Petrotek

LOST CREEK HYDROLOGIC TESTING – MINE UNIT 1 NORTH AND SOUTH TESTS

ISR

10758 West Centennial Road, Suite 200
Littleton, Colorado 80127 USA

LOST CREEK PROJECT, SWEETWATER COUNTY, WY

OCTOBER 2009

(Revised March 2010)

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EXECUTIVE SUMMARY

- Lost Creek ISR, LLC (LC ISR) plans to develop and extract uranium from in-situ recovery (ISR) mine units within the HJ Horizon of the Battle Spring Formation located at the Lost Creek Project Area (LCPA). To support State and Federal permit applications necessary for the project, LC ISR has completed the Mine Unit 1 (MU1) pump tests from pumping wells located north and south of the Lost Creek Fault, within MU1. Both pump tests targeted the primary Production Zone (HJ Horizon) aquifer and supplement two previous smaller-scale pump tests conducted within the HJ Horizon.

- Pump testing performed in the HJ Horizon north of the fault has demonstrated hydraulic communication between the HJ Horizon pumping well and the surrounding HJ monitor wells; likewise, pump testing conducted in the HJ Horizon south of the fault has demonstrated hydraulic communication between the HJ Horizon and surrounding HJ monitor wells.

- Testing has confirmed that the Lost Creek Fault is a partial barrier to groundwater flow within the HJ Horizon. During both tests, responses observed in the HJ Horizon on the opposite side of the fault were an order of magnitude lower than those observed on the pumping well side.

- The observed response during the north test at well MU-108 (24.7 feet of drawdown, completed in the underlying UKM Sand) was due to damage to the casing and annular seal during well completion. This well was subsequently plugged and abandoned. LC ISR conducted additional hydrologic testing during June 2009 to confirm the successful abandonment and hydraulic isolation at this location between the HJ Horizon and the underlying UKM Sand by pumping from the UKM Sand and monitoring the aquifer response in the HJ at well MP-108 (located approximately 15 feet adjacent to MU-108), where water levels were not observed to vary in response to the pumping.

- Geologic data indicate that the overlying and underlying confining shale units are continuous throughout the permit area. Testing results indicate adequate vertical confinement of the HJ Horizon and successful abandonment of well MU-108.

- Responses in the overlying and underlying aquifers were minor and an order of magnitude lower than responses observed in the HJ Horizon. Additional evaluation as to the cause of the responses is being conducted. LC ISR is pursuing the proper plugging and abandonment of historic wells to mitigate the potential for communication through improperly abandoned wells.

- Based on testing results to date, it is anticipated that the minor communication between the HJ Horizon and the overlying and underlying sands can be managed through operational practices, detailed monitoring, and engineering operations.

- The pump test results provide sufficient aquifer characterization of the HJ Horizon such that mining can proceed after the appropriate Nuclear Regulatory Commission (NRC) license and Wyoming Land Quality Division (LQD) permit are issued, and demonstrate that the HJ Horizon has sufficient transmissivity for ISR operations.

1.0 INTRODUCTION

1.1 BACKGROUND

The Lost Creek Project Area (LCPA) is located in the northeastern portion of the Great Divide Basin of Wyoming, within Sweetwater County (Figure 1-1). LC ISR plans to develop and extract uranium from ISR mine units within the HJ Horizon of the Battle Spring Formation. This report provides a summary of the mine-unit scale hydrogeologic testing conducted in the HJ Horizon during November and December 2008 to support State and Federal permit applications necessary for the project. Pump tests were conducted at separate locations north and south of the Lost Creek Fault (referenced as "fault" within this report), identified within the proposed MU1. The pump test on the north side of the fault ("north test") was conducted at pumping well PW-102, and the test on the south side of the fault ("south test") was conducted at pumping well PW-101.

The LCPA is located in all or parts of Sections 13, 24, and 25 of T25N, R93W, and Sections 16 through 20, and 29 through 31 of T25N, R92W. Figure 1-1 shows the LCPA and its relationship to the Great Divide Basin. Figures 1-2 and 1-3 present the location of the pumping wells and monitor wells used for the north and south pump tests, respectively.

There are no active ISR operations within ten miles of the LCPA. Areva's Christensen Ranch and Cameco Resources' Smith Ranch-Highland uranium project are located approximately 150 miles to the northeast and east, respectively. The primary Production Zone at Lost Creek is the HJ Horizon that occurs between depths of 300 and 450 feet below ground surface, although the ore bearing sand is typically found in the middle portion of the HJ horizon.

In the LCPA, water is beneficially used for livestock watering as well as for purposes related to mining (monitoring, test wells, dewatering, industrial, stock, reservoir supply, and miscellaneous use). Currently, water is not used for domestic or irrigation purposes within two miles of the LCPA.

1.2 REGULATORY REQUIREMENTS

The objectives of mine-unit scale pumping tests, as stated in the Wyoming Department of Environmental Quality/Land Quality Division (WDEQ/LQD) Chapter 11 (and associated guidelines) and Nuclear Regulatory Commission (NRC) NUREG 1569 (Section 2.7; Hydrology), are to:

1. Determine the hydrologic characteristics of the Production Zone Aquifer;
2. Demonstrate hydrologic communication between the Production Zone pumping well and the surrounding Production Zone monitor wells;
3. Assess the presence of hydrologic boundaries, if any, within the Production Zone Aquifer over the area evaluated by the Pump Test; and,

4. Evaluate the degree of hydrologic communication, if any, between the Production Zone and the overlying and underlying aquifers in the vicinity of the pumping well.

The testing procedures and results are presented and discussed in this report. Two pump tests were conducted because of the presence of a fault (Lost Creek Fault) that bisects MU1 (Figures 1-2 and 1-3). Results from previous aquifer testing conducted on a smaller scale at the site within the HJ Horizon Production Zone Aquifer (Petrotek 2007a, Petrotek 2007b) indicated that the fault acts as a hydraulic barrier to groundwater flow in the production zone aquifer.

1.3 PURPOSE AND OBJECTIVES

The purpose of this report is to demonstrate that the recently completed hydrologic tests meet the requirements and objectives of WDEQ and NRC as previously stated. This report demonstrates that the HJ Horizon on both sides of the identified fault within MU1 has been sufficiently evaluated with respect to hydrogeologic conditions and is suitable for ISR mining.

The objective of this report is to present the information required by WDEQ/LQD and NRC NUREG 1569 (Section 2.7; Hydrology) for a Hydrologic Test Report. In accordance with these regulations the following information is included or referenced:

- A description and maps of the proposed permit area;
- Geological cross-sections, including data from monitor wells and test holes;
- Isopach maps of the Production Zone, Overlying Confining Unit, and Underlying Confining Unit;
- Well completion reports;
- A description of hydrologic testing;
- Discussion of the hydrologic test results including raw pump test data, type curve matches, potentiometric surface maps, water level graphs, drawdown maps, and other hydrologic data with interpretation and conclusions, as appropriate; and,
- Verification, based on the test data, that: (1) the monitor wells completed within the Production Zone are in communication with the pumping well; and (2) there is adequate confinement between the HJ Horizon Production Zone and the overlying (LFG Sand) and underlying (UKM Sand) aquifers, and (3) the Lost Creek Fault acts as a hydraulic barrier.

1.4 REPORT ORGANIZATION

The results of the MU1 pump tests conducted on both sides of the fault are included within this report. This report includes nine sections, summarized below:

1.0 Introduction
2.0 Site Characterization
3.0 Monitor Well Locations, Installation, and Completion
4.0 Pump Test Design and Procedures
5.0 Barometric Pressure Correlations and Corrections
6.0 Test Results
7.0 Analytical Methods and Results
8.0 Summary and Conclusions
9.0 References

Field activities for the Lost Creek Pump Test were jointly performed by LC ISR and Petrotek Engineering Corporation (Petrotek) personnel. Geologic interpretations were performed by LC ISR geologists. Aquifer test analyses were performed by Petrotek, and the summary report was written by Petrotek.

2.0 SITE CHARACTERIZATION

2.1 HYDROSTRATIGRAPHY

The LCPA is underlain by the upper portion of the Battle Spring Formation. The total thickness of the Battle Spring Formation is approximately 6,000 ft. The Battle Spring Formation unconformably overlies the Fort Union Formation. LC ISR utilizes the following nomenclature for the hydrostratigraphic units of interest within the Battle Spring Formation. The primary Production Zone is identified as the HJ Horizon. The HJ Horizon is subdivided into the Upper (UHJ), Middle (MHJ), and Lower (LHJ) Sands. The HJ Horizon is bounded above and below by areally extensive confining units identified as the Lost Creek Shale and the Sagebrush Shale, respectively. Overlying the Lost Creek Shale is the FG Horizon, the overlying aquifer to the HJ Production Zone (HJ Horizon). The FG Horizon consists of an upper and lower sand sequence that are hydrostratigraphically connected. The deepest sand in the FG Horizon is designated as the Lower FG (LFG) Sand and is the interval in which all overlying monitor wells are completed. Beneath the Sagebrush Shale is the KM Horizon, the underlying aquifer to the HJ Horizon. Similar to the HJ Horizon, the KM Horizon consists of upper, middle, and lower sand intervals that are hydrostratigraphically connected. The uppermost sand within the KM Horizon is designated the Upper KM (UKM) Sand and is the interval in which all of the underlying monitor wells were completed, with the exception of UKMU-103 (Middle KM [MKM] Sand completion). The shallowest occurrence of groundwater within the LCPA occurs within the DE Horizon, which is above the FG Horizon. Figure 2-1 depicts the hydrostratigraphic relationship of these units.

