		Water		Water		Water		Water		Water		Water	
Dilution Factor	1		1		1		1		1		1		1		1	
Units	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
Analyte																
1,3,5-Trinitrobenzene													0.22	p		
1,3-Dinitrobenzene							0.23	p								
3-Nitrotoluene									0.23				0.37	p	0.3	

Note: See Table 2-2 for laboratory qualifiers, notes, and abbreviations.

Table 3-5 Field Duplicate Results - Volatile Organic Compounds
June 2011 Monitoring Well Sampling Event
Metropolitan Utility District, Mead, NE

Sample ID	AMW06-018-062411		AMW06-218-062411	
Lab Sample Number	200-5753-1		200-5753-2	
Sampling Date	06/24/11		06/24/11	
Matrix	Water		Water	
Dilution Factor	1		1	
Units	ug/L		ug/L	
Analyte				
1,1,1,2-Tetrachloroethane	1	U	1	U
1,1,1-Trichloroethane	1	U	1	U
1,1,2,2-Tetrachloroethane	1	U	1	U
1,1,2-Trichloroethane	1	U	1	U
1,1-Dichloroethane	1	U	1	U
1,1-Dichloroethene	1	U	1	U
1,1-Dichloropropene	1	U	1	U
1,2,3-Trichlorobenzene	1	U	1	U
1,2,4-Trichlorobenzene	1	U	1	U
1,2,4-Trimethylbenzene	1	U	1	U
1,2-Dibromo-3-Chloropropane	1	U	1	U
1,2-Dibromoethane	1	U	1	U
1,2-Dichlorobenzene	1	U	1	U
1,2-Dichloroethane	1	U	1	U
1,2-Dichloroethene, Total	1	U	1	U
1,2-Dichloropropane	1	U	1	U
1,3,5-Trimethylbenzene	1	U	1	U
1,3-Dichlorobenzene	1	U	1	U
1,3-Dichloropropane	1	U	1	U
1,4-Dichlorobenzene	1	U	1	U
2-Butanone	5	U	5	U
2-Chlorotoluene	1	U	1	U
2-Hexanone	5	U	5	U
4-Chlorotoluene	1	U	1	U
4-Isopropyltoluene	1	U	1	U
4-Methyl-2-pentanone	5	U	5	U
Acetone	5	U	5	U
Benzene	1	U	1	U
Bromobenzene	1	U	1	U
Bromochloromethane	1	U	1	U
Bromodichloromethane	1	U	1	U
Bromoform	1	U	1	U
Bromomethane	1	U	1	U
Carbon disulfide	1	U	1	U
Carbon tetrachloride	1	U	1	U
Chlorobenzene	1	U	1	U

Table 3-5 Field Duplicate Results - Volatile Organic Compounds
June 2011 Monitoring Well Sampling Event
Metropolitan Utility District, Mead, NE

Sample ID	AMW06-018-062411		AMW06-218-062411	
Lab Sample Number	200-5753-1		200-5753-2	
Sampling Date	06/24/11		06/24/11	
Matrix	Water		Water	
Dilution Factor	1		1	
Units	ug/L		ug/L	
Analyte				
Chloroethane	1	U	1	U
Chloroform	1	U	1	U
Chloromethane	1	U	1	U
cis-1,2-Dichloroethene	1	U	1	U
cis-1,3-Dichloropropene	1	U	1	U
Dibromochloromethane	1	U	1	U
Dibromomethane	1	U	1	U
Dichlorodifluoromethane	1	U	1	U
Ethylbenzene	1	U	1	U
Freon TF	1	U	1	U
Hexachlorobutadiene	1	U	1	U
Isopropylbenzene	1	U	1	U
m&p-Xylene	1	U	1	U
Methyl t-butyl ether	1	U	1	U
Methylene Chloride	1	U	1	U
Naphthalene	1	U	1	U
n-Butylbenzene	1	U	1	U
n-Propylbenzene	1	U	1	U
o-Xylene	1	U	1	U
sec-Butylbenzene	1	U	1	U
Styrene	1	U	1	U
tert-Butylbenzene	1	U	1	U
Tetrachloroethene	1	U	1	U
Toluene	1	U	1	U
trans-1,2-Dichloroethene	1	U	1	U
trans-1,3-Dichloropropene	1	U	1	U
Trichloroethene	1	U	1	U
Trichlorofluoromethane	1	U	1	U
Vinyl chloride	1	U	1	U
Xylenes, Total	1	U	1	U

Note: See Table 2-2 for laboratory qualifiers, notes, and abbreviations.

Table 3-6 Field Duplicate Results - Explosive Compounds
June 2011 Monitroing Well Sampling Event
Metropolitan Utility District, Mead, NE

Sample ID	AMW06-018-062411		AMW06-218-062411	
Lab Sample Number	200-5753-1		200-5753-2	
Sampling Date	06/24/11		06/24/11	
Matrix	Water		Water	
Dilution Factor	1		1	
Units	ug/L		ug/L	
Analyte				
1,3,5-Trinitrobenzene	0.2	U	0.2	U
1,3-Dinitrobenzene	0.2	U	0.2	U
2,4,6-Trinitrotoluene	0.2	U	0.2	U
2,4-Dinitrotoluene	0.2	U	0.2	U
2,6-Dinitrotoluene	0.2	U	0.2	U
2-Amino-4,6-dinitrotoluene	0.2	U	0.2	U
2-Nitrotoluene	0.19	Jp	0.2	U
3-Nitrotoluene	0.077	J	0.063	J
4-Amino-2,6-dinitrotoluene	0.2	U	0.2	U
4-Nitrotoluene	0.2	U	0.2	U
HMX	0.2	U	0.2	U
Nitrobenzene	0.2	U	0.2	U
RDX	0.2	U	0.2	U
Tetryl	0.2	U	0.2	U

Note: See Table 2-2 for laboratory qualifiers, notes, and abbreviations.

Table 3-7
Field Blank Results - Volatile Organic Compounds
June 2011 Monitoring Well Sampling Event
Metropolitan Utility District, Mead, NE

Sample ID	TRB-239-062411	
Lab Sample Number	200-5753-10	
Sampling Date	06/24/11	
Matrix	Water	
Dilution Factor	1	
Units	ug/L	
Analyte		
1,1,1,2-Tetrachloroethane	1	U
1,1,1-Trichloroethane	1	U
1,1,2,2-Tetrachloroethane	1	U
1,1,2-Trichloroethane	1	U
1,1-Dichloroethane	1	U
1,1-Dichloroethene	1	U
1,1-Dichloropropene	1	U
1,2,3-Trichlorobenzene	1	U
1,2,4-Trichlorobenzene	1	U
1,2,4-Trimethylbenzene	1	U
1,2-Dibromo-3-Chloropropane	1	U
1,2-Dibromoethane	1	U
1,2-Dichlorobenzene	1	U
1,2-Dichloroethane	1	U
1,2-Dichloroethene, Total	1	U
1,2-Dichloropropane	1	U
1,3,5-Trimethylbenzene	1	U
1,3-Dichlorobenzene	1	U
1,3-Dichloropropane	1	U
1,4-Dichlorobenzene	1	U
2-Butanone	5	U
2-Chlorotoluene	1	U
2-Hexanone	5	U
4-Chlorotoluene	1	U
4-Isopropyltoluene	1	U
4-Methyl-2-pentanone	5	U
Acetone	4.5	J
Benzene	1	U
Bromobenzene	1	U
Bromochloromethane	1	U
Bromodichloromethane	1	U
Bromoform	1	U
Bromomethane	1	U
Carbon disulfide	1	U
Carbon tetrachloride	1	U
Chlorobenzene	1	U

Table 3-7
Field Blank Results - Volatile Organic Compounds
June 2011 Monitoring Well Sampling Event
Metropolitan Utility District, Mead, NE

Sample ID	TRB-239-062411	
Lab Sample Number	200-5753-10	
Sampling Date	06/24/11	
Matrix	Water	
Dilution Factor	1	
Units	ug/L	
Analyte		
Chloroethane	1	U
Chloroform	1	U
Chloromethane	1	U
cis-1,2-Dichloroethene	1	U
cis-1,3-Dichloropropene	1	U
Dibromochloromethane	1	U
Dibromomethane	1	U
Dichlorodifluoromethane	1	U
Ethylbenzene	1	U
Freon TF	1	U
Hexachlorobutadiene	1	U
Isopropylbenzene	1	U
m&p-Xylene	1	U
Methyl t-butyl ether	1	U
Methylene Chloride	1	U
Naphthalene	1.7	B
n-Butylbenzene	1	U
n-Propylbenzene	1	U
o-Xylene	1	U
sec-Butylbenzene	1	U
Styrene	1	U
tert-Butylbenzene	1	U
Tetrachloroethene	1	U
Toluene	1	U
trans-1,2-Dichloroethene	1	U
trans-1,3-Dichloropropene	1	U
Trichloroethene	1	U
Trichlorofluoromethane	1	U
Vinyl chloride	1	U
Xylenes, Total	1	U

Note: See Table 2-2 for laboratory qualifiers, notes, and abbreviations.

Table- 4-1
Field Completeness
June 2011 Monitoring Well Sampling Event
Metropolitan Utility District, Mead, NE

	Volatile Organic Compounds (8260B)		Percent Complete	Explosive Compounds (8330B)		Percent Complete
	Actual	*Proposed*		*Actual*	*Proposed*	
No. of Sampling Locations	8	8	100%	8	8	100%
Number of Field Duplicates	1	1	100%	1	1	100%
Number of Matrix Spike Samples	1	1	100%	1	1	100%
Number of Matrix Spike Duplicate Samples	1	1	100%	1	1	100%
Number of Field Blanks	1[3]	0	NA[2]	0	0	NA[2]
Number of Equipment Blanks	0	0	NA[2]	0	0	NA[2]
Number of VOC Trip Blanks	0	1	0%	0	0	NA[2]
Number of Lab Performance Testing Samples[1]	0	0	NA[2]	0	0	NA[2]
Total Number of Samples per event	11	12	92%	11	11	100%

Overall Field Completeness	96%	**Overall Field Completeness Goal**	95%

[1] The number of Batch or Project-specific proficiency testing (PT) samples are scheduled for the fall event.

[2] Percent Complete calculation not required since no samples were proposed for this event.

[3] Although a sample was collected, it was not proposed and cannot be counted toward the completeness goal.

Table- 4-2
Analytical Completeness
June 2011 Monitoring Well Sampling Event
Metropolitan Utility District, Mead, NE

	Volatile Organic Compound Analyses	Explosive Compound Analyses
Number of Analyses	660	126
Number of J qualified data points	4	19
Percent Complete	99%	85%

Overall Acceptable Data Analytical Completeness	92%

Overall Acceptable Data Analytical Completeness Goal	85%

	Volatile Organic Compound Analyses	Explosive Compound Analyses
Number of Analyses	660	126
Number of Rejected Data points	0	0
Percent Complete	100%	100%

Overall Quality Data Analytical Completeness	100%

Overall Quality Data Analytical Completeness Goal	85%

Table- 4-3
Project Completeness
June 2011 Monitoring Well Sampling Event
Metropolitan Utility District, Mead, NE

Overall Field Completeness	Overall Analytical Completeness[1]	Overall Project Completeness[2]
96%	92%	94%

Overall Project Completeness Goal	90%

Notes:
1 = Analytical completeness is the percentage of usable data i.e. quality data completeness.
2 = Project completeness combines sampling and analytical protocols to assess the expectations of the project as a whole. Project completeness is determined by comparing the percentage of samples / measurements that are determined to be usable to the total number of samples / measurements planned.

APPENDIX A

Chain of Custody

TestAmerica Burlington
30 Community Drive, Suite 11
South Burlington, VT 05403
Phone:(802)660-1990

Chain of Custody Record

TestAmerica

Client Information	Sampler: Ryan Doty	Lab PM: Sara Goff	Carrier Tracking No(s):	COC No:
Client Contact: Jeff McPeak	Phone: 402-458-5909	E-Mail: jmcpeak@oaconsulting.com		Page: 1 of 2
Company: Olsson Associates				Job #: 010-1087
Address: 1111 Lincoln Mall	Due Date Requested:			
City: Lincoln, NE	TAT Requested (days): Standard			
State, Zip: NEBRASKA 68508	PO #: 011			
Phone: 402-474-6311	WO #:			
Email: jmcpeak@oaconsulting.com				
Project Name: MUD Platte West Well Field	Project #: 011-1087			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
Other:

Sample Identification - Client ID	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	VOCs 8260	Explosives 8330	Total Number of containers	Special Instructions/Note:
			Preservation Code:							
AMW06-018-062411	6/24/11	1400	6	W			X	X	5	
AMW06-218-062411		1400					X	X	5	
BMW06-018-062411		1420					X	X	5	
BMW06-018-062411 MS		1420					X	X	5	
BMW06-018-062411 MSD		1420					X	X	5	
AMW06-030-062411		1105					X	X	5	
BMW06-030-062411		1615					X	X	5	
AMW06-031-062411		1230					X	X	5	
BMW06-031-062411		1304					X	X	5	
AMW-039-062411		1512					X	X	5	
BMW-039-062411		1538					X	X	5	

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements: In 2 coolers

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
	6/27 16:07	Olsson		6/28/11 1000	TA
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No
Custody Seal No.: 106492, 491
Cooler Temperature(s) °C and Other Remarks: 5.5, 4.3

TestAmerica Burlington
30 Community Drive, Suite 11
South Burlington, VT 05403
Phone:(802)660-1990

Chain of Custody Record

TestAmerica

Client Information	Sampler:	Lab PM:	Carrier Tracking No(s):	COC No:
Client Contact:	Phone:	E-Mail:		Page: 2 of 2
Company:				Job #:

Address:	Due Date Requested:
City:	TAT Requested (days):
State, Zip:	
Phone:	PO #:
Email:	WO #:
Project Name:	Project #:
Site:	SSOW#:

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2SO3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - ph 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification - Client ID	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	VOCs 8260	Total Number of containers	Special Instructions/Note:
			Preservation Code:						
TRB-239-062411	6/24/11	1545	G	W			X	3	

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements: In 2 Coolers

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
	6/27 16:07	Olsson		6/28/11 1000	TA
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: ☐ Yes ☐ No
Custody Seal No.: 106492, 491

Cooler Temperature(s) °C and Other Remarks: 5.5, 4.3

APPENDIX B

Field Notes

Groundwater Sampling Field Notes

General Information

Facility Name: MUD Platte West	Sampler Name(s): Ryan & Doty
Monitor Well Identification Number: MW06-18	Date: 6/24/11
Sample Number: AMW06-018-062411	Weather Conditions: Sunny, windy 72°
PID Reading: 0	Wellhead Inspection (note conditions): OK / Needs Repair

Damage	X	
Locked	X	
Intact Cap	X	
Other (note in comments section)		

Ground Water Measurements

1. Static Water Level (+/-)0.01 ft.)	2.32	5. TOC Elevation:	1089.79
2. Measured Well Depth (+/-0.25 ft.)	49.18	6. Static Water Elevation:	1087.47
3. Casing Diameter (in)	4	7. Water Level Equipment:	Solinst
4. Sample Equipment (Hydrasleeve type):	Custom 4" Hydrasleeve		

Purging: Not Applicable - No Purge Sample Time: 1400

Duplicate Collected?	Yes	Duplicate ID:	AMW06-0218-062411
MS/MSD Collected?	NO	MS/MSD ID:	N A
Sample Analysis:	☒ VOCs ☒ Explosives		
Number of Bottles Filled:	VOAs 6	500ml	4
Investigative Sample pH:	——— (must be < 2)		

Sample Clear or Turbid:	Clear	Preservation Method:	Per FSP
Sample Color:	None	Decon Procedures:	4
Sample Odor:	None	Instrument Calibrations:	

Comments:

Groundwater Sampling Field Notes

General Information

Facility Name: MUD Platte West	Sampler Name(s): Ryan Doty
Monitor Well Identification Number: MW06-18	Date: 6/24/11
Sample Number: BMW06-018-062411	Weather Conditions: Sunny, Windy, 72
PID Reading: 0	Wellhead Inspection (note conditions): OK / Needs Repair

	OK	Needs Repair
Damage	X	
Locked	X	
Intact Cap	X	
Other (note in comments section)		

Ground Water Measurements

1. Static Water Level (+/-)0.01 ft.)	2.32	5. TOC Elevation:	1089.79
2. Measured Well Depth (+/-0.25 ft.)	49.18	6. Static Water Elevation:	1087.47
3. Casing Diameter (in)	4	7. Water Level Equipment:	Solinst
4. Sample Equipment (Hydrasleeve type):	Custom 4" Hydrasleeve		

Purging: Not Applicable - No Purge Sample Time: 1420

Duplicate Collected?	NO	Duplicate ID:	NA
MS/MSD Collected?	Yes	MS/MSD ID:	See Comments
Sample Analysis:	[X] VOCs [X] Explosives		
Number of Bottles Filled:	VOAs 9	500ml	6
Investigative Sample pH:	~NA (must be < 2)		

Sample Clear or Turbid:	Clear	Preservation Method:	Per FSP
Sample Color:	None	Decon Procedures:	
Sample Odor:	None	Instrument Calibrations:	

Comments: Collected
BMW06-018-062411 MS
BMW06-018-062411 MSD

Groundwater Sampling Field Notes

General Information

Facility Name: MUD Platte West	Sampler Name(s): Ryan Doty
Monitor Well Identification Number: MW06-30A	Date: 6/24/11
Sample Number: AMW06-030-062411	Weather Conditions: Sunny, windy 70°
PID Reading: 0	Wellhead Inspection (note conditions): OK / Needs Repair

	OK	Needs Repair
Damage	X	
Locked	X	
Intact Cap	X	
Other (note in comments section)		

Ground Water Measurements

1. Static Water Level (+/-)0.01 ft.)	68.07	5. TOC Elevation:	1199.31
2. Measured Well Depth (+/-0.25 ft.)	92.55	6. Static Water Elevation:	1131.24
3. Casing Diameter (in)	2	7. Water Level Equipment:	Solinst
4. Sample Equipment (Hydrasleeve type):	1L Super Sleeve		

Purging: Not Applicable - No Purge Sample Time: 11:05

Duplicate Collected?	NO	Duplicate ID:	NA
MS/MSD Collected?	NO	MS/MSD ID:	NA
Sample Analysis:	☒ VOCs	☒ Explosives	
Number of Bottles Filled:	VOAs 3	500ml	2
Investigative Sample pH:	NA (must be < 2)		

Sample Clear or Turbid:	Sl. Turbid	Preservation Method:	Per FSP
Sample Color:	Clear / Brown	Decon Procedures:	Per FSP
Sample Odor:	None	Instrument Calibrations:	Per FSP

Comments:

Groundwater Sampling Field Notes

General Information

Facility Name: MUD Platte West	Sampler Name(s): Ryan Doty
Monitor Well Identification Number: MW06-30B	Date: 6/29/11
Sample Number: BMW06-030-062911	Weather Conditions: Sunny, windy, 70
PID Reading: 0	Wellhead Inspection (note conditions): OK / Needs Repair

Damage	Y	
Locked	Y	
Intact Cap	Y	
Other (note in comments section)		

Ground Water Measurements

1. Static Water Level (+/-)0.01 ft.)	68.04	5. TOC Elevation:	1199.37
2. Measured Well Depth (+/-0.25 ft.)	82.10	6. Static Water Elevation:	1131.33
3. Casing Diameter (in)	2	7. Water Level Equipment:	Solinst
4. Sample Equipment (Hydrasleeve type):	2L SuperSleeve		

Purging: Not Applicable - No Purge Sample Time: 1615

Duplicate Collected?	NO	Duplicate ID:	NA
MS/MSD Collected?	NO	MS/MSD ID:	NA
Sample Analysis:	☒ VOCs	☒ Explosives	
Number of Bottles Filled:	VOAs 3	500ml 2	
Investigative Sample pH:	NA (must be < 2)		

Sample Clear or Turbid:	Turbid	Preservation Method:	Per FSP
Sample Color:	DK. Brown	Decon Procedures:	
Sample Odor:	None	Instrument Calibrations:	

Comments:

Hydrasleeve broke, deploy new sleeve at 1200, return at end of sampling to collect

Re collected sample at 1615

Groundwater Sampling Field Notes

General Information

Facility Name: MUD Platte West	Sampler Name(s): Ryan Doty
Monitor Well Identification Number: MW06-31A	Date: 6/24/11
Sample Number: AMW06-031-062411	Weather Conditions: Sunny, Windy, 72°
PID Reading: 0.0	Wellhead Inspection (note conditions): OK / Needs Repair

	OK	Needs Repair
Damage	X	
Locked	X	
Intact Cap	X	
Other (note in comments section)		

Ground Water Measurements

1. Static Water Level (+/-)0.01 ft.)	50.21	5. TOC Elevation:	1149.98
2. Measured Well Depth (+/-0.25 ft.)	158.60	6. Static Water Elevation:	1099.77
3. Casing Diameter (in)	2	7. Water Level Equipment:	Solinst
4. Sample Equipment (Hydrasleeve type):	1L Super Sleeve		

Purging: Not Applicable - No Purge Sample Time: 12:30

Duplicate Collected?	NO	Duplicate ID:	NA
MS/MSD Collected?	NO	MS/MSD ID:	NA
Sample Analysis:	☒ VOCs ☒ Explosives		
Number of Bottles Filled:	VOAs 3	500ml	2
Investigative Sample pH:	2 (must be < 2)		

Sample Clear or Turbid:	Clear	Preservation Method:	Per FSP
Sample Color:	None	Decon Procedures:	Per FSP
Sample Odor:	None	Instrument Calibrations:	Per FSP

Comments:

Groundwater Sampling Field Notes

General Information

Facility Name: MUD Platte West	Sampler Name(s): Ryan Doty
Monitor Well Identification Number: MW06-31B	Date: 6/24/11
Sample Number: BMW06-031-062411	Weather Conditions: Sunny, windy, 72°
PID Reading: 0.0	Wellhead Inspection (note conditions): OK / Needs Repair

Damage	X	
Locked	X	
Intact Cap	X	
Other (note in comments section)		

Ground Water Measurements

1. Static Water Level (+/-)0.01 ft.)	49.96	5. TOC Elevation:	1150.02
2. Measured Well Depth (+/-0.25 ft.)	72.00	6. Static Water Elevation:	1100.06
3. Casing Diameter (in)	2"	7. Water Level Equipment:	Solinst
4. Sample Equipment (Hydrasleeve type):	2L Super Sleeve		

Purging: Not Applicable - No Purge Sample Time: 1304

Duplicate Collected?	No	Duplicate ID:	NA
MS/MSD Collected?	No	MS/MSD ID:	NA
Sample Analysis:	☒ VOCs ☒ Explosives		
Number of Bottles Filled:	VOAs 3	500ml	2
Investigative Sample pH:	NA (must be < 2)		

Sample Clear or Turbid:	Clear	Preservation Method:	Per FSP
Sample Color:	None	Decon Procedures:	Per FSP
Sample Odor:	None	Instrument Calibrations:	Per FSP

Comments:

Groundwater Sampling Field Notes

General Information

Facility Name: MUD Platte West	Sampler Name(s): Ryan Doby
Monitor Well Identification Number: MW-39A	Date: 6/24/11
Sample Number: AMW-039-062411	Weather Conditions: Sunny, slight breeze 77
PID Reading: 0.0	Wellhead Inspection (note conditions): OK / Needs Repair

	OK	Needs Repair
Damage	X	
Locked	X	
Intact Cap	X	
Other (note in comments section)		

Ground Water Measurements

1. Static Water Level (+/-)0.01 ft.)	3.19	5. TOC Elevation:	1082.82
2. Measured Well Depth (+/-0.25 ft.)	51.40	6. Static Water Elevation:	1079.63
3. Casing Diameter (in)	2	7. Water Level Equipment:	Solinst
4. Sample Equipment (Hydrasleeve type):	1L Super Sleeve		

Purging: Not Applicable - No Purge Sample Time: 1512

Duplicate Collected?	No	Duplicate ID:	NA
MS/MSD Collected?	No	MS/MSD ID:	NA
Sample Analysis:	☒ VOCs ☒ Explosives		
Number of Bottles Filled:	VOAs 3	500ml	2
Investigative Sample pH:	NA (must be < 2)		

Sample Clear or Turbid:	Sl. Turbid	Preservation Method:	Per FSP
Sample Color:	Lt. Gray	Decon Procedures:	↓
Sample Odor:	None	Instrument Calibrations:	↓

Comments:

Groundwater Sampling Field Notes

General Information

Facility Name: MUD Platte West	Sampler Name(s): Ryan Doty
Monitor Well Identification Number: MW-39D	Date: 6/24/11
Sample Number: DMW-039-062411	Weather Conditions: Sunny, slight breeze, 70
PID Reading: 0.0	Wellhead Inspection (note conditions): OK / Needs Repair

	OK	Needs Repair
Damage	X	
Locked	X	
Intact Cap	X	
Other (note in comments section)		

Ground Water Measurements

1. Static Water Level (+/-)0.01 ft.)	3.28	5. TOC Elevation:	1082.95
2. Measured Well Depth (+/-0.25 ft.)	57.55	6. Static Water Elevation:	1079.67
3. Casing Diameter (in)	2	7. Water Level Equipment:	Solinst
4. Sample Equipment (Hydrasleeve type):			

Purging: Not Applicable - No Purge Sample Time: 1538

Duplicate Collected?	NO	Duplicate ID:	NA
MS/MSD Collected?	NO	MS/MSD ID:	NA
Sample Analysis:	☒ VOCs	☒ Explosives	
Number of Bottles Filled:	VOAs 3	500ml 2	
Investigative Sample pH:	NA (must be < 2)		

Sample Clear or Turbid:	Clear	Preservation Method:	Per FSP
Sample Color:	None	Decon Procedures:	
Sample Odor:	None	Instrument Calibrations:	X

Comments:

Trip Blank at 1545
TRB-239-062411

Location Saunders County, NE Date 6/23/11

Project / Client MUD Platte West Well field

Personnel: Ryan Doty
Weather: Sunny, high 75, some wind
POD: Install Hydrasleeves, download data
Instruments: See Page 2 - ① Rugged Reader

0740 left office
0820 had to turn around, forgot Keys
0858 left office again 2962 miles
0944 arrived at mw06-30 well site
0950 download MW06-30A data
needs new desicant pack
1017 finish removing pumps from both wells, calibrated WL meter
1045 set hydrasleeve in mw06-30A
1055 set hydrasleeve in MW06-30B
1058 heading to MW06-19
1103 download transducer data, needs new desicant, larger one would fit
1107 water level
1111 head to MW06-31 needs desicant
1118 down load transducer data MW06-31A
1147 pulled pumps & transducer, Water Levels
1240 finally got hydras leeve set in MW06-31A, sleeve snagged side of casing

Location Saunders County Date 6/23/11

Project / Client MUD Platte West Wellfield

ended up wasting a sleeve and ~110' of tether that got wrapped around a burnt piece of wood
need to order another sleeve
1252 set hydrasleeve in MW06-31B
1255 heading to MW06-18
1300 download transducer data needs large desicant
1325 set both hydrasleeves
1328 head to ~~MW-112~~ make that MW-39
1336 download MW-39A transducer
1341 water levels needs desicant
1355 install MW-39D hydrasleeve
1405 install MW-39A hydrasleeve
1409 head to MW-38
1414 download MW-38A transducer
1416 measure WOC
1419 head to MW-112
well I found was MW-114
1434 arrive at MW-46
1436 download MW-46A transducer
1437 measure WL
1439 head to MW-110

Location Saunders County Date 6/23/11

Project / Client MUD Platte West Wellfield

1517 Stopped at ECC plant
Vince and Tim were both gone
Going to look for MW-56 and
MW-106, then head back
1526 found MW-106
1528 download transducer data
1530 measure WL
1532 heading to MW-56
1601 giving up on MW-56 heading
back to office
Didn't find MW-112, MW-110, MW-56
1650 return to office

Location Saunders County Date 6/24/11

Project / Client MUD Platte West Wellfield

Personnel: Ryan Doby
Weather: Partly cloudy, high 80, some wind
POO: Groundwater Sampling
Instruments: See Page 2 ⑦ ⑧

0732 calibrate PID 0/100.2
0828 left office
0911 arrived at ECC plant,
Toby took me around to the
3 wells I didn't find yesterday
0948 left plant, heading to MW-56
0958 arrive at MW-56,
download transducer data
1003 measure WL
1010 head to MW-110
1016 arrive at MW-110, download
transducer data
1021 measure WL
1024 head to MW-112
1028 arrive at MW-112
1034 download transducer data, doesn't
have desiccant, just red rubber cap.
water is flowing out of well.
1038 head to MW 06-30

Location Saunders County Date 6/24/11

Project / Client MUD Platte West Wellfield

1045 arrive at MW06-30
1105 collected AMW06-030-062411
~~1137 collected BMW06-030-062411~~
hydrasleeve broke
1200 deploy new hydrasleeve
1207 deploy transducer and resume logging
1211 head to MW06-31
1317 arrive at MW06-31
1230 collected AMW06-031-062411
1242 Investigative pH sample
1304 collected BMW06-031-062411
1322 deploy transducer & resume logging
1325 head to MW06-18
1330 arrive at MW06-18
1400 collect AMW06-018-062411 and duplicate AMW06-218-062411
1420 collect BMW06-018-062411 and BMW06-018-062411 MS and BMW06-018-062411 MSD
1447 deploy transducer and resume logging
1452 head to MW-39
1458 arrive at MW-39
1512 collect AMW-039-062411

Location Saunders County PWWF Date 6/24/11

Project / Client MUD Platte West Wellfield

1538 collect DMW-039-062411
1556 head back to ~~MW-30~~ MW06-30
1608 arrive at MW06-30
1615 collect BMW06-30-0624
1646 leave site
1744 return to office

6/24/11

SAMPLE COLLECTION CHECKLIST

Project Name/Number: 011-1087 mud **Monitoring Well Number:** Platte West Well Field **Sampling Date:** 6/24/11

Complete for each monitoring well sampling location inspected. Answer each question by checking the appropriate column (yes, no, not observed (N/O) or N/A). If "no" is checked, provide an explanation on the form.

General	Yes	No	N/O	N/A
1. Were new protective gloves worn between sampling locations and/or intervals?	X			
2. Were samples collected using methods described in the FSP?	X			
3. Were sample containers filled in the correct order?	X			
4. Was sampling equipment appropriate for the purpose and site conditions?	X			
5. Was sampling equipment decontaminated or disposable/dedicated equipment used between each sample?	X			
6. Were procedures for collecting QA/QC samples followed as per the FSP?	X			
7. Were sampling locations properly identified by land survey?				X
8. Were bottles adequately protected from contamination prior to sample collection?	X			
Groundwater from wells for Chemical Analysis				
9. Were groundwater parameters stable before sample collection (as per FSP)?				X
10. Were turbidity readings below 50 NTU (or if all other field parameters are stable and turbidity can not be lowered below 50 NTU, were turbidity readings within + or - 10% over three, five-minute readings)?				X
11. Was a field sampling form completed?	X			
12. Were the analytical parameters and QA/QC samples recorded on the field sampling form?	X			
13. Was low-flow sampling conducted in accordance with the approved SAP?				X
14. Was headspace (bubbles) in sample containers for volatiles eliminated?	X			

Corrective Actions:

N/A

The QC Inspector shall sign this checklist upon completion of all items on the checklist.

QC Inspector Signature:

Date: 6/24/11

DECONTAMINATION CHECK LIST

Boring/Monitoring Well Number(s):

Date: 6/24/11

Answer each question by checking the appropriate column (yes, no, not observed (N/O) or N/A). If "no" is checked, provide an explanation on the form.

Equipment	Yes	No	N/O	N/A
1. Was all sampling equipment decontaminated properly prior to use and between sample intervals?	X			
2. Was each decontamination event recorded in the logbook?		X		
3. Was IDW (decontamination water) handled in accordance with the approved work plan?	X			

Corrective Actions: Record decon in log book.

The QC Inspector shall sign this checklist upon completion of all items on the checklist.

QC Inspector Signature:

Date: 6/24/11

INSTRUMENT CALIBRATION CHECK LIST

Instrument Calibration	Yes	No	N/O	N/A
1. Were all field instruments calibrated properly?	X			
2. Were all field instruments calibrated on the schedule in the FSP / QAPP?	X			
3. Did the Field Calibration Forms list all calibration events? No Forms, In Log Book	X			
List instruments used at the Site: Soliost Model 101 WL Meter TEI model 580B PID				

The QC Inspector shall sign this checklist upon completion of all items on the checklist.

QC Inspector Signature:

Date: 6/24/11

FIELD DOCUMENTATION CHECKLIST

Project Name/Number: 011-1087 MUD Platte West Wellfield **Site:**

Complete daily. Answer each question by checking the appropriate column (yes, no, not observed (N/O) or not applicable (N/A). If a No is checked, provide an explanation on the Noncompliance and Corrective Actions form.