Thickness (isopach) maps of the overlying shale (Lost Creek Shale), the Production Zone Aquifer (HJ Horizon), and the underlying shale (Sagebrush Shale) were created utilizing geologic data provided by LC ISR, and are presented on Figures 2-2, 2-3, and 2-4, respectively. A structure map of the formation top of the HJ Horizon is presented on Figure 2-5.

Multiple cross-sections were also constructed from available geologic data. The cross-section locations are shown on Figure 2-6. North-south cross sections are presented in Figures 2-7 through 2-9, and west-east cross sections are presented in Figures 2-10 and 2-11.

2.2 OVERLYING UNITS: LFG SAND AND LOST CREEK SHALE

The overlying aquifer designated for the pump tests is the LFG Sand, the lowermost portion of the FG Horizon. The LFG Sand is continuous throughout the LCPA and ranges from 20 to 50 feet thick. The Lost Creek Shale is the confining layer that separates the overlying LFG Sand and Production Zone HJ Horizon. The Lost Creek Shale is continuous throughout MU1, and ranges from 4 to 40 feet thick, with typical thickness of 10 to 25 feet (Figure 2-2). Additional description of the LFG Sand can be found in Appendix D6 - Lost Creek Project – WDEQ Permit to Mine Application (LC ISR, 2007).

The DE Sand overlies the LFG sand, separated by an unnamed shale unit (Figure 2-1). Several observation wells were monitored during testing and the results are reported to supplement the majority of data recorded in wells screened to the immediately overlying sand (LFG).

2.3 PRODUCTION ZONE: HJ HORIZON

The Production Zone aquifer is designated as the HJ Horizon. The HJ Horizon is continuous throughout the proposed MU1 with a total thickness ranging from 100 to 151 feet, and averages approximately 120 feet (Figure 2-3). As mentioned above, the majority of mineralization within the HJ Horizon occurs in the middle portion (MHJ). For purposes of this report and because no laterally extensive confining units have been observed between the UHJ, MHJ and LHJ Sands, discussions and analyses presented herein will focus on the HJ Horizon as a single hydrostratigraphic unit. Additional description of the HJ Horizon can be found in Appendix D6 - Lost Creek Project - WDEQ Permit to Mine Application (LC ISR, 2007).

2.4 UNDERLYING UNITS: SAGEBRUSH SHALE AND UKM SAND

The underlying aquifer is designated as the UKM Sand, a member of the KM Horizon. The total thickness of the UKM Sand is typically 30 to 60 feet and is continuous throughout MU1. The Sagebrush Shale is the confining layer that separates the underlying UKM Sand and the Production Zone HJ Horizon. The Sagebrush Shale is continuous throughout MU1 and ranges from 5 to 38 feet thick, as seen in Figure 2-4. Additional description of the UKM Sand and Sagebrush Shale can be found in Appendix D6 - Lost Creek Project - WDEQ Permit to Mine Application (LC ISR, 2007).

2.5 STRUCTURE

In the LCPA, the Battle Spring Formation dips to the west at a rate of approximately three degrees. The Lost Creek Fault zone extends the length of the MU1 from the west-southwest to the east-northeast. The main fault bisects MU1 and is downthrown to the south. Displacement across the fault ranges from approximately 30 to 50 feet on the western end to approximately 80 feet on the eastern end (see Figures 2-5, 2-7, 2-8, and 2-9). There is also a fault splay to the south of the main Lost Creek Fault that intersects the main fault near the center of MU1. The fault splay generally trends to the east, subparallel to the main fault. The splay is upthrown to the south creating a downthrown fault block between the splay and the Lost creek Fault (Figure 2-5). Displacement associated with the splay is approximately 14 feet in the western portion of the splay (Figure 2-8) and increases to approximately 28 feet farther to the east (Figure 2-9).

In previous pump test reports, LC ISR postulated that the Lost Creek Fault was a "scissor fault", with essentially no displacement near the center of MU1 at the hinge of the fault. Based on additional review of available geologic information of historic and newly installed borings, LC ISR personnel concluded that displacement increases from west to east.

The degree of hydraulic connection between hydrostratigraphic units across the fault is of interest with respect to ISR operations. As described above, the maximum observed displacement across the fault is approximately 80 feet. The thickness of the HJ Horizon averages about 120 feet thick throughout MU1. This indicates that the HJ Horizon should have sand to sand contact across the fault everywhere within MU1. However, water level elevation data and previous pump test results indicate that hydraulic communication across the fault is limited and that groundwater flow within the HJ Horizon is impeded (i.e., the fault acts as a low permeability barrier to flow).

2.6 PREVIOUS TESTING

Several historic pumping tests were conducted on the Lost Creek project in 1982 and 2006 to assess hydraulic characteristics of the Production Zone as well as overlying and underlying hydrostratigraphic units. Historic testing was performed by Hydro-Search Inc. (1982) and Hydro-Engineering, Inc. (2007). A pump test was conducted by LC ISR in the HJ Horizon north of the fault (pumping well LC19M) in June and July 2007 (Petrotek 2007a). A summary of these tests is presented in Appendix D6 of the Lost Creek WDEQ Permit to Mine (LC ISR, 2007). A second pump test was conducted by LC ISR in the HJ Horizon south of the fault (pumping well LC16M) in October and November 2007 (Petrotek 2007b).

The following discussion briefly summarizes the results of two previous regional pump tests conducted within MU1 at LCPA:

- **Regional Test #1 (June – July 2007)** – Pumping was conducted on the north side of the fault in the HJ Horizon (pumping well LC19M) for a period of 5.73 days, at an average rate of 42.9 gallons per minute (gpm). Calculated transmissivities ranged from 30 to 76 ft^2/day, with an average transmissivity of 61 ft^2/day. Calculated storativities ranged from 6.6×10^{-5} to 1.5×10^{-4}, with an average storativity of 1.1×10^{-4}.

- **Regional Test #2 (October – November 2007)** – Pumping was conducted on the south side of the fault in the HJ Horizon (pumping well LC16M) for a period of 5.5 days, at an average rate of 37.4 gpm. Calculated transmissivities ranged from 57 to 110 ft^2/day, with an average transmissivity value of 76 ft^2/day. Calculated storativities ranged from 3.5×10^{-5} to 9.1×10^{-4}, with an average storativity of 2.9×10^{-4}.

3.0 MONITOR WELL LOCATIONS, INSTALLATION, AND COMPLETION

3.1 WELL LOCATIONS

All of the pumping and observation wells monitored during pump testing are located in the proposed MU1 of the LCPA. The monitor wells included in the north and south pump tests are shown on Figures 1-2 and 1-3, respectively. Surveyed locations of all wells and test holes presented in this report are based on the NAD 83 Wyoming State Plane West Central Coordinate System.

3.2 WELL INSTALLATION AND COMPLETION

All of the wells used for this test are located in Sections 17, 18, 19 and 20, Township 25 North, Range 92 West (Figures 1-2 and 1-3), and were constructed with 4.5-inch nominal diameter casing. The wells were developed using standard water well construction techniques, including air lifting, pumping, swabbing, and/or surging. Completion information for each well is provided in Appendix A. Specific data related to well location, completion interval, and initial water levels are provided in Table 3-1.

3.2.1 NORTH TEST, PUMPING WELL PW-102

For the pump test conducted on the north side of the Fault, LC ISR monitored 99 wells (Figure 1-2), including 44 Production Zone (HJ Horizon) monitor wells, 25 Overlying (LFG Sand) monitor wells, 26 Underlying (UKM Sand and one well completed in the MKM) monitor wells, 3 monitor wells in the uppermost DE Horizon, and PW-102 (pumping well completed in the HJ Horizon).

3.2.2 SOUTH TEST, PUMPING WELL PW-101

For the pump test conducted on the south side of the Fault, LC ISR monitored 101 wells (Figure 1-3), including 48 Production Zone (HJ Horizon) monitor wells, 25 Overlying (LFG Sand) monitor wells, 25 Underlying (UKM Sand) monitor wells, 2 monitor wells in the uppermost DE Horizon, and PW-101 (pumping well completed in the HJ Horizon).

4.0 PUMP TEST DESIGN AND PROCEDURES

The following section details pump test design and procedures for the MU1 pump tests conducted at pumping wells PW-102 (north test) and PW-101 (south test). Pumping was conducted for the north test during November 18 – 20, 2008. Pumping was conducted for the south test during December 9 – 12, 2008. Details of pump testing at both locations are summarized separately below.

4.1 TEST DESIGN

The two MU1 tests are the first mine-unit scale hydrologic tests conducted in the LCPA. These tests were conducted in the HJ Horizon on both sides of the Lost Creek Fault and designed to:

1. Demonstrate hydrologic communication between the Production Zone pumping well and the surrounding Production Zone monitor wells;
2. Assess the hydrologic characteristics of the Production Zone aquifer within the test area;
3. Evaluate the presence or absence of hydrologic boundaries in the Production Zone within the LCPA; and
4. Demonstrate sufficient confinement between the Production Zone and the Overlying and Underlying aquifers for the purposes of ISR mining.

The general testing procedures were as follows:

1. Install In-Situ Level TROLL® data-logging transducers (vented) in wells to record changes in water levels during tests. Verify setting depths and head readings with manual water level measurements;
2. Measure and record background water levels and barometric pressure for a minimum of 96 hours prior to the test;
3. Run the pumping well at a constant rate (or as close as practical); and
4. Record water levels and barometric pressure throughout background, pumping, and recovery periods.