Field Documentation	**Yes**	**No**	**N/O**	**N/A**
1. Was all original field data, except boring logs, recorded in black indelible ink?	X			
2. Were logbooks filled out properly; accurately recounting the day's events?	X			
3. Were all field forms completed and information accurately recorded:				
* Sampling Forms?	X			
* Water Level Forms?	X			
* Chain of Custody Forms?	X			
* Field Log Books?	X			
* Project Photograph Log (in Log Book)?				X
List additional field forms completed:				
4. Was field documentation forwarded to office for peer review and QC?	X			

The QC Inspector shall sign this checklist upon completion of all items on the checklist. QC Inspector Signature:

Date: 6/29/14

PACKING, STORING, AND SHIPMENT OF SAMPLES CHECKLIST

Project Name/Number: MUD Platte West Wellfield **Site:**

Monitoring Well Number(s): **Sampling Date:** 6/24/11

Complete daily. Answer each question by checking the appropriate column (yes, no, not observed (N/O) or not applicable (N/A). If a No is checked, provide an explanation on the Noncompliance and Corrective Actions form.

Packing, Storing, and Shipment of Samples	Yes	No	N/O	N/A
1. Were the samples handled according to the FSP / QAPP?	X			
2. Was the pH of samples requiring pH adjustment verified in the field?	X			
3. Did the samples remain on ice from collection until cooler was taped for shipment?	X			
4. Were COC forms filled out accurately and completely including project name and number, sampling date, sampling time, analytical parameters, preservatives, size and number of containers for each analytical parameter, and media sampled?	X			
5. Were COC forms signed and dated by the preparer and the form tapped to the inside of the cooler lid?	X			
6. Were signed and dated custody seals properly placed on the cooler and the cooler sealed with strapping tape?	X			
7. Was a shipping label attached to the cooler?	X			
8. Was custody documentation intact until receipt by the laboratory?	X			

The QC Inspector shall sign this checklist upon completion of all items on the checklist.

QC Inspector Signature:

Date:

APPENDIX C

Laboratory Analytical Report

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

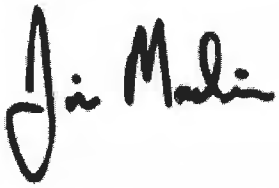
Job Number: 200-5753-1

SDG Number: 200-5753-1

Job Description: M.U.D. Platte West Well Field

For:
Olsson Associates
1111 Lincoln Mall
Suite 111
Lincoln, NE 68508

Attention: Mr. Jeff McPeak



Approved for release.
James W Madison
Project Manager I
08/25/11 9:28 AM

Designee for
Sara S Goff
Project Manager I
sara.goff@testamericainc.com
08/25/2011
Revision: 1

The test results in this report relate only to sample(s) as received by the laboratory. These test results were derived under a quality system that adheres to the requirements of NELAC. Pursuant to NELAC, this report may not be produced in full without written approval from the laboratory

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ACCREDITED IN ACCORDANCE WITH nelac

QUALITY CONTROL SUMMARY REPORT
OCTOBER 2011 MONITORING WELL SAMPLING EVENT

METROPOLITAN UTILITIES DISTRICT OF OMAHA
PLATTE WEST WELL FIELD
SAUNDERS COUNTY, NEBRASKA

PREPARED FOR
METROPOLITAN UTILITIES DISTRICT OF OMAHA

PREPARED BY
OLSSON ASSOCIATES

NOVEMBER 2011

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LIST OF APPENDICES

1.0 INTRODUCTION

The Metropolitan Utilities District of Omaha (MUD) provides potable water for a metropolitan area of over three-quarters of a million people. To meet projected water demands from continued population growth in the greater Omaha area in the coming decades, MUD completed construction of the Platte West Well Field (PWWF) in 2008. The PWWF consists of 42 wells constructed along and adjacent to the Platte River approximately 7 miles east of the town of Mead in Saunders County, Nebraska. The well field began operations in July of 2008 and currently has the capacity to provide 334 million gallons per day (mgd). Because the PWWF transmits water across the Platte River from wells on the west bank eastward via a pipeline, the well field is subject to U.S. Army Corp of Engineers (USACE) Omaha District (CENWO) Section 404 Permit regulations. This permit requires MUD to monitor any influence the well field activity may have on remediation efforts at the former Nebraska Ordnance Plant (NOP) south of Mead, which is under the jurisdiction of the USACE Kansas City District (CENWK). Two overlapping plumes of contaminants (trichloroethylene and RDX) from former munitions and missile plants are found in the subsurface south/southeast of Mead and follow the ambient groundwater gradient from the northwest to the southeast. USACE monitoring of the aquifer conditions consists of tracking both physical parameters (water table elevations and gradient) and changes in contaminant concentrations in the groundwater in both the plume area and the well field. Data obtained from these activities will be used by MUD and the USACE to determine if any impacts have occurred by assessing changes in any concentrations of any contaminants present in monitoring wells. Water levels will also be used to verify the groundwater model of the well field area.

Olsson Associates was contracted by the MUD to monitor the aquifer conditions in accordance with the USACE requirements. This Quality Control Summary Report (QCSR) provides the results of data validation for the data resulting from the Fall 2011 sampling event at the PWWF completed on October 12, 2011.

2.0 FIELD SAMPLING ACTIVITIES

In accordance with the Field Sampling Plan (Olsson, 2011), samples were collected from eight monitoring wells and analyzed for volatile organic compounds (VOCs) and explosive compounds as listed in Table 2-1. Additionally, three quality control (QC) samples were collected:

1. One field duplicate
2. One matrix spike/matrix spike duplicate
3. One trip blank

Table 2-2 provides an explanation of all abbreviations, laboratory qualifiers and notes associated with the tables in this QCSR report. Table 2-3 provides information on sample collection, laboratory numbering and analyses requested as listed below:

- Quality control sample information including duplicate sample location
- A cross reference between field sample and laboratory sample IDs
- Sample delivery group numbers
- Dates of sample collection and sample receipt at the laboratory
- List of analyses requested

3.0 ANALYTICAL RESULTS

The samples were analyzed by TestAmerica, Inc. in Burlington, Vermont for VOCs and explosive compounds. A summary of the analytical results is presented in Table 3-1 for VOCs

and Table 3-2 for explosive compounds. As listed in Table 3-3, there were no VOC detections above the reporting limit. For the explosive compounds, 4-Nitrotoluene was detected above the reporting limit in wells MW06-030A and MW-031A. The detections of explosive compounds are presented in Table 3-4.

The following subsections present results of the data quality evaluation. The evaluation was performed in accordance with the Quality Assurance Project Plan (QAPP) developed specifically for this monitoring program (Olsson, 2011). Qualifiers were assigned by the laboratory in accordance to their quality control program.

3.1 Summary of Receipt in the Laboratory

The samples were received on October 13, 2011 as noted on the Chain-of-Custody (COC) included in Appendix A. The samples arrived in good condition, properly preserved and on ice. The temperature of the coolers was within the acceptable range.

3.2 Holding Times

All samples were extracted and analyzed within the method specific holding times as noted in the QAPP (Olsson, 2011):

- 14-days to extraction for VOCs
- 7-days to extraction and 40-days to analysis for Explosives

3.3 Tuning and Calibration

Assessment of tune and calibration data was validated by reviewing the case narrative and analytical report. Tuning and calibration outliers are to be detailed by the laboratory in Final Analytical Report. No deviations from method specifications for the calibration and tuning of pertinent instrumentation were reported by TestAmerica.

3.4 Laboratory Method Blanks

Method blanks were prepared and analyzed as per the requirements of the QAPP (Olsson, 2011). Method blanks are sample containers filled by the laboratory with analyte-free water that is carried through the entire preparation and analysis sequence for the purpose of identifying potential contamination. Method blanks were analyzed with each sample batch for all analyses.

No target analytes for VOCs or explosives were detected in the method blanks; however, several analytes were detected in method blank MB 200-26946/5 at levels that were above the method detection limit but below the reporting limit. The values should be considered estimates, and have been flagged “J”. If an associated sample reported a result above the MDL and/or RL, the result has been “B” flagged. Several analytes were detected in method blank MB 200-27011/7 at levels that were above the method detection limit but below the reporting limit. The values should be considered estimates, and have been flagged “J”. If the associated sample reported a result above the MDL and/or RL, the result has been “B” flagged.

3.5 Trip Blanks

Trip blanks are required when samples are collected for analysis of VOCs. Trip blanks are prepared in the laboratory with analyte-free water and are shipped to the site with the regular sample containers. The blanks are kept unopened in the field during site sampling activities and are shipped for analysis with the project samples. Trip blanks are designed to evaluate VOC contamination encountered during sampling, transportation, and storage. One trip blank sample

was placed in each sample cooler containing samples to be analyzed for VOCs, and was analyzed with the samples selected for VOC analysis. As noted in Table 3-7, no detections were noted in the trip blank analysis.

3.6 Rinsate Blanks

Rinsate blank samples serve as a quality control check on the cleanliness of the sampling device and the equipment decontamination process. Rinsate blanks are prepared in the field using analyte-free or organic-free water. The samples are used to evaluate if contaminants have been introduced through contact with the sampling equipment. Rinsate blanks are only required when non-dedicated sampling equipment is used to collect groundwater samples, as specified in the QAPP (Olsson, 2011). For the MUD Platte West Monitoring program, rinsate samples were not required because dedicated sampling equipment, specifically, Hydrasleeves, were used to collect the groundwater samples.

3.7 Surrogates

Surrogates are compounds that are added (spiked) into samples prior to sample extraction or analysis, depending on the method. The compounds are not normally found in the environment and therefore can be analyzed for their percent recovery as part of the quality control process. The percent recovery (%REC) of each surrogate is used to assess the success of the sample preparation process for each sample.

For the 8260B VOC analyses (GC/MS), four surrogate analytes were introduced:

- 1,2-Dichloroethane-d4 (80-115%)
- Toluene-d8 (80-115%)
- Bromofluorobenzene (85-120%)
- 1,2-Dichlorobenzene-d4 (80-115%)

All four surrogates were recovered within their acceptable range as noted above.

For the 8330B Nitroaromatic and nitramines (HPLC) explosive compound analyses, the surrogate 1,2-dinitrobenzene was introduced. The surrogate recoveries were within the TestAmerica control limits of 40-150%.

3.8 Laboratory Control Sample/Laboratory Control Sample Duplicate

The laboratory control sample (LCS) consists of a matrix similar to the field sample. The LCS is spiked with known concentrations of analytes. As with the surrogates, the LCS %REC is a measure of the method accuracy. If % REC results are outside the laboratory criteria, then the data is flagged with a laboratory qualifier “F” meaning the recovery (REC) or Relative Percent Difference (RPD) exceeds the control limits.

For the VOCs, no qualifiers were noted in the Quality Control Results of the Final Analytical Report (TestAmerica, 2011) because the % RECs were within the acceptable laboratory limits. For the Explosive analyses, one compound was qualified with “p” qualifiers because the RPD between the primary and confirmation columns differed by more than 40%. The compound was 4-Nitrotoluene. The lower value has been reported.

3.9 Matrix Spike/Matrix Spike Duplicate

Matrix Spike/Matrix Spike Duplicate (MS/MSD) analyses measure method accuracy and precision for a project-specific matrix. A field sample is split into three portions (original, MS,

and MSD) and known amounts of analytes are spiked into the MS and MSD portions of the sample. The analytical results of these two portions are compared to each other for reproducibility using the RPD. The results are also compared against the unspiked portion of the sample for % REC of the spiked analytes. Typically, MS/MSD samples are analyzed for each Sample Delivery Group (SDG) for all analytes. For this sample event, there was only one SDG and therefore only one MS/MSD was analyzed for each analysis. All results that are qualified with J this round are due to MS/MSD % REC or RPD outliers. Results for contaminants of concern are R-coded if the MS/MSD %REC is less than 10%.

MS/MSD % REC were within laboratory limits for VOCs except for 1,2-Dibromo-3-Chloropropane failed the recovery criteria low for the MS of sample BMW06-018-101211MS in batch 200-26946. For explosive analyses, 2-Nitrotoluene, 4-Nitrotoluene, HMX and RDX failed the recovery criteria high for the MS of sample BMW06-018-101211MS in batch 200-26896. 2-Nitrotoluene failed the recovery criteria high for the MSD of sample BMW06-018-101211MSD in batch 200-26896.

Data qualifiers due to MSMSD % REC are as follows. J-coded data are noted in Tables 3-1, 3-2 and 3-6. For VOCs 1,2,4-Trichlorobenzene for sample BMW06-031-101211 is J-coded. For explosive compounds, 1,3,5-Trinitrobenzene for samples AMW06-030-101211; 2,6-Dinitrotoluene for samples AMW06-018-101211, AMW06-031-101211, and DMW-039-101211; 3-Nitrotoluene for samples AMW06-030-101211, and AMW06-031-101211; and RDX for samples AMW06-018-101211, AMW06-218-101211 (Field Duplicate), BMW06-018-101211, and AMW06-030-101211. There were no R-coded data.

All other quality control parameters were within the acceptance limits.

3.10 Field Duplicate Results

Field duplicate results provide information on the reproducibility of field sample results and account for error introduced from handling, shipping, storage, preparation, and analysis of field samples. One field duplicate pair was collected during the October 2011 groundwater sampling event. The field duplicate pair is AMW06-018-101211 and AMW06-218-101211. The pair were analyzed for VOCs and explosives.

Along with QC evaluations presented in other sections of this QCSR, the results of the field duplicate pair are compared to one another. Results within a factor of two of each other are considered to be in agreement. Results between a factor of two to three of each other are considered a minor discrepancy and results greater than a factor of three are considered a major discrepancy. Table 3-5 and 3-6 present the results of the field duplicate pair for VOCs and explosive compounds (respectively). Field duplicate comparisons between AMW06-018-101211 and AMW06-218-101211 are considered to be in agreement.

3.11 Dilutions and Re-analyses

As noted on the data tables presented in this QCSR, the VOC and explosive samples did not require dilution (dilution factor = 1). The data reported in the tables are usable as reported.

3.12 Other QC Parameters

A column comparison between the detected explosive results was made using explosive identification summary forms. The RPDs were calculated by the laboratory on the appropriate Form X, Identification Summary (See Appendix C). All detected explosives reported were

confirmed by a second column. The lower value was reported. The percent difference between the two columns did not exceed 40% with the exception of seven compounds. As stated above, seven compounds were qualified with "p" qualifiers because the RPD between the primary and confirmation columns differed by more than 40%. The compounds are 2,6-Dinitrotoluene, RDX, tetryl, 2,4-Dinitrotoluene, 4-Nitrotoluene, 3-Nitrotoluene, and 1,3,5-Trinitrobenzene. The results for these compounds from the subsequent sampling rounds will be carefully evaluated.

3.13 Laboratory Qualifiers

Analytes detected below the quantitation limit or reporting limit but above the lowest level of detection were quantified and results were assigned an estimate (J) qualifier by the laboratory. The qualifiers are identified in Tables 3-1 through 3-7. These qualifiers were carried over and were not used to evaluate analytical completeness or project completeness.

4.0 OVERALL ASSESSMENT

The following sections present the field completeness, analytical completeness and project completeness for the October 2011 monitoring well sampling event.

4.1 Field Completeness

Field completeness for sample collection is assessed by comparing the number of samples collected to the number of samples originally planned for collection. Table 4-1 presents the field completeness values for the October 2011 monitoring event. Field completeness for explosives was 100%. Field completeness for the VOCs was 100%. The overall field completeness was 100% which is above the goal of 95%.

4.2 Analytical Completeness

Acceptable data is a measure of contract laboratory compliance. Acceptable data includes data that has not been rejected or qualified as estimated (J). Qualified data is considered acceptable if appropriate corrective actions were taken by the laboratory. The acceptable data completeness percentage for VOCs was 100% and for explosives was 92%. The overall acceptable data completeness is 96% which is above the overall acceptable data completeness goal of 85%.

Quality data is a measure of the percentage of usable data. Quality data includes all data except rejected data points, and does not include analyses for which replacement data points are available. There was no rejected data and therefore quality data completeness percentages for VOCs and explosives were 100% which exceeds the quality data completeness goals of 85% for each analytical method. Table 4-2 presents acceptable and quality data completeness. Overall quality data completeness is 100%, which exceeds the overall quality data completeness goal of 85%.

4.3 Project Completeness

Project completeness combines sampling and analytical completeness percentages to assess the success in achieving the expectations of the project as a whole. Project completeness is determined by comparing the percentage of usable samples/measurements to the percentage of planned or observed samples/measurements. For the field completeness portion, this involves comparison of the number of samples properly collected to the number of samples planned for collection. For the analytical data completeness portion, this involves comparison of the number of usable data points to the number of observed data points. The field

Table 2-1
Monitoring Wells Samples and Analytical Requirements
October 2011 Monitoring Well Sampling Event
Metropolitan Utilities District, Saunders County, NE

Well Identification	Latitude	Longitude	Analyses
MW06-18A	-96.382036	41.160754	Volatile Organic and Explosive Compounds
MW06-18B	-96.382036	41.160754	Volatile Organic and Explosive Compounds
MW06-30A	-96.405926	41.190157	Volatile Organic and Explosive Compounds
MW06-30B	-96.405926	41.190157	Volatile Organic and Explosive Compounds
MW06-31A	-96.391220	41.175544	Volatile Organic and Explosive Compounds
MW06-31B	-96.391220	41.175544	Volatile Organic and Explosive Compounds
MW-39A	-96.368231	41.146403	Volatile Organic and Explosive Compounds
MW-39D	-96.368231	41.146403	Volatile Organic and Explosive Compounds

Table 2-2
Abbreviations, Data Qualifiers and Notes
October 2011 Monitoring Well Sampling Event
Metropolitan Utilities District, Saunders County, NE

Notes:

All analyses were completed by TestAmerica in Burlington, Vermont

Abbreviations:

Dup	Duplicate sample
ID	Identification
Invest.	Investigative sample
Lab	Laboratory
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NA	Not Analyzed
VOCs	Volatile Organic Compounds
VOAs	Volatile Organic Analyses
RPD	Relative Percent Difference
HPLC/IC	High Performance Liquid Chromatography/Ionic Chromatography

Data Qualifiers:

GC/MS VOA

*	Recovery or RPD exceeds control limits
B	Compound was found in the blank and sample.
F	MS/MSD Recovery or RPD exceeds the control limits
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U	Indicates the analyte was analyzed for but not detected.

HPLC/IC

*	Recovery or RPD exceeds control limits
F	MS/MSD Recovery or RPD exceeds the control limits
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
p	The %RPD between the primary and confirmation column/detector is >40%. The lower value has been reported.
U	Indicates the analyte was analyzed for but not detected.

Table 2-3
Sample Collection Summary
October 2011 Monitoring Well Sampling Event
Metropolitan Utilities District, Saunders County, NE

Well Number	Investigative Sample ID	Quality Control Sample ID	MS/MSD Sample ID	Trip Blank Sample ID	Date Sampled	Date Received by Lab	COC Record Number	Lab ID	Sample Delivery Group	VOCs	Explosives
MW06-18A	AMW06-018-101211	--	--	--	10/12/2011	10/13/11	None	200-7484-3	200-7484-1	Yes	Yes
MW06-18A	--	AMW06-218-101211	--	--	10/12/2011	10/13/11	None	200-7484-4	200-7484-1	Yes	Yes
MW06-18B	BMW06-018-101211	--	--	--	10/12/2011	10/13/11	None	200-7484-5	200-7484-1	Yes	Yes
MW06-18B	--	--	BMW06-018-101211MS	--	10/12/2011	10/13/11	None	200-7484-5MS	200-7484-1	No	No
MW06-18B	--	--	BMW06-018-101211MSD	--	10/12/2011	10/13/11	None	200-7484-5MSD	200-7484-1	No	No
MW06-30A	AMW06-030-101211	--	--	--	10/12/2011	10/13/11	None	200-7484-8	200-7484-1	Yes	Yes
MW06-30B	BMW06-030-101211	--	--	--	10/12/2011	10/13/11	None	200-7484-9	200-7484-1	Yes	Yes
MW06-31A	AMW06-031-101211	--	--	--	10/12/2011	10/13/11	None	200-7484-6	200-7484-1	Yes	Yes
MW06-31B	BMW06-031-101211	--	--	--	10/12/2011	10/13/11	None	200-7484-7	200-7484-1	Yes	Yes
MW-39A	AMW-39-101211	--	--	--	10/12/2011	10/13/11	None	200-7484-2	200-7484-1	Yes	Yes
MW-39D	DMW-039-101211	--	--	--	10/12/2011	10/13/11	None	200-7484-1	200-7484-1	Yes	Yes
All wells	--	--	--	TRB-239-101211	10/12/2011	10/13/11	None	200-7484-16	200-7484-1	Yes	No

Note: See Table 2-2 for laboratory qualifiers, notes, and abbreviations.

Table 3-1 Results - Volatile Organic Compounds
October 2011 Monitoring Well Sampling Event
Metropolitan Utilities District, Saunders County, NE

Sample ID	AMW06-018-101211		BMW06-018-101211		AMW06-030-101211		BMW06-030-101211		AMW06-031-101211		BMW06-031-101211		AMW-039-101211		DMW-039-101211	
Lab Sample Number	200-7484-3		200-7484-5		200-7484-8		200-7484-9		200-7484-6		200-7484-7		200-7484-2		200-7484-1	
Sampling Date	10/12/11		10/12/11		10/12/11		10/12/11		10/12/11		10/12/11		10/12/11		10/12/11	
Matrix	Water		Water		Water		Water		Water		Water		Water		Water	
Dilution Factor	1		1		1		1		1		1		1		1	
Units	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
Analyte																
1,1,1,2-Tetrachloroethane	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
1,1,1-Trichloroethane	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
1,1,2,2-Tetrachloroethane	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
1,1,2-Trichloroethane	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
1,1-Dichloroethane	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
1,1-Dichloroethene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
1,1-Dichloropropene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
1,2,3-Trichlorobenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
1,2,4-Trichlorobenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	0.24	J B	1.0	U	1.0	U
1,2,4-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
1,2-Dibromo-3-Chloropropane	1.0	U *	1.0	U *	1.0	U *	1.0	U *	1.0	U	1.0	U *	1.0	U *	1.0	U *
1,2-Dibromoethane	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
1,2-Dichlorobenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
1,2-Dichloroethane	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
1,2-Dichloroethene, Total	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
1,2-Dichloropropane	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
1,3,5-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
1,3-Dichlorobenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
1,3-Dichloropropane	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
1,4-Dichlorobenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
2-Butanone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
2-Chlorotoluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
2-Hexanone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
4-Chlorotoluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
4-Isopropyltoluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U

Table 3-1 Results - Volatile Organic Compounds
October 2011 Monitoring Well Sampling Event
Metropolitan Utilities District, Saunders County, NE

Sample ID	AMW06-018-101211		BMW06-018-101211		AMW06-030-101211		BMW06-030-101211		AMW06-031-101211		BMW06-031-101211		AMW-039-101211		DMW-039-101211	
Lab Sample Number	200-7484-3		200-7484-5		200-7484-8		200-7484-9		200-7484-6		200-7484-7		200-7484-2		200-7484-1	
Sampling Date	10/12/11		10/12/11		10/12/11		10/12/11		10/12/11		10/12/11		10/12/11		10/12/11	
Matrix	Water		Water		Water		Water		Water		Water		Water		Water	
Dilution Factor	1		1		1		1		1		1		1		1	
Units	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
Analyte																
4-Methyl-2-pentanone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Acetone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Benzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Bromobenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Bromochloromethane	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Bromodichloromethane	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Bromomethane	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Carbon disulfide	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Carbon tetrachloride	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Chlorobenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Chloroethane	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Chloroform	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Chloromethane	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
cis-1,2-Dichloroethene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
cis-1,3-Dichloropropene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Dibromochloromethane	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Dibromomethane	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Dichlorodifluoromethane	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Ethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Freon TF	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Hexachlorobutadiene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Isopropylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
m&p-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Methyl t-butyl ether	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U

Table 3-1 Results - Volatile Organic Compounds
October 2011 Monitoring Well Sampling Event
Metropolitan Utilities District, Saunders County, NE

Sample ID	AMW06-018-101211		BMW06-018-101211		AMW06-030-101211		BMW06-030-101211		AMW06-031-101211		BMW06-031-101211		AMW-039-101211		DMW-039-101211	
Lab Sample Number	200-7484-3		200-7484-5		200-7484-8		200-7484-9		200-7484-6		200-7484-7		200-7484-2		200-7484-1	
Sampling Date	10/12/11		10/12/11		10/12/11		10/12/11		10/12/11		10/12/11		10/12/11		10/12/11	
Matrix	Water		Water		Water		Water		Water		Water		Water		Water	
Dilution Factor	1		1		1		1		1		1		1		1	
Units	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
Analyte																
Methylene Chloride	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Naphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
n-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
n-Propylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
o-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
sec-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Styrene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
tert-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Tetrachloroethene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Toluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
trans-1,2-Dichloroethene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
trans-1,3-Dichloropropene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Trichloroethene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Trichlorofluoromethane	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Vinyl chloride	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Xylenes, Total	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U

Note: See Table 2-2 for laboratory qualifiers, notes, and abbreviations.

Table 3-2 Results - Explosive Compounds
October 2011 Monitoring Well Sampling Event
Metropolitan Utilities District, Saunders County, NE

Sample ID	AMW06-018-101211		BMW06-018-101211		AMW06-030-101211		BMW06-030-101211		AMW06-031-101211		BMW06-031-101211		AMW-039-101211		DMW-039-101211	
Lab Sample Number	200-7484-3		200-7484-5		200-7484-8		200-7484-9		200-7484-6		200-7484-7		200-7484-2		200-7484-1	
Sampling Date	10/12/11		10/12/11		10/12/11		10/12/11		10/12/11		10/12/11		10/12/11		10/12/11	
Matrix	Water		Water		Water		Water		Water		Water		Water		Water	
Dilution Factor	1		1		1		1		1		1		1		1	
Units	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
Analyte																
1,3,5-Trinitrobenzene	0.20	U	0.20	U	0.042	J p	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U
1,3-Dinitrobenzene	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U
2,4,6-Trinitrotoluene	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U
2,4-Dinitrotoluene	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U
2,6-Dinitrotoluene	0.035	J p	0.20	U	0.20	U	0.20	U	0.043	J p	0.20	U	0.20	U	0.022	J p
2-Amino-4,6-dinitrotoluene	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U
2-Nitrotoluene	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U
3-Nitrotoluene	0.20	U	0.20	U	0.097	J p	0.20	U	0.076	J p	0.20	U	0.20	U	0.20	U
4-Amino-2,6-dinitrotoluene	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U
4-Nitrotoluene	0.20	U	0.20	U	0.48	p	0.20	U	0.63	p	0.20	U	0.20	U	0.20	U
HMX	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U
Nitrobenzene	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U
RDX	0.023	J p	0.027	J p	0.14	J p	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U
Tetryl	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U

Note: See Table 2-2 for laboratory qualifiers, notes, and abbreviations.

Table 3-3 Detections - Volatile Organic Compounds
October 2011 Monitoring Well Sampling Event
Metropolitan Utilities District, Saunders County, NE

Sample ID	AMW06-018-101211	BMW06-018-101211	AMW06-030-101211	BMW06-030-101211	AMW06-031-101211	BMW06-031-101211	AMW-039-101211	DMW-039-101211
Lab Sample Number	200-7484-3	200-7484-5	200-7484-8	200-7484-9	200-7484-6	200-7484-7	200-7484-2	200-7484-1
Sampling Date	10/12/11	10/12/11	10/12/11	10/12/11	10/12/11	10/12/11	10/12/11	10/12/11
Matrix	Water	Water	Water	Water	Water	Water	Water	Water
Dilution Factor	1	1	1	1	1	1	1	1
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Analyte								

There were no detections for volatile organic compounds above the reporting limit.

Note: See Table 2-2 for laboratory qualifiers, notes, and abbreviations.

Table 3-4 Detections - Explosive Compounds
October 2011 Monitoring Well Sampling Event
Metropolitan Utilities District, Saunders County, NE

Sample ID	AMW06-018-101211		BMW06-018-101211		AMW06-030-101211		BMW06-030-101211		AMW06-031-101211		BMW06-031-101211		AMW-039-101211		DMW-039-101211	
Lab Sample Number	200-7484-3		200-7484-5		200-7484-8		200-7484-9		200-7484-6		200-7484-7		200-7484-2		200-7484-1	
Sampling Date	10/12/11		10/12/11		10/12/11		10/12/11		10/12/11		10/12/11		10/12/11		10/12/11	
Matrix	Water		Water		Water		Water		Water		Water		Water		Water	
Dilution Factor	1		1		1		1		1		1		1		1	
Units	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
Analyte																
4-Nitrotoluene					0.48	p			0.63	p						

Note: See Table 2-2 for laboratory qualifiers, notes, and abbreviations.

Table 3-5 Field Duplicate Results - Volatile Organic Compounds
October 2011 Monitoring Well Sampling Event
Metropolitan Utilities District, Saunders County, NE

Sample ID	AMW06-018-101211		AMW06-218-101211	
Lab Sample Number	200-7484-3		200-7484-4	
Sampling Date	10/12/11		10/12/11	
Matrix	Water		Water	
Dilution Factor	1		1	
Units	ug/L		ug/L	
Analyte				
1,1,1,2-Tetrachloroethane	1.0	U	1.0	U
1,1,1-Trichloroethane	1.0	U	1.0	U
1,1,2,2-Tetrachloroethane	1.0	U	1.0	U
1,1,2-Trichloroethane	1.0	U	1.0	U
1,1-Dichloroethane	1.0	U	1.0	U
1,1-Dichloroethene	1.0	U	1.0	U
1,1-Dichloropropene	1.0	U	1.0	U
1,2,3-Trichlorobenzene	1.0	U	1.0	U
1,2,4-Trichlorobenzene	1.0	U	1.0	U
1,2,4-Trimethylbenzene	1.0	U	1.0	U
1,2-Dibromo-3-Chloropropane	1.0	U *	1.0	U *
1,2-Dibromoethane	1.0	U	1.0	U
1,2-Dichlorobenzene	1.0	U	1.0	U
1,2-Dichloroethane	1.0	U	1.0	U
1,2-Dichloroethene, Total	1.0	U	1.0	U
1,2-Dichloropropane	1.0	U	1.0	U
1,3,5-Trimethylbenzene	1.0	U	1.0	U
1,3-Dichlorobenzene	1.0	U	1.0	U
1,3-Dichloropropane	1.0	U	1.0	U
1,4-Dichlorobenzene	1.0	U	1.0	U
2-Butanone	5.0	U	5.0	U
2-Chlorotoluene	1.0	U	1.0	U
2-Hexanone	5.0	U	5.0	U
4-Chlorotoluene	1.0	U	1.0	U
4-Isopropyltoluene	1.0	U	1.0	U
4-Methyl-2-pentanone	5.0	U	5.0	U
Acetone	5.0	U	5.0	U
Benzene	1.0	U	1.0	U
Bromobenzene	1.0	U	1.0	U
Bromochloromethane	1.0	U	1.0	U
Bromodichloromethane	1.0	U	1.0	U
Bromoform	1.0	U	1.0	U
Bromomethane	1.0	U	1.0	U
Carbon disulfide	1.0	U	1.0	U
Carbon tetrachloride	1.0	U	1.0	U
Chlorobenzene	1.0	U	1.0	U

Table 3-5 Field Duplicate Results - Volatile Organic Compounds
October 2011 Monitoring Well Sampling Event
Metropolitan Utilities District, Saunders County, NE

Sample ID	AMW06-018-101211		AMW06-218-101211	
Lab Sample Number	200-7484-3		200-7484-4	
Sampling Date	10/12/11		10/12/11	
Matrix	Water		Water	
Dilution Factor	1		1	
Units	ug/L		ug/L	
Analyte				
Chloroethane	1.0	U	1.0	U
Chloroform	1.0	U	1.0	U
Chloromethane	1.0	U	1.0	U
cis-1,2-Dichloroethene	1.0	U	1.0	U
cis-1,3-Dichloropropene	1.0	U	1.0	U
Dibromochloromethane	1.0	U	1.0	U
Dibromomethane	1.0	U	1.0	U
Dichlorodifluoromethane	1.0	U	1.0	U
Ethylbenzene	1.0	U	1.0	U
Freon TF	1.0	U	1.0	U
Hexachlorobutadiene	1.0	U	1.0	U
Isopropylbenzene	1.0	U	1.0	U
m&p-Xylene	1.0	U	1.0	U
Methyl t-butyl ether	1.0	U	1.0	U
Methylene Chloride	1.0	U	1.0	U
Naphthalene	1.0	U	1.0	U
n-Butylbenzene	1.0	U	1.0	U
n-Propylbenzene	1.0	U	1.0	U
o-Xylene	1.0	U	1.0	U
sec-Butylbenzene	1.0	U	1.0	U
Styrene	1.0	U	1.0	U
tert-Butylbenzene	1.0	U	1.0	U
Tetrachloroethene	1.0	U	1.0	U
Toluene	1.0	U	1.0	U
trans-1,2-Dichloroethene	1.0	U	1.0	U
trans-1,3-Dichloropropene	1.0	U	1.0	U
Trichloroethene	1.0	U	1.0	U
Trichlorofluoromethane	1.0	U	1.0	U
Vinyl chloride	1.0	U	1.0	U
Xylenes, Total	1.0	U	1.0	U

Note: See Table 2-2 for laboratory qualifiers, notes, and abbreviations.