4.2 PUMP TEST EQUIPMENT

4.2.1 NORTH TEST, PUMPING WELL PW-102

Aquifer testing was performed utilizing a Grundfos 85S100-9, 10 hp, 460V, 3-phase electrical submersible pump powered by a portable diesel generator. At pumping well PW-102, the pump was set at a depth of 345 feet (approximately 122 feet off the bottom). The static depth to water in PW-102 was approximately 171 feet, providing for approximately 175 feet of head above the pump. Flow from the pump was controlled with a manual gate valve. Surface flow monitoring equipment included two 1.5" turbine meters (Turbines Incorporated FW Series, provided by LC ISR) that display total flow (in gallons) and instantaneous flow rates (in gallons per minute [gpm]). Per discussions with WDEQ/WQD, no Temporary Discharge Permit was required. Discharge water was land applied approximately 350 feet downgradient from PW-102 via a 3" HDPE line.

Water levels in 53 wells (including the pumping well, 28 HJ Horizon observation wells, and 24 wells in the overlying and underlying aquifers) were measured and recorded with In-Situ Level TROLL® pressure transducer dataloggers. The pressure rating for the transducers ranged from 15 to 100 psi, and they were programmed to record depth to water at 5 minute intervals at all pumping and observation wells (during background monitoring, and the pumping and recovery periods). A detailed summary of the monitoring equipment used is presented in Table 4-1.

In addition to the wells continuously monitored using the Level TROLLS®, numerous other wells were periodically measured for depth to water using a manual electronic water level meter. This allowed for a more extensive assessment of the potentiometric surface before, during, and after the pump test. A list of wells that were included in the hand measurement rounds is provided in Table 4-1.

The following is an interval-specific summary of water level monitoring locations recorded during testing at PW-102:

- HJ Horizon – 29 wells (including the pumping well) were monitored by dataloggers; 16 wells were periodically measured by e-line.
- Overlying LFG Sand – 12 wells were monitored by dataloggers; 13 wells were periodically measured by e-line.
- Underlying UKM Sand – 12 wells were monitored by dataloggers; 14 wells were periodically measured by e-line.
- Overlying DE Horizon – 3 wells were periodically measured by e-line.

Petrotek and LC ISR personnel installed the monitoring equipment prior to testing, verified the datalogger programming and equipment layout, and performed a short-term constant rate pump test at PW-102. Thereafter, Petrotek and LC ISR personnel collected the daily downloads and transferred the data to Petrotek for review/QA/QC for the duration of the long-term pumping test. Table 4-3 contains the drawdown response observed for each well at or near the end of pumping for the north test.

4.2.2 SOUTH TEST, PUMPING WELL PW-101

Aquifer testing was performed utilizing a Grundfos 75S100-16, 10 hp, 460V, 3-phase electrical submersible pump powered by a portable diesel generator. At pumping well PW-

101, the pump was set at a depth of 365 feet (approximately 130 feet off the bottom). The static depth to water in PW-101 was approximately 185 feet, providing for approximately 180 feet of head above the pump. Flow from the pump was controlled with a manual gate valve. Surface flow monitoring equipment included two 1.5" turbine meters (Turbines Incorporated FW Series, provided by LC ISR) that display total flow (in gallons) and instantaneous flow rates (in gallons per minute [gpm]). Per discussions with WDEQ/WQD, no Temporary Discharge Permit was required. Discharge water was land applied approximately 350 feet downgradient from PW-101 via a 1.5" HDPE line.

Water levels in 52 wells (including the pumping well, 31 HJ Horizon observation wells, and 20 wells in the overlying and underlying aquifers) were measured and recorded with In-Situ Level TROLLs®. The pressure rating for the Level TROLLS® ranged from 15 to 100 psi, and they were programmed to record depth to water at 5 minute intervals at all pumping and observation wells (during background monitoring, and the pumping and recovery periods). A detailed summary of the monitoring equipment used is presented in Table 4-2.

In addition to the wells continuously monitored using the Level TROLLS®, numerous other wells were periodically measured for depth to water using a hand lowered electronic water level meter. This allowed for a more extensive assessment of the potentiometric surface before, during, and after the pump test. A list of wells that were included in the hand measurement rounds is provided in Table 4-2.

The following is an interval-specific summary of water level monitoring locations recorded during testing at PW-101:

- HJ Horizon – 32 wells (including the pumping well) were monitored by dataloggers; 17 wells were periodically measured by e-line.
- Overlying LFG Sand – 10 wells were monitored by dataloggers; 15 wells were periodically measured by e-line.
- Underlying UKM Sand – 10 wells were monitored by dataloggers; 15 wells were periodically measured by e-line.
- Overlying DE Horizon – 2 wells were periodically measured by e-line.

Petrotek and LC ISR personnel installed the monitoring equipment prior to testing, verified the Level TROLL® programming and equipment layout, and performed a step-rate pump test at PW-101. Thereafter, Petrotek and LC ISR personnel collected the daily downloads and transferred the data to Petrotek for review/QA/QC for the duration of the long-term pumping test. Table 4-4 contains the drawdown response observed for each well at or near the end of pumping for the south test.

4.3 POTENTIOMETRIC SURFACES

Figure 4-1 presents potentiometric elevations within the Production Zone (HJ Horizon) within MU1 from water level measurements on December 8, 2008. The data are considered representative of static conditions within the HJ Horizon because the water levels were collected after an extended period in which there were no drilling activities or pumping tests conducted in the immediate vicinity (i.e., shut-in for the north side pump test at PW-102 occurred on November 20, 2008, allowing approximately 18 days of recovery). The data from December 8 are the most comprehensive set of water levels collected to date as all available monitor wells were included.

Based on potentiometric elevations, the direction of groundwater flow within MU1 in the HJ Horizon on both the north and south sides of the fault is predominantly to the west-southwest. Calculated hydraulic gradients were approximately 0.0052 ft/ft (27.4 ft/mile) on the north side and 0.0087 ft/ft (45.9 ft/mile) on the south side. The potentiometric elevation on the north side of the fault ranges from approximately 5 to 17 feet higher than the south side under static, non-pumping conditions. It is postulated that as the regional groundwater flow is in a southwesterly direction, groundwater mounding is observed on the north side as flow encounters the fault. The steep gradient observed in the potentiometric surface across the fault is likely a manifestation of a lower permeability transition area associated with the fault smear zone (Petrotek 2007a, 2007b). The observed potentiometric surface configuration is consistent with groundwater flow systems impacted by lower permeability zones as studied and modeled by Freeze (1969). Although limited groundwater leakage occurs across the fault, the majority of groundwater flow on both sides of the fault appears to be generally parallel to the fault, to the west-southwest. Water level data used for preparation of this map are presented in Table 3-1.

Figure 4-2 presents potentiometric elevations within the Overlying (LFG Sand) aquifer on December 8, 2008. The direction of groundwater flow within MU1 in the LFG Sand also trends to the west-southwest. The calculated hydraulic gradient on the north side of the fault is approximately 0.006 ft/ft (31.7 ft/mile) and approximately 0.0046 ft/ft (24.3 ft/mile) on the south side. Similar to the HJ Horizon, a steep gradient is also observed in the potentiometric surface from the north to the south side of the fault.

Figure 4-3 presents potentiometric elevations within the Underlying (UKM Sand) aquifer on December 8, 2008. The direction of groundwater flow within MU1 in the UKM Sand trends to the west-southwest, similar to the observed flow directions in the HJ and LFG Sands. The calculated hydraulic gradient on the north side of the fault is approximately 0.006 ft/ft (31.7 ft/mile) and approximately 0.0054 ft/ft (28.5 ft/mile) on the south side of the fault. Unlike the HJ Horizon and LFG Sand, the fault does not appear to impede groundwater flow within the UKM Sand as there is little or no displacement in the potentiometric surface across the fault

Water level data for the LFG Sand (overlying), HJ Horizon (production), and UKM Sand (underlying) were analyzed in several locations to evaluate vertical hydraulic gradients within MU1. Water level data were analyzed from MU1 well clusters at select locations north and south of the fault, and are presented in Table 4-5. At well cluster locations on the north side of the fault, the potentiometric surface of the HJ Horizon is approximately 10 to 12 feet lower than the potentiometric surface of the overlying LFG Sand. At well cluster locations south of the fault, the potentiometric elevation of the HJ Horizon ranges between

10 and 24 feet lower than the elevation within the LFG Sand. Similarly, the water level elevations in the underlying UKM Sand are lower than the water level elevations within the HJ Horizon (approximately 20 to 22 feet lower on the north side well clusters, and 2 to 19 feet lower within the south side well clusters [Table 4-5]). The downward hydraulic gradients observed in the three horizons are consistent with the regional hydraulic flow characteristics in this portion of the Great Divide Basin. There is at least one location in the southwest corner of the permit area (approximately 12,000 feet from MU1) where the potentiometric head in the HJ Horizon is slightly greater than the potentiometric head in the overlying LFG Sand, indicating an upward vertical gradient at that location. Near Lost Creek, groundwater flows to the southwest towards the center of the basin, from upland areas of regional and local recharge to discharge areas near the basin center.

The data presented in the potentiometric surface maps in Figures 4-1 to 4-3, and Table 4-5 suggest that the FG, HJ, and KM Horizons are not in direct hydraulic communication within MU1, under natural non-stressed conditions. The hydraulic gradients between horizons will influence potential leaks or excursions. The higher head in the overlying FG Horizon will serve to retard or minimize vertical migration of fluid from the underlying HJ Horizon. Similarly, fluid with higher head in the HJ Horizon could potentially drain to the underlying KM Horizon if an artificial pathway were present (e.g., improperly constructed well or improperly abandoned borehole).