Table 3-6 Field Duplicate Results - Explosive Compounds
October 2011 Monitroing Well Sampling Event
Metropolitan Utilities District, Saunders County, NE

Sample ID	AMW06-018-101211		AMW06-218-101211	
Lab Sample Number	200-7484-3		200-7484-4	
Sampling Date	10/12/11		10/12/11	
Matrix	Water		Water	
Dilution Factor	1		1	
Units	ug/L		ug/L	
Analyte				
1,3,5-Trinitrobenzene	0.20	U	0.20	U
1,3-Dinitrobenzene	0.20	U	0.20	U
2,4,6-Trinitrotoluene	0.20	U	0.20	U
2,4-Dinitrotoluene	0.20	U	0.20	U
2,6-Dinitrotoluene	0.035	J p	0.20	U
2-Amino-4,6-dinitrotoluene	0.20	U	0.20	U
2-Nitrotoluene	0.20	U	0.20	U
3-Nitrotoluene	0.20	U	0.20	U
4-Amino-2,6-dinitrotoluene	0.20	U	0.20	U
4-Nitrotoluene	0.20	U	0.20	U
HMX	0.20	U	0.20	U
Nitrobenzene	0.20	U	0.20	U
RDX	0.023	J p	0.061	J

Note: See Table 2-2 for laboratory qualifiers, notes, and abbreviations.

Table 3-7
Trip Blank Results - Volatile Organic Compounds
October 2011 Monitoring Well Sampling Event
Metropolitan Utilities District, Saunders County, NE

Sample ID	TRB-239-101211	
Lab Sample Number	200-7484-16	
Sampling Date	10/12/11	
Matrix	Water	
Dilution Factor	1	
Units	ug/L	
Analyte		
1,1,1,2-Tetrachloroethane	1.0	U
1,1,1-Trichloroethane	1.0	U
1,1,2,2-Tetrachloroethane	1.0	U
1,1,2-Trichloroethane	1.0	U
1,1-Dichloroethane	1.0	U
1,1-Dichloroethene	1.0	U
1,1-Dichloropropene	1.0	U
1,2,3-Trichlorobenzene	1.0	U
1,2,4-Trichlorobenzene	1.0	U
1,2,4-Trimethylbenzene	1.0	U
1,2-Dibromo-3-Chloropropane	1.0	U *
1,2-Dibromoethane	1.0	U
1,2-Dichlorobenzene	1.0	U
1,2-Dichloroethane	1.0	U
1,2-Dichloroethene, Total	1.0	U
1,2-Dichloropropane	1.0	U
1,3,5-Trimethylbenzene	1.0	U
1,3-Dichlorobenzene	1.0	U
1,3-Dichloropropane	1.0	U
1,4-Dichlorobenzene	1.0	U
2-Butanone	5.0	U
2-Chlorotoluene	1.0	U
2-Hexanone	5.0	U
4-Chlorotoluene	1.0	U
4-Isopropyltoluene	1.0	U
4-Methyl-2-pentanone	5.0	U
Acetone	5.0	U
Benzene	1.0	U
Bromobenzene	1.0	U
Bromochloromethane	1.0	U
Bromodichloromethane	1.0	U
Bromoform	1.0	U
Bromomethane	1.0	U
Carbon disulfide	1.0	U
Carbon tetrachloride	1.0	U

Table 3-7
Trip Blank Results - Volatile Organic Compounds
October 2011 Monitoring Well Sampling Event
Metropolitan Utilities District, Saunders County, NE

Sample ID	TRB-239-101211	
Lab Sample Number	200-7484-16	
Sampling Date	10/12/11	
Matrix	Water	
Dilution Factor	1	
Units	ug/L	
Analyte		
Chlorobenzene	1.0	U
Chloroethane	1.0	U
Chloroform	1.0	U
Chloromethane	1.0	U
cis-1,2-Dichloroethene	1.0	U
cis-1,3-Dichloropropene	1.0	U
Dibromochloromethane	1.0	U
Dibromomethane	1.0	U
Dichlorodifluoromethane	1.0	U
Ethylbenzene	1.0	U
Freon TF	1.0	U
Hexachlorobutadiene	1.0	U
Isopropylbenzene	1.0	U
m&p-Xylene	1.0	U
Methyl t-butyl ether	1.0	U
Methylene Chloride	1.0	U
Naphthalene	1.0	U
n-Butylbenzene	1.0	U
n-Propylbenzene	1.0	U
o-Xylene	1.0	U
sec-Butylbenzene	1.0	U
Styrene	1.0	U
tert-Butylbenzene	1.0	U
Tetrachloroethene	1.0	U
Toluene	1.0	U
trans-1,2-Dichloroethene	1.0	U
trans-1,3-Dichloropropene	1.0	U
Trichloroethene	1.0	U
Trichlorofluoromethane	1.0	U
Vinyl chloride	1.0	U
Xylenes, Total	1.0	U

Note: See Table 2-2 for laboratory qualifiers, notes, and abbreviations.

Table- 4-1
Field Completeness
October 2011 Monitoring Well Sampling Event
Metropolitan Utilities District, Saunders County, NE

	Volatile Organic Compounds (8260B)		Percent Complete	Explosive Compounds (8330B)		Percent Complete
	Actual	*Proposed*		*Actual*	*Proposed*	
No. of Sampling Locations	8	8	100%	8	8	100%
Number of Field Duplicates	1	1	100%	1	1	100%
Number of Matrix Spike Samples	1	1	100%	1	1	100%
Number of Matrix Spike Duplicate Samples	1	1	100%	1	1	100%
Number of Field Blanks	0	0	NA[2]	0	0	NA[2]
Number of Equipment Blanks	0	0	NA[2]	0	0	NA[2]
Number of VOC Trip Blanks	1	1	100%	0	0	NA[2]
Number of Lab Performance Testing Samples[1]	0	0	NA[2]	0	0	NA[2]
Total Number of Samples per event	12	12	100%	11	11	100%

Overall Field Completeness	100%	**Overall Field Completeness Goal**	95%

[1] The number of Batch or Project-specific proficiency testing (PT) samples are scheduled for the fall event.

[2] Percent Complete calculation not required since no samples were proposed for this event.

[3] Although a sample was collected, it was not proposed and cannot be counted toward the completeness goal.

Table- 4-2
Analytical Completeness
October 2011 Monitoring Well Sampling Event
Metropolitan Utilities District, Saunders County, NE

	Volatile Organic Compound Analyses	Explosive Compound Analyses
Number of Analyses	660	126
Number of J qualified data points	1	10
Percent Complete	100%	92%

Overall Acceptable Data Analytical Completeness	96%

Overall Acceptable Data Analytical Completeness Goal	85%

	Volatile Organic Compound Analyses	Explosive Compound Analyses
Number of Analyses	660	126
Number of Rejected Data points	0	0
Percent Complete	100%	100%

Overall Quality Data Analytical Completeness	100%

Overall Quality Data Analytical Completeness Goal	85%

Table- 4-3
Project Completeness
October 2011 Monitoring Well Sampling Event
Metropolitan Utilities District, Saunders County, NE

Overall Field Completeness	Overall Analytical Completeness[1]	Overall Project Completeness[2]
100%	96%	98%

Overall Project Completeness Goal	90%

Notes:
1 = Analytical completeness is the percentage of usable data i.e. quality data completeness.
2 = Project completeness combines sampling and analytical protocols to assess the expectations of the project as a whole. Project completeness is determined by comparing the percentage of samples / measurements that are determined to be usable to the total number of samples / measurements planned.

completeness and analytical completeness (quality data) completeness percentages are used to calculate the project completeness percentage. Table 4-3 presents project completeness calculations. For the October 2011 monitoring event, project completeness is 98%, which is above the project completeness goal of 90%.

5.0 CONCLUSIONS

Data are valid for use, as qualified. Overall field completeness is 100%, acceptable data completeness is 96%, quality data completeness is 100%, and project completeness is 98%. No data have been rejected. Data are qualified using the following laboratory qualifiers noted in Tables 3-1 through 3-7:

B = Compound was found in the blank and sample
J = Result is less than the Reporting Limit but greater than or equal to the Method Detection Limit and the concentration reported is an estimated value.
p = The % RPD between the primary and confirmation column/detector is greater than 40 percent.
* = Recovery of RPD exceeds control limits
U = Indicates the analytes was analyzed for but not detected
F = MS/MSD Recovery or RPD exceeded the control limits

6.0 REFERENCES

Olsson Associates, 2011. Final Field Sampling Plan for the Metropolitan Utilities District of Omaha, Platte West Well Field, Monitoring Well Sampling Program, Mead, Nebraska, prepared for the Metropolitan Utilities District of Omaha, July.

Olsson Associates, 2011. Quality Assurance Project Plan for the Metropolitan Utilities District of Omaha, Platte West Well Field, Monitoring Well Sampling Program, Mead, Nebraska, prepared for the Metropolitan Utilities District of Omaha, July.

APPENDIX A

Chain of Custody

APPENDIX B

Field Notes

APPENDIX C

Laboratory Analytical Report

APPENDIX A

Chain of Custody

TestAmerica Burlington
30 Community Drive, Suite 11
South Burlington, VT 05403
Phone:(802)660-1990

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: Ryan Doty	Lab PM: Jim Madison	Carrier Tracking No(s):	COC No:
Client Contact: Jeff McPeak	Phone: 402-458-5909	E-Mail: jmcpeak@oaconsulting.com		Page: 1 of 2
Company: Olsson Associates		Analysis Requested		Job #: 011-1087
Address: 1111 Lincoln Mall	Due Date Requested:			Preservation Codes:
City: Lincoln	TAT Requested (days): Standard			A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
State, Zip: NE 68508	PO #:			Other:
Phone: 402-474-6311	WO #:			
Email: jmcpeak@oaconsulting.com	Project #: 011-1087			
Project Name: MUD - Platte West Wellfield	SSOW#:			
Site:				

Sample Identification - Client ID	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	VOCs 8260	Explosives 8330	Total Number of containers	Special Instructions/Note:
Preservation Code:									
DMW-039-101211	10/12/11	0755	G	W		X	X	5	
AMW-039-101211	10/12/11	0817	G	W		X	X	5	
AMW06-018-101211	10/12/11	0903	G	W		X	X	5	
AMW06-218-101211	10/12/11	0903	G	W		X	X	5	
BMW06-018-101211	10/12/11	0920	G	W		X	X	5	
BMW06-018-101211 MS	10/12/11	0920	G	W		X	X	5	
BMW06-018-101211 MSD	10/12/11	0920	G	W		X	X	5	
AMW06-031-101211	10/12/11	1000	G	W		X	X	5	
BMW06-031-101211	10/12/11	1025	G	W		X	X	5	
AMW06-030-101211	10/12/11	1055	G	W		X	X	5	
BMW06-030-101211	10/12/11	1110	G	W		X	X	5	

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
	10/12/11 1340	Olsson		10/13/11 1030	TABLR
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No
Custody Seal No.: 168013, 014
Cooler Temperature(s) °C and Other Remarks: 3.3, 2.5

TestAmerica Burlington
30 Community Drive, Suite 11
South Burlington, VT 05403
Phone:(802)660-1990

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: Ryan Doty	Lab PM: Jim Madison	Carrier Tracking No(s):	COC No:
Client Contact: Jeff McPeak	Phone: 402-458-5909	E-Mail: jmcpeak@oaconsulting.com		Page: 2 of 2
Company: Olsson Associates				Job #: 011-1087
Address: 1111 Lincoln Mall	Due Date Requested:	Analysis Requested		Preservation Codes:
City: Lincoln	TAT Requested (days): Standard			A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
State, Zip: NE 68508	PO #:			Other:
Phone: 402-474-6311	WO #:			
Email: jmcpeak@oaconsulting.com				
Project Name: MUD-Platte West Wellfield	Project #: 011-1087			
Site:	SSOW#:			

Sample Identification - Client ID	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	1005 8260	Total Number of Containers	Special Instructions/Note:
			Preservation Code:						
FRB-239-101211	10/12/11	<	G	W			X	4	

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Possible Hazard Identification	Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological	☐ Return To Client ☐ Disposal By Lab ☐ Archive For ____ Months
Deliverable Requested: I, II, III, IV, Other (specify)	Special Instructions/QC Requirements:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
				10/13/11 1030	TABER
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact:	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:
Δ Yes Δ No	1680 13, 014	

APPENDIX B

Field Notes

Groundwater Sampling Field Notes

General Information

Facility Name: MUD Platte West	Sampler Name(s): Ryan Doty
Monitor Well Identification Number: MW-39D	Date: 10/12/11
Sample Number: DMW-039-101211	Weather Conditions: Overcast, 56°
PID Reading: NA	Wellhead Inspection (note conditions):

	OK	Needs Repair
Damage	X	
Locked	X	
Intact Cap	X	
Other (note in comments section)		

Ground Water Measurements

1. Static Water Level (+/-)0.01 ft.)	5.63	5. TOC Elevation:	—
2. Measured Well Depth (+/-0.25 ft.)	NA	6. Static Water Elevation:	—
3. Casing Diameter (in)	2	7. Water Level Equipment:	Solinst
4. Sample Equipment (Hydrasleeve type):	1L Sleeve		

Purging: Not Applicable - No Purge

Duplicate Collected? NO		Duplicate ID:	
MS/MSD Collected? NO		MS/MSD ID:	
Sample Analysis: VOCs & Explosives			
Number of Bottles Filled:	VOAs 3	500ml 2	
Investigative Sample pH: NA	(must be < 2)		

Sample Clear or Turbid:	Clear	Preservation Method:	PER SAP
Sample Color:	Clear	Decon Procedures:	1
Sample Odor:	None	Instrument Calibrations:	1

Comments:

Groundwater Sampling Field Notes

General Information

Facility Name: MUD Platte West	Sampler Name(s): Ryan Doty			
Monitor Well Identification Number: MW-39A	Date: 10/12/11			
Sample Number: AMW-039-101211	Weather Conditions: Overcast 56			
PID Reading: NA	Wellhead Inspection (note conditions):	OK	Needs Repair	
	Damage	X		
	Locked	X		
	Intact Cap	X		
	Other (note in comments section)			

Ground Water Measurements

1. Static Water Level (+/-)0.01 ft.)	5.55	5. TOC Elevation:	—
2. Measured Well Depth (+/-0.25 ft.)	—	6. Static Water Elevation:	—
3. Casing Diameter (in)	2	7. Water Level Equipment:	Solinst
4. Sample Equipment (Hydrasleeve type):	1L Supersleeve		

Purging: Not Applicable - No Purge

Duplicate Collected? NO		Duplicate ID:	
MS/MSD Collected? NO		MS/MSD ID:	
Sample Analysis: VOCs + Explosives			
Number of Bottles Filled:	VOAs	500ml	
Investigative Sample pH: NA	(must be < 2)		

Sample Clear or Turbid:	Clear	Preservation Method:	PER SAP
Sample Color:	Clear	Decon Procedures:	/
Sample Odor:	None	Instrument Calibrations:	/

Comments:

Groundwater Sampling Field Notes

General Information

Facility Name: MUD Platte West	Sampler Name(s): Ryan Doty		
Monitor Well Identification Number: MW06-18	Date: 10/12/11		
Sample Number: AMW06-018-101211	Weather Conditions: Overcast 58		
PID Reading: NA	Wellhead Inspection (note conditions):	OK	Needs Repair
	Damage	X	
	Locked	X	
	Intact Cap	X	
	Other (note in comments section)		

Ground Water Measurements

1. Static Water Level (+/-)0.01 ft.)	3.92	5. TOC Elevation:	—
2. Measured Well Depth (+/-0.25 ft.)	—	6. Static Water Elevation:	—
3. Casing Diameter (in)	4	7. Water Level Equipment:	Solinst
4. Sample Equipment (Hydrasleeve type):	Custom 2L Sleeve		

Purging: Not Applicable - No Purge

Duplicate Collected? Yes		Duplicate ID: AMW06-218-101211	
MS/MSD Collected? NO		MS/MSD ID:	
Sample Analysis: VOCs + Explosives			
Number of Bottles Filled:	VOAs 6	500ml 4	
Investigative Sample pH: NA	(must be < 2)		

Sample Clear or Turbid:	Clear	Preservation Method:	Per SAP
Sample Color:	None	Decon Procedures:	Per SAP
Sample Odor:	None	Instrument Calibrations:	Per SAP

Comments:

Groundwater Sampling Field Notes

General Information

Facility Name: MUD Platte West	Sampler Name(s): Ryan Doty
Monitor Well Identification Number: MW06-18	Date: 10/12/11
Sample Number: BMW06-018-101211	Weather Conditions: Overcast, 58
PID Reading: NA	Wellhead Inspection (note conditions): OK / Needs Repair

Damage	X	
Locked	X	
Intact Cap	X	
Other (note in comments section)		

Ground Water Measurements

1. Static Water Level (+/-)0.01 ft.)	3.92	5. TOC Elevation:	—
2. Measured Well Depth (+/-0.25 ft.)	—	6. Static Water Elevation:	—
3. Casing Diameter (in)	4	7. Water Level Equipment:	Solinst
4. Sample Equipment (Hydrasleeve type):	Custom 3L Hydrasleeve		

Purging: Not Applicable - No Purge

Duplicate Collected?	NO	Duplicate ID: —	BMW06-018-101211 MS and BMW06-018-101211MS
MS/MSD Collected?	Yes	MS/MSD ID: ~~BMW-018~~ ~~BMW06-018MS~~	
Sample Analysis:	VOCs + Explosives		
Number of Bottles Filled:	VOAs 9	500ml 6	
Investigative Sample pH:	NA (must be < 2)		

Sample Clear or Turbid:	Clear	Preservation Method:	Per SAP
Sample Color:	None	Decon Procedures:	/
Sample Odor:	None	Instrument Calibrations:	/

Comments:

Groundwater Sampling Field Notes

General Information

Facility Name: MUD Platte West	Sampler Name(s): Ryan Doty
Monitor Well Identification Number: MW06-31A	Date: 10/12/11
Sample Number: AMW06-031-101211	Weather Conditions: Overcast, 61
PID Reading: NA	Wellhead Inspection (note conditions): OK / Needs Repair

	OK	Needs Repair
Damage	X	
Locked	X	
Intact Cap	X	
Other (note in comments section)		

Ground Water Measurements

1. Static Water Level (+/-)0.01 ft.)	51.16	5. TOC Elevation:	—
2. Measured Well Depth (+/-0.25 ft.)	—	6. Static Water Elevation:	—
3. Casing Diameter (in)	2	7. Water Level Equipment:	Solinst
4. Sample Equipment (Hydrasleeve type):	2L Supersleeve		

Purging: Not Applicable - No Purge

Duplicate Collected?	NO	Duplicate ID:	
MS/MSD Collected?	NO	MS/MSD ID:	
Sample Analysis:	VOCs + Explosives		
Number of Bottles Filled:	VOAs 3	500ml	2
Investigative Sample pH:	NA (must be < 2)		

Sample Clear or Turbid:	Brown	Preservation Method:	Per SAP
Sample Color:	Sl. Turbid	Decon Procedures:	I
Sample Odor:	None	Instrument Calibrations:	I

Comments:

Groundwater Sampling Field Notes

General Information

Facility Name: MUD Platte West	Sampler Name(s): Ryan Doty
Monitor Well Identification Number: MW06-31B	Date: 10/12/11
Sample Number: BMW06-031-101211	Weather Conditions: Overcast, 61
PID Reading: NA	Wellhead Inspection (note conditions):

	OK	Needs Repair
Damage	X	
Locked	X	
Intact Cap	X	
Other (note in comments section)		

Ground Water Measurements

1. Static Water Level (+/-)0.01 ft.)	50.87	5. TOC Elevation:	—
2. Measured Well Depth (+/-0.25 ft.)	—	6. Static Water Elevation:	—
3. Casing Diameter (in)	2	7. Water Level Equipment:	Solinst
4. Sample Equipment (Hydrasleeve type):	2L Supersleeve		

Purging: Not Applicable - No Purge

Duplicate Collected?	NO	Duplicate ID:	
MS/MSD Collected?	NO	MS/MSD ID:	
Sample Analysis:	VOCs & Explosives		
Number of Bottles Filled:	VOAs 3	500ml	2
Investigative Sample pH:	NA (must be < 2)		

Sample Clear or Turbid:	~~Clear~~ Brown	Preservation Method:	Per SAP
Sample Color:	Sl. Turbid	Decon Procedures:	1
Sample Odor:	None	Instrument Calibrations:	1

Comments:

Groundwater Sampling Field Notes

General Information

Facility Name: MUD Platte West		Sampler Name(s): Ryan Doty	
Monitor Well Identification Number: MW06030A		Date: 10/12/11	
Sample Number: AMW06-030-101211		Weather Conditions: Overcast, 63	
PID Reading: NA		Wellhead Inspection (note conditions):	OK / Needs Repair
		Damage	X /
		Locked	X /
		Intact Cap	X /
		Other (note in comments section)	

Ground Water Measurements

1. Static Water Level (+/-)0.01 ft.)	68.06	5. TOC Elevation:	—
2. Measured Well Depth (+/-0.25 ft.)	—	6. Static Water Elevation:	—
3. Casing Diameter (in)	2	7. Water Level Equipment:	Solinst
4. Sample Equipment (Hydrasleeve type):	1L Supersleeve		

Purging: Not Applicable - No Purge

Duplicate Collected?	NO	Duplicate ID:	
MS/MSD Collected?	NO	MS/MSD ID:	
Sample Analysis:	VOCs + Explosives		
Number of Bottles Filled:	VOAs 3	500ml	2
Investigative Sample pH:	NA (must be < 2)		

Sample Clear or Turbid:	Brown	Preservation Method:	
Sample Color:	Sl. Turbid	Decon Procedures:	
Sample Odor:	None	Instrument Calibrations:	

Comments:

Groundwater Sampling Field Notes

General Information

Facility Name: MUD Platte West		Sampler Name(s): Ryan Doty	
Monitor Well Identification Number: MW06-30B		Date: 10/12/11	
Sample Number: BMW06-030-101211		Weather Conditions: Overcast, 63	
PID Reading: NA		Wellhead Inspection (note conditions):	OK / Needs Repair
		Damage	X /
		Locked	X /
		Intact Cap	X /
		Other (note in comments section)	

Ground Water Measurements

1. Static Water Level (+/-)0.01 ft.)	68.00	5. TOC Elevation:	—
2. Measured Well Depth (+/-0.25 ft.)	—	6. Static Water Elevation:	—
3. Casing Diameter (in)	2	7. Water Level Equipment:	Solinst
4. Sample Equipment (Hydrasleeve type):	1L Supersleeve		

Purging: Not Applicable - No Purge

Duplicate Collected? NO		Duplicate ID:	
MS/MSD Collected? NO		MS/MSD ID:	
Sample Analysis: VOCs & Explosives			
Number of Bottles Filled:	VOAs 3	500ml 2	
Investigative Sample pH: NP	(must be < 2)		

Sample Clear or Turbid:	Brown	Preservation Method:	
Sample Color:	Sl. Turbid	Decon Procedures:	
Sample Odor:	None	Instrument Calibrations:	

Comments:

TestAmerica Burlington
30 Community Drive, Suite 11
South Burlington, VT 05403
Phone:(802)660-1990

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: Ryan Doty	Lab PM: Jim Madison	Carrier Tracking No(s):	COC No:
Client Contact: Jeff McPeak	Phone: 402-458-5909	E-Mail: jmcpeak@oaconsulting.com		Page: 1 of 2
Company: Olsson Associates				Job #: 011-1087
Address: 1111 Lincoln Mall	Due Date Requested:	Analysis Requested		Preservation Codes:
City: Lincoln	TAT Requested (days): Standard			A - HCL, B - NaOH, C - Zn Acelate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
State, Zip: NE 68508				
Phone: 402-474-6311	PO #:			Other:
Email: jmcpeak@oaconsulting.com	WO #:			
Project Name: MUD - Platte West Wellfield	Project #: 011-1087			
Site:	SSOW#:			

Sample Identification - Client ID	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	VOCs 8260	Explosives 8330	Total Number of containers	Special Instructions/Note:
			Preservation Code:							
DMW-039-101211	10/12/11	0755	G	W			X	X	5	
AMW-039-101211	10/12/11	0817	G	W			X	X	5	
AMW06-018-101211	10/12/11	0903	G	W			X	X	5	
AMW06-218-101211	10/12/11	0903	G	W			X	X	5	
BMW06-018-101211	10/12/11	0920	G	W			X	X	5	
BMW06-018-101211 MS	10/12/11	0920	G	W			X	X	5	
BMW06-018-101211 MSD	10/12/11	0920	G	W			X	X	5	
AMW06-031-101211	10/12/11	1000	G	W			X	X	5	
BMW06-031-101211	10/12/11	1025	G	W			X	X	5	
AMW06-030-101211	10/12/11	1055	G	W			X	X	5	
BMW06-030-101211	10/12/11	1110	G	W			X	X	5	

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
[signature]	10/12/11 1340	Olsson			
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.: | Cooler Temperature(s) °C and Other Remarks:

TestAmerica Burlington
30 Community Drive, Suite 11
South Burlington, VT 05403
Phone:(802)660-1990

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: Ryan Doty	Lab PM: Jim Madison	Carrier Tracking No(s):	COC No:
Client Contact: Jeff McPeak	Phone: 402-458-5909	E-Mail: jmcpeak@ooaconsulting.com		Page: 2 of 2
Company: Olsson Associates				Job #: 011-1087
Address: 1111 Lincoln Mall	Due Date Requested:	Analysis Requested		
City: Lincoln	TAT Requested (days): Standard			
State, Zip: NE 68508	PO #:			
Phone: 402-474-6311	WO #:			
Email: jmcpeak@ooaconsulting.com	Project #: 011-1087			
Project Name: MUD-Platte West Wellfield	SSOW#:			
Site:				

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2SO3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - ph 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification - Client ID	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	VOCs 8260	Total Number of containers	Special Instructions/Note:
			Preservation Code:						
TRB-239-101211	10/12/11	<	G	W			X	4	

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Location Saunders County Date 10/11/11

Project / Client MUD – Platte West Wellfield

Personnel: Ryan Doty
Weather: Partly cloudy, high 77
POO: Setup hydrasleeves + download transducers
Instruments: See Page 2

0636 leave office
0718 stop at ECC to get key for MW-56
0730 arrive at MW-39
0734 download transducer data
39A 5.55
39D 5.63
0750 set sleeve in MW-39D
0756 set sleeve in MW-39A
0804 arrive at MW06-18 and download transducer data
MW06-18 WL- 3.92
0822 set sleeves in MW06-18
0826 arrive at MW-06-31
0830 download MW06-31A transducer
MW06-31A WL 51.16
MW06-31B WL 50.87
0847 set sleeve in MW06-31A
0855 set sleeve in MW06-31B
0902 arrive at MW06-30

Location Saunders County Date 10/11/11

Project / Client MUD – Platte West Wellfield

0904 download MW06-30A transducer
MW06-30A WL – 68.06
MW06-30B WL – 68.00
0917 set sleeve in MW06-30A
0923 set sleeve in MW06-30B
0926 head to MUD plant to return pumps, then head back to well field to download remaining transducers
0943 arrive at MUD Plant
1000 leave plant
1015 arrive at MW06-19, unable to download data, don't have correct cable connection
1036 download MW-56 transducer
1055 arrive at MW-106 and download transducer
1105 download MW-110A transducer
1118 download MW-46A transducer
1125 download MW-112A transducer
1135 download MW-38A transducer
1138 head back to Lincoln
1235 return to office

10/11/11

Location Saunders County Date 10/12/11

Project / Client MUD – Platte West Wellfield

Personnel: Ryan Doty

Weather: Partly cloudy, high 72

POD: Sample wells

Instruments: See Page 2

0648	leave office
0740	arrive at MW-39
0755	sample DMW-039-101211
0817	Sample AMW-039-101211
0827	redeploy transducer and resume logging in MW-39A
0839	arrive at MW06-18
0903	sample AMW06-018-101211 and AMW06-218-101211
0920	sample BMW06-018-101211, BMW06-018-101211 MS and BMW06-018-101211 MSD
0944	redeploy transducer and resume logging in MW06-18
0950	arrive at MW06-31
1000	sample AMW06-031-101211
labeled	Trip Blank TRB-239-101211
1025	sample BMW06-031-101211
1036	redeploy transducer in MW06-31A + resume logging

Location Saunders County Date 10/12/11

Project / Client MUD – Platte West Wellfield

1045	arrive at MW06-30
1055	sample AMW06-030-101211
1110	sample BMW06-030-101211
1119	redeploy transducer and resume logging in MW06-30A
1187	head back to Lincoln
1231	return to office

10/12/11

APPENDIX C

Laboratory Analytical Report

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

Job Number: 200-7484-1

SDG Number: 7484

Job Description: M.U.D. Platte West Well Field

For:
Olsson Associates
1111 Lincoln Mall
Suite 111
Lincoln, NE 68508

Attention: Mr. Jeff McPeak

Approved for release.
James W Madison
Project Manager I
10/26/11 5:00 PM

James W Madison
Project Manager I
jim.madison@testamericainc.com
10/26/2011

GC/MS VOA

Method(s) 8260B: The continuing calibration verification (CCV) for analytical batch MIBG exceeded control criteria for Acetone, Chloromethane, and 1,2-dibromo-3-chloropropane. The data have been qualified and reported.

Method(s) 8260B: The laboratory control sample (LCS) and / or the laboratory control sample duplicate (LCSD) for batch MIBG exceeded control limits for the following analytes: 1,2-Dibromo-3-chloropropane 79%R.

Method(s) 8260B: The laboratory control sample (LCS) and / or the laboratory control sample duplicate (LCSD) for batch 26946 exceeded control limits for the following analytes: 1,2-dibromo-3-chloropropane.

Method(s) 8260B: The continuing calibration verification (CCV) for analytical batch 27096 exceeded control criteria for bromomethane. The data have been qualified and reported.

HPLC

Method(s) 8330B: The laboratory control sample (LCS) and / or laboratory control sample duplicate (LCSD) for batch 26823 exceeded control limits on the confirmation Biphenyl column for the following analytes: 2,4,6-Trinitrotoluene and RDX. 2,4,6-Trinitrotoluene was not detected in any associated samples. RDX was detected in associated samles, but the LCS recovery for RDX was within limits on the primary C-18 coumn.

Method(s) 8330B: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 26823 were outside control limits on the confirmation biphenyl column for 2,4,6-Trinitrotoluene and RDX. The associated laboratory control sample (LCS) also was outside the control limits on the confirmation biphenyl column. The laboratory control sample was within limits for RDX on the primary C-18 column. 2,4,6-Trinitrotoluene is not reported in any associated samples.

Method(s) 8330B: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 26823 were outside control limits. The associated laboratory control sample (LCS) recovery met acceptance criteria.

CASE NARRATIVE

Client: Olsson Associates

Project: M.U.D. Platte West Well Field

Report Number: 200-7484-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

RECEIPT

The samples were received on 10/13/2011; the samples arrived in good condition, properly preserved and on ice.

VOLATILE ORGANIC COMPOUNDS (GC-MS)

Samples DMW-039-101211, AMW-039-101211, AMW06-018-101211, AMW06-218-101211, BMW06-018-101211, AMW06-031-101211, BMW06-031-101211, AMW06-030-101211, BMW06-030-101211 and TRB-239-101211 were analyzed for volatile organic compounds (GC-MS) in accordance with EPA SW-846 Method 8260B. The samples were analyzed on 10/17/2011, 10/18/2011 and 10/19/2011.

Several analytes were detected in method blank MB 200-26946/5 at levels that were above the method detection limit but below the reporting limit. The values should be considered estimates, and have been flagged "J". If the associated sample reported a result above the MDL and/or RL, the result has been "B" flagged. Several analytes were detected in method blank MB 200-27011/7 at levels that were above the method detection limit but below the reporting limit. The values should be considered estimates, and have been flagged "J". If the associated sample reported a result above the MDL and/or RL, the result has been "B" flagged. Refer to the QC report for details.

1,2-Dibromo-3-Chloropropane failed the recovery criteria low for LCS 200-26946/3. 1,2-Dibromo-3-Chloropropane failed the recovery criteria low for LCS 200-27011/5. Refer to the QC report for details.

1,2-Dibromo-3-Chloropropane failed the recovery criteria low for the MS of sample BMW06-018-101211MS in batch 200-26946.

No other difficulties were encountered during the volatiles analyses.

All other quality control parameters were within the acceptance limits.

NITROAROMATICS AND NITRAMINES (HPLC)

Samples DMW-039-101211, AMW-039-101211, AMW06-018-101211, AMW06-218-101211, BMW06-018-101211, AMW06-031-101211, BMW06-031-101211, AMW06-030-101211 and BMW06-030-101211 were analyzed for Nitroaromatics and Nitramines (HPLC) in accordance with EPA SW-846 Method 8330B. The samples were prepared on 10/15/2011 and analyzed on 10/18/2011.

2-Nitrotoluene, 4-Nitrotoluene, HMX and RDX failed the recovery criteria high for the MS of sample BMW06-018-101211MS in batch 200-26896.

2-Nitrotoluene failed the recovery criteria high for the MSD of sample BMW06-018-101211MSD in batch 200-26896.

No other difficulties were encountered during the explosives analyses.

All other quality control parameters were within the acceptance limits.

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **DMW-039-101211**

Lab Sample ID: 200-7484-1
Client Matrix: Water

Date Sampled: 10/12/2011 0755
Date Received: 10/13/2011 1030

8260B Volatile Organic Compounds (GC/MS)

Analysis Method:	8260B	Analysis Batch:	200-26946	Instrument ID:	M.i
Prep Method:	5030B	Prep Batch:	N/A	Lab File ID:	mibf17.d
Dilution:	1.0			Initial Weight/Volume:	5 mL
Analysis Date:	10/17/2011 1622			Final Weight/Volume:	5 mL
Prep Date:	10/17/2011 1622				

Analyte	Result (ug/L)	Qualifier	MDL	RL
Dichlorodifluoromethane	1.0	U	0.23	1.0
Chloromethane	1.0	U	0.22	1.0
Vinyl chloride	1.0	U	0.24	1.0
Bromomethane	1.0	U	0.30	1.0
Chloroethane	1.0	U	0.26	1.0
Trichlorofluoromethane	1.0	U	0.19	1.0
1,1-Dichloroethene	1.0	U	0.21	1.0
Freon TF	1.0	U	0.22	1.0
Acetone	5.0	U	0.49	5.0
Carbon disulfide	1.0	U	0.42	1.0
Methylene Chloride	1.0	U	0.17	1.0
trans-1,2-Dichloroethene	1.0	U	0.24	1.0
Methyl t-butyl ether	1.0	U	0.17	1.0
1,1-Dichloroethane	1.0	U	0.15	1.0
cis-1,2-Dichloroethene	1.0	U	0.24	1.0
2-Butanone	5.0	U	1.2	5.0
Bromochloromethane	1.0	U	0.13	1.0
Chloroform	1.0	U	0.20	1.0
1,1,1-Trichloroethane	1.0	U	0.19	1.0
1,1-Dichloropropene	1.0	U	0.21	1.0
Carbon tetrachloride	1.0	U	0.18	1.0
Benzene	1.0	U	0.15	1.0
1,2-Dichloroethane	1.0	U	0.20	1.0
Trichloroethene	1.0	U	0.20	1.0
1,2-Dichloropropane	1.0	U	0.18	1.0
Dibromomethane	1.0	U	0.14	1.0
Bromodichloromethane	1.0	U	0.16	1.0
cis-1,3-Dichloropropene	1.0	U	0.14	1.0
4-Methyl-2-pentanone	5.0	U	0.45	5.0
Toluene	1.0	U	0.16	1.0
trans-1,3-Dichloropropene	1.0	U	0.16	1.0
1,1,2-Trichloroethane	1.0	U	0.35	1.0
Tetrachloroethene	1.0	U	0.18	1.0
1,3-Dichloropropane	1.0	U	0.17	1.0
2-Hexanone	5.0	U	0.46	5.0
Dibromochloromethane	1.0	U	0.17	1.0
1,2-Dibromoethane	1.0	U	0.15	1.0
Chlorobenzene	1.0	U	0.15	1.0
1,1,1,2-Tetrachloroethane	1.0	U	0.16	1.0
Ethylbenzene	1.0	U	0.19	1.0
m&p-Xylene	1.0	U	0.32	1.0
Xylenes, Total	1.0	U	0.48	1.0
o-Xylene	1.0	U	0.16	1.0
Styrene	1.0	U	0.15	1.0
Bromoform	1.0	U	0.18	1.0
Isopropylbenzene	1.0	U	0.16	1.0

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **DMW-039-101211**

Lab Sample ID: 200-7484-1
Client Matrix: Water

Date Sampled: 10/12/2011 0755
Date Received: 10/13/2011 1030

8260B Volatile Organic Compounds (GC/MS)

Analysis Method:	8260B	Analysis Batch:	200-26946	Instrument ID:	M.i
Prep Method:	5030B	Prep Batch:	N/A	Lab File ID:	mibf17.d
Dilution:	1.0			Initial Weight/Volume:	5 mL
Analysis Date:	10/17/2011 1622			Final Weight/Volume:	5 mL
Prep Date:	10/17/2011 1622				

Analyte	Result (ug/L)	Qualifier	MDL	RL
Bromobenzene	1.0	U	0.15	1.0
1,1,2,2-Tetrachloroethane	1.0	U	0.15	1.0
n-Propylbenzene	1.0	U	0.20	1.0
2-Chlorotoluene	1.0	U	0.17	1.0
1,3,5-Trimethylbenzene	1.0	U	0.17	1.0
4-Chlorotoluene	1.0	U	0.18	1.0
tert-Butylbenzene	1.0	U	0.17	1.0
1,2,4-Trimethylbenzene	1.0	U	0.17	1.0
sec-Butylbenzene	1.0	U	0.18	1.0
1,3-Dichlorobenzene	1.0	U	0.14	1.0
4-Isopropyltoluene	1.0	U	0.22	1.0
1,4-Dichlorobenzene	1.0	U	0.19	1.0
1,2-Dichlorobenzene	1.0	U	0.11	1.0
n-Butylbenzene	1.0	U	0.23	1.0
1,2-Dibromo-3-Chloropropane	1.0	U *	0.37	1.0
1,2,4-Trichlorobenzene	1.0	U	0.23	1.0
Hexachlorobutadiene	1.0	U	0.26	1.0
Naphthalene	1.0	U	0.31	1.0
1,2,3-Trichlorobenzene	1.0	U	0.28	1.0
1,2-Dichloroethene, Total	1.0	U	0.39	1.0

Surrogate	%Rec	Qualifier	Acceptance Limits
1,2-Dichloroethane-d4	90		80 - 115
Toluene-d8	94		80 - 115
Bromofluorobenzene	95		85 - 120
1,2-Dichlorobenzene-d4	102		80 - 115

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **AMW-039-101211**

Lab Sample ID: 200-7484-2
Client Matrix: Water

Date Sampled: 10/12/2011 0817
Date Received: 10/13/2011 1030

8260B Volatile Organic Compounds (GC/MS)

Analysis Method:	8260B	Analysis Batch:	200-26946	Instrument ID:	M.i
Prep Method:	5030B	Prep Batch:	N/A	Lab File ID:	mibf18.d
Dilution:	1.0			Initial Weight/Volume:	5 mL
Analysis Date:	10/17/2011 1653			Final Weight/Volume:	5 mL
Prep Date:	10/17/2011 1653				

Analyte	Result (ug/L)	Qualifier	MDL	RL
Dichlorodifluoromethane	1.0	U	0.23	1.0
Chloromethane	1.0	U	0.22	1.0
Vinyl chloride	1.0	U	0.24	1.0
Bromomethane	1.0	U	0.30	1.0
Chloroethane	1.0	U	0.26	1.0
Trichlorofluoromethane	1.0	U	0.19	1.0
1,1-Dichloroethene	1.0	U	0.21	1.0
Freon TF	1.0	U	0.22	1.0
Acetone	5.0	U	0.49	5.0
Carbon disulfide	1.0	U	0.42	1.0
Methylene Chloride	1.0	U	0.17	1.0
trans-1,2-Dichloroethene	1.0	U	0.24	1.0
Methyl t-butyl ether	1.0	U	0.17	1.0
1,1-Dichloroethane	1.0	U	0.15	1.0
cis-1,2-Dichloroethene	1.0	U	0.24	1.0
2-Butanone	5.0	U	1.2	5.0
Bromochloromethane	1.0	U	0.13	1.0
Chloroform	1.0	U	0.20	1.0
1,1,1-Trichloroethane	1.0	U	0.19	1.0
1,1-Dichloropropene	1.0	U	0.21	1.0
Carbon tetrachloride	1.0	U	0.18	1.0
Benzene	1.0	U	0.15	1.0
1,2-Dichloroethane	1.0	U	0.20	1.0
Trichloroethene	1.0	U	0.20	1.0
1,2-Dichloropropane	1.0	U	0.18	1.0
Dibromomethane	1.0	U	0.14	1.0
Bromodichloromethane	1.0	U	0.16	1.0
cis-1,3-Dichloropropene	1.0	U	0.14	1.0
4-Methyl-2-pentanone	5.0	U	0.45	5.0
Toluene	1.0	U	0.16	1.0
trans-1,3-Dichloropropene	1.0	U	0.16	1.0
1,1,2-Trichloroethane	1.0	U	0.35	1.0
Tetrachloroethene	1.0	U	0.18	1.0
1,3-Dichloropropane	1.0	U	0.17	1.0
2-Hexanone	5.0	U	0.46	5.0
Dibromochloromethane	1.0	U	0.17	1.0
1,2-Dibromoethane	1.0	U	0.15	1.0
Chlorobenzene	1.0	U	0.15	1.0
1,1,1,2-Tetrachloroethane	1.0	U	0.16	1.0
Ethylbenzene	1.0	U	0.19	1.0
m&p-Xylene	1.0	U	0.32	1.0
Xylenes, Total	1.0	U	0.48	1.0
o-Xylene	1.0	U	0.16	1.0
Styrene	1.0	U	0.15	1.0
Bromoform	1.0	U	0.18	1.0
Isopropylbenzene	1.0	U	0.16	1.0

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **AMW-039-101211**

Lab Sample ID: 200-7484-2
Client Matrix: Water

Date Sampled: 10/12/2011 0817
Date Received: 10/13/2011 1030

8260B Volatile Organic Compounds (GC/MS)

Analysis Method:	8260B	Analysis Batch:	200-26946	Instrument ID:	M.i
Prep Method:	5030B	Prep Batch:	N/A	Lab File ID:	mibf18.d
Dilution:	1.0			Initial Weight/Volume:	5 mL
Analysis Date:	10/17/2011 1653			Final Weight/Volume:	5 mL
Prep Date:	10/17/2011 1653				

Analyte	Result (ug/L)	Qualifier	MDL	RL
Bromobenzene	1.0	U	0.15	1.0
1,1,2,2-Tetrachloroethane	1.0	U	0.15	1.0
n-Propylbenzene	1.0	U	0.20	1.0
2-Chlorotoluene	1.0	U	0.17	1.0
1,3,5-Trimethylbenzene	1.0	U	0.17	1.0
4-Chlorotoluene	1.0	U	0.18	1.0
tert-Butylbenzene	1.0	U	0.17	1.0
1,2,4-Trimethylbenzene	1.0	U	0.17	1.0
sec-Butylbenzene	1.0	U	0.18	1.0
1,3-Dichlorobenzene	1.0	U	0.14	1.0
4-Isopropyltoluene	1.0	U	0.22	1.0
1,4-Dichlorobenzene	1.0	U	0.19	1.0
1,2-Dichlorobenzene	1.0	U	0.11	1.0
n-Butylbenzene	1.0	U	0.23	1.0
1,2-Dibromo-3-Chloropropane	1.0	U *	0.37	1.0
1,2,4-Trichlorobenzene	1.0	U	0.23	1.0
Hexachlorobutadiene	1.0	U	0.26	1.0
Naphthalene	1.0	U	0.31	1.0
1,2,3-Trichlorobenzene	1.0	U	0.28	1.0
1,2-Dichloroethene, Total	1.0	U	0.39	1.0

Surrogate	%Rec	Qualifier	Acceptance Limits
1,2-Dichloroethane-d4	92		80 - 115
Toluene-d8	96		80 - 115
Bromofluorobenzene	96		85 - 120
1,2-Dichlorobenzene-d4	104		80 - 115

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **AMW06-018-101211**

Lab Sample ID: 200-7484-3
Client Matrix: Water

Date Sampled: 10/12/2011 0903
Date Received: 10/13/2011 1030

8260B Volatile Organic Compounds (GC/MS)

Analysis Method:	8260B	Analysis Batch:	200-26946	Instrument ID:	M.i
Prep Method:	5030B	Prep Batch:	N/A	Lab File ID:	mibf19.d
Dilution:	1.0			Initial Weight/Volume:	5 mL
Analysis Date:	10/17/2011 1724			Final Weight/Volume:	5 mL
Prep Date:	10/17/2011 1724				

Analyte	Result (ug/L)	Qualifier	MDL	RL
Dichlorodifluoromethane	1.0	U	0.23	1.0
Chloromethane	1.0	U	0.22	1.0
Vinyl chloride	1.0	U	0.24	1.0
Bromomethane	1.0	U	0.30	1.0
Chloroethane	1.0	U	0.26	1.0
Trichlorofluoromethane	1.0	U	0.19	1.0
1,1-Dichloroethene	1.0	U	0.21	1.0
Freon TF	1.0	U	0.22	1.0
Acetone	5.0	U	0.49	5.0
Carbon disulfide	1.0	U	0.42	1.0
Methylene Chloride	1.0	U	0.17	1.0
trans-1,2-Dichloroethene	1.0	U	0.24	1.0
Methyl t-butyl ether	1.0	U	0.17	1.0
1,1-Dichloroethane	1.0	U	0.15	1.0
cis-1,2-Dichloroethene	1.0	U	0.24	1.0
2-Butanone	5.0	U	1.2	5.0
Bromochloromethane	1.0	U	0.13	1.0
Chloroform	1.0	U	0.20	1.0
1,1,1-Trichloroethane	1.0	U	0.19	1.0
1,1-Dichloropropene	1.0	U	0.21	1.0
Carbon tetrachloride	1.0	U	0.18	1.0
Benzene	1.0	U	0.15	1.0
1,2-Dichloroethane	1.0	U	0.20	1.0
Trichloroethene	1.0	U	0.20	1.0
1,2-Dichloropropane	1.0	U	0.18	1.0
Dibromomethane	1.0	U	0.14	1.0
Bromodichloromethane	1.0	U	0.16	1.0
cis-1,3-Dichloropropene	1.0	U	0.14	1.0
4-Methyl-2-pentanone	5.0	U	0.45	5.0
Toluene	1.0	U	0.16	1.0
trans-1,3-Dichloropropene	1.0	U	0.16	1.0
1,1,2-Trichloroethane	1.0	U	0.35	1.0
Tetrachloroethene	1.0	U	0.18	1.0
1,3-Dichloropropane	1.0	U	0.17	1.0
2-Hexanone	5.0	U	0.46	5.0
Dibromochloromethane	1.0	U	0.17	1.0
1,2-Dibromoethane	1.0	U	0.15	1.0
Chlorobenzene	1.0	U	0.15	1.0
1,1,1,2-Tetrachloroethane	1.0	U	0.16	1.0
Ethylbenzene	1.0	U	0.19	1.0
m&p-Xylene	1.0	U	0.32	1.0
Xylenes, Total	1.0	U	0.48	1.0
o-Xylene	1.0	U	0.16	1.0
Styrene	1.0	U	0.15	1.0
Bromoform	1.0	U	0.18	1.0
Isopropylbenzene	1.0	U	0.16	1.0

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **AMW06-018-101211**

Lab Sample ID: 200-7484-3
Client Matrix: Water

Date Sampled: 10/12/2011 0903
Date Received: 10/13/2011 1030

8260B Volatile Organic Compounds (GC/MS)

Analysis Method:	8260B	Analysis Batch:	200-26946	Instrument ID:	M.i
Prep Method:	5030B	Prep Batch:	N/A	Lab File ID:	mibf19.d
Dilution:	1.0			Initial Weight/Volume:	5 mL
Analysis Date:	10/17/2011 1724			Final Weight/Volume:	5 mL
Prep Date:	10/17/2011 1724				

Analyte	Result (ug/L)	Qualifier	MDL	RL
Bromobenzene	1.0	U	0.15	1.0
1,1,2,2-Tetrachloroethane	1.0	U	0.15	1.0
n-Propylbenzene	1.0	U	0.20	1.0
2-Chlorotoluene	1.0	U	0.17	1.0
1,3,5-Trimethylbenzene	1.0	U	0.17	1.0
4-Chlorotoluene	1.0	U	0.18	1.0
tert-Butylbenzene	1.0	U	0.17	1.0
1,2,4-Trimethylbenzene	1.0	U	0.17	1.0
sec-Butylbenzene	1.0	U	0.18	1.0
1,3-Dichlorobenzene	1.0	U	0.14	1.0
4-Isopropyltoluene	1.0	U	0.22	1.0
1,4-Dichlorobenzene	1.0	U	0.19	1.0
1,2-Dichlorobenzene	1.0	U	0.11	1.0
n-Butylbenzene	1.0	U	0.23	1.0
1,2-Dibromo-3-Chloropropane	1.0	U *	0.37	1.0
1,2,4-Trichlorobenzene	1.0	U	0.23	1.0
Hexachlorobutadiene	1.0	U	0.26	1.0
Naphthalene	1.0	U	0.31	1.0
1,2,3-Trichlorobenzene	1.0	U	0.28	1.0
1,2-Dichloroethene, Total	1.0	U	0.39	1.0

Surrogate	%Rec	Qualifier	Acceptance Limits
1,2-Dichloroethane-d4	92		80 - 115
Toluene-d8	97		80 - 115
Bromofluorobenzene	96		85 - 120
1,2-Dichlorobenzene-d4	104		80 - 115

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **AMW06-218-101211**

Lab Sample ID: 200-7484-4
Client Matrix: Water

Date Sampled: 10/12/2011 0903
Date Received: 10/13/2011 1030

8260B Volatile Organic Compounds (GC/MS)

Analysis Method:	8260B	Analysis Batch:	200-26946	Instrument ID:	M.i
Prep Method:	5030B	Prep Batch:	N/A	Lab File ID:	mibf20.d
Dilution:	1.0			Initial Weight/Volume:	5 mL
Analysis Date:	10/17/2011 1755			Final Weight/Volume:	5 mL
Prep Date:	10/17/2011 1755				

Analyte	Result (ug/L)	Qualifier	MDL	RL
Dichlorodifluoromethane	1.0	U	0.23	1.0
Chloromethane	1.0	U	0.22	1.0
Vinyl chloride	1.0	U	0.24	1.0
Bromomethane	1.0	U	0.30	1.0
Chloroethane	1.0	U	0.26	1.0
Trichlorofluoromethane	1.0	U	0.19	1.0
1,1-Dichloroethene	1.0	U	0.21	1.0
Freon TF	1.0	U	0.22	1.0
Acetone	5.0	U	0.49	5.0
Carbon disulfide	1.0	U	0.42	1.0
Methylene Chloride	1.0	U	0.17	1.0
trans-1,2-Dichloroethene	1.0	U	0.24	1.0
Methyl t-butyl ether	1.0	U	0.17	1.0
1,1-Dichloroethane	1.0	U	0.15	1.0
cis-1,2-Dichloroethene	1.0	U	0.24	1.0
2-Butanone	5.0	U	1.2	5.0
Bromochloromethane	1.0	U	0.13	1.0
Chloroform	1.0	U	0.20	1.0
1,1,1-Trichloroethane	1.0	U	0.19	1.0
1,1-Dichloropropene	1.0	U	0.21	1.0
Carbon tetrachloride	1.0	U	0.18	1.0
Benzene	1.0	U	0.15	1.0
1,2-Dichloroethane	1.0	U	0.20	1.0
Trichloroethene	1.0	U	0.20	1.0
1,2-Dichloropropane	1.0	U	0.18	1.0
Dibromomethane	1.0	U	0.14	1.0
Bromodichloromethane	1.0	U	0.16	1.0
cis-1,3-Dichloropropene	1.0	U	0.14	1.0
4-Methyl-2-pentanone	5.0	U	0.45	5.0
Toluene	1.0	U	0.16	1.0
trans-1,3-Dichloropropene	1.0	U	0.16	1.0
1,1,2-Trichloroethane	1.0	U	0.35	1.0
Tetrachloroethene	1.0	U	0.18	1.0
1,3-Dichloropropane	1.0	U	0.17	1.0
2-Hexanone	5.0	U	0.46	5.0
Dibromochloromethane	1.0	U	0.17	1.0
1,2-Dibromoethane	1.0	U	0.15	1.0
Chlorobenzene	1.0	U	0.15	1.0
1,1,1,2-Tetrachloroethane	1.0	U	0.16	1.0
Ethylbenzene	1.0	U	0.19	1.0
m&p-Xylene	1.0	U	0.32	1.0
Xylenes, Total	1.0	U	0.48	1.0
o-Xylene	1.0	U	0.16	1.0
Styrene	1.0	U	0.15	1.0
Bromoform	1.0	U	0.18	1.0
Isopropylbenzene	1.0	U	0.16	1.0

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **AMW06-218-101211**

Lab Sample ID: 200-7484-4
Client Matrix: Water

Date Sampled: 10/12/2011 0903
Date Received: 10/13/2011 1030

8260B Volatile Organic Compounds (GC/MS)

Analysis Method:	8260B	Analysis Batch:	200-26946	Instrument ID:	M.i
Prep Method:	5030B	Prep Batch:	N/A	Lab File ID:	mibf20.d
Dilution:	1.0			Initial Weight/Volume:	5 mL
Analysis Date:	10/17/2011 1755			Final Weight/Volume:	5 mL
Prep Date:	10/17/2011 1755				

Analyte	Result (ug/L)	Qualifier	MDL	RL
Bromobenzene	1.0	U	0.15	1.0
1,1,2,2-Tetrachloroethane	1.0	U	0.15	1.0
n-Propylbenzene	1.0	U	0.20	1.0
2-Chlorotoluene	1.0	U	0.17	1.0
1,3,5-Trimethylbenzene	1.0	U	0.17	1.0
4-Chlorotoluene	1.0	U	0.18	1.0
tert-Butylbenzene	1.0	U	0.17	1.0
1,2,4-Trimethylbenzene	1.0	U	0.17	1.0
sec-Butylbenzene	1.0	U	0.18	1.0
1,3-Dichlorobenzene	1.0	U	0.14	1.0
4-Isopropyltoluene	1.0	U	0.22	1.0
1,4-Dichlorobenzene	1.0	U	0.19	1.0
1,2-Dichlorobenzene	1.0	U	0.11	1.0
n-Butylbenzene	1.0	U	0.23	1.0
1,2-Dibromo-3-Chloropropane	1.0	U *	0.37	1.0
1,2,4-Trichlorobenzene	1.0	U	0.23	1.0
Hexachlorobutadiene	1.0	U	0.26	1.0
Naphthalene	1.0	U	0.31	1.0
1,2,3-Trichlorobenzene	1.0	U	0.28	1.0
1,2-Dichloroethene, Total	1.0	U	0.39	1.0

Surrogate	%Rec	Qualifier	Acceptance Limits
1,2-Dichloroethane-d4	91		80 - 115
Toluene-d8	96		80 - 115
Bromofluorobenzene	97		85 - 120
1,2-Dichlorobenzene-d4	103		80 - 115

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **BMW06-018-101211**

Lab Sample ID: 200-7484-5
Client Matrix: Water

Date Sampled: 10/12/2011 0920
Date Received: 10/13/2011 1030

8260B Volatile Organic Compounds (GC/MS)

Analysis Method:	8260B	Analysis Batch:	200-26946	Instrument ID:	M.i
Prep Method:	5030B	Prep Batch:	N/A	Lab File ID:	mibf21.d
Dilution:	1.0			Initial Weight/Volume:	5 mL
Analysis Date:	10/17/2011 1826			Final Weight/Volume:	5 mL
Prep Date:	10/17/2011 1826				

Analyte	Result (ug/L)	Qualifier	MDL	RL
Dichlorodifluoromethane	1.0	U	0.23	1.0
Chloromethane	1.0	U	0.22	1.0
Vinyl chloride	1.0	U	0.24	1.0
Bromomethane	1.0	U	0.30	1.0
Chloroethane	1.0	U	0.26	1.0
Trichlorofluoromethane	1.0	U	0.19	1.0
1,1-Dichloroethene	1.0	U	0.21	1.0
Freon TF	1.0	U	0.22	1.0
Acetone	5.0	U	0.49	5.0
Carbon disulfide	1.0	U	0.42	1.0
Methylene Chloride	1.0	U	0.17	1.0
trans-1,2-Dichloroethene	1.0	U	0.24	1.0
Methyl t-butyl ether	1.0	U	0.17	1.0
1,1-Dichloroethane	1.0	U	0.15	1.0
cis-1,2-Dichloroethene	1.0	U	0.24	1.0
2-Butanone	5.0	U	1.2	5.0
Bromochloromethane	1.0	U	0.13	1.0
Chloroform	1.0	U	0.20	1.0
1,1,1-Trichloroethane	1.0	U	0.19	1.0
1,1-Dichloropropene	1.0	U	0.21	1.0
Carbon tetrachloride	1.0	U	0.18	1.0
Benzene	1.0	U	0.15	1.0
1,2-Dichloroethane	1.0	U	0.20	1.0
Trichloroethene	1.0	U	0.20	1.0
1,2-Dichloropropane	1.0	U	0.18	1.0
Dibromomethane	1.0	U	0.14	1.0
Bromodichloromethane	1.0	U	0.16	1.0
cis-1,3-Dichloropropene	1.0	U	0.14	1.0
4-Methyl-2-pentanone	5.0	U	0.45	5.0
Toluene	1.0	U	0.16	1.0
trans-1,3-Dichloropropene	1.0	U	0.16	1.0
1,1,2-Trichloroethane	1.0	U	0.35	1.0
Tetrachloroethene	1.0	U	0.18	1.0
1,3-Dichloropropane	1.0	U	0.17	1.0
2-Hexanone	5.0	U	0.46	5.0
Dibromochloromethane	1.0	U	0.17	1.0
1,2-Dibromoethane	1.0	U	0.15	1.0
Chlorobenzene	1.0	U	0.15	1.0
1,1,1,2-Tetrachloroethane	1.0	U	0.16	1.0
Ethylbenzene	1.0	U	0.19	1.0
m&p-Xylene	1.0	U	0.32	1.0
Xylenes, Total	1.0	U	0.48	1.0
o-Xylene	1.0	U	0.16	1.0
Styrene	1.0	U	0.15	1.0
Bromoform	1.0	U	0.18	1.0
Isopropylbenzene	1.0	U	0.16	1.0

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **BMW06-018-101211**

Lab Sample ID: 200-7484-5
Client Matrix: Water

Date Sampled: 10/12/2011 0920
Date Received: 10/13/2011 1030

8260B Volatile Organic Compounds (GC/MS)

Analysis Method:	8260B	Analysis Batch:	200-26946	Instrument ID:	M.i
Prep Method:	5030B	Prep Batch:	N/A	Lab File ID:	mibf21.d
Dilution:	1.0			Initial Weight/Volume:	5 mL
Analysis Date:	10/17/2011 1826			Final Weight/Volume:	5 mL
Prep Date:	10/17/2011 1826				

Analyte	Result (ug/L)	Qualifier	MDL	RL
Bromobenzene	1.0	U	0.15	1.0
1,1,2,2-Tetrachloroethane	1.0	U	0.15	1.0
n-Propylbenzene	1.0	U	0.20	1.0
2-Chlorotoluene	1.0	U	0.17	1.0
1,3,5-Trimethylbenzene	1.0	U	0.17	1.0
4-Chlorotoluene	1.0	U	0.18	1.0
tert-Butylbenzene	1.0	U	0.17	1.0
1,2,4-Trimethylbenzene	1.0	U	0.17	1.0
sec-Butylbenzene	1.0	U	0.18	1.0
1,3-Dichlorobenzene	1.0	U	0.14	1.0
4-Isopropyltoluene	1.0	U	0.22	1.0
1,4-Dichlorobenzene	1.0	U	0.19	1.0
1,2-Dichlorobenzene	1.0	U	0.11	1.0
n-Butylbenzene	1.0	U	0.23	1.0
1,2-Dibromo-3-Chloropropane	1.0	U *	0.37	1.0
1,2,4-Trichlorobenzene	1.0	U	0.23	1.0
Hexachlorobutadiene	1.0	U	0.26	1.0
Naphthalene	1.0	U	0.31	1.0
1,2,3-Trichlorobenzene	1.0	U	0.28	1.0
1,2-Dichloroethene, Total	1.0	U	0.39	1.0

Surrogate	%Rec	Qualifier	Acceptance Limits
1,2-Dichloroethane-d4	91		80 - 115
Toluene-d8	98		80 - 115
Bromofluorobenzene	95		85 - 120
1,2-Dichlorobenzene-d4	103		80 - 115

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **AMW06-031-101211**

Lab Sample ID: 200-7484-6
Client Matrix: Water

Date Sampled: 10/12/2011 1000
Date Received: 10/13/2011 1030

8260B Volatile Organic Compounds (GC/MS)

Analysis Method:	8260B	Analysis Batch:	200-27096	Instrument ID:	L.i
Prep Method:	5030B	Prep Batch:	N/A	Lab File ID:	lgii09.d
Dilution:	1.0			Initial Weight/Volume:	5 mL
Analysis Date:	10/19/2011 1609			Final Weight/Volume:	5 mL
Prep Date:	10/19/2011 1609				

Analyte	Result (ug/L)	Qualifier	MDL	RL
Dichlorodifluoromethane	1.0	U	0.23	1.0
Chloromethane	1.0	U	0.22	1.0
Vinyl chloride	1.0	U	0.24	1.0
Bromomethane	1.0	U	0.30	1.0
Chloroethane	1.0	U	0.26	1.0
Trichlorofluoromethane	1.0	U	0.19	1.0
1,1-Dichloroethene	1.0	U	0.21	1.0
Freon TF	1.0	U	0.22	1.0
Acetone	5.0	U	0.49	5.0
Carbon disulfide	1.0	U	0.42	1.0
Methylene Chloride	1.0	U	0.17	1.0
trans-1,2-Dichloroethene	1.0	U	0.24	1.0
Methyl t-butyl ether	1.0	U	0.17	1.0
1,1-Dichloroethane	1.0	U	0.15	1.0
cis-1,2-Dichloroethene	1.0	U	0.24	1.0
2-Butanone	5.0	U	1.2	5.0
Bromochloromethane	1.0	U	0.13	1.0
Chloroform	1.0	U	0.20	1.0
1,1,1-Trichloroethane	1.0	U	0.19	1.0
1,1-Dichloropropene	1.0	U	0.21	1.0
Carbon tetrachloride	1.0	U	0.18	1.0
Benzene	1.0	U	0.15	1.0
1,2-Dichloroethane	1.0	U	0.20	1.0
Trichloroethene	1.0	U	0.20	1.0
1,2-Dichloropropane	1.0	U	0.18	1.0
Dibromomethane	1.0	U	0.14	1.0
Bromodichloromethane	1.0	U	0.16	1.0
cis-1,3-Dichloropropene	1.0	U	0.14	1.0
4-Methyl-2-pentanone	5.0	U	0.45	5.0
Toluene	1.0	U	0.16	1.0
trans-1,3-Dichloropropene	1.0	U	0.16	1.0
1,1,2-Trichloroethane	1.0	U	0.35	1.0
Tetrachloroethene	1.0	U	0.18	1.0
1,3-Dichloropropane	1.0	U	0.17	1.0
2-Hexanone	5.0	U	0.46	5.0
Dibromochloromethane	1.0	U	0.17	1.0
1,2-Dibromoethane	1.0	U	0.15	1.0
Chlorobenzene	1.0	U	0.15	1.0
1,1,1,2-Tetrachloroethane	1.0	U	0.16	1.0
Ethylbenzene	1.0	U	0.19	1.0
m&p-Xylene	1.0	U	0.32	1.0
Xylenes, Total	1.0	U	0.48	1.0
o-Xylene	1.0	U	0.16	1.0
Styrene	1.0	U	0.15	1.0
Bromoform	1.0	U	0.18	1.0
Isopropylbenzene	1.0	U	0.16	1.0

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **AMW06-031-101211**

Lab Sample ID: 200-7484-6
Client Matrix: Water

Date Sampled: 10/12/2011 1000
Date Received: 10/13/2011 1030

8260B Volatile Organic Compounds (GC/MS)

Analysis Method:	8260B	Analysis Batch:	200-27096	Instrument ID:	L.i
Prep Method:	5030B	Prep Batch:	N/A	Lab File ID:	lgii09.d
Dilution:	1.0			Initial Weight/Volume:	5 mL
Analysis Date:	10/19/2011 1609			Final Weight/Volume:	5 mL
Prep Date:	10/19/2011 1609				

Analyte	Result (ug/L)	Qualifier	MDL	RL
Bromobenzene	1.0	U	0.15	1.0
1,1,2,2-Tetrachloroethane	1.0	U	0.15	1.0
n-Propylbenzene	1.0	U	0.20	1.0
2-Chlorotoluene	1.0	U	0.17	1.0
1,3,5-Trimethylbenzene	1.0	U	0.17	1.0
4-Chlorotoluene	1.0	U	0.18	1.0
tert-Butylbenzene	1.0	U	0.17	1.0
1,2,4-Trimethylbenzene	1.0	U	0.17	1.0
sec-Butylbenzene	1.0	U	0.18	1.0
1,3-Dichlorobenzene	1.0	U	0.14	1.0
4-Isopropyltoluene	1.0	U	0.22	1.0
1,4-Dichlorobenzene	1.0	U	0.19	1.0
1,2-Dichlorobenzene	1.0	U	0.11	1.0
n-Butylbenzene	1.0	U	0.23	1.0
1,2-Dibromo-3-Chloropropane	1.0	U	0.37	1.0
1,2,4-Trichlorobenzene	1.0	U	0.23	1.0
Hexachlorobutadiene	1.0	U	0.26	1.0
Naphthalene	1.0	U	0.31	1.0
1,2,3-Trichlorobenzene	1.0	U	0.28	1.0
1,2-Dichloroethene, Total	1.0	U	0.39	1.0