4.4 BACKGROUND MONITORING, TEST PROCEDURES, AND DATA COLLECTION

4.4.1 NORTH TEST, PUMPING WELL PW-102

The majority of the testing equipment (e.g., pump, flow meters, Level TROLLS®) for the test conducted at PW-102 was installed and checked by Petrotek on November 5, 2008. A short-term constant rate test was conducted on November 11, 2008, to evaluate potential pumping rates for the long-term test. Initial test plans included a step-rate test, but due to an initial calibration error in the discharge line totalizers, a short-term constant rate test at 86.4 gpm was substituted. The short-term constant rate test was run for 5.8 hours.

Background-monitoring followed the short-term pump test and ran for a period of approximately seven days. Water levels were recorded every 5 minutes during background monitoring.

Level TROLLS® were programmed to record water levels every 5 minutes during the pumping and recovery periods. Pumping was conducted during November 18 – 20, 2008, and water level recovery data was collected through December 2, 2008. Pumping rate data for this test are shown on Table 4-6. A CD containing the water level data for the step test, background monitoring, pumping, and recovery periods is included in Appendix E-1. Manually collected e-line data are included in Appendix E-3.

4.4.2 SOUTH TEST, PUMPING WELL PW-101

The majority of the testing equipment (e.g., pump, flow meters, Level TROLLS®) for the test conducted at PW-101 was installed and checked by Petrotek on December 2 – 3, 2008. A step-rate test was conducted on November 12, 2008. Rates utilized during this step-test were 39.0, 54.4, 72.9, and 80.8 gpm. No losses in well efficiency were observed at the higher pumping rates

The background-monitoring for the south side pump test followed the completion of datalogger installations on December 3, 2008, for a period of approximately 6 days. Water levels were recorded every 5 minutes during background monitoring.

Level TROLLS® were programmed to record water levels every 5 minutes during the pumping and recovery periods. Pumping was conducted during December 9 – 12, 2008, and water level recovery data were collected through December 22, 2008. Pumping rate data for this test are shown on Table 4-7. A CD containing the water level data for the step test, background monitoring, pumping, and recovery periods is included in Appendix E-2. Manually collected e-line data are included in Appendix E-4.

5.0 BAROMETRIC PRESSURE CORRELATIONS AND CORRECTIONS

5.1 MONITORING EQUIPMENT

As previously discussed, all of the In-Situ Level TROLLS® used for both pump tests were vented (gauged). In-Situ has stated that if vented transducers are used, the vent eliminates the impact of barometric pressure on the sensor. However, a change in water levels due to barometric changes will occur whether a vented sensor is used or not. Hence, use of vented equipment eliminates the barometric impact on the sensor, but does not correct the water level measurements for barometric effects on the aquifer. In this regard, the vented Level TROLLS® are barometrically *compensated*, but not *corrected*. If significant variations in water levels are observed, the data may require correction for fluctuations in water levels associated with changes in barometric pressure.

5.2 BAROMETRIC CORRECTIONS

To demonstrate the effect of barometric pressure on water levels for the pump tests, two different corrections were evaluated. The first correction, referred to as the manual correction, involves evaluating the data based on total head (i.e., depth to water in the well plus barometric pressure as feet of water), and normalizing the values to the initial barometric pressure at the start of each pump test. The manual correction input parameters and calculation follows:

$$WL_c = (WL + BP) - BP_i$$

Where:

WL_c = Corrected water level elevation (ft)
WL = Water level elevation (ft)
BP = Barometric pressure (ft)
BP_i = Initial barometric pressure (ft)

The second method utilizes a software program entitled BETCO (barometric and earth tide correction) developed to analyze barometric and tidal effects on groundwater levels (Toll & Rasmussen, 2007). BETCO was developed to remove the effects of barometric pressure and earth tides from water level observations from a multiple regression analysis. The BETCO program is publicly available at http://www.hydrology.uga.edu/tools.html.

Water level observations from selected wells from the pump tests were evaluated by both correction methods to evaluate the potential impact of barometric pressure on water levels. Wells MP-106 (north test) and MP-109 (south test) were evaluated by the two methods and the graphical results are presented on Figures 5-1 and 5-2, respectively. From well MP-106, the largest magnitude of water level fluctuation by the manual correction was approximately 0.4 ft, and approximately 0.6 ft for the BETCO correction (Figure 5-1). Compared to the approximately 30 feet of observed drawdown in this well, the impact of the corrections is minimal. From well MP-109, the largest magnitude of water level fluctuation from the manual correction was approximately 0.6 ft, and approximately 0.2 ft for the BETCO correction (Figure 5-2). Observed drawdown in this well was approximately 18 feet.

An analysis of aquifer properties, including transmissivity (T), hydraulic conductivity (K), and storativity (S) were evaluated based on the two corrected water level elevation data sets and compared to the uncorrected data. A more complete discussion of the analytical methods is presented in Section 7. The following table presents a summary of the comparative analysis of aquifer properties evaluated by the Theis (1935) method.

Well	MP-106	MP-106	MP-106	MP-109	MP-109	MP-109
Barometric Pressure Correction	Uncorrected	Manual Correction	BETCO Software	Uncorrected	Manual Correction	BETCO Software
T (ft^2/day)	67.9	68.3	68.6	71.6	69.0	70.4
K (ft/day)	0.57	0.57	0.57	0.60	0.58	0.59
Storativity	1.38×10^{-4}	1.36×10^{-4}	1.35×10^{-4}	8.29×10^{-5}	8.30×10^{-5}	8.23×10^{-5}

Comparison of the two correction methods for the MU1 pump tests indicate that barometric pressure had minimal impact on water levels prior to, during, and after the pumping test in the HJ Horizon observation wells. Additionally, differences between the analytical results of aquifer properties between uncorrected and corrected data were minimal (on the order of 1% to 4% difference). Observed drawdown is approximately two orders of magnitude greater than the potential barometric pressure effects on water levels. These results are in agreement with those of previous pump tests conducted at the LCPA (Petrotek 2007a, 2007b) which showed the effects of barometric pressure were negligible. Due to the negligible impact on water levels and minimal impact on the analytical analysis, uncorrected water levels were utilized in the evaluation of observed drawdown, potentiometric surfaces, and in the analysis of aquifer properties (see Section 7).

6.0 TEST RESULTS

The following section discusses the results of pump testing and details background monitoring, response in the Production Zone aquifer, and responses in the overlying and underlying aquifers for the north and south-side tests conducted at pumping wells PW-102 and PW-101, respectively.

6.1 BACKGROUND TRENDS

6.1.1 NORTH TEST, PUMPING WELL PW-102

Water level stability data were collected prior to the start of the north side pump test. Plots of the background, pumping, and recovery data for wells completed in the HJ Horizon and monitored with transducers are shown in Figures 6-1 through 6-4. Wells completed in the HJ Horizon were grouped into four geographical categories: 1) west side of the pumping well and north of the fault (Figure 6-1), 2) central area near pumping well (approximately 1000 foot radius) and north of the fault (Figure 6-2), 3) east side of the pumping well and north of the fault (Figure 6-3), and all wells located south of the fault (Figure 6-4).

Water level data for the overlying (LFG Sand) and underlying (UKM Sand) wells monitored by transducers are presented in Figures 6-5 through 6-8. Water level graphs on these figures are grouped by location relative to the fault. Wells in the LFG Sand located north and south of the fault are presented on Figures 6-5 and 6-6, respectively. Wells completed in the UKM Sand located north and south of the fault are presented on Figures 6-7 and 6-8, respectively.

Water level versus barometric pressure plots for all wells monitored by transducers during the test are presented in Appendix B-1. Individual well water levels for wells equipped with transducers versus pumping well water levels are presented in Appendices C-1 to C-4.

Prior to conducting the short-term constant rate pump test at pumping well PW-102 on November 11, 2008, water levels were increasing slightly in the HJ Horizon. Subsequent to this short-term test and prior to the start of the long-term pump test, water levels were still equilibrating and had risen to within approximately 1 foot or less of the observed static water level prior to the short-term test. The recovery interval prior to initiation of the long-term pump test at PW-102 was approximately seven days.

It is noted that during background monitoring of HJ wells on the south side of the fault, water levels responded to the step-rate pump test conducted at pumping well PW-101 on November 12, 2008 (Figure 6-4). Water levels were allowed to recover for approximately six days prior to the initiation of pumping at PW-102.

In general, water levels in the LFG Sand and UKM Sand north and south of the fault were increasing slightly prior to the start of the short-term pump test, and generally decreasing or steady prior to the start of the long-term pump test at PW-102.

6.1.2 SOUTH TEST, PUMPING WELL PW-101

Water level stability data were collected prior to the start of the south side pump test. Plots of the background, pumping, and recovery data for wells completed in the HJ Horizon and monitored with transducers are shown in Figures 6-9 through 6-12. Wells completed in the HJ Horizon were grouped into four geographical categories: 1) west side of the pumping well and south of the fault (Figure 6-9), 2) central area near pumping well (approximately 1000 foot radius) and south of the fault (Figure 6-10), 3) east side of the pumping well and south of the fault (Figure 6-11), and all wells located north of the fault (Figure 6-12).

Water level data for the overlying (LFG Sand) and underlying (UKM Sand) wells monitored by transducers are presented in Figures 6-13 to 6-16. Water level depictions on these figures are grouped by location relative to the fault. Wells in the LFG Sand located south and north of the fault are presented on Figures 6-13 and 6-14, respectively. Wells completed in the UKM Sand located south and north of the fault are presented on Figures 6-15 and 6-16, respectively.

Water levels versus barometric pressure plots for all wells monitored by transducers during the test are presented in Appendix B-2. Individual well water levels for wells equipped with transducers versus pumping well water levels are presented in Appendices C-5 to C-8.

Level TROLLS® were installed on December 2 – 3, 2008, allowing approximately 6 to 7 days of background monitoring prior to the start of the mine-unit scale pump test on December 9, 2008. In general, water levels in the HJ Horizon on the south side of the fault zone were slightly increasing prior to the pump test. Water levels monitored on the north side of the fault rose approximately 0.5 to 2.0 ft during the course of background monitoring (see Figure 6-12), as these wells were likely equilibrating in response to the pump test previously conducted on the north side of the fault.

In general, water levels in the LFG Sand and UKM Sand north and south of the fault were increasing slightly prior to the start of the short-term pump test, and generally decreasing or steady prior to the start of the long-term pump test at PW-101.

It is also noted that the abrupt spike in water level observed on December 5, 2008 at well M-104 is due to placement of cement to plug and abandon an adjacent well (see Figure 6-11) that failed mechanical integrity testing (MIT). Prior to the start of the south side pump test, LC ISR personnel plugged this older well to ensure hydraulic isolation at well M-104.

6.2 PUMP DURATION AND RATE

6.2.1 NORTH TEST, PUMPING WELL PW-102

The north test was started at 10:30 on November 18, 2008 and was terminated at 10:30 on November 20, 2008. The total length of pumping was approximately 2,880 minutes (2.0 days). The average pumping rate during the PW-102 test was 70.9 gpm.

6.2.2 SOUTH TEST, PUMPING WELL PW-101

The south test was started at 14:00 on December 9, 2008 and was terminated at 11:45 on December 12, 2008. The total length of pumping was approximately 4,185 minutes (2.9 days) and the average pumping rate during the PW-101 test was 58.1 gpm. Due to ice in the 3-inch HDPE discharge line utilized for the step-rate test, the long-term pump test at PW-101 was conducted utilizing 1.5-inch discharge pipe. It is noted that there were several short false starts that occurred on December 9, 2008 at times 10:15, 10:50, and 11:15. These false starts were due to ice in the pump assembly and discharge line. As these false starts were short in duration and produced minimal groundwater volume, the pumping well recovered quickly prior to the initiation of the long-term pump test.

6.3 HJ HORIZON REPONSE

6.3.1 NORTH TEST, PUMPING WELL PW-102

Drawdown observed in the monitor wells completed in the HJ Horizon is presented on Figure 6-17. Drawdown values presented on this figure are a combination of water levels observed from Level TROLLS® and hand measured e-line data collected on November 20, 2008, just prior to shut-in at PW-102. A summary of these data are also included as Table 4-3. It is noted that residual drawdown after the end of pumping was observed in many wells located distant from the pumping well.

The drawdown contour map includes 45 HJ Horizon wells, of which 29 were monitored by Level TROLLS® and 16 measured by e-line. As shown in Figure 6-17, considerable drawdown (i.e. greater than 2 feet) was observed prior to shut-in at all wells located north of the fault. The maximum drawdown observed in the pumping well PW-102 was 111.1 feet. At the closest observation well (MP-107), observed drawdown was 48.6 feet. Observed drawdown in the perimeter "ring" observation wells located on the north side of the fault (M-114 to M-126) ranged from 2.8 to 36.5 feet.

As discussed in Section 4.3, the potentiometric level on the north side of the fault ranges from approximately 5 to 17 feet higher than the south side under static, non-pumping conditions. Observed drawdown responses in the 13 wells located south of the fault ranged from 0.0 to 2.7 feet, with the largest responses observed in those wells closest to the fault. The total head difference across the fault just prior to shut-in can be seen by comparing the drawdown responses between wells HJT-101 (34.2 feet, located north of the fault) and MP-109 (2.7 feet, south of the fault), which are located approximately 100 feet apart. Since the total head difference across the fault was on the order of 30 feet, a large hydraulic stress was applied to the aquifer across the fault. Based on the substantial drawdown observed in the HJ Horizon north of the fault in response to pumping at PW-102, and the minimal response observed in wells located south of the fault, the Lost Creek Fault is a partial barrier to groundwater flow within MU1. The drawdown observed in wells south of the fault, although minimal, suggests that some leakage across the fault does occur.

6.3.2 SOUTH TEST, PUMPING WELL PW-101

Drawdown observed in the monitor wells completed in the HJ Horizon is presented on Figure 6-18. Drawdown values presented on this figure are a combination of water levels observed from Level TROLLS® and hand measured e-line data collected on December 12, 2008, just prior to shut-in at PW-101. A summary of these data is included as Table 4-4. It is noted that residual drawdown after the end of pumping was observed in many wells located distant from the pumping well.

The drawdown contour map includes 50 HJ Horizon wells, of which 33 were monitored by transducers and 17 measured by e-line. As shown in Figure 6-18, considerable drawdown (i.e. greater than 2 feet) was observed prior to shut-in at all wells located south of the fault. The maximum drawdown observed in the pumping well PW-101 was 63.5 feet. At the closest observation wells (HJMP-109 and MP-104), observed drawdowns were 41.7 and 48.1 feet, respectively. Observed drawdown in the perimeter "ring" observation wells located on the south side of the fault (M-101 to M-113, and M-127 and M-128) ranged from 4.8 to 34.1 feet.

As discussed in Section 4.3, the potentiometric levels on the south side of the fault range from approximately 5 to 17 feet lower than the north side under static, non-pumping conditions. Observed drawdown responses in the 21 wells located north of the fault ranged from 0.1 to 2.0 feet, with the largest responses generally seen in those wells closest to the fault. The total head difference across the fault just prior to shut-in can be seen by comparing the drawdown responses between wells MP-104 (48.1 feet, located south of the fault) and HJT-104 (2.0 feet, north of the fault), which are located a distance of approximately 190 feet apart. It is also apparent from the relatively steep drawdown contours north and northeast of the pumping well across the fault splay that the splay influences the propagation of drawdown and acts as a minor barrier to flow across the fault (Figure 6-18). Observed drawdowns at the two wells (UKMO-101 and HJT-105) located within the downthrown fault block north of the splay and south of the main fault are 17.4 and 12.2 feet, respectively. Measured drawdowns at monitoring wells south of the pumping well and located a similar distance from the pumping well (e.g. wells M-106, M-107 and M-108) are approximately twice that observed north of the splay.

Similar to results of the north test, a large hydraulic stress was applied to the aquifer across the fault and minimal response was observed on the north side of the fault. Therefore, the fault acts as a partial barrier to groundwater flow, with the minimal responses observed across the fault indicating that some leakage across the fault does occur.

6.4 CONFINING UNITS RESPONSE

6.4.1 NORTH TEST, PUMPING WELL PW-102

During the pump test, small responses were observed in the overlying and underlying aquifer observation wells. The observed responses correlate with the beginning and ending of the PW-102 pump test. The responses ranged from 0.1 to 3.4 feet in the overlying LFG Sand aquifer, and 0.0 to 2.2 feet (excluding the response observed in MU-108, discussed below) in the underlying UKM Sand aquifer (Table 4-3). Graphical presentations of well response in these aquifers are included as Figures 6-5 to 6-8. Three wells in the uppermost DE Sand aquifer were monitored on the south side of the fault, and e-line measurements indicate no observed response (i.e., greater than 0.1 feet) from pumping in this aquifer (Table 4-3). Drawdown contour maps prior to test shut-in for the overlying LFG Sand and underlying UKM Sand are presented in Figures 6-19 and 6-20, respectively. The water level plots for all wells instrumented with transducers are included in Appendices C-3 and C-4.

The observed drawdown response in well MU-108 (not presented on Figures 6-7 and 6-20), completed in the underlying UKM Sand, was 24.7 feet and was due to damage to the casing and annular seal during well completion operations. Drilling records for this well indicated that the underreamer bit was not fully closed upon withdrawal into the casing. Due to the large observed drawdown at this well, communication between the HJ Horizon and underlying aquifer was present due to this artificial pathway within the casing. Well MU-108 was subsequently plugged and abandoned with cement grout on December 2, 2008. LC ISR tested the hydraulic continuity between the overlying HJ Horizon and the underlying UKM sand during August 2009 to confirm successful abandonment, the details of which are presented in Section 6.5.

While there is a limited degree of communication between the HJ Horizon and overlying and underlying aquifers, the magnitude of response within these adjacent aquifers is generally an order of magnitude less than the observed response within the Production Zone Aquifer. The communication observed at Lost Creek is similar to that observed in other ISR operations where engineering practices were successfully implemented to isolate lixiviant from overlying and underlying aquifers.

In evaluating the response of the overlying and underlying aquifers in those wells instrumented with Level TROLLS®, many wells exhibited an appreciable rise in water level corresponding to the initiation of pumping at PW-102, followed by a subsequent decline (see Figures 6-5 and 6-7). This response is most prominent in those wells located on the north side of the fault. This phenomenon has been described previously in layered confined aquifer systems as the "Noordbergum effect" or "reverse water-level fluctuation (Hsieh, 1996). Conventional groundwater theory does not account for this effect, and must be explained by poroelastic theory. Poroelastic theory considers that "drawing down an aquifer produces time-dependent volumetric contraction and, hence, induced increases in pore pressure in the aquifer, adjacent confining layers, and adjacent aquifers" (Wang, 2000). As the aquifer contracts upon pumping, vertical and horizontal strains are transferred to the aquitard and adjacent aquifer via shear. The increase in pore pressure in adjacent aquifers can result in an initial water level rise, which is eventually canceled by pore-pressure diffusion and the later propagation of drawdown.