Surrogate	%Rec	Qualifier	Acceptance Limits
1,2-Dichloroethane-d4	96		80 - 115
Toluene-d8	99		80 - 115
Bromofluorobenzene	101		85 - 120
1,2-Dichlorobenzene-d4	101		80 - 115

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **BMW06-031-101211**

Lab Sample ID: 200-7484-7
Client Matrix: Water

Date Sampled: 10/12/2011 1025
Date Received: 10/13/2011 1030

8260B Volatile Organic Compounds (GC/MS)

Analysis Method:	8260B	Analysis Batch:	200-27011	Instrument ID:	M.i
Prep Method:	5030B	Prep Batch:	N/A	Lab File ID:	mibg09.d
Dilution:	1.0			Initial Weight/Volume:	5 mL
Analysis Date:	10/18/2011 1249			Final Weight/Volume:	5 mL
Prep Date:	10/18/2011 1249				

Analyte	Result (ug/L)	Qualifier	MDL	RL
Dichlorodifluoromethane	1.0	U	0.23	1.0
Chloromethane	1.0	U	0.22	1.0
Vinyl chloride	1.0	U	0.24	1.0
Bromomethane	1.0	U	0.30	1.0
Chloroethane	1.0	U	0.26	1.0
Trichlorofluoromethane	1.0	U	0.19	1.0
1,1-Dichloroethene	1.0	U	0.21	1.0
Freon TF	1.0	U	0.22	1.0
Acetone	5.0	U	0.49	5.0
Carbon disulfide	1.0	U	0.42	1.0
Methylene Chloride	1.0	U	0.17	1.0
trans-1,2-Dichloroethene	1.0	U	0.24	1.0
Methyl t-butyl ether	1.0	U	0.17	1.0
1,1-Dichloroethane	1.0	U	0.15	1.0
cis-1,2-Dichloroethene	1.0	U	0.24	1.0
2-Butanone	5.0	U	1.2	5.0
Bromochloromethane	1.0	U	0.13	1.0
Chloroform	1.0	U	0.20	1.0
1,1,1-Trichloroethane	1.0	U	0.19	1.0
1,1-Dichloropropene	1.0	U	0.21	1.0
Carbon tetrachloride	1.0	U	0.18	1.0
Benzene	1.0	U	0.15	1.0
1,2-Dichloroethane	1.0	U	0.20	1.0
Trichloroethene	1.0	U	0.20	1.0
1,2-Dichloropropane	1.0	U	0.18	1.0
Dibromomethane	1.0	U	0.14	1.0
Bromodichloromethane	1.0	U	0.16	1.0
cis-1,3-Dichloropropene	1.0	U	0.14	1.0
4-Methyl-2-pentanone	5.0	U	0.45	5.0
Toluene	1.0	U	0.16	1.0
trans-1,3-Dichloropropene	1.0	U	0.16	1.0
1,1,2-Trichloroethane	1.0	U	0.35	1.0
Tetrachloroethene	1.0	U	0.18	1.0
1,3-Dichloropropane	1.0	U	0.17	1.0
2-Hexanone	5.0	U	0.46	5.0
Dibromochloromethane	1.0	U	0.17	1.0
1,2-Dibromoethane	1.0	U	0.15	1.0
Chlorobenzene	1.0	U	0.15	1.0
1,1,1,2-Tetrachloroethane	1.0	U	0.16	1.0
Ethylbenzene	1.0	U	0.19	1.0
m&p-Xylene	1.0	U	0.32	1.0
Xylenes, Total	1.0	U	0.48	1.0
o-Xylene	1.0	U	0.16	1.0
Styrene	1.0	U	0.15	1.0
Bromoform	1.0	U	0.18	1.0
Isopropylbenzene	1.0	U	0.16	1.0

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **BMW06-031-101211**

Lab Sample ID: 200-7484-7
Client Matrix: Water

Date Sampled: 10/12/2011 1025
Date Received: 10/13/2011 1030

8260B Volatile Organic Compounds (GC/MS)

Analysis Method:	8260B	Analysis Batch:	200-27011	Instrument ID:	M.i
Prep Method:	5030B	Prep Batch:	N/A	Lab File ID:	mibg09.d
Dilution:	1.0			Initial Weight/Volume:	5 mL
Analysis Date:	10/18/2011 1249			Final Weight/Volume:	5 mL
Prep Date:	10/18/2011 1249				

Analyte	Result (ug/L)	Qualifier	MDL	RL
Bromobenzene	1.0	U	0.15	1.0
1,1,2,2-Tetrachloroethane	1.0	U	0.15	1.0
n-Propylbenzene	1.0	U	0.20	1.0
2-Chlorotoluene	1.0	U	0.17	1.0
1,3,5-Trimethylbenzene	1.0	U	0.17	1.0
4-Chlorotoluene	1.0	U	0.18	1.0
tert-Butylbenzene	1.0	U	0.17	1.0
1,2,4-Trimethylbenzene	1.0	U	0.17	1.0
sec-Butylbenzene	1.0	U	0.18	1.0
1,3-Dichlorobenzene	1.0	U	0.14	1.0
4-Isopropyltoluene	1.0	U	0.22	1.0
1,4-Dichlorobenzene	1.0	U	0.19	1.0
1,2-Dichlorobenzene	1.0	U	0.11	1.0
n-Butylbenzene	1.0	U	0.23	1.0
1,2-Dibromo-3-Chloropropane	1.0	U *	0.37	1.0
1,2,4-Trichlorobenzene	0.24	J B	0.23	1.0
Hexachlorobutadiene	1.0	U	0.26	1.0
Naphthalene	1.0	U	0.31	1.0
1,2,3-Trichlorobenzene	1.0	U	0.28	1.0
1,2-Dichloroethene, Total	1.0	U	0.39	1.0

Surrogate	%Rec	Qualifier	Acceptance Limits
1,2-Dichloroethane-d4	85		80 - 115
Toluene-d8	90		80 - 115
Bromofluorobenzene	91		85 - 120
1,2-Dichlorobenzene-d4	97		80 - 115

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **AMW06-030-101211**

Lab Sample ID: 200-7484-8
Client Matrix: Water

Date Sampled: 10/12/2011 1055
Date Received: 10/13/2011 1030

8260B Volatile Organic Compounds (GC/MS)

Analysis Method:	8260B	Analysis Batch:	200-27011	Instrument ID:	M.i
Prep Method:	5030B	Prep Batch:	N/A	Lab File ID:	mibg10.d
Dilution:	1.0			Initial Weight/Volume:	5 mL
Analysis Date:	10/18/2011 1320			Final Weight/Volume:	5 mL
Prep Date:	10/18/2011 1320				

Analyte	Result (ug/L)	Qualifier	MDL	RL
Dichlorodifluoromethane	1.0	U	0.23	1.0
Chloromethane	1.0	U	0.22	1.0
Vinyl chloride	1.0	U	0.24	1.0
Bromomethane	1.0	U	0.30	1.0
Chloroethane	1.0	U	0.26	1.0
Trichlorofluoromethane	1.0	U	0.19	1.0
1,1-Dichloroethene	1.0	U	0.21	1.0
Freon TF	1.0	U	0.22	1.0
Acetone	5.0	U	0.49	5.0
Carbon disulfide	1.0	U	0.42	1.0
Methylene Chloride	1.0	U	0.17	1.0
trans-1,2-Dichloroethene	1.0	U	0.24	1.0
Methyl t-butyl ether	1.0	U	0.17	1.0
1,1-Dichloroethane	1.0	U	0.15	1.0
cis-1,2-Dichloroethene	1.0	U	0.24	1.0
2-Butanone	5.0	U	1.2	5.0
Bromochloromethane	1.0	U	0.13	1.0
Chloroform	1.0	U	0.20	1.0
1,1,1-Trichloroethane	1.0	U	0.19	1.0
1,1-Dichloropropene	1.0	U	0.21	1.0
Carbon tetrachloride	1.0	U	0.18	1.0
Benzene	1.0	U	0.15	1.0
1,2-Dichloroethane	1.0	U	0.20	1.0
Trichloroethene	1.0	U	0.20	1.0
1,2-Dichloropropane	1.0	U	0.18	1.0
Dibromomethane	1.0	U	0.14	1.0
Bromodichloromethane	1.0	U	0.16	1.0
cis-1,3-Dichloropropene	1.0	U	0.14	1.0
4-Methyl-2-pentanone	5.0	U	0.45	5.0
Toluene	1.0	U	0.16	1.0
trans-1,3-Dichloropropene	1.0	U	0.16	1.0
1,1,2-Trichloroethane	1.0	U	0.35	1.0
Tetrachloroethene	1.0	U	0.18	1.0
1,3-Dichloropropane	1.0	U	0.17	1.0
2-Hexanone	5.0	U	0.46	5.0
Dibromochloromethane	1.0	U	0.17	1.0
1,2-Dibromoethane	1.0	U	0.15	1.0
Chlorobenzene	1.0	U	0.15	1.0
1,1,1,2-Tetrachloroethane	1.0	U	0.16	1.0
Ethylbenzene	1.0	U	0.19	1.0
m&p-Xylene	1.0	U	0.32	1.0
Xylenes, Total	1.0	U	0.48	1.0
o-Xylene	1.0	U	0.16	1.0
Styrene	1.0	U	0.15	1.0
Bromoform	1.0	U	0.18	1.0
Isopropylbenzene	1.0	U	0.16	1.0

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **AMW06-030-101211**

Lab Sample ID: 200-7484-8
Client Matrix: Water

Date Sampled: 10/12/2011 1055
Date Received: 10/13/2011 1030

8260B Volatile Organic Compounds (GC/MS)

Analysis Method:	8260B	Analysis Batch:	200-27011	Instrument ID:	M.i
Prep Method:	5030B	Prep Batch:	N/A	Lab File ID:	mibg10.d
Dilution:	1.0			Initial Weight/Volume:	5 mL
Analysis Date:	10/18/2011 1320			Final Weight/Volume:	5 mL
Prep Date:	10/18/2011 1320				

Analyte	Result (ug/L)	Qualifier	MDL	RL
Bromobenzene	1.0	U	0.15	1.0
1,1,2,2-Tetrachloroethane	1.0	U	0.15	1.0
n-Propylbenzene	1.0	U	0.20	1.0
2-Chlorotoluene	1.0	U	0.17	1.0
1,3,5-Trimethylbenzene	1.0	U	0.17	1.0
4-Chlorotoluene	1.0	U	0.18	1.0
tert-Butylbenzene	1.0	U	0.17	1.0
1,2,4-Trimethylbenzene	1.0	U	0.17	1.0
sec-Butylbenzene	1.0	U	0.18	1.0
1,3-Dichlorobenzene	1.0	U	0.14	1.0
4-Isopropyltoluene	1.0	U	0.22	1.0
1,4-Dichlorobenzene	1.0	U	0.19	1.0
1,2-Dichlorobenzene	1.0	U	0.11	1.0
n-Butylbenzene	1.0	U	0.23	1.0
1,2-Dibromo-3-Chloropropane	1.0	U *	0.37	1.0
1,2,4-Trichlorobenzene	1.0	U	0.23	1.0
Hexachlorobutadiene	1.0	U	0.26	1.0
Naphthalene	1.0	U	0.31	1.0
1,2,3-Trichlorobenzene	1.0	U	0.28	1.0
1,2-Dichloroethene, Total	1.0	U	0.39	1.0

Surrogate	%Rec	Qualifier	Acceptance Limits
1,2-Dichloroethane-d4	89		80 - 115
Toluene-d8	95		80 - 115
Bromofluorobenzene	93		85 - 120
1,2-Dichlorobenzene-d4	100		80 - 115

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **BMW06-030-101211**

Lab Sample ID: 200-7484-9
Client Matrix: Water

Date Sampled: 10/12/2011 1110
Date Received: 10/13/2011 1030

8260B Volatile Organic Compounds (GC/MS)

Analysis Method:	8260B	Analysis Batch:	200-27011	Instrument ID:	M.i
Prep Method:	5030B	Prep Batch:	N/A	Lab File ID:	mibg11.d
Dilution:	1.0			Initial Weight/Volume:	5 mL
Analysis Date:	10/18/2011 1351			Final Weight/Volume:	5 mL
Prep Date:	10/18/2011 1351				

Analyte	Result (ug/L)	Qualifier	MDL	RL
Dichlorodifluoromethane	1.0	U	0.23	1.0
Chloromethane	1.0	U	0.22	1.0
Vinyl chloride	1.0	U	0.24	1.0
Bromomethane	1.0	U	0.30	1.0
Chloroethane	1.0	U	0.26	1.0
Trichlorofluoromethane	1.0	U	0.19	1.0
1,1-Dichloroethene	1.0	U	0.21	1.0
Freon TF	1.0	U	0.22	1.0
Acetone	5.0	U	0.49	5.0
Carbon disulfide	1.0	U	0.42	1.0
Methylene Chloride	1.0	U	0.17	1.0
trans-1,2-Dichloroethene	1.0	U	0.24	1.0
Methyl t-butyl ether	1.0	U	0.17	1.0
1,1-Dichloroethane	1.0	U	0.15	1.0
cis-1,2-Dichloroethene	1.0	U	0.24	1.0
2-Butanone	5.0	U	1.2	5.0
Bromochloromethane	1.0	U	0.13	1.0
Chloroform	1.0	U	0.20	1.0
1,1,1-Trichloroethane	1.0	U	0.19	1.0
1,1-Dichloropropene	1.0	U	0.21	1.0
Carbon tetrachloride	1.0	U	0.18	1.0
Benzene	1.0	U	0.15	1.0
1,2-Dichloroethane	1.0	U	0.20	1.0
Trichloroethene	1.0	U	0.20	1.0
1,2-Dichloropropane	1.0	U	0.18	1.0
Dibromomethane	1.0	U	0.14	1.0
Bromodichloromethane	1.0	U	0.16	1.0
cis-1,3-Dichloropropene	1.0	U	0.14	1.0
4-Methyl-2-pentanone	5.0	U	0.45	5.0
Toluene	1.0	U	0.16	1.0
trans-1,3-Dichloropropene	1.0	U	0.16	1.0
1,1,2-Trichloroethane	1.0	U	0.35	1.0
Tetrachloroethene	1.0	U	0.18	1.0
1,3-Dichloropropane	1.0	U	0.17	1.0
2-Hexanone	5.0	U	0.46	5.0
Dibromochloromethane	1.0	U	0.17	1.0
1,2-Dibromoethane	1.0	U	0.15	1.0
Chlorobenzene	1.0	U	0.15	1.0
1,1,1,2-Tetrachloroethane	1.0	U	0.16	1.0
Ethylbenzene	1.0	U	0.19	1.0
m&p-Xylene	1.0	U	0.32	1.0
Xylenes, Total	1.0	U	0.48	1.0
o-Xylene	1.0	U	0.16	1.0
Styrene	1.0	U	0.15	1.0
Bromoform	1.0	U	0.18	1.0
Isopropylbenzene	1.0	U	0.16	1.0

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **BMW06-030-101211**

Lab Sample ID: 200-7484-9
Client Matrix: Water

Date Sampled: 10/12/2011 1110
Date Received: 10/13/2011 1030

8260B Volatile Organic Compounds (GC/MS)

Analysis Method:	8260B	Analysis Batch:	200-27011	Instrument ID:	M.i
Prep Method:	5030B	Prep Batch:	N/A	Lab File ID:	mibg11.d
Dilution:	1.0			Initial Weight/Volume:	5 mL
Analysis Date:	10/18/2011 1351			Final Weight/Volume:	5 mL
Prep Date:	10/18/2011 1351				

Analyte	Result (ug/L)	Qualifier	MDL	RL
Bromobenzene	1.0	U	0.15	1.0
1,1,2,2-Tetrachloroethane	1.0	U	0.15	1.0
n-Propylbenzene	1.0	U	0.20	1.0
2-Chlorotoluene	1.0	U	0.17	1.0
1,3,5-Trimethylbenzene	1.0	U	0.17	1.0
4-Chlorotoluene	1.0	U	0.18	1.0
tert-Butylbenzene	1.0	U	0.17	1.0
1,2,4-Trimethylbenzene	1.0	U	0.17	1.0
sec-Butylbenzene	1.0	U	0.18	1.0
1,3-Dichlorobenzene	1.0	U	0.14	1.0
4-Isopropyltoluene	1.0	U	0.22	1.0
1,4-Dichlorobenzene	1.0	U	0.19	1.0
1,2-Dichlorobenzene	1.0	U	0.11	1.0
n-Butylbenzene	1.0	U	0.23	1.0
1,2-Dibromo-3-Chloropropane	1.0	U *	0.37	1.0
1,2,4-Trichlorobenzene	1.0	U	0.23	1.0
Hexachlorobutadiene	1.0	U	0.26	1.0
Naphthalene	1.0	U	0.31	1.0
1,2,3-Trichlorobenzene	1.0	U	0.28	1.0
1,2-Dichloroethene, Total	1.0	U	0.39	1.0

Surrogate	%Rec	Qualifier	Acceptance Limits
1,2-Dichloroethane-d4	88		80 - 115
Toluene-d8	96		80 - 115
Bromofluorobenzene	94		85 - 120
1,2-Dichlorobenzene-d4	102		80 - 115

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **TRB-239-101211**

Lab Sample ID: 200-7484-10
Client Matrix: Water

Date Sampled: 10/12/2011 0000
Date Received: 10/13/2011 1030

8260B Volatile Organic Compounds (GC/MS)

Analysis Method:	8260B	Analysis Batch:	200-27011	Instrument ID:	M.i
Prep Method:	5030B	Prep Batch:	N/A	Lab File ID:	mibg12.d
Dilution:	1.0			Initial Weight/Volume:	5 mL
Analysis Date:	10/18/2011 1422			Final Weight/Volume:	5 mL
Prep Date:	10/18/2011 1422				

Analyte	Result (ug/L)	Qualifier	MDL	RL
Dichlorodifluoromethane	1.0	U	0.23	1.0
Chloromethane	1.0	U	0.22	1.0
Vinyl chloride	1.0	U	0.24	1.0
Bromomethane	1.0	U	0.30	1.0
Chloroethane	1.0	U	0.26	1.0
Trichlorofluoromethane	1.0	U	0.19	1.0
1,1-Dichloroethene	1.0	U	0.21	1.0
Freon TF	1.0	U	0.22	1.0
Acetone	5.0	U	0.49	5.0
Carbon disulfide	1.0	U	0.42	1.0
Methylene Chloride	1.0	U	0.17	1.0
trans-1,2-Dichloroethene	1.0	U	0.24	1.0
Methyl t-butyl ether	1.0	U	0.17	1.0
1,1-Dichloroethane	1.0	U	0.15	1.0
cis-1,2-Dichloroethene	1.0	U	0.24	1.0
2-Butanone	5.0	U	1.2	5.0
Bromochloromethane	1.0	U	0.13	1.0
Chloroform	1.0	U	0.20	1.0
1,1,1-Trichloroethane	1.0	U	0.19	1.0
1,1-Dichloropropene	1.0	U	0.21	1.0
Carbon tetrachloride	1.0	U	0.18	1.0
Benzene	1.0	U	0.15	1.0
1,2-Dichloroethane	1.0	U	0.20	1.0
Trichloroethene	1.0	U	0.20	1.0
1,2-Dichloropropane	1.0	U	0.18	1.0
Dibromomethane	1.0	U	0.14	1.0
Bromodichloromethane	1.0	U	0.16	1.0
cis-1,3-Dichloropropene	1.0	U	0.14	1.0
4-Methyl-2-pentanone	5.0	U	0.45	5.0
Toluene	1.0	U	0.16	1.0
trans-1,3-Dichloropropene	1.0	U	0.16	1.0
1,1,2-Trichloroethane	1.0	U	0.35	1.0
Tetrachloroethene	1.0	U	0.18	1.0
1,3-Dichloropropane	1.0	U	0.17	1.0
2-Hexanone	5.0	U	0.46	5.0
Dibromochloromethane	1.0	U	0.17	1.0
1,2-Dibromoethane	1.0	U	0.15	1.0
Chlorobenzene	1.0	U	0.15	1.0
1,1,1,2-Tetrachloroethane	1.0	U	0.16	1.0
Ethylbenzene	1.0	U	0.19	1.0
m&p-Xylene	1.0	U	0.32	1.0
Xylenes, Total	1.0	U	0.48	1.0
o-Xylene	1.0	U	0.16	1.0
Styrene	1.0	U	0.15	1.0
Bromoform	1.0	U	0.18	1.0
Isopropylbenzene	1.0	U	0.16	1.0

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **TRB-239-101211**

Lab Sample ID: 200-7484-10
Client Matrix: Water

Date Sampled: 10/12/2011 0000
Date Received: 10/13/2011 1030

8260B Volatile Organic Compounds (GC/MS)

Analysis Method:	8260B	Analysis Batch:	200-27011	Instrument ID:	M.i
Prep Method:	5030B	Prep Batch:	N/A	Lab File ID:	mibg12.d
Dilution:	1.0			Initial Weight/Volume:	5 mL
Analysis Date:	10/18/2011 1422			Final Weight/Volume:	5 mL
Prep Date:	10/18/2011 1422				

Analyte	Result (ug/L)	Qualifier	MDL	RL
Bromobenzene	1.0	U	0.15	1.0
1,1,2,2-Tetrachloroethane	1.0	U	0.15	1.0
n-Propylbenzene	1.0	U	0.20	1.0
2-Chlorotoluene	1.0	U	0.17	1.0
1,3,5-Trimethylbenzene	1.0	U	0.17	1.0
4-Chlorotoluene	1.0	U	0.18	1.0
tert-Butylbenzene	1.0	U	0.17	1.0
1,2,4-Trimethylbenzene	1.0	U	0.17	1.0
sec-Butylbenzene	1.0	U	0.18	1.0
1,3-Dichlorobenzene	1.0	U	0.14	1.0
4-Isopropyltoluene	1.0	U	0.22	1.0
1,4-Dichlorobenzene	1.0	U	0.19	1.0
1,2-Dichlorobenzene	1.0	U	0.11	1.0
n-Butylbenzene	1.0	U	0.23	1.0
1,2-Dibromo-3-Chloropropane	1.0	U *	0.37	1.0
1,2,4-Trichlorobenzene	1.0	U	0.23	1.0
Hexachlorobutadiene	1.0	U	0.26	1.0
Naphthalene	1.0	U	0.31	1.0
1,2,3-Trichlorobenzene	1.0	U	0.28	1.0
1,2-Dichloroethene, Total	1.0	U	0.39	1.0

Surrogate	%Rec	Qualifier	Acceptance Limits
1,2-Dichloroethane-d4	85		80 - 115
Toluene-d8	92		80 - 115
Bromofluorobenzene	92		85 - 120
1,2-Dichlorobenzene-d4	98		80 - 115

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **DMW-039-101211**

Lab Sample ID: 200-7484-1
Client Matrix: Water

Date Sampled: 10/12/2011 0755
Date Received: 10/13/2011 1030

8330B Nitroaromatics and Nitramines (HPLC)

Analysis Method:	8330B	Analysis Batch:	200-26898	Instrument ID:	CH1488
Prep Method:	8330-Prep	Prep Batch:	200-26823	Initial Weight/Volume:	500 mL
Dilution:	1.0			Final Weight/Volume:	10000 uL
Analysis Date:	10/18/2011 0001			Injection Volume:	450 uL
Prep Date:	10/15/2011 1223			Result Type:	SECONDARY

Analyte	Result (ug/L)	Qualifier	MDL	RL
2,6-Dinitrotoluene	0.32	p	0.019	0.20

Surrogate	%Rec	Qualifier	Acceptance Limits
1,2-Dinitrobenzene	101		40 - 150

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **DMW-039-101211**

Lab Sample ID: 200-7484-1
Client Matrix: Water

Date Sampled: 10/12/2011 0755
Date Received: 10/13/2011 1030

8330B Nitroaromatics and Nitramines (HPLC)

Analysis Method:	8330B	Analysis Batch:	200-26896	Instrument ID:	CH1208
Prep Method:	8330-Prep	Prep Batch:	200-26823	Initial Weight/Volume:	500 mL
Dilution:	1.0			Final Weight/Volume:	10000 uL
Analysis Date:	10/18/2011 0030			Injection Volume:	150 uL
Prep Date:	10/15/2011 1223			Result Type:	PRIMARY

Analyte	Result (ug/L)	Qualifier	MDL	RL
HMX	0.20	U	0.0087	0.20
RDX	0.20	U	0.023	0.20
1,3,5-Trinitrobenzene	0.20	U	0.015	0.20
1,3-Dinitrobenzene	0.20	U	0.025	0.20
Nitrobenzene	0.20	U	0.030	0.20
Tetryl	0.20	U	0.059	0.20
2,4,6-Trinitrotoluene	0.20	U	0.012	0.20
4-Amino-2,6-dinitrotoluene	0.20	U	0.022	0.20
2-Amino-4,6-dinitrotoluene	0.20	U	0.021	0.20
2,6-Dinitrotoluene	0.022	J p	0.019	0.20
2,4-Dinitrotoluene	0.20	U	0.059	0.20
2-Nitrotoluene	0.20	U	0.032	0.20
4-Nitrotoluene	0.20	U	0.055	0.20
3-Nitrotoluene	0.20	U	0.057	0.20

Surrogate	%Rec	Qualifier	Acceptance Limits
1,2-Dinitrobenzene	101		40 - 150

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **AMW-039-101211**

Lab Sample ID: 200-7484-2
Client Matrix: Water

Date Sampled: 10/12/2011 0817
Date Received: 10/13/2011 1030

8330B Nitroaromatics and Nitramines (HPLC)

Analysis Method:	8330B	Analysis Batch:	200-26898	Instrument ID:	CH1488
Prep Method:	8330-Prep	Prep Batch:	200-26823	Initial Weight/Volume:	500 mL
Dilution:	1.0			Final Weight/Volume:	10000 uL
Analysis Date:	10/18/2011 0036			Injection Volume:	450 uL
Prep Date:	10/15/2011 1223			Result Type:	SECONDARY

Surrogate	%Rec	Qualifier	Acceptance Limits
1,2-Dinitrobenzene	99		40 - 150

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **AMW-039-101211**

Lab Sample ID: 200-7484-2
Client Matrix: Water

Date Sampled: 10/12/2011 0817
Date Received: 10/13/2011 1030

8330B Nitroaromatics and Nitramines (HPLC)

Analysis Method:	8330B	Analysis Batch:	200-26896	Instrument ID:	CH1208
Prep Method:	8330-Prep	Prep Batch:	200-26823	Initial Weight/Volume:	500 mL
Dilution:	1.0			Final Weight/Volume:	10000 uL
Analysis Date:	10/18/2011 0107			Injection Volume:	150 uL
Prep Date:	10/15/2011 1223			Result Type:	PRIMARY

Analyte	Result (ug/L)	Qualifier	MDL	RL
HMX	0.20	U	0.0087	0.20
RDX	0.20	U	0.023	0.20
1,3,5-Trinitrobenzene	0.20	U	0.015	0.20
1,3-Dinitrobenzene	0.20	U	0.025	0.20
Nitrobenzene	0.20	U	0.030	0.20
Tetryl	0.20	U	0.059	0.20
2,4,6-Trinitrotoluene	0.20	U	0.012	0.20
4-Amino-2,6-dinitrotoluene	0.20	U	0.022	0.20
2-Amino-4,6-dinitrotoluene	0.20	U	0.021	0.20
2,6-Dinitrotoluene	0.20	U	0.019	0.20
2,4-Dinitrotoluene	0.20	U	0.059	0.20
2-Nitrotoluene	0.20	U	0.032	0.20
4-Nitrotoluene	0.20	U	0.055	0.20
3-Nitrotoluene	0.20	U	0.057	0.20

Surrogate	%Rec	Qualifier	Acceptance Limits
1,2-Dinitrobenzene	98		40 - 150

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **AMW06-018-101211**

Lab Sample ID: 200-7484-3
Client Matrix: Water

Date Sampled: 10/12/2011 0903
Date Received: 10/13/2011 1030

8330B Nitroaromatics and Nitramines (HPLC)

Analysis Method:	8330B	Analysis Batch:	200-26898	Instrument ID:	CH1488
Prep Method:	8330-Prep	Prep Batch:	200-26823	Initial Weight/Volume:	500 mL
Dilution:	1.0			Final Weight/Volume:	10000 uL
Analysis Date:	10/18/2011 0144			Injection Volume:	450 uL
Prep Date:	10/15/2011 1223			Result Type:	SECONDARY

Analyte	Result (ug/L)	Qualifier	MDL	RL
RDX	0.053	J p *	0.023	0.20
2,6-Dinitrotoluene	0.062	J p	0.019	0.20

Surrogate	%Rec	Qualifier	Acceptance Limits
1,2-Dinitrobenzene	101		40 - 150

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **AMW06-018-101211**

Lab Sample ID: 200-7484-3
Client Matrix: Water

Date Sampled: 10/12/2011 0903
Date Received: 10/13/2011 1030

8330B Nitroaromatics and Nitramines (HPLC)

Analysis Method:	8330B	Analysis Batch:	200-26896	Instrument ID:	CH1208
Prep Method:	8330-Prep	Prep Batch:	200-26823	Initial Weight/Volume:	500 mL
Dilution:	1.0			Final Weight/Volume:	10000 uL
Analysis Date:	10/18/2011 0222			Injection Volume:	150 uL
Prep Date:	10/15/2011 1223			Result Type:	PRIMARY

Analyte	Result (ug/L)	Qualifier	MDL	RL
HMX	0.20	U	0.0087	0.20
RDX	0.023	J p	0.023	0.20
1,3,5-Trinitrobenzene	0.20	U	0.015	0.20
1,3-Dinitrobenzene	0.20	U	0.025	0.20
Nitrobenzene	0.20	U	0.030	0.20
Tetryl	0.20	U	0.059	0.20
2,4,6-Trinitrotoluene	0.20	U	0.012	0.20
4-Amino-2,6-dinitrotoluene	0.20	U	0.022	0.20
2-Amino-4,6-dinitrotoluene	0.20	U	0.021	0.20
2,6-Dinitrotoluene	0.035	J p	0.019	0.20
2,4-Dinitrotoluene	0.20	U	0.059	0.20
2-Nitrotoluene	0.20	U	0.032	0.20
4-Nitrotoluene	0.20	U	0.055	0.20
3-Nitrotoluene	0.20	U	0.057	0.20

Surrogate	%Rec	Qualifier	Acceptance Limits
1,2-Dinitrobenzene	100		40 - 150

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **AMW06-218-101211**

Lab Sample ID: 200-7484-4
Client Matrix: Water

Date Sampled: 10/12/2011 0903
Date Received: 10/13/2011 1030

8330B Nitroaromatics and Nitramines (HPLC)

Analysis Method:	8330B	Analysis Batch:	200-26898	Instrument ID:	CH1488
Prep Method:	8330-Prep	Prep Batch:	200-26823	Initial Weight/Volume:	500 mL
Dilution:	1.0			Final Weight/Volume:	10000 uL
Analysis Date:	10/18/2011 0218			Injection Volume:	450 uL
Prep Date:	10/15/2011 1223			Result Type:	SECONDARY

Analyte	Result (ug/L)	Qualifier	MDL	RL
RDX	0.073	J *	0.023	0.20

Surrogate	%Rec	Qualifier	Acceptance Limits
1,2-Dinitrobenzene	100		40 - 150

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **AMW06-218-101211**

Lab Sample ID: 200-7484-4
Client Matrix: Water

Date Sampled: 10/12/2011 0903
Date Received: 10/13/2011 1030

8330B Nitroaromatics and Nitramines (HPLC)

Analysis Method:	8330B	Analysis Batch:	200-26896	Instrument ID:	CH1208
Prep Method:	8330-Prep	Prep Batch:	200-26823	Initial Weight/Volume:	500 mL
Dilution:	1.0			Final Weight/Volume:	10000 uL
Analysis Date:	10/18/2011 0300			Injection Volume:	150 uL
Prep Date:	10/15/2011 1223			Result Type:	PRIMARY

Analyte	Result (ug/L)	Qualifier	MDL	RL
HMX	0.20	U	0.0087	0.20
RDX	0.061	J	0.023	0.20
1,3,5-Trinitrobenzene	0.20	U	0.015	0.20
1,3-Dinitrobenzene	0.20	U	0.025	0.20
Nitrobenzene	0.20	U	0.030	0.20
Tetryl	0.20	U	0.059	0.20
2,4,6-Trinitrotoluene	0.20	U	0.012	0.20
4-Amino-2,6-dinitrotoluene	0.20	U	0.022	0.20
2-Amino-4,6-dinitrotoluene	0.20	U	0.021	0.20
2,6-Dinitrotoluene	0.20	U	0.019	0.20
2,4-Dinitrotoluene	0.20	U	0.059	0.20
2-Nitrotoluene	0.20	U	0.032	0.20
4-Nitrotoluene	0.20	U	0.055	0.20
3-Nitrotoluene	0.20	U	0.057	0.20