6.4.2 SOUTH TEST, PUMPING WELL PW-101

During the pump test, small responses were observed in the overlying and underlying aquifer observation wells. The observed responses correlate with the beginning and ending of the PW-101 pump test. The responses ranged from no response to 1.9 feet in the overlying LFG Sand aquifer, and 0.1 to 5.7 feet in the underlying UKM Sand aquifer (Table 4-4). Within the underlying aquifer wells MU-104 and MU-109, drawdown response was 5.7 feet and 3.9 feet, respectively. Drawdown responses in the remainder of the wells monitoring the underlying aquifer were less than 2.0 feet. Two wells in the uppermost DE Sand aquifer were monitored on the south side of the fault, and e-line measurements indicate no observed response from pumping in this aquifer (Table 4-4). Drawdown contour maps prior to test shut-in for the overlying LFG Sand and underlying UKM Sand are presented in Figures 6-21 and 6-22, respectively. Graphical presentations of well response in these aquifers are included as Figures 6-13 to 6-16. The water level plots for all wells are included in Appendices C-7 and C-8.

Similar to the results of the north test, there was a limited degree of communication between the HJ Horizon and overlying and underlying aquifers. These responses are generally an order of magnitude less than the observed response within the HJ Horizon, and these conditions are similar to other ISR operations where engineering practices were successfully implemented to isolate lixiviant from overlying and underlying aquifers.

It is also noted that increases in water level were observed in response to the start of pumping in many of the underlying and overlying aquifer wells (see Figures 6-13 and 6-15). As discussed previously in Section 6.4.1, this is likely a manifestation of the "Noordbergum effect", which is an aquifer deformation-induced water level response.

6.5 SUPPLEMENTAL TESTING TO CONFIRM ABANDONMENT AT WELL MU-108

During the course of testing during the north test at pumping well PW-102, a dramatic drawdown response of 24.7 feet was observed in well MU-108, which is completed in the UKM Sand. Drilling records for this well indicated that the underreamer bit was not fully closed upon withdrawal into the casing. Due to the large observed drawdown at this well, communication between the HJ Horizon and underlying UKM Sand was present due to this artificial pathway within the casing. Well MU-108 was plugged and abandoned with cement grout on December 2, 2008.

A short-term pump test was conducted at well KPW-2, completed within the entire KM Sand interval, to observe the response in the overlying HJ Horizon at well MP-108, which is located approximately 15 feet from well MU-108. Figure 6-23 presents the locations of these wells. On June 16, 2009, well KPW-2 was pumped for 8 hours at a constant rate of 68.3 gpm, and well MP-108 was monitored for water level. Both wells were instrumented with In-Situ Level TROLLS® programmed to record depth to water at 5 minute intervals (as testing was conducted for the north and south tests). A graph of water levels in the observation well MP-108 versus water level in the pumping well KPW-2 is presented in Figure 6-24. Drawdown at the end of pumping in the pumping well was measured at 90.7

feet, and no water level drop was observed in the overlying well MP-108. The initial rise observed in well MP-108 concurrent with the start of pumping is likely a manifestation of the "Noordbergum effect", which is an aquifer deformation-induced water level response.

Due to the fact that no observed water level drop was observed in the HJ Horizon in response to pumping in the underlying aquifer, testing confirms the successful abandonment of well MU-108 and confirms previously existing artificial flow pathways through casing have been sealed.

7.0 ANALYTICAL METHODS AND RESULTS

7.1 ANALYTICAL METHODS

Drawdown data collected from monitor wells (instrumented with Level TROLLS®) were graphically analyzed to determine aquifer properties of Transmissivity and Storativity. The primary analysis method used was Theis (1935). The assumption used in this analysis was that the aquifer is confined and has a saturated thickness of 120 feet (average thickness of the HJ, provided by LC ISR geologists). The use of the Cooper & Jacob time-drawdown (1946) method was evaluated for the pump test data, however, the criteria for validity for this method ($\mu = r^2S / 4Tt < 0.01$ [where r = distance to observation well, S = storativity, T = transmissivity, and t = time since pumping began], Kruseman & de Ridder [1990]) was satisfied by only one well (MP-104, located approximately 331 feet from the pumping well of the south test). The Theis Recovery (1935) analysis was also performed for the pumping well and select observation wells. As noted, minor responses in observation wells across the fault were observed. However, the magnitude of those responses did not warrant quantitative analyses. Water level plots for all the wells are presented in Appendix C.

The test data were analyzed using the Theis method, which is a standard analytical approach to evaluate aquifer characteristics. Assumptions inherent in this method include:

- The aquifer is confined and has apparent infinite extent;
- The aquifer is homogeneous and isotropic, and of uniform effective thickness over the area influenced by pumping;
- The potentiometric surface is horizontal prior to pumping;
- The well is pumped at a constant rate;
- The pumping well is fully penetrating; and,
- Well diameter is small, so well storage is negligible.

These assumptions are reasonably satisfied, with the exception of the uniform thickness of the aquifer and infinite extent of the aquifer due to the presence of boundary conditions (i.e., fault). Locally, the HJ Horizon at LCPA is not homogeneous and isotropic; however, over the scale of both pump tests, the aquifer can be treated in this manner. As previously discussed and verified with the pumping tests, the fault acts as a hydraulic barrier to groundwater flow and therefore limits the effective extent of the aquifer. In this regard, water level responses from all the wells in the HJ Horizon are likely to be impacted by the fault. Due to the presence of the fault, the aquifer is not infinite-acting, and the fault effectively reduces the available aquifer by approximately half. The actual transmissivity of the aquifer, without the impact of the fault, would be higher.

Because of the influence of the fault, the transmissivity determined from this pumping test is viewed as an "effective" transmissivity. The fault will impact all production and restoration operations for this mine unit, therefore the "effective" transmissivity is more suitable for estimating hydraulic impacts of the in-situ operation. A hydraulic conductivity calculated from this "effective" transmissivity will be lower than the actual, or intrinsic, hydraulic conductivity of the aquifer.

The Theis Recovery method was utilized for analysis of recovery data from those wells located relatively close (i.e. within 1000 feet) to the corresponding pumping well. This analysis was not used on the more distant wells because of residual drawdown after the end of pumping.

Because none of the monitor wells were completed within the confining units, a Neuman-Witherspoon (1972) analysis was not performed. Use of the Hantush (1956) leaky aquifer analysis was considered because of the observed response in overlying and underlying aquifers during both the north and south pump tests. The Hantush analysis was not used for the following,reasons. The response of underlying and overlying monitor wells indicates some leakage through the confining units during the tests. However, as previously noted, some of the observed responses in the underlying aquifer are directly attributable to an improperly constructed well (MU-108). Also, the Hantush leaky aquifer analysis is designed to evaluate leakage through a single confining unit. In the case of the MU1 pump tests, it is apparent that there is leakage (albeit minor) from above and below the production zone aquifer. Finally, the impact of the fault as a hydraulic barrier dominates the response of the monitor wells in each of the pump tests. The transmissivity calculated from these pump tests is an "effective" transmissivity that reflects the impact of the fault that essentially reduces the available aquifer by approximately one half. The effects of leakage from overlying and underlying units will be negligible compared to the effects of the fault in the calculation of "effective" transmissivity.

The software used to graphically analyze the data was AquiferTest Pro (Version 4.2, Schlumberger Water Services, 2008).

Water level stability data collected during the pre-test and post-test periods along with barometric pressure (Appendices B and C) were used to assess the background trends. No significant trend corrections were warranted for any of the wells.

7.2 ANALYTICAL RESULTS

7.2.1 NORTH TEST, PUMPING WELL PW-102

Transmissivity (T) results from the Theis analysis were calculated using both drawdown and recovery portions of the test data. Transmissivity results from drawdown data for the PW-102 pump test for the HJ Horizon aquifer range from 50.9 to 104.0 ft^2/d, with an average T value of 77.9 ft^2/d (Table 7-1). A contour map of T values from these analyses is presented in Figure 7-2. Transmissivity values from recovery data were calculated from eight monitor wells (including PW-102) and were consistently lower than the T values calculated from drawdown data. Transmissivity values for the recovery data range between 52.2 to 57.5 ft^2/d, with an average T value of 55.4 ft^2/d (Table 7-1).

Based on an average thickness of 120 feet and transmissivity results from drawdown data, hydraulic conductivity (K) ranges from 0.42 to 0.87 ft/day and averages 0.65 ft/day (Table 7-1). Assuming a water viscosity of 1.35 cp (50 degrees F) and a density of 1.0, this equates to a permeability of approximately 320 millidarcies (md). Storativity (S) of the HJ Horizon aquifer ranges from 5.4×10^{-5} to 1.9×10^{-4}, with an average value of 9.3×10^{-5} (Table 7-1). It should be reiterated that these values are considered "effective" because of the impact of the fault on the aquifer response.

Average linear velocity of groundwater flow was also calculated in Table 7-1 from hydraulic conductivity, utilizing an estimated effective porosity of 28% (provided by LC ISR) and the calculated hydraulic gradient from Section 4.3 (0.0052 ft/ft). On the north side of the fault, calculated groundwater velocities ranged from 2.9 to 5.6 ft/year, with an average velocity of 4.4 ft/year.

An example of a type curve match using the Theis method is provided in Figure 7-1. Type curve matches of the HJ Horizon monitor wells analyzed in the pump test are provided in Appendix D-1. Water level data for all monitor wells from background through pumping and recovery are included in Appendix E-1 on a CD ROM. Manually collected e-line data are presented in Appendix E-3.

7.2.2 SOUTH TEST, PUMPING WELL PW-101

Transmissivity (T) results from the Theis analysis were calculated using both drawdown and recovery portions of the test data. Transmissivity results from drawdown data for the PW-101 pump test for the HJ Horizon aquifer range from 69.4 to 129.0 ft^2/d, with an average T value of 92.6 ft^2/d (Table 7-2). A contour map of T values is presented in Figure 7-3. Transmissivity values from recovery data were calculated from nine monitor wells (including PW-101) and were consistently lower than the T values calculated from drawdown data. Transmissivity values for the recovery data range between 58.3 to 108.0 ft^2/d, with an average T value of 70.5 ft^2/d (Table 7-2).