Surrogate	%Rec	Qualifier	Acceptance Limits
1,2-Dinitrobenzene	100		40 - 150

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **BMW06-018-101211**

Lab Sample ID: 200-7484-5
Client Matrix: Water

Date Sampled: 10/12/2011 0920
Date Received: 10/13/2011 1030

8330B Nitroaromatics and Nitramines (HPLC)

Analysis Method:	8330B	Analysis Batch:	200-26898	Instrument ID:	CH1488
Prep Method:	8330-Prep	Prep Batch:	200-26823	Initial Weight/Volume:	500 mL
Dilution:	1.0			Final Weight/Volume:	10000 uL
Analysis Date:	10/18/2011 0252			Injection Volume:	450 uL
Prep Date:	10/15/2011 1223			Result Type:	SECONDARY

Analyte	Result (ug/L)	Qualifier	MDL	RL
RDX	0.048	J p *	0.023	0.20

Surrogate	%Rec	Qualifier	Acceptance Limits
1,2-Dinitrobenzene	100		40 - 150

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **BMW06-018-101211**

Lab Sample ID: 200-7484-5
Client Matrix: Water

Date Sampled: 10/12/2011 0920
Date Received: 10/13/2011 1030

8330B Nitroaromatics and Nitramines (HPLC)

Analysis Method:	8330B	Analysis Batch:	200-26896	Instrument ID:	CH1208
Prep Method:	8330-Prep	Prep Batch:	200-26823	Initial Weight/Volume:	500 mL
Dilution:	1.0			Final Weight/Volume:	10000 uL
Analysis Date:	10/18/2011 0337			Injection Volume:	150 uL
Prep Date:	10/15/2011 1223			Result Type:	PRIMARY

Analyte	Result (ug/L)	Qualifier	MDL	RL
HMX	0.20	U	0.0087	0.20
RDX	0.027	J p	0.023	0.20
1,3,5-Trinitrobenzene	0.20	U	0.015	0.20
1,3-Dinitrobenzene	0.20	U	0.025	0.20
Nitrobenzene	0.20	U	0.030	0.20
Tetryl	0.20	U	0.059	0.20
2,4,6-Trinitrotoluene	0.20	U	0.012	0.20
4-Amino-2,6-dinitrotoluene	0.20	U	0.022	0.20
2-Amino-4,6-dinitrotoluene	0.20	U	0.021	0.20
2,6-Dinitrotoluene	0.20	U	0.019	0.20
2,4-Dinitrotoluene	0.20	U	0.059	0.20
2-Nitrotoluene	0.20	U	0.032	0.20
4-Nitrotoluene	0.20	U	0.055	0.20
3-Nitrotoluene	0.20	U	0.057	0.20

Surrogate	%Rec	Qualifier	Acceptance Limits
1,2-Dinitrobenzene	99		40 - 150

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **AMW06-031-101211**

Lab Sample ID: 200-7484-6
Client Matrix: Water

Date Sampled: 10/12/2011 1000
Date Received: 10/13/2011 1030

8330B Nitroaromatics and Nitramines (HPLC)

Analysis Method:	8330B	Analysis Batch:	200-26898	Instrument ID:	CH1488
Prep Method:	8330-Prep	Prep Batch:	200-26823	Initial Weight/Volume:	500 mL
Dilution:	1.0			Final Weight/Volume:	10000 uL
Analysis Date:	10/18/2011 0327			Injection Volume:	450 uL
Prep Date:	10/15/2011 1223			Result Type:	SECONDARY

Analyte	Result (ug/L)	Qualifier	MDL	RL
2,6-Dinitrotoluene	0.35	p	0.019	0.20
4-Nitrotoluene	0.23	p	0.055	0.20
3-Nitrotoluene	0.23	p	0.057	0.20

Surrogate	%Rec	Qualifier	Acceptance Limits
1,2-Dinitrobenzene	99		40 - 150

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **AMW06-031-101211**

Lab Sample ID: 200-7484-6
Client Matrix: Water

Date Sampled: 10/12/2011 1000
Date Received: 10/13/2011 1030

8330B Nitroaromatics and Nitramines (HPLC)

Analysis Method:	8330B	Analysis Batch:	200-26896	Instrument ID:	CH1208
Prep Method:	8330-Prep	Prep Batch:	200-26823	Initial Weight/Volume:	500 mL
Dilution:	1.0			Final Weight/Volume:	10000 uL
Analysis Date:	10/18/2011 0415			Injection Volume:	150 uL
Prep Date:	10/15/2011 1223			Result Type:	PRIMARY

Analyte	Result (ug/L)	Qualifier	MDL	RL
HMX	0.20	U	0.0087	0.20
RDX	0.20	U	0.023	0.20
1,3,5-Trinitrobenzene	0.20	U	0.015	0.20
1,3-Dinitrobenzene	0.20	U	0.025	0.20
Nitrobenzene	0.20	U	0.030	0.20
Tetryl	0.20	U	0.059	0.20
2,4,6-Trinitrotoluene	0.20	U	0.012	0.20
4-Amino-2,6-dinitrotoluene	0.20	U	0.022	0.20
2-Amino-4,6-dinitrotoluene	0.20	U	0.021	0.20
2,6-Dinitrotoluene	0.043	J p	0.019	0.20
2,4-Dinitrotoluene	0.20	U	0.059	0.20
2-Nitrotoluene	0.20	U	0.032	0.20
4-Nitrotoluene	0.63	p	0.055	0.20
3-Nitrotoluene	0.076	J p	0.057	0.20

Surrogate	%Rec	Qualifier	Acceptance Limits
1,2-Dinitrobenzene	100		40 - 150

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **BMW06-031-101211**

Lab Sample ID: 200-7484-7
Client Matrix: Water

Date Sampled: 10/12/2011 1025
Date Received: 10/13/2011 1030

8330B Nitroaromatics and Nitramines (HPLC)

Analysis Method:	8330B	Analysis Batch:	200-26898	Instrument ID:	CH1488
Prep Method:	8330-Prep	Prep Batch:	200-26823	Initial Weight/Volume:	500 mL
Dilution:	1.0			Final Weight/Volume:	10000 uL
Analysis Date:	10/18/2011 0401			Injection Volume:	450 uL
Prep Date:	10/15/2011 1223			Result Type:	SECONDARY

Surrogate	%Rec	Qualifier	Acceptance Limits
1,2-Dinitrobenzene	100		40 - 150

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **BMW06-031-101211**

Lab Sample ID: 200-7484-7
Client Matrix: Water

Date Sampled: 10/12/2011 1025
Date Received: 10/13/2011 1030

8330B Nitroaromatics and Nitramines (HPLC)

Analysis Method:	8330B	Analysis Batch:	200-26896	Instrument ID:	CH1208
Prep Method:	8330-Prep	Prep Batch:	200-26823	Initial Weight/Volume:	500 mL
Dilution:	1.0			Final Weight/Volume:	10000 uL
Analysis Date:	10/18/2011 0452			Injection Volume:	150 uL
Prep Date:	10/15/2011 1223			Result Type:	PRIMARY

Analyte	Result (ug/L)	Qualifier	MDL	RL
HMX	0.20	U	0.0087	0.20
RDX	0.20	U	0.023	0.20
1,3,5-Trinitrobenzene	0.20	U	0.015	0.20
1,3-Dinitrobenzene	0.20	U	0.025	0.20
Nitrobenzene	0.20	U	0.030	0.20
Tetryl	0.20	U	0.059	0.20
2,4,6-Trinitrotoluene	0.20	U	0.012	0.20
4-Amino-2,6-dinitrotoluene	0.20	U	0.022	0.20
2-Amino-4,6-dinitrotoluene	0.20	U	0.021	0.20
2,6-Dinitrotoluene	0.20	U	0.019	0.20
2,4-Dinitrotoluene	0.20	U	0.059	0.20
2-Nitrotoluene	0.20	U	0.032	0.20
4-Nitrotoluene	0.20	U	0.055	0.20
3-Nitrotoluene	0.20	U	0.057	0.20

Surrogate	%Rec	Qualifier	Acceptance Limits
1,2-Dinitrobenzene	99		40 - 150

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **AMW06-030-101211**

Lab Sample ID: 200-7484-8
Client Matrix: Water

Date Sampled: 10/12/2011 1055
Date Received: 10/13/2011 1030

8330B Nitroaromatics and Nitramines (HPLC)

Analysis Method:	8330B	Analysis Batch:	200-26898	Instrument ID:	CH1488
Prep Method:	8330-Prep	Prep Batch:	200-26823	Initial Weight/Volume:	500 mL
Dilution:	1.0			Final Weight/Volume:	10000 uL
Analysis Date:	10/18/2011 0435			Injection Volume:	450 uL
Prep Date:	10/15/2011 1223			Result Type:	SECONDARY

Analyte	Result (ug/L)	Qualifier	MDL	RL
RDX	0.084	J p *	0.023	0.20
1,3,5-Trinitrobenzene	0.10	J p	0.015	0.20
4-Nitrotoluene	0.25	p	0.055	0.20
3-Nitrotoluene	0.25	p	0.057	0.20

Surrogate	%Rec	Qualifier	Acceptance Limits
1,2-Dinitrobenzene	99		40 - 150

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **AMW06-030-101211**

Lab Sample ID: 200-7484-8
Client Matrix: Water

Date Sampled: 10/12/2011 1055
Date Received: 10/13/2011 1030

8330B Nitroaromatics and Nitramines (HPLC)

Analysis Method:	8330B	Analysis Batch:	200-26896	Instrument ID:	CH1208
Prep Method:	8330-Prep	Prep Batch:	200-26823	Initial Weight/Volume:	500 mL
Dilution:	1.0			Final Weight/Volume:	10000 uL
Analysis Date:	10/18/2011 0529			Injection Volume:	150 uL
Prep Date:	10/15/2011 1223			Result Type:	PRIMARY

Analyte	Result (ug/L)	Qualifier	MDL	RL
HMX	0.20	U	0.0087	0.20
RDX	0.14	J p	0.023	0.20
1,3,5-Trinitrobenzene	0.042	J p	0.015	0.20
1,3-Dinitrobenzene	0.20	U	0.025	0.20
Nitrobenzene	0.20	U	0.030	0.20
Tetryl	0.20	U	0.059	0.20
2,4,6-Trinitrotoluene	0.20	U	0.012	0.20
4-Amino-2,6-dinitrotoluene	0.20	U	0.022	0.20
2-Amino-4,6-dinitrotoluene	0.20	U	0.021	0.20
2,6-Dinitrotoluene	0.20	U	0.019	0.20
2,4-Dinitrotoluene	0.20	U	0.059	0.20
2-Nitrotoluene	0.20	U	0.032	0.20
4-Nitrotoluene	0.48	p	0.055	0.20
3-Nitrotoluene	0.097	J p	0.057	0.20

Surrogate	%Rec	Qualifier	Acceptance Limits
1,2-Dinitrobenzene	102		40 - 150

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **BMW06-030-101211**

Lab Sample ID: 200-7484-9
Client Matrix: Water

Date Sampled: 10/12/2011 1110
Date Received: 10/13/2011 1030

8330B Nitroaromatics and Nitramines (HPLC)

Analysis Method:	8330B	Analysis Batch:	200-26898	Instrument ID:	CH1488
Prep Method:	8330-Prep	Prep Batch:	200-26823	Initial Weight/Volume:	500 mL
Dilution:	1.0			Final Weight/Volume:	10000 uL
Analysis Date:	10/18/2011 0509			Injection Volume:	450 uL
Prep Date:	10/15/2011 1223			Result Type:	SECONDARY

Surrogate	%Rec	Qualifier	Acceptance Limits
1,2-Dinitrobenzene	100		40 - 150

Client: Olsson Associates

Job Number: 200-7484-1
Sdg Number: 7484

Client Sample ID: **BMW06-030-101211**

Lab Sample ID: 200-7484-9
Client Matrix: Water

Date Sampled: 10/12/2011 1110
Date Received: 10/13/2011 1030

8330B Nitroaromatics and Nitramines (HPLC)

Analysis Method:	8330B	Analysis Batch:	200-26896	Instrument ID:	CH1208
Prep Method:	8330-Prep	Prep Batch:	200-26823	Initial Weight/Volume:	500 mL
Dilution:	1.0			Final Weight/Volume:	10000 uL
Analysis Date:	10/18/2011 0607			Injection Volume:	150 uL
Prep Date:	10/15/2011 1223			Result Type:	PRIMARY

Analyte	Result (ug/L)	Qualifier	MDL	RL
HMX	0.20	U	0.0087	0.20
RDX	0.20	U	0.023	0.20
1,3,5-Trinitrobenzene	0.20	U	0.015	0.20
1,3-Dinitrobenzene	0.20	U	0.025	0.20
Nitrobenzene	0.20	U	0.030	0.20
Tetryl	0.20	U	0.059	0.20
2,4,6-Trinitrotoluene	0.20	U	0.012	0.20
4-Amino-2,6-dinitrotoluene	0.20	U	0.022	0.20
2-Amino-4,6-dinitrotoluene	0.20	U	0.021	0.20
2,6-Dinitrotoluene	0.20	U	0.019	0.20
2,4-Dinitrotoluene	0.20	U	0.059	0.20
2-Nitrotoluene	0.20	U	0.032	0.20
4-Nitrotoluene	0.20	U	0.055	0.20
3-Nitrotoluene	0.20	U	0.057	0.20

Surrogate	%Rec	Qualifier	Acceptance Limits
1,2-Dinitrobenzene	98		40 - 150

Appendix 5-1

Groundwater Elevation Comparison Hydrographs

Douglas County Monitoring Wells

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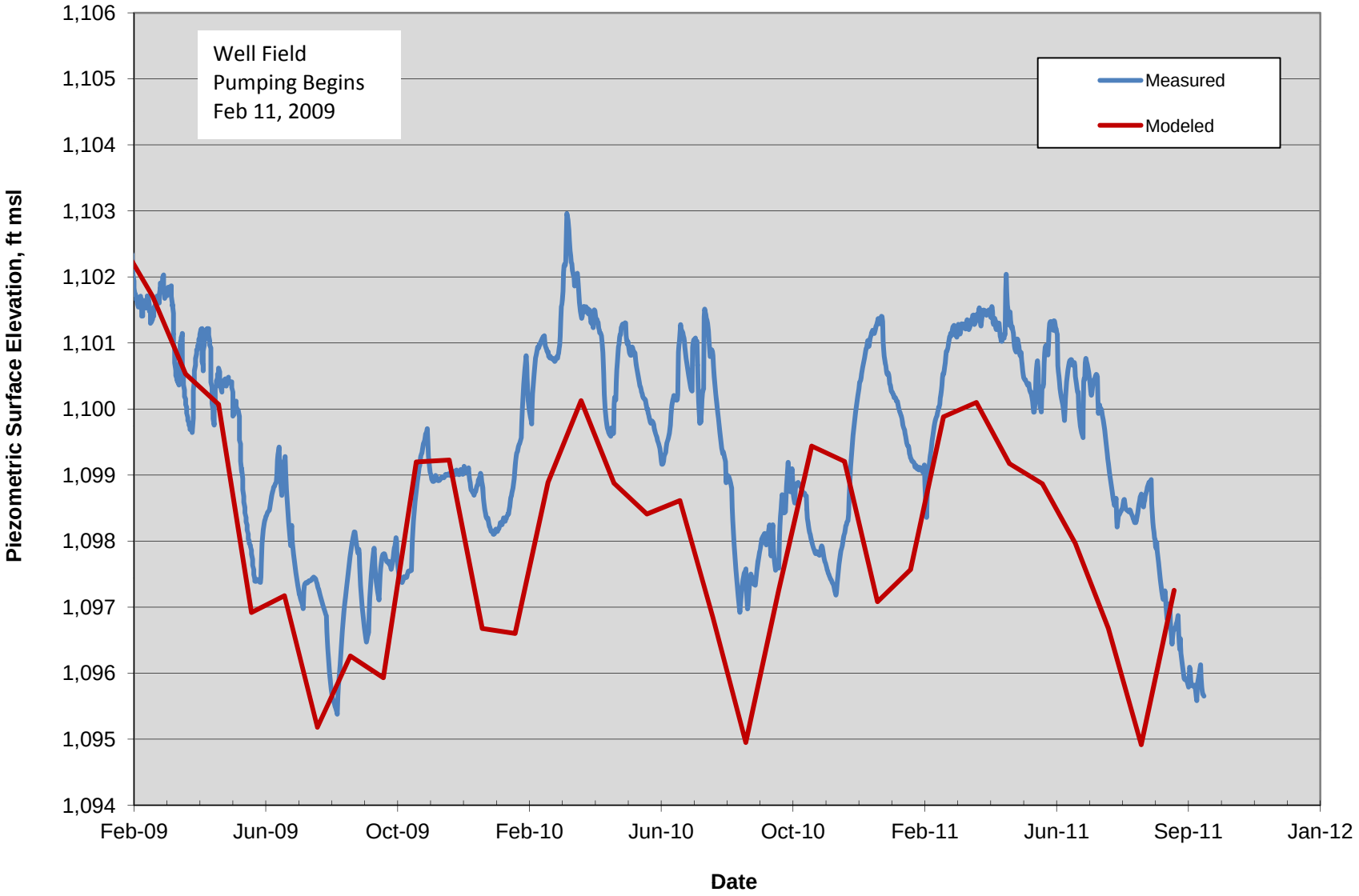
MW90-5 Hydrograph

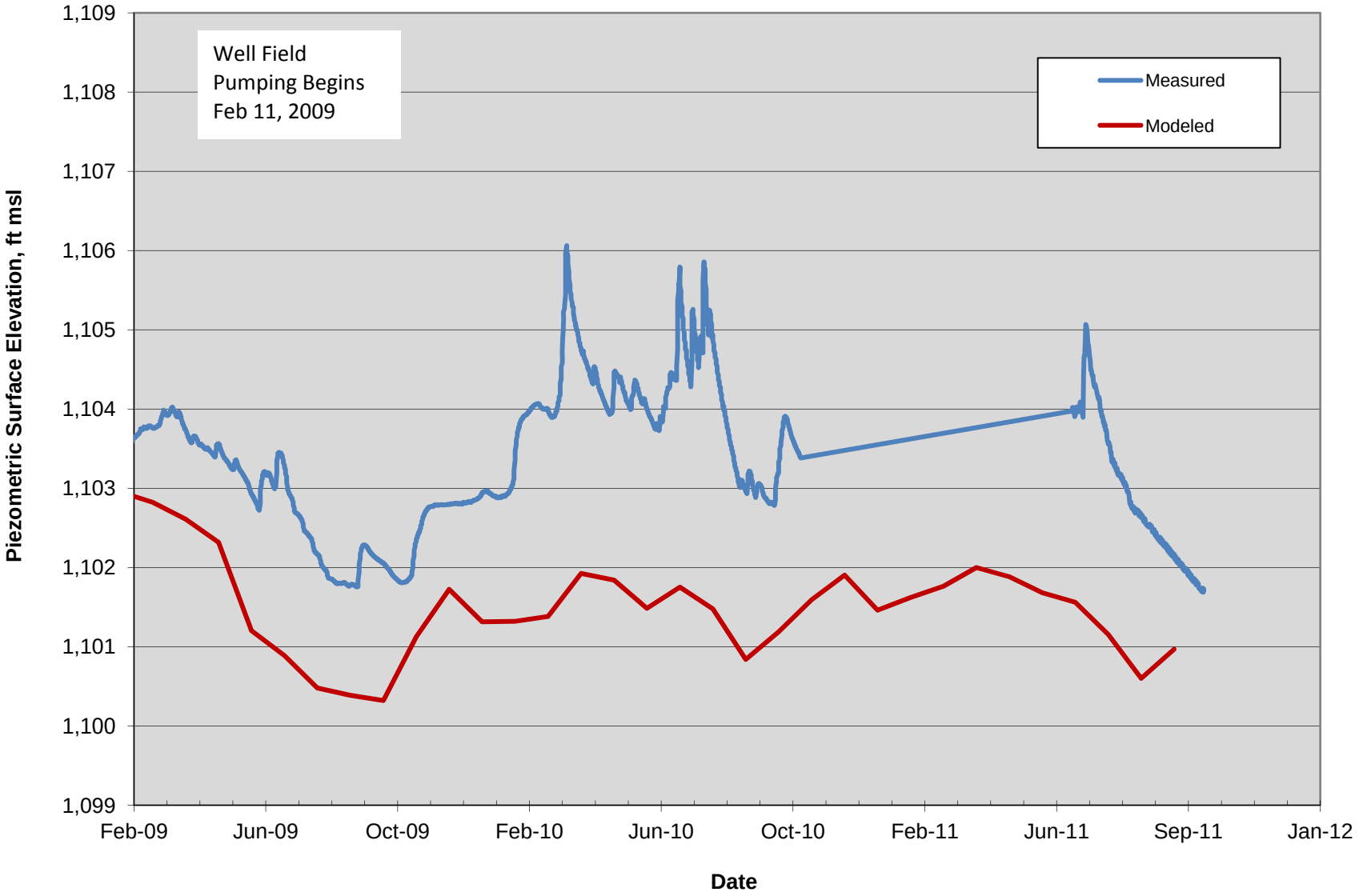
Measured and Modeled Piezometric Surface Elevations



DRAFT

MW90-6 Hydrograph

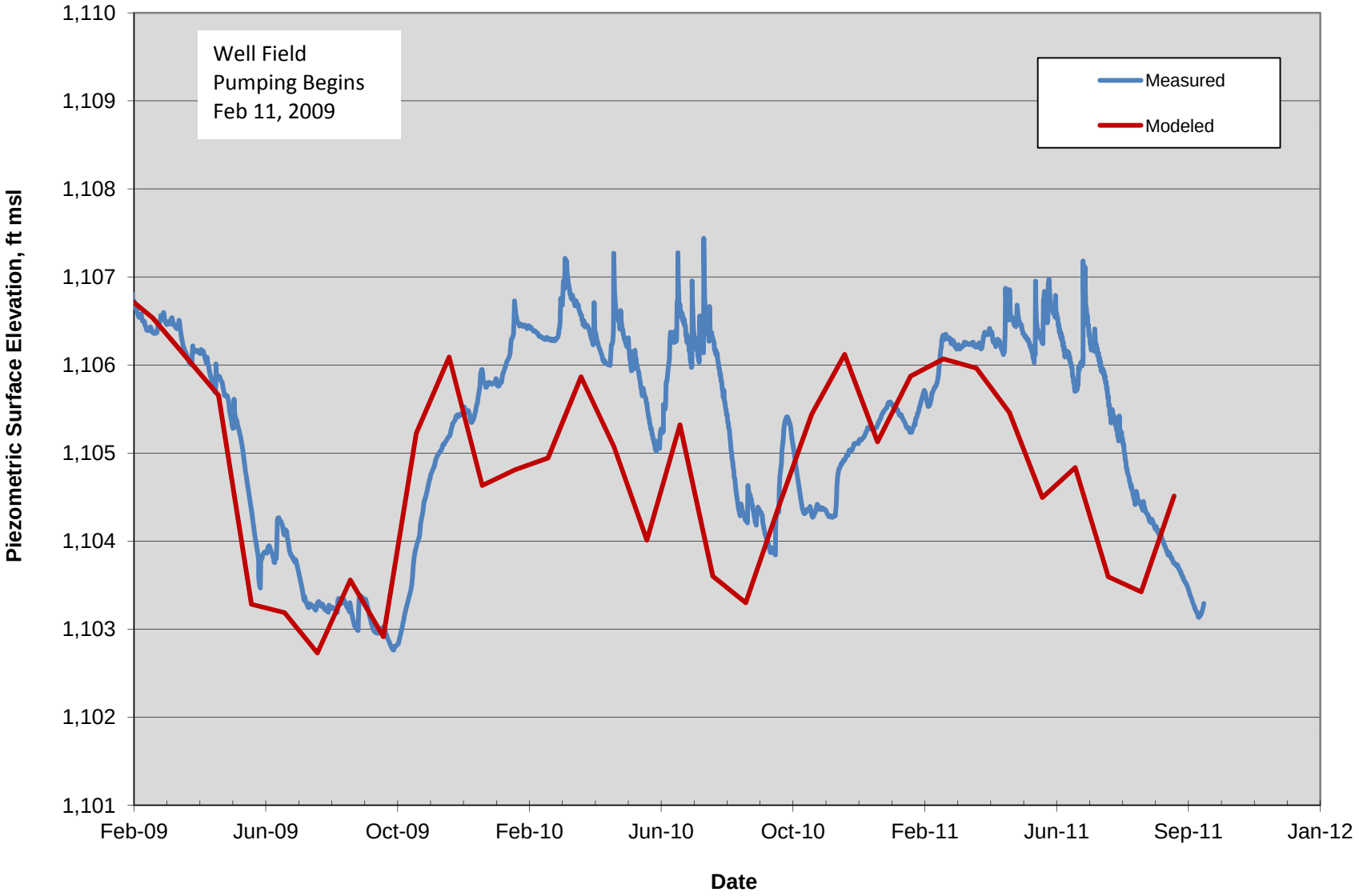
Measured and Modeled Piezometric Surface Elevations



DRAFT

MW90-7 Hydrograph

Measured and Modeled Piezometric Surface Elevations



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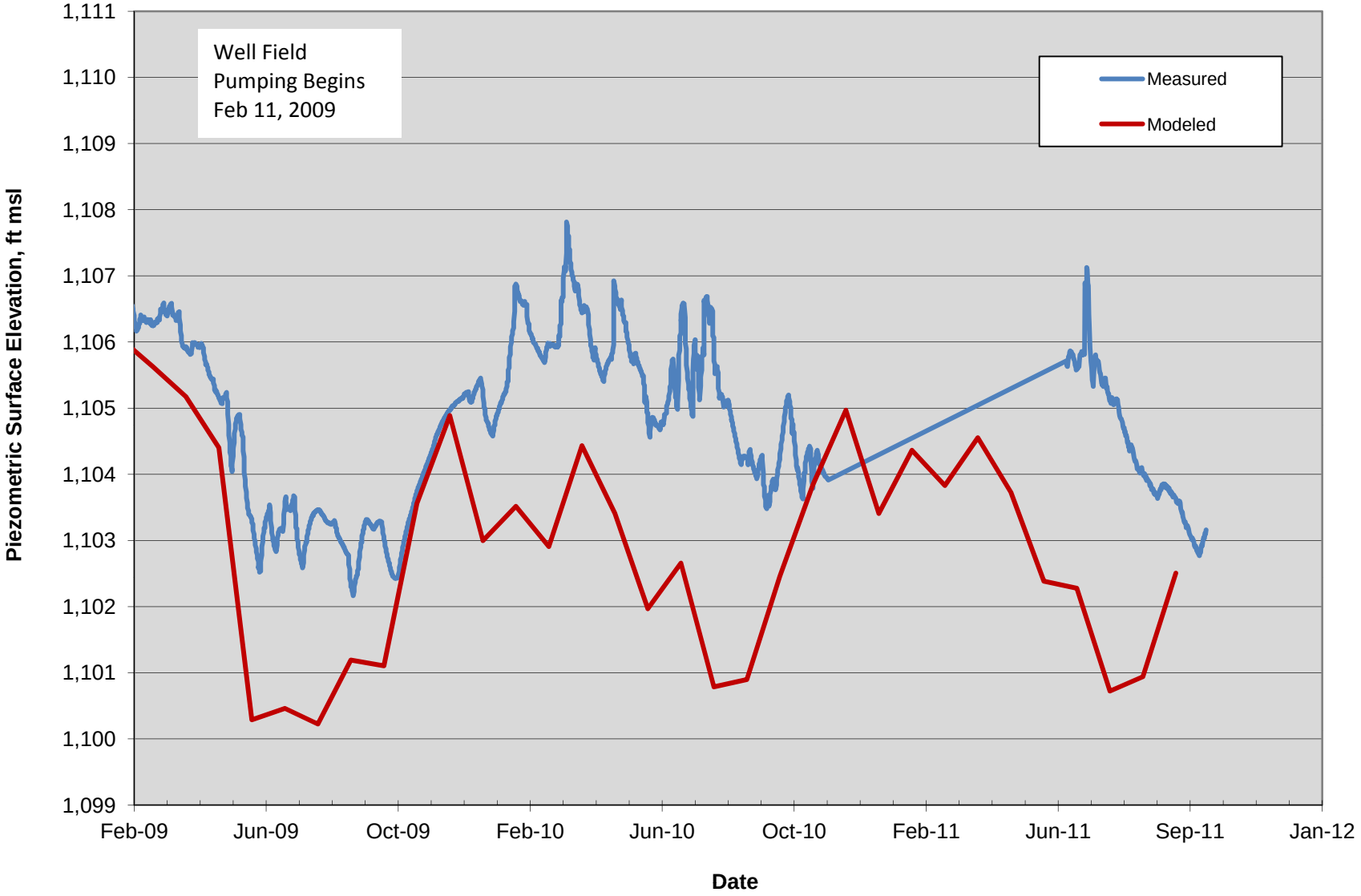
MW94-1 Hydrograph

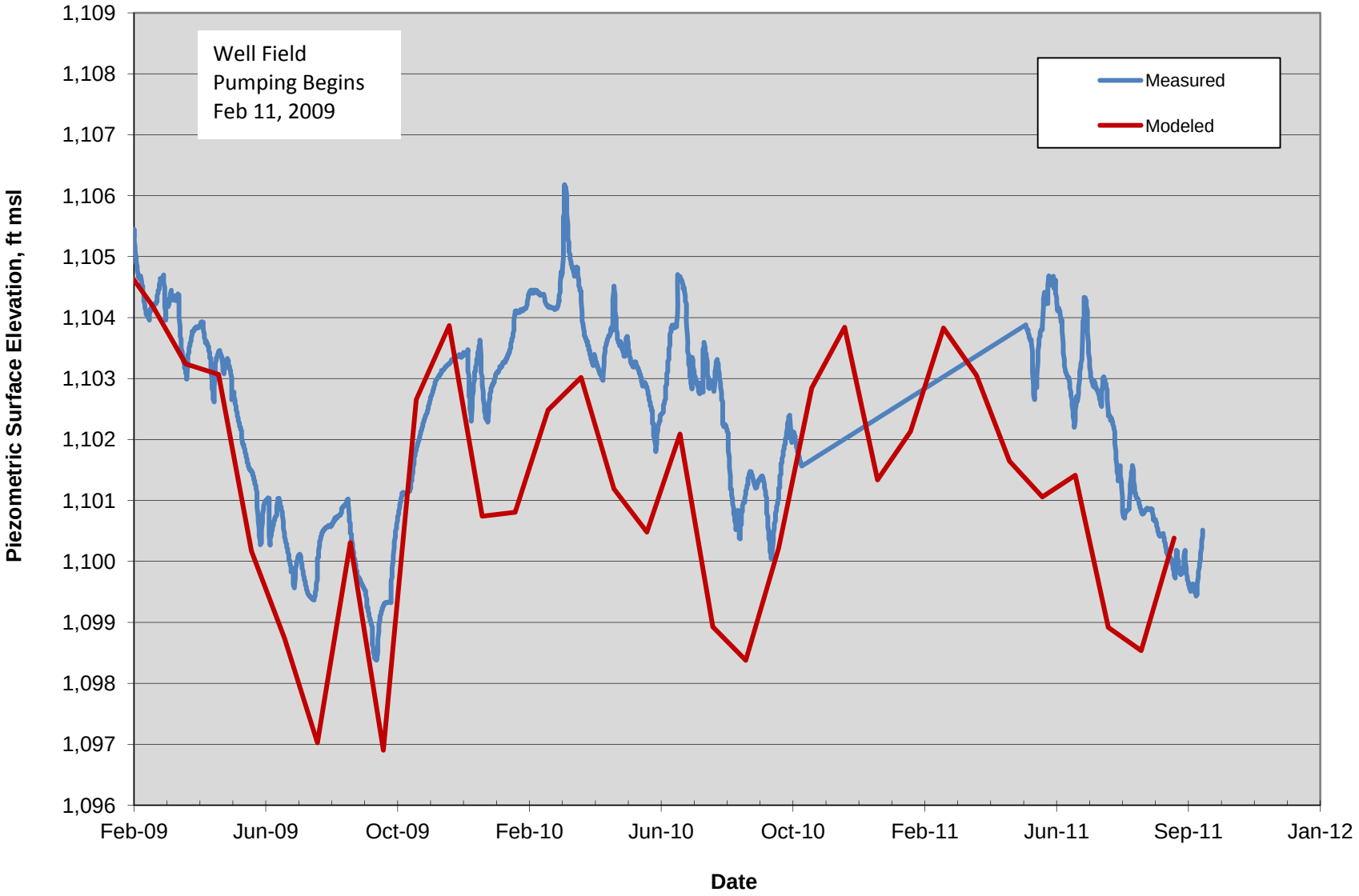
Measured and Modeled Piezometric Surface Elevations



DRAFT

MW94-2 Hydrograph

Measured and Modeled Piezometric Surface Elevations



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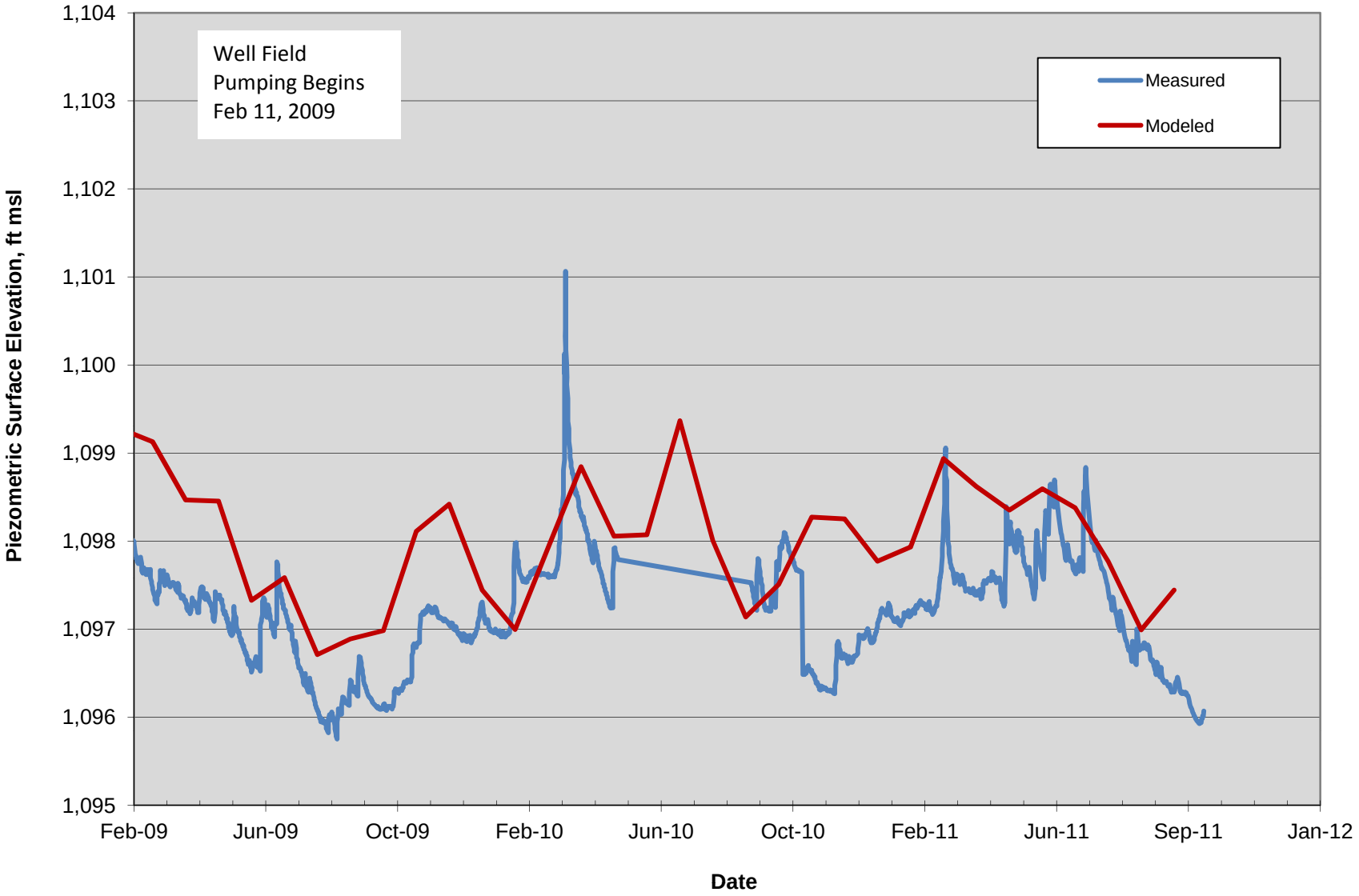
MW05-24 Hydrograph

Measured and Modeled Piezometric Surface Elevations



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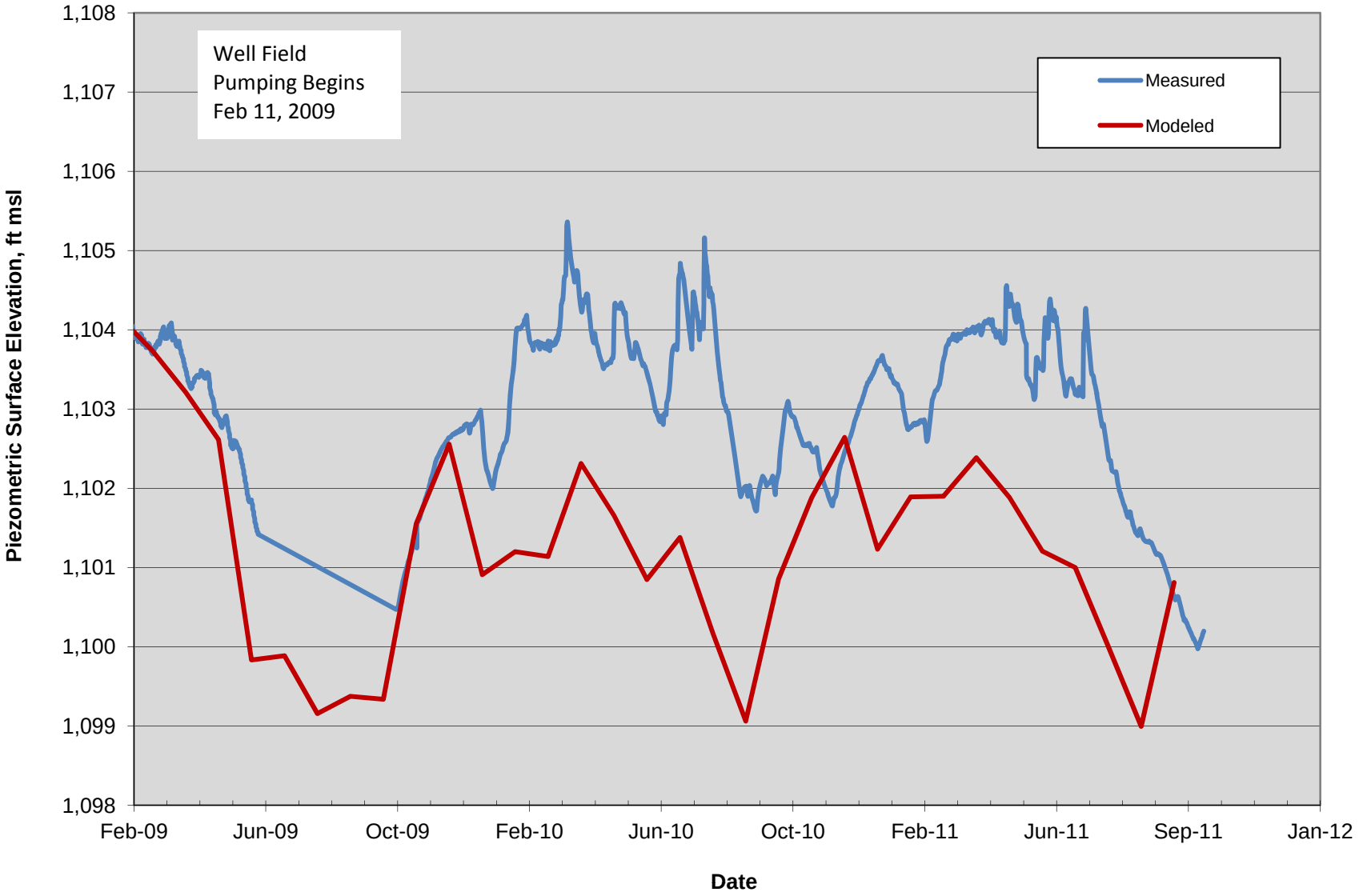
MW05-25 Hydrograph

Measured and Modeled Piezometric Surface Elevations



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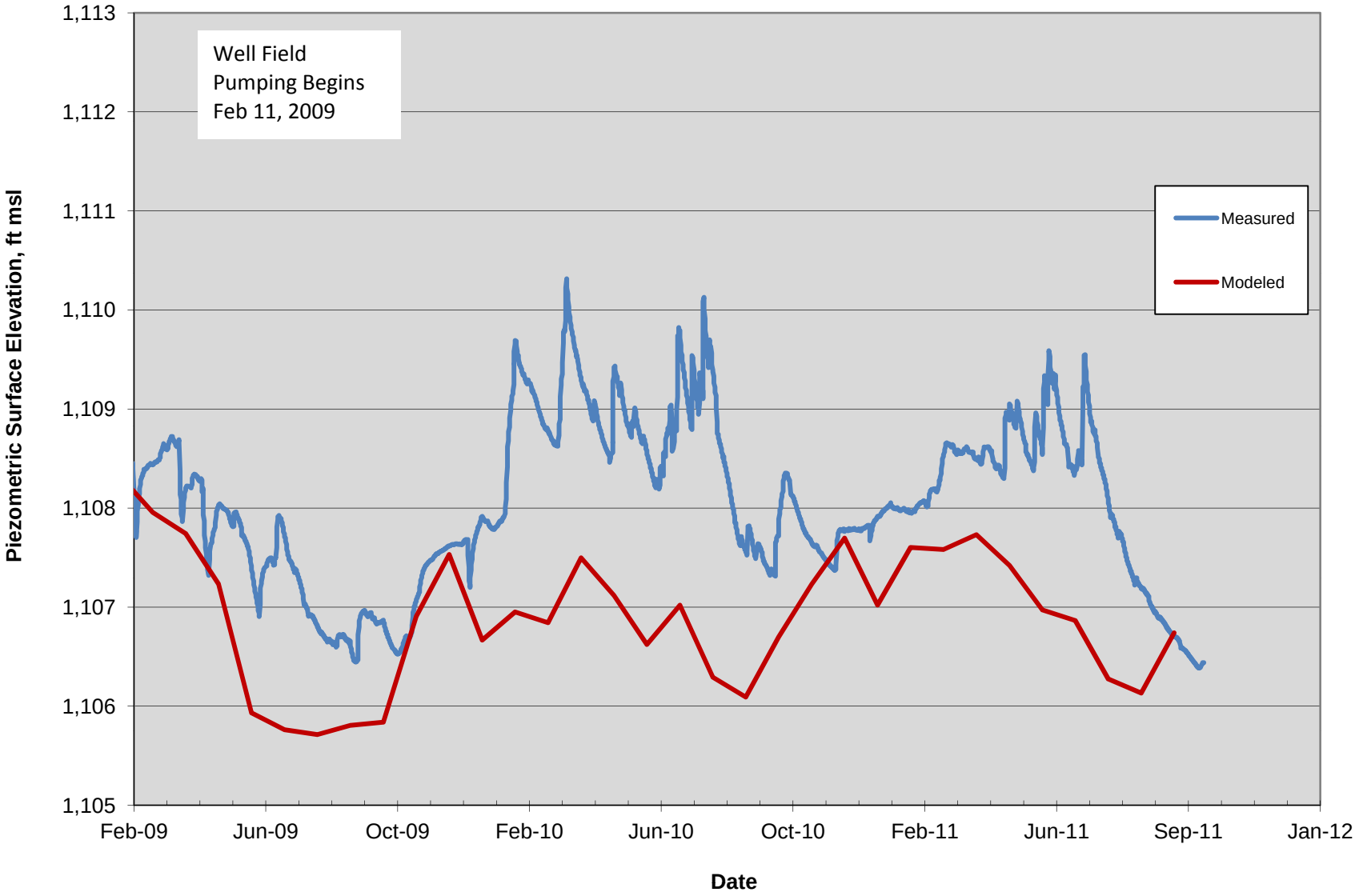
MW05-26 Hydrograph

Measured and Modeled Piezometric Surface Elevations

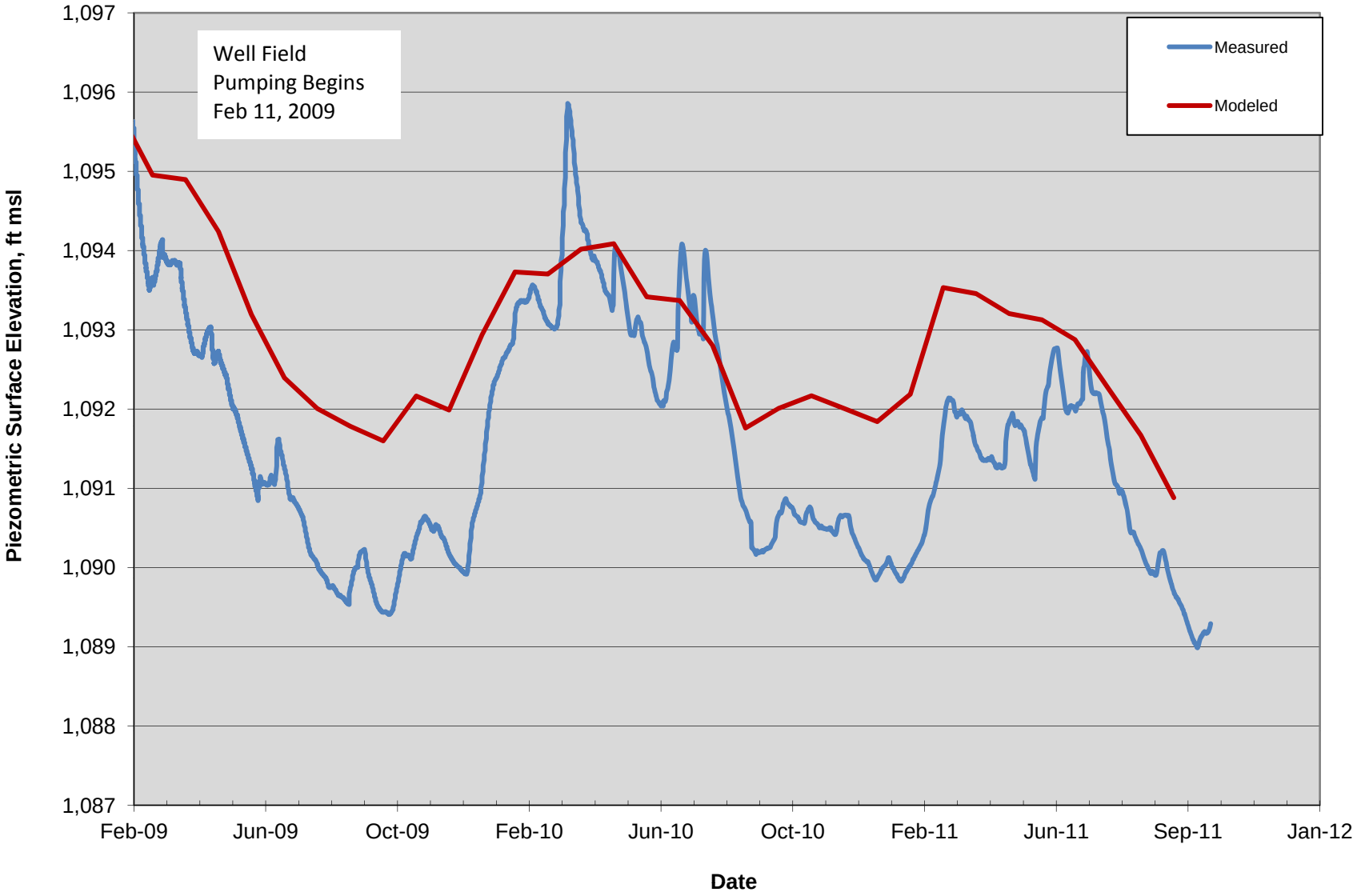


Saunders County Monitoring Wells

DRAFT

MW90-10 Hydrograph

Measured and Modeled Piezometric Surface Elevations



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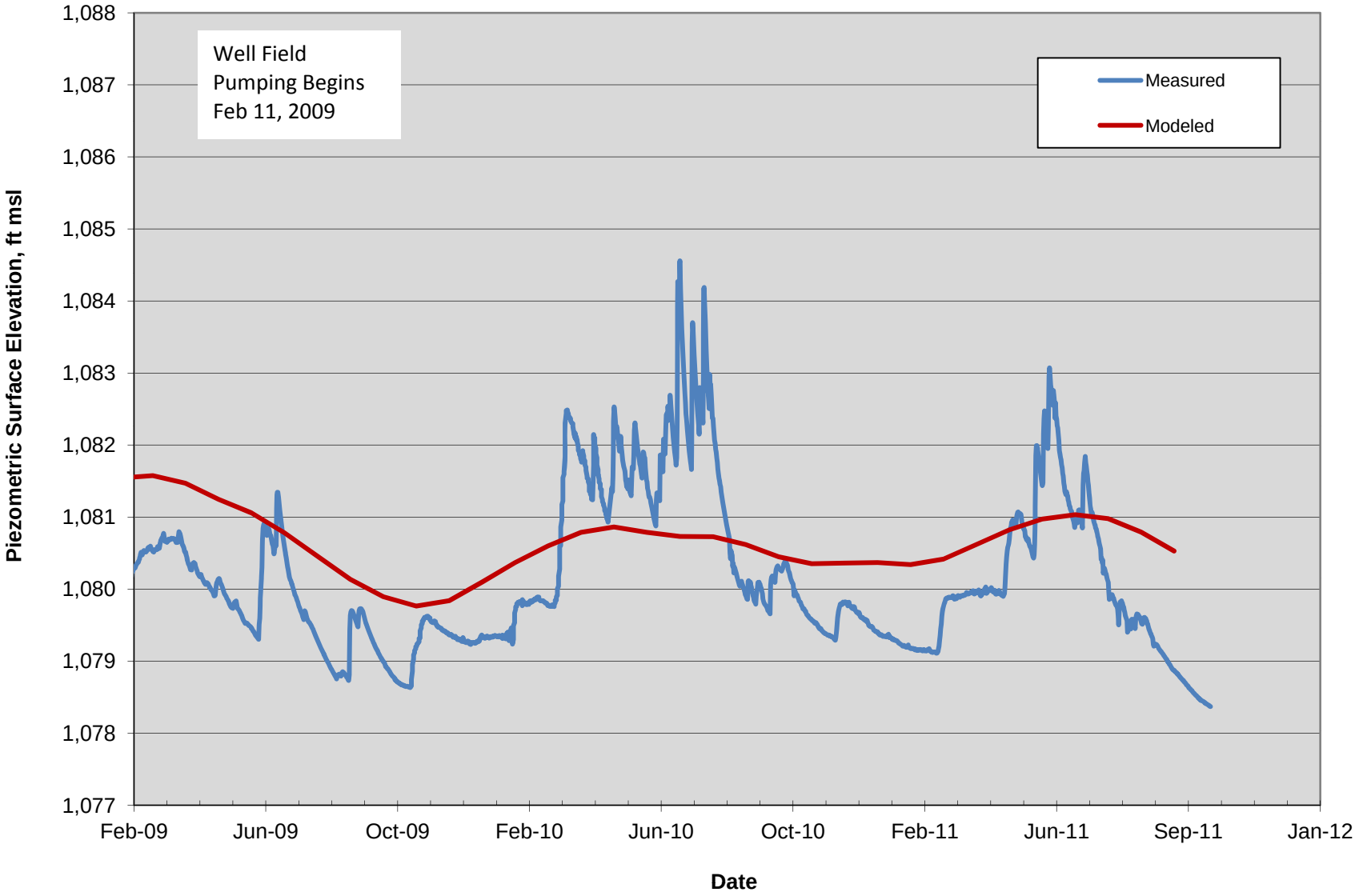
MW94-3 Hydrograph

Measured and Modeled Piezometric Surface Elevations



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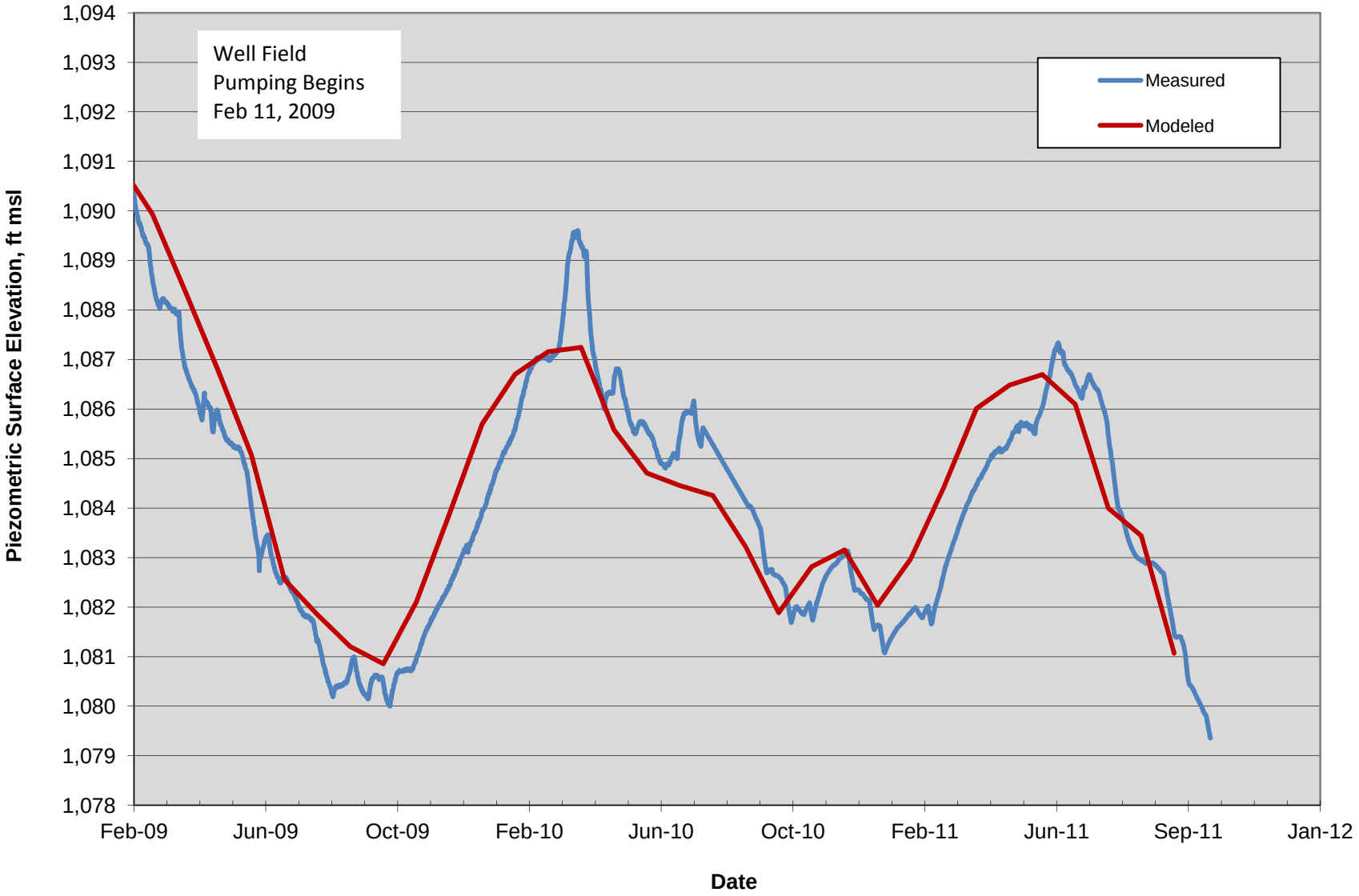
MW94-4 Hydrograph

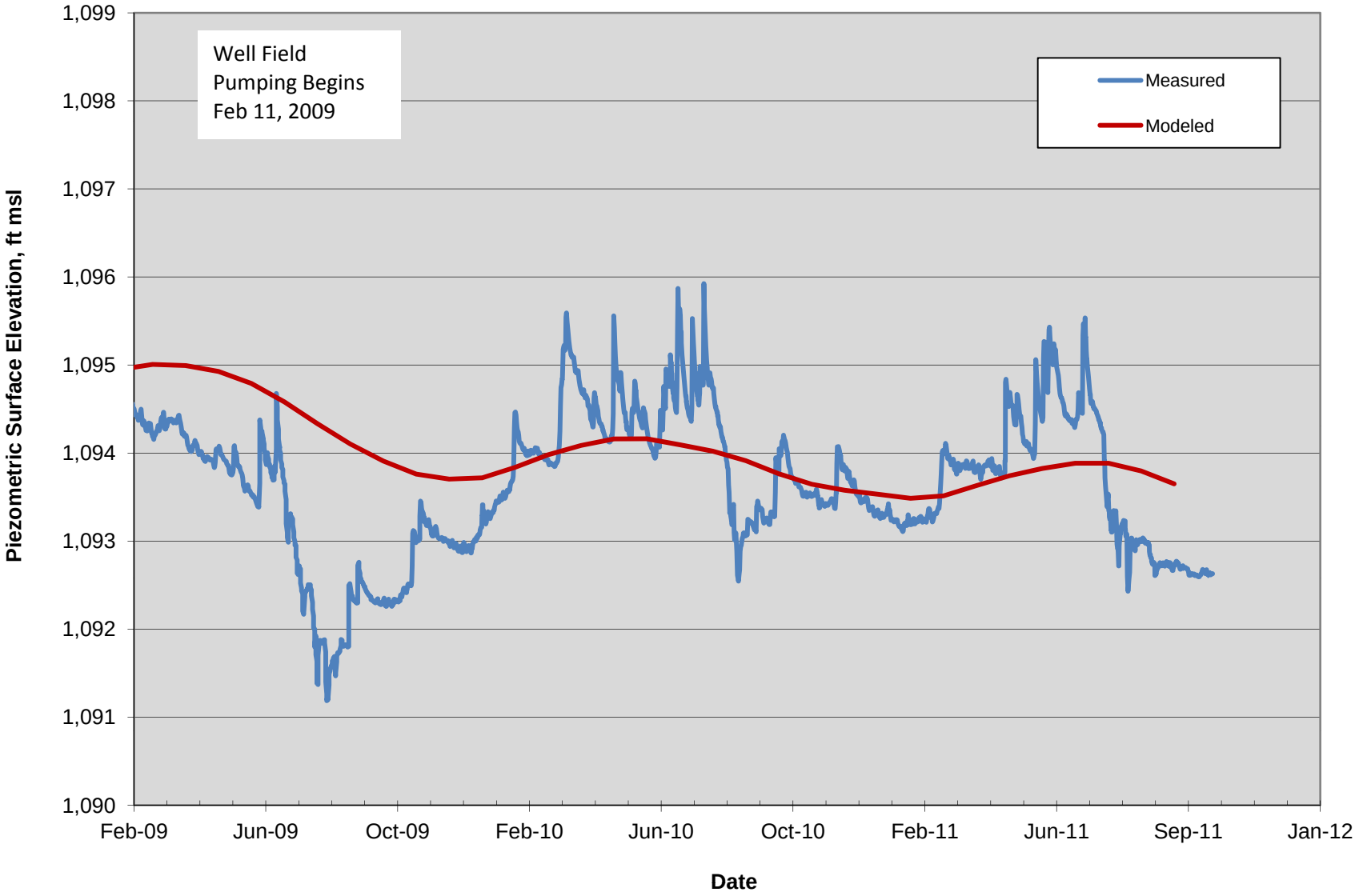
Measured and Modeled Piezometric Surface Elevations



DRAFT

MW94-5 Hydrograph

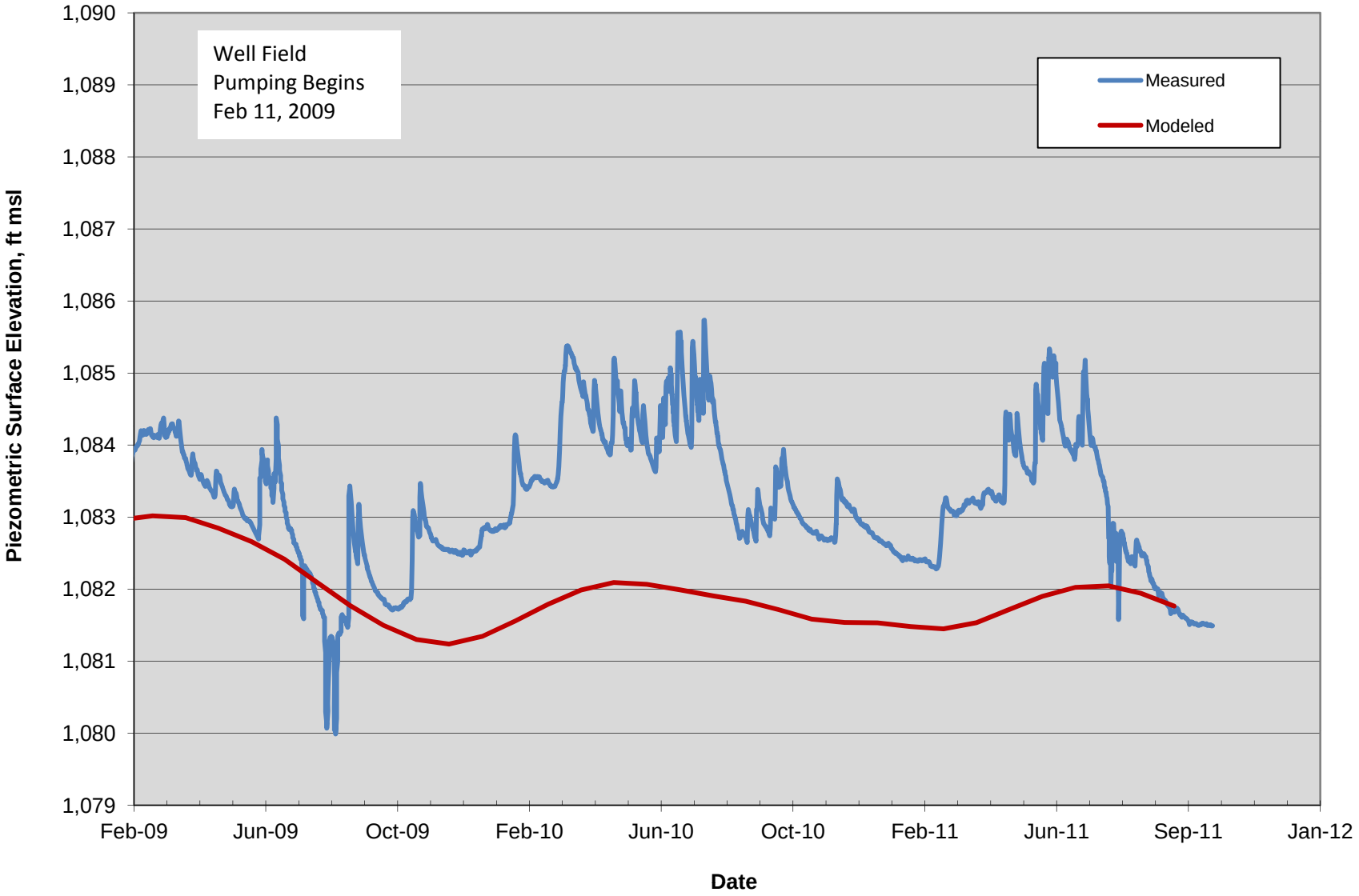
Measured and Modeled Piezometric Surface Elevations



DRAFT

MW94-6 Hydrograph

Measured and Modeled Piezometric Surface Elevations



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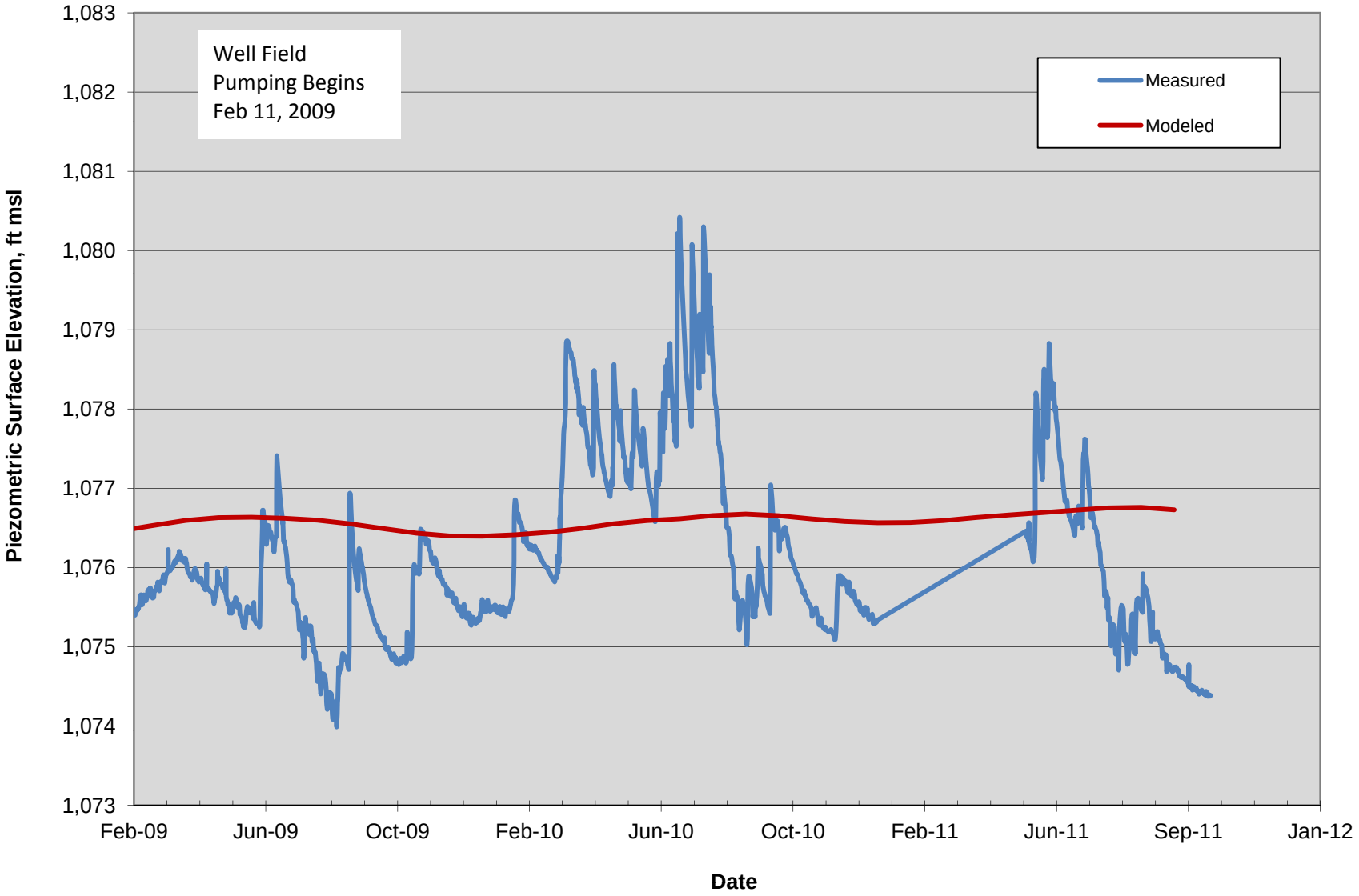
MW94-7 Hydrograph