Based on an average thickness of 120 feet and transmissivity results from drawdown data, hydraulic conductivity (K) ranges from 0.58 to 1.08 ft/day and averages 0.77 ft/day (Table 7-2). Assuming a water viscosity of 1.35 cp (50 degrees F) and a density of 1.0, this equates to a permeability of approximately 379 millidarcies (md). Storativity (S) of the HJ Horizon aquifer ranges from 3.6×10^{-5} to 4.2×10^{-4}, with an average value of 1.1×10^{-4} (Table 7-2). It should be reiterated that these values are considered "effective" because of the impact of the fault on the aquifer response.

Average linear velocity of groundwater flow was also calculated in Table 7-2 from hydraulic conductivity, utilizing an estimated effective porosity of 28% (provided by LC ISR) and the calculated hydraulic gradient from Section 4.3 (0.0087 ft/ft). On the south side of the fault, calculated groundwater velocities ranged from 6.6 to 12.1 ft/year, with an average velocity of 8.7 ft/year.

Type curve matches for the HJ Horizon monitor wells analyzed in the pump test are provided in Appendix D-2. Water level data for all monitor wells from background through pumping and recovery are included in Appendix E-2 on a CD ROM. Manually collected e-line data are presented in Appendix E-44.

7.3 TRANSMISSIVITY DISTRIBUTION

The distribution of transmissivity calculated from the MU1 north and south pump tests are presented on Figures 7-2 and 7-3, respectively. For consistency, only transmissivity values determined from the Theis drawdown method are posted. The overall range of transmissivity determined from the north and south tests is relatively small (51 to 129 ft^2/d) relative to typical fluvial depositional systems.

The presentation of the distribution of transmissivity (provided in Attachment MU1 2-1, Figures 7-2 and 7-3), indicates a slight directional bias in transmissivity. A southwest decrease in transmissivity observed on the north side of the Fault appears to be correlative with a slight reduction in the thickness of the HJ Horizon. The HJ Horizon thins west of the pumping well PW-102 (Figure 2-3), which generally corresponds to the decreasing trend observed in T values (Figure 7-2). On the south side of the Fault there is an area of slightly lower transmissivity that trends along wells M-106, M105 and M104 to the southeast. This southeast trend of low transmissivity correlates with the elliptical shape of the drawdown observed on the south side of the Fault during hydrologic testing. Transmissivity appears to increase closer to the Fault in the area of the fault splay (wells UKMO-101, HJT-105 and M-127). This increase in transmissivity may be partially the result of impacts of the fault splay during the south hydrologic test in reducing the drawdown in wells located in the downthrown fault block.

On a regional scale, the observed variation in T is not expected to impact ISR mining and has no apparent regulatory implications. Further, field operations will be modified to achieve mine unit balance in light of the variation in T.

As discussed previously, the T results for the HJ Horizon are considered "effective" because of the barrier effect of the fault. Because of the fault, the aquifer is not infinite-acting and the available aquifer is effectively reduced by half. The T results are representative of the HJ Horizon on the scale of the pump test, and directly apply to design calculations such as water balance. However, the actual transmissivity of the aquifer, without impacts from the fault, would be higher (e.g., by an approximate factor of 1.5 to 2.0). In other words, there would be less drawdown at the pumping well at a given pumping rate, if the fault were not restricting flow to the well.

The K results estimated from these tests (0.42 to 1.08 ft/d) are calculated by dividing the T by the saturated thickness of the aquifer. Similar to the higher "effective" T within MU1 due to the presence of the fault, actual K values are likely higher, on the order of approximately 1.0 to 2.0 ft/d. This range of K values would be most representative for estimating groundwater velocity and travel times with regard to mine unit design, exterior monitor well spacing, excursion control, and excursion recovery.

7.4 RADIUS OF INFLUENCE

7.4.1 NORTH TEST, PUMPING WELL PW-102

Based on the drawdown response observed at the outlying "ring" monitor wells during the north test, the minimum radius of influence (ROI) is greater than 2,600 feet. The ROI is not symmetrical with respect to the pumping well and is truncated due to the presence of the fault. The actual ROI of the test (extending away from the fault) was estimated utilizing distance-drawdown data (i.e., drawdown on an arithmetic scale and distance to the pumping well on a logarithmic scale) (Appendix F). From the distance-drawdown analysis, the ROI for the north test is estimated between 3,100 to 3,300 feet.

Minor drawdown responses in the HJ Horizon were observed on the southern side of the fault (see Table 4-3 and Figure 6-17) that ranged between 0.0 to 2.7 feet, and generally decreased with increasing distance to the pumping well. At distances greater than 2,000 feet, drawdown responses were less than 1 foot.

7.4.2 SOUTH TEST, PUMPING WELL PW-101

Based on the observed drawdown at the outlying "ring" monitor wells during the south test, the minimum ROI is greater than 2900 feet. As observed in the north test, the ROI is truncated by the fault. The actual ROI extending away from the fault was estimated between 3,200 to 3,500 feet utilizing distance-drawdown data (Appendix F).

Minor drawdown responses (less than 1 foot) were observed north of the fault (Table 4-4 and Figure 6-18). Drawdown at well HJT-104 was observed at 2.0 ft, but this well is located north and immediately adjacent to the fault, and only a distance of 400 feet from the pumping well.

7.5 COMPARISON TO PREVIOUS TESTING RESULTS

The following table presents a summary of all hydrologic testing performed in the HJ Horizon on both sides of the fault during 2007 and 2008. Results from the two mine-unit scale pump tests conducted in 2008 compare favorably to previous testing (2007) conducted on both sides of the fault. The table below also shows the larger area of investigation of the 2008 MU1 tests compared to the tests conducted in 2007.

Analytical results of aquifer properties from the MU1 tests were evaluated in observation wells located a distance of approximately three times that of the 2007 tests.

Test	North Regional Test #1	MU1 North Test	South Regional Test #2	MU1 South Test
Pumping Well	LC19M	PW-102	LC16M	PW-101
Date	June – July 2007	November 2008	October – November 2007	December 2008
Relationship to Fault	North	North	South	South
Farthest Observ. Well (feet)*	781	2569	866	2945
Test Duration (days)	5.7	2.0	5.5	2.9
Test Rate (gpm)	42.9	70.9	37.4	58.1
Range of T (ft^2/day)	30 – 76	51 – 104	57 – 110	69 – 129
Average T (ft^2/day)	61	79	76	93
Range of Storativity	$6.6x10^{-5}$ – $1.5x10^{-4}$	$5.4x10^{-5}$ – $1.9x10^{-4}$	$3.5x10^{-5}$ – $9.1x10^{-4}$	$3.6x10^{-5}$ – $4.2x10^{-4}$
Average Storativity	$1.1x10^{-4}$	$9.3x10^{-5}$	$2.9x10^{-4}$	$1.1x10^{-4}$

* Distance from farthest observation well to pumping well, on the same side of the fault.

8.0 SUMMARY AND CONCLUSIONS

- The results of the MU1 north and south pump tests conducted on both sides of the Lost Creek Fault demonstrate that the HJ Horizon monitor wells and pumping wells (for the north and south sides of the fault) are in hydraulic communication. Minor communication was observed across the fault during both tests, but responses were an order of magnitude smaller, suggesting that the fault is a partial barrier to groundwater flow within the HJ Horizon. Data from the south test also indicates that the splay to the south of the Lost Creek Fault is a minor barrier to groundwater flow

- On a regional scale, the HJ Horizon on both sides of the Lost Creek Fault has been adequately characterized with respect to hydrogeologic conditions within MU1. Results of the MU1 tests demonstrate that the HJ Horizon has sufficient transmissivity for in-situ recovery mining operations.

- Geological information suggests that the overlying and underlying shales are continuous throughout MU1. Minor responses (order of magnitude or less in relation to responses in wells completed in the HJ Horizon) were observed during the pump test. Communication observed in the LFG and UKM Sands is similar to the responses observed at other ISR facilities where engineering practices are successfully implemented to isolate lixiviant from overlying and underlying aquifers.

- LC ISR is conducting a program of locating, plugging and abandonment of historic wells within MU1 to mitigate the potential for hydraulic communication through improperly abandoned wells.

- The observed response during the north test at well MU-108 (completed in the underlying UKM Sand) of 24.7 feet of drawdown was due to damage of the casing and annular seal during well completion. Drilling records indicate that the underreamer bit was not fully closed upon withdrawal into the casing. This well was subsequently plugged and abandoned and additional pump testing conducted within the underlying aquifer confirmed the abandonment was successful, as an immediately adjacent well to MU-108 completed in the HJ Horizon did not respond to pumping.