Measured and Modeled Piezometric Surface Elevations



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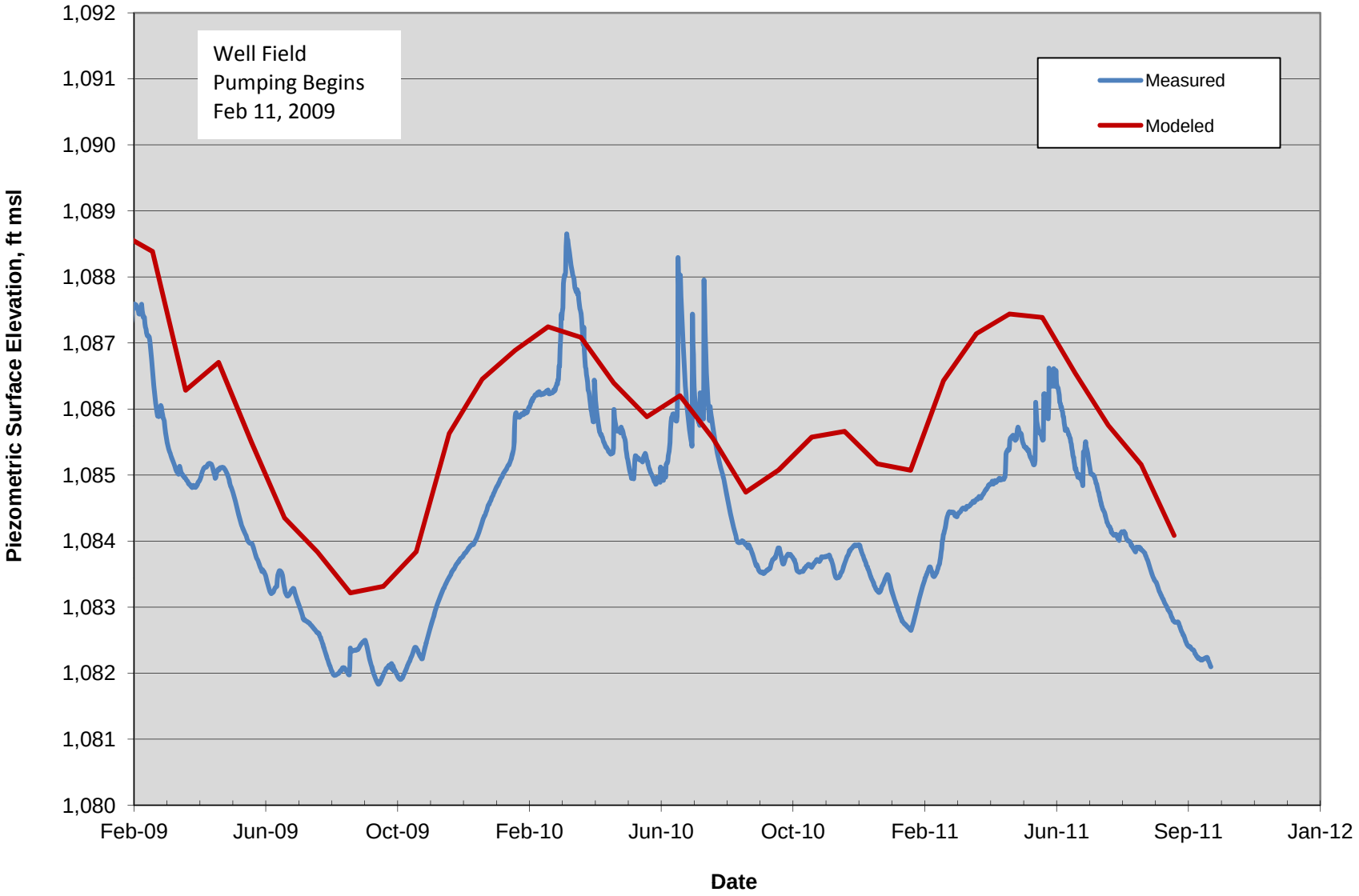
MW05-22 Hydrograph

Measured and Modeled Piezometric Surface Elevations



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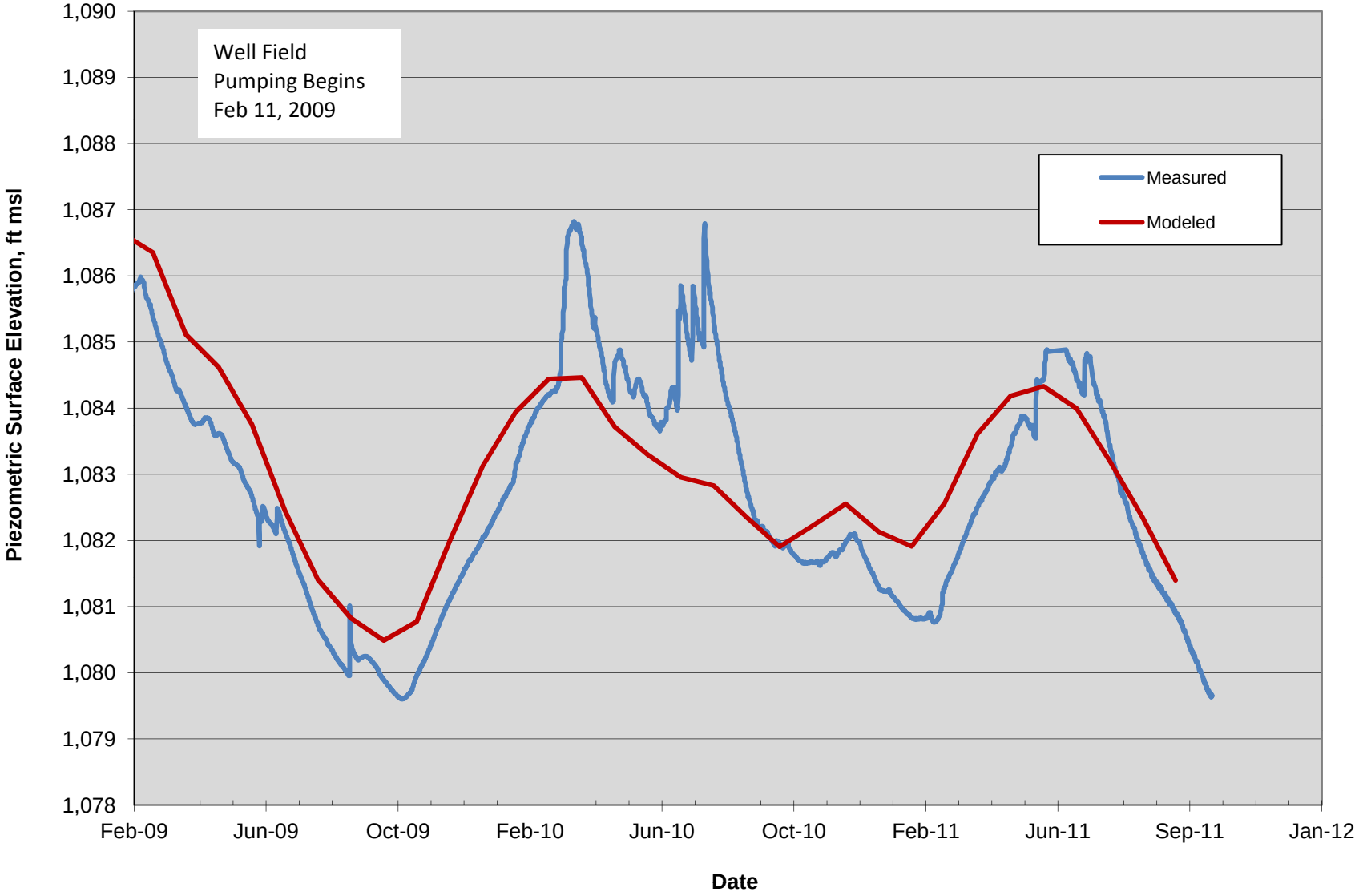
MW05-23 Hydrograph

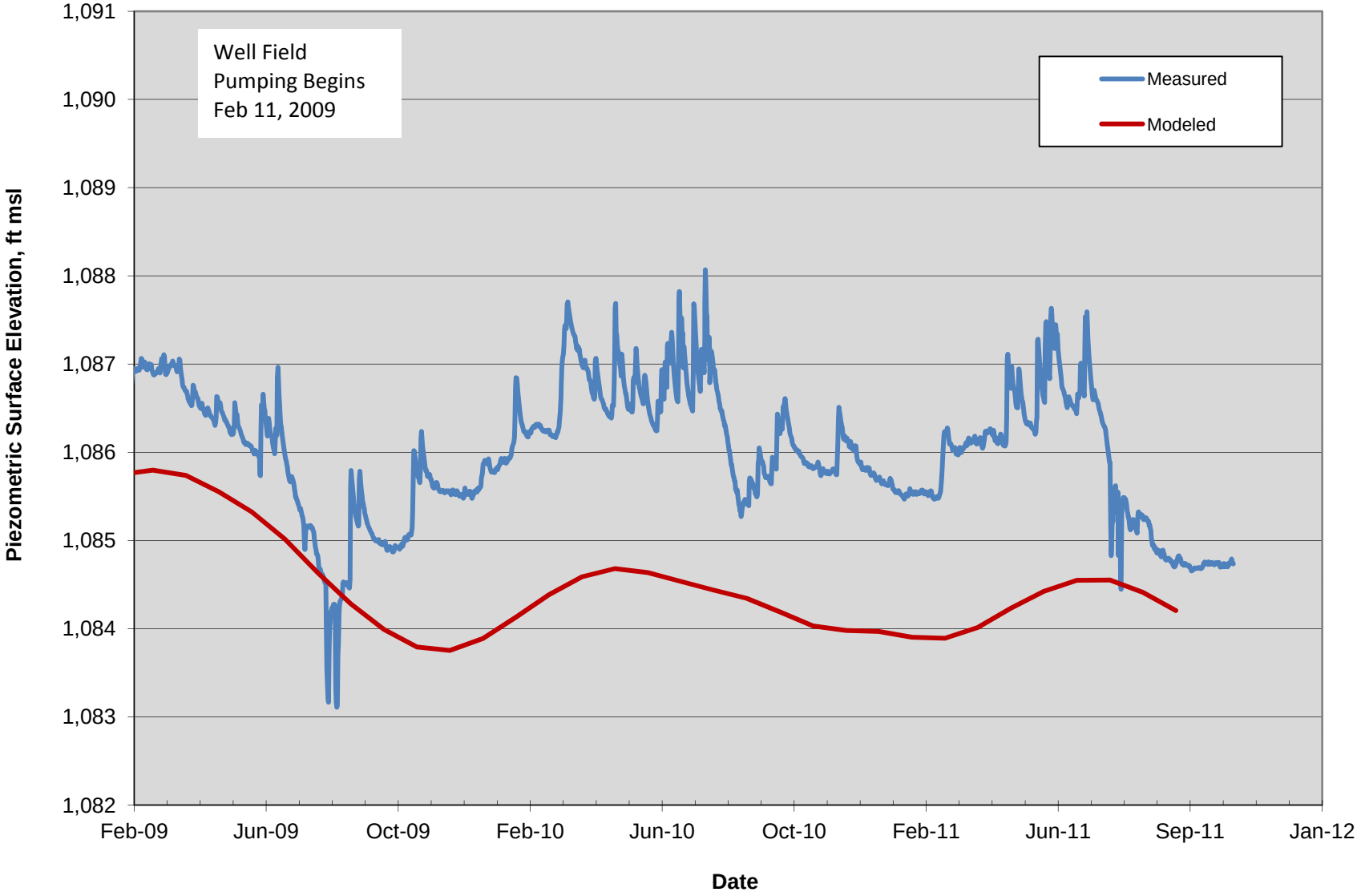
Measured and Modeled Piezometric Surface Elevations



DRAFT

MW06-27 Hydrograph

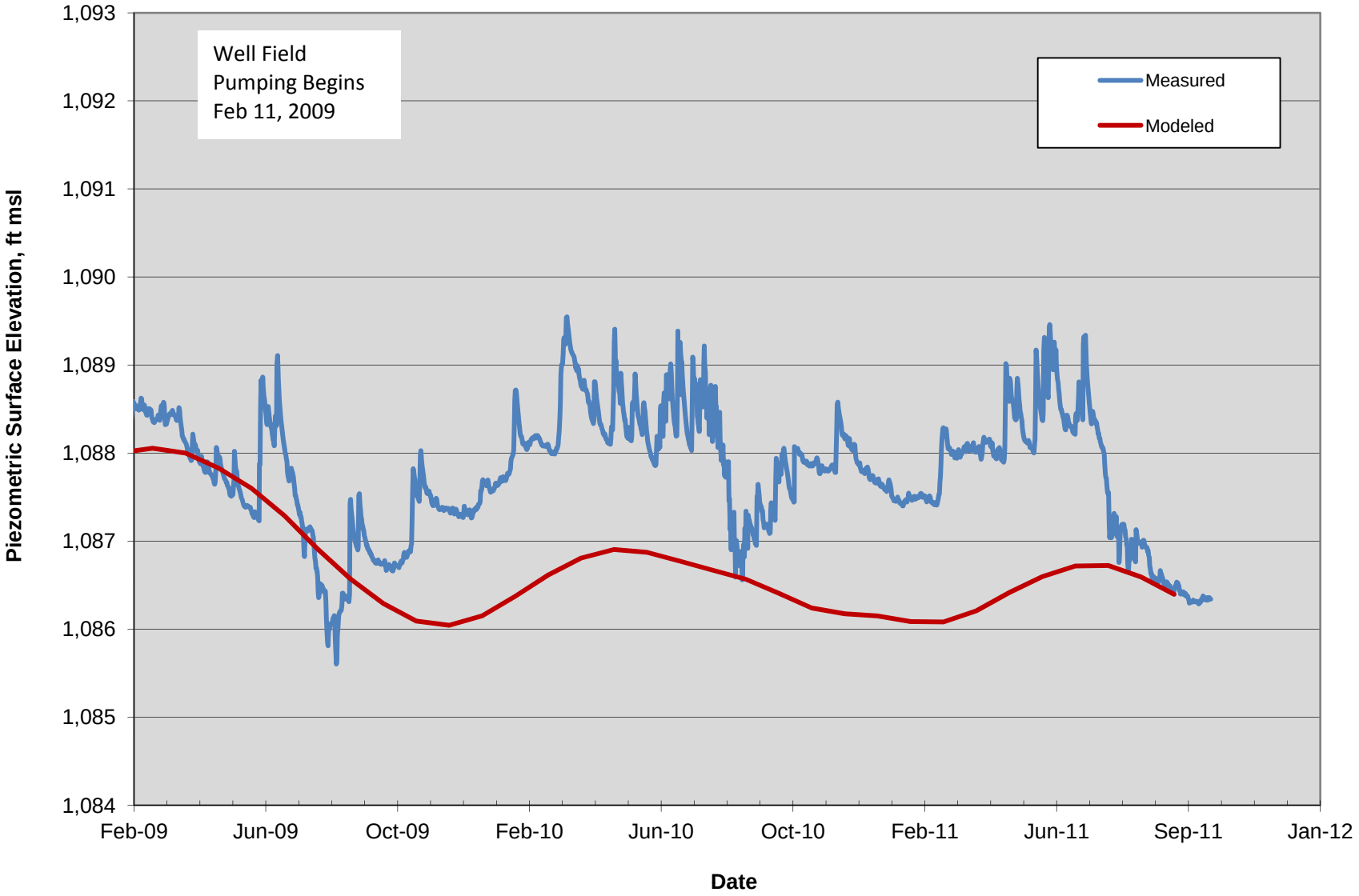
Measured and Modeled Piezometric Surface Elevations



DRAFT

MW06-28 Hydrograph

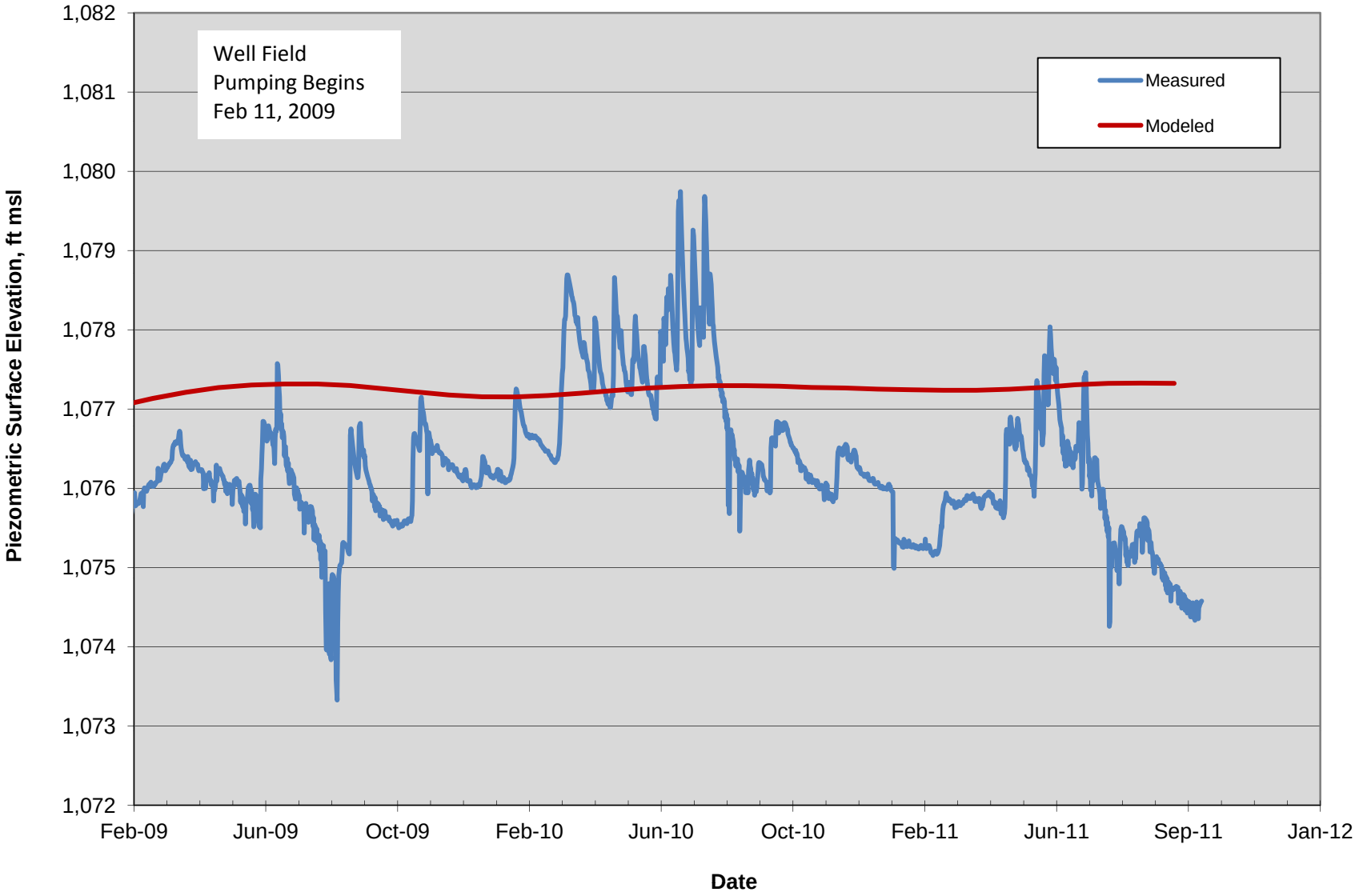
Measured and Modeled Piezometric Surface Elevations



DRAFT

MW38 Hydrograph

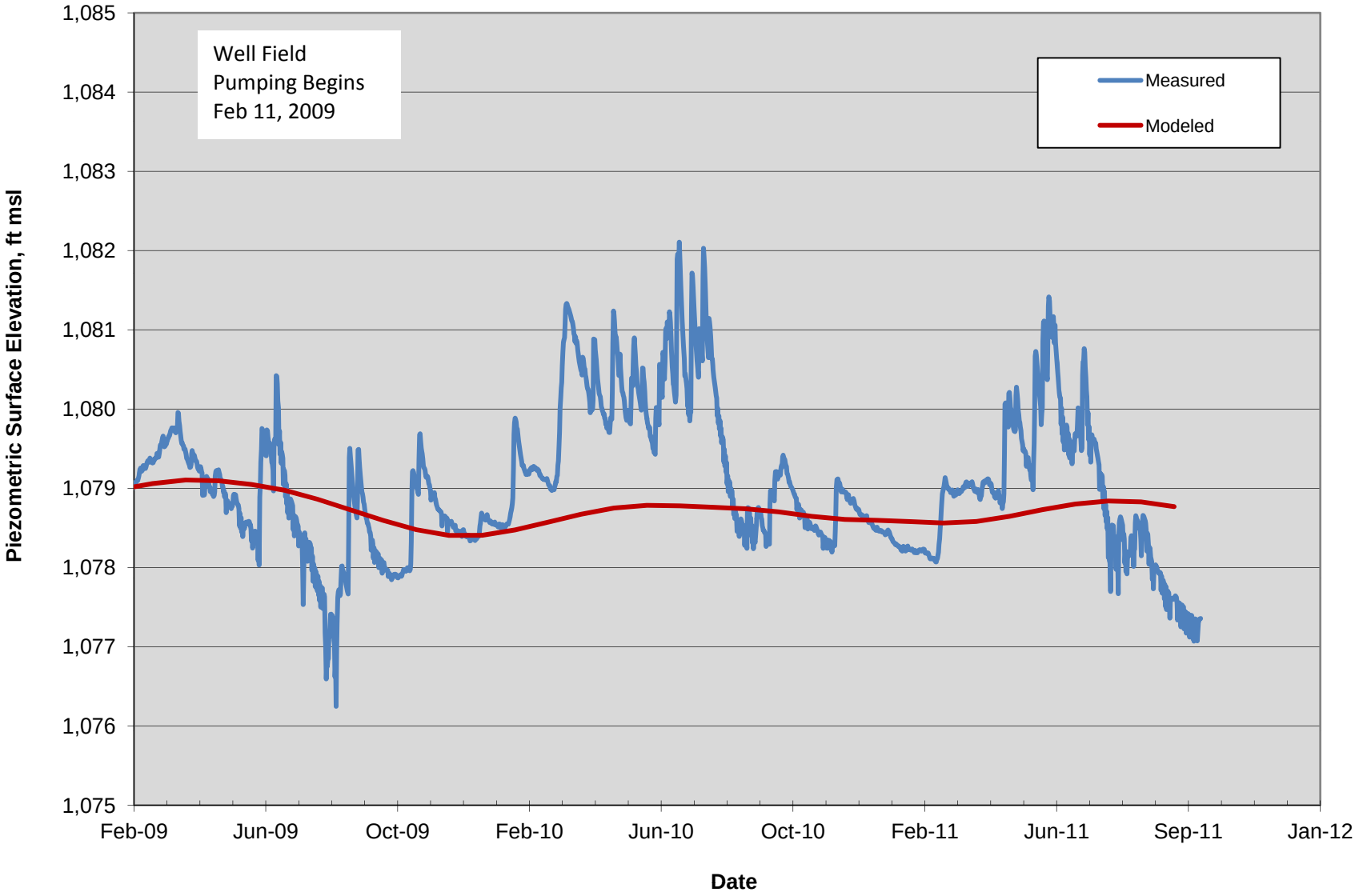
Measured and Modeled Piezometric Surface Elevations



DRAFT

MW39 Hydrograph

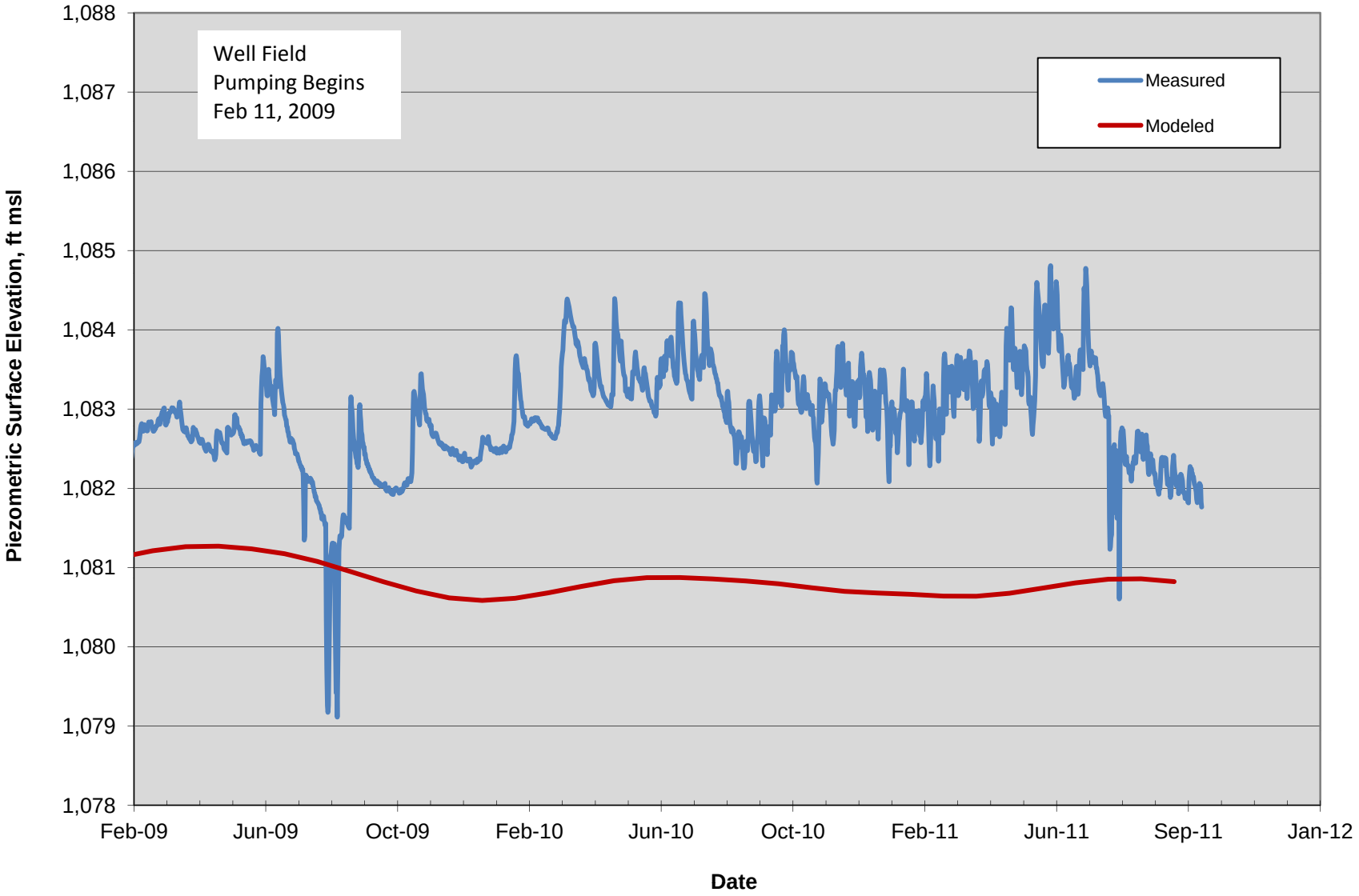
Measured and Modeled Piezometric Surface Elevations



DRAFT

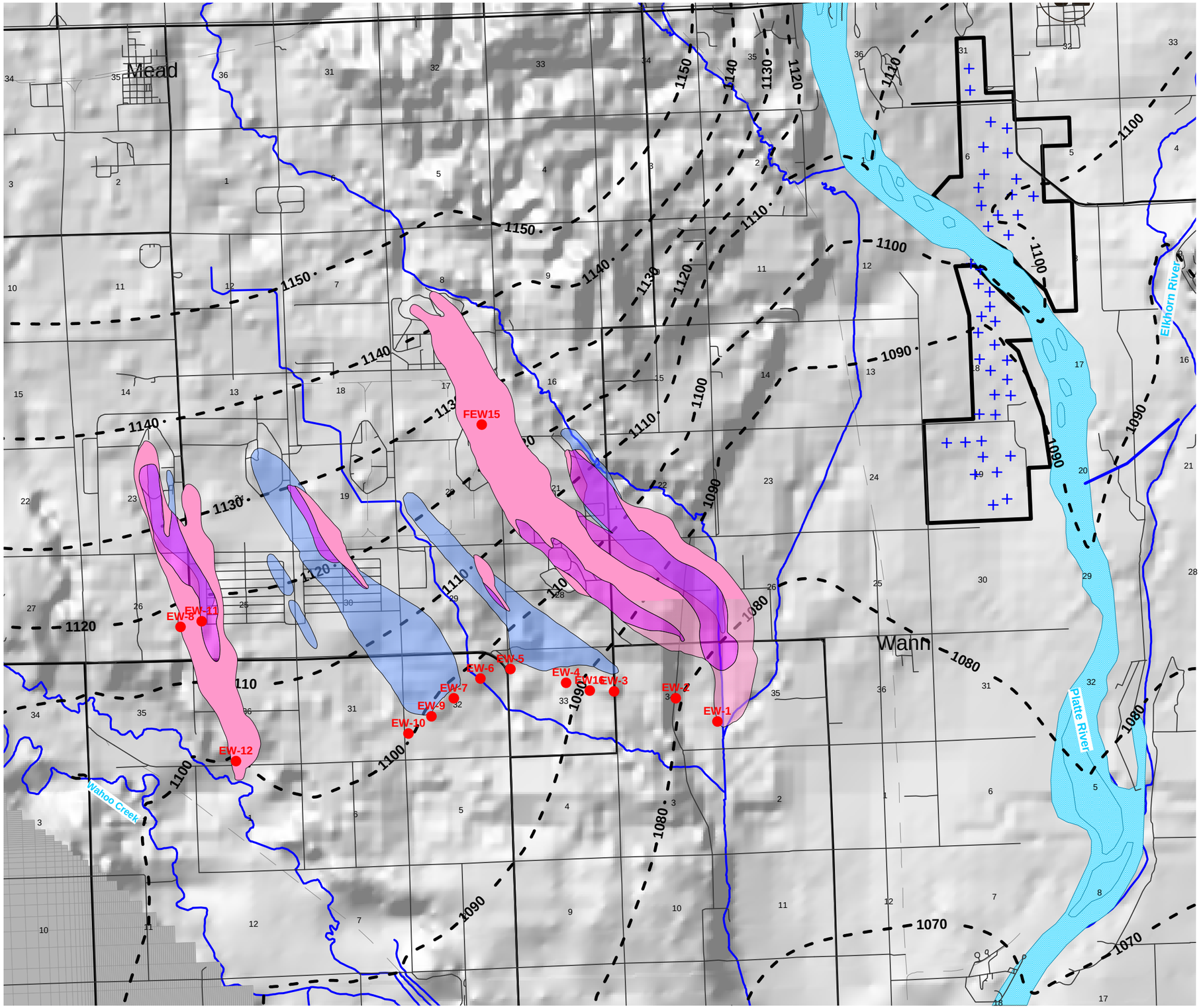
MW112 Hydrograph

Measured and Modeled Piezometric Surface Elevations



Appendix 5-2

Forecast Model Simulation – Predicted Potentiometric Surface Map



metropolitan UTILITIES DISTRICT

Platte West Well Field
Nebraska Ordnance Plant
Groundwater Report

Appendix 5-2
Forecast Model Predicted Potentiometric Surface (End of April 2012)

LEGEND:

- Forecast Model Predicted Potentiometric Surface Elevation Contour (ft msl) - End of April 2012
- TCE Plume
- Overlapping RDX/TCE Plume
- RDX Plume

Pumping Wellfields Operating During MODFLOW Simulation

- Platte West Well Field Boundary
- Platte West Well Field Well
- FNOP Containment/Focused Extraction Well

MAP SCALE (feet)

0 5000 10000

HDR

January 2012