9.0 REFERENCES

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Table 3-1
Well Information
Mine Unit 1 Aquifer Tests
Lost Creek ISR, LLC

Well Name	Well Type	Monitored Sand	Ground Surface Elevation [feet amsl]	Top of Casing Elevation [feet amsl]	NAD 83 Easting [feet]	NAD 83 Northing [feet]	Screened Interval(s) [feet bgs]	Total Screen Length	12/08/08 Depth to Water	12/08/08 Water Level Elevation
PW-101	Production Zone Pumping Well	HJ	6936.67	6,938.06	2,212,158	595,259	385 - 473, 482 - 495	101	184.56	6,753.50
PW-102	Production Zone Pumping Well	HJ	6937.16	6,938.58	2,210,906	595,846	360 - 382, 387 - 393, 397 - 467	98	170.58	6,768.00
HJMO-101	Overlying Monitor Well	LFG	6,948.49	6,949.70	2,211,604	595,702	295 - 326	31	169.61	6,780.09
HJMO-104	Overlying Monitor Well	LFG	6,939.51	6,940.77	2,211,220	595,612	296 - 326	30	162.15	6,778.62
HJMO-105	Overlying Monitor Well	LFG	6,936.84	6,938.00	2,211,275	595,787	300 - 320	20	159.24	6,778.76
HJMO-108	Overlying Monitor Well	LFG	6,950.64	6,951.64	2,211,781	596,003	305 - 333	28	170.10	6,781.54
HJMO-109	Overlying Monitor Well	LFG	6,937.79	6,938.95	2,212,227	595,538	345 - 370	25	161.82	6,777.13
HJMO-110	Overlying Monitor Well	LFG	6,945.92	6,947.13	2,211,998	595,907	300 - 330	30	165.23	6,781.90
HJMO-113	Overlying Monitor Well	LFG	6,936.06	6,936.97	2,212,588	595,518	318 - 356	38	159.84	6,777.13
LC15M	Overlying Monitor Well	LFG	6,935.13	6,936.55	2,212,853	595,526	286 - 340	54	158.06	6,778.49
LC18M	Overlying Monitor Well	LFG	6,947.68	6,948.97	2,211,668	596,021	290 - 332	42	168.15	6,780.82
LC25M	Overlying Monitor Well	LFG	6,934.73	6,936.40	2,211,713	595,323	316 - 349	33	163.57	6,772.83
MO-101	Overlying Monitor Well	LFG	6,938.64	6,940.24	2,213,870	595,207	310 - 340	30	156.31	6,783.93
MO-102	Overlying Monitor Well	LFG	6,939.09	6,940.75	2,213,302	595,389	324 - 360	36	161.70	6,779.05
MO-103	Overlying Monitor Well	LFG	6,933.76	6,935.52	2,212,698	595,388	305 - 350	45	157.02	6,778.50
MO-104	Overlying Monitor Well	LFG	6,936.86	6,937.86	2,212,019	595,504	339 - 369	30	165.41	6,772.45
MO-105	Overlying Monitor Well	LFG	6,949.38	6,950.46	2,212,148	596,085	303 - 330	27	166.90	6,783.56
MO-106	Overlying Monitor Well	LFG	6,941.00	6,941.75	2,211,489	595,963	296 - 326	30	161.90	6,779.85
MO-107	Overlying Monitor Well	LFG	6,935.29	6,936.29	2,210,970	595,815	291 - 327	36	158.56	6,777.73
MO-108	Overlying Monitor Well	LFG	6,933.89	6,934.56	2,210,872	595,476	290 - 330	40	157.88	6,776.68
MO-109	Overlying Monitor Well	LFG	6,931.64	6,932.18	2,210,957	595,223	330 - 355	25	165.84	6,766.34
MO-110	Overlying Monitor Well	LFG	6,936.97	6,938.39	2,210,183	595,637	315 - 340	25	167.38	6,771.01
MO-111	Overlying Monitor Well	LFG	6,935.78	6,936.70	2,209,938	595,367	315 - 330	15	166.73	6,769.97
MO-112	Overlying Monitor Well	LFG	6,935.39	6,936.66	2,209,577	595,528	315 - 335	20	167.61	6,769.05
MO-113	Overlying Monitor Well	LFG	6,921.52	6,922.29	2,209,855	594,940	346 - 366	20	159.19	6,763.10
MO-114	Overlying Monitor Well	LFG	6,939.87	6,941.87	2,212,409	595,656	366 - 386	20	165.77	6,776.10
MO-115	Overlying Monitor Well	LFG	6,940.62	6,942.62	2,212,528	595,847	286 - 306	20	157.14	6,785.48
HJT-106	Overlying Monitor Well	DE	6,933.14	6,935.14	2,212,544	595,286	142 - 162	20	153.43	6,781.71
HJT-107	Overlying Monitor Well	DE	6,942.69	6,944.34	2,213,554	595,554	133 - 163	30	159.40	6,784.94
LC29M	Overlying Monitor Well	DE	6,935.25	6,937.55	2,212,854	595,540	140 - 164	24	155.94	6,781.61
HJMP-101	Production Zone Monitor Well	HJ	6,947.36	6,948.64	2,211,610	595,711	438 - 465	27	179.38	6,769.26
HJMP-104	Production Zone Monitor Well	HJ	6,939.04	6,941.04	2,211,208	595,610	402 - 430	28	173.04	6,768.00
HJMP-105	Production Zone Monitor Well	HJ	6,936.84	6,937.38	2,211,255	595,787	425 - 463	38	168.99	6,768.39
HJMP-108	Production Zone Monitor Well	HJ	6,951.12	6,952.20	2,211,784	596,011	400 - 434	34	181.58	6,770.62
HJMP-109	Production Zone Monitor Well	HJ	6,937.89	6,939.10	2,212,218	595,543	478 - 512	34	184.09	6,755.01
HJMP-110	Production Zone Monitor Well	HJ	6,945.81	6,947.02	2,212,004	595,897	431 - 476	45	176.10	6,770.92
HJMP-113	Production Zone Monitor Well	HJ	6,935.26	6,937.27	2,212,596	595,510	416 - 462	46	179.95	6,757.32
HJT-101	Production Zone Monitor Well	HJ	6,937.12	6,937.56	2,210,883	595,323	437 - 477	40	172.98	6,764.58
HJT-102	Production Zone Monitor Well	HJ	6,937.82	6,939.15	2,211,209	595,409	390 - 417	27	171.32	6,767.83
HJT-103	Production Zone Monitor Well	HJ	6,937.56	6,938.22	2,211,502	595,383	291 - 327	36	189.20	6,749.02
HJT-104	Production Zone Monitor Well	HJ	6,937.48	6,940.15	2,211,976	595,605	410 - 460	50	170.63	6,769.52
HJT-105	Production Zone Monitor Well	HJ	6,937.45	6,938.87	2,212,760	595,740	407 - 438	31	171.61	6,767.26
LC16M	Production Zone Monitor Well	HJ	6,934.73	6,936.15	2,212,869	595,523	410 - 467	57	177.45	6,758.70

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Well Name	Well Type	Monitored Sand	Ground Surface Elevation [feet amsl]	Top of Casing Elevation [feet amsl]	NAD 83 Easting [feet]	NAD 83 Northing [feet]	Screened Interval(s) [feet bgs]	Total Screen Length	12/08/08 Depth to Water	12/08/08 Water Level Elevation
LC19M	Production Zone Monitor Well	HJ	6,949.01	6,950.02	2,211,685	596,020	412 - 463	51	179.85	6,770.17
M-101	Production Zone Monitor Well	HJ	6,948.49	6,949.24	2,214,619	595,288	423 - 438	15	175.43	6,773.81
M-102	Production Zone Monitor Well	HJ	6,951.18	6,952.73	2,214,476	594,822	421 - 438	17	179.38	6,773.35
M-103	Production Zone Monitor Well	HJ	6,944.62	6,946.20	2,214,018	594,644	364 - 378, 414 - 434	34	173.87	6,772.33
M-104	Production Zone Monitor Well	HJ	6,940.66	6,942.11	2,213,543	594,565	368 - 382, 400 - 415, 437 - 453	45	182.24	6,759.87
M-105	Production Zone Monitor Well	HJ	6,932.91	6,933.45	2,213,052	594,631	360 - 372, 388 - 404, 410 - 431	49	176.71	6,756.74
M-106	Production Zone Monitor Well	HJ	6,922.20	6,922.85	2,212,578	594,746	356 - 401	45	167.29	6,755.56
M-107	Production Zone Monitor Well	HJ	6,927.03	6,927.93	2,212,095	594,681	373 - 398	25	178.00	6,749.93
M-108	Production Zone Monitor Well	HJ	6,926.33	6,927.87	2,211,633	594,853	405 - 425	20	179.08	6,748.79
M-109	Production Zone Monitor Well	HJ	6,919.90	6,921.72	2,211,180	594,671	379 - 391, 403 - 423	32	174.75	6,746.97
M-110	Production Zone Monitor Well	HJ	6,921.45	6,922.41	2,210,690	594,699	381 - 392, 408 - 427	30	176.62	6,745.79
M-111	Production Zone Monitor Well	HJ	6,907.84	6,909.59	2,210,270	594,451	416 - 429, 445 - 460	28	170.10	6,739.49
M-112	Production Zone Monitor Well	HJ	6,917.18	6,917.97	2,209,790	594,358	388 - 400, 420 - 488	80	179.49	6,738.48
M-113	Production Zone Monitor Well	HJ	6,926.89	6,928.01	2,209,310	594,510	396 - 406, 417 - 439, 447 - 463, 472 - 480	56	190.48	6,737.53
M-114	Production Zone Monitor Well	HJ	6,929.05	6,930.75	2,208,942	594,834	465 - 485	20	188.75	6,742.00
M-115	Production Zone Monitor Well	HJ	6,937.30	6,939.10	2,208,879	595,321	428 - 451	23	184.94	6,754.16
M-116	Production Zone Monitor Well	HJ	6,932.10	6,934.00	2,208,959	595,807	430 - 445	15	178.70	6,755.30
M-117	Production Zone Monitor Well	HJ	6,943.06	6,944.80	2,209,308	596,148	435 - 453	18	185.56	6,759.24
M-118	Production Zone Monitor Well	HJ	6,944.11	6,945.16	2,209,797	596,146	430 - 447, 454 - 467	30	183.33	6,761.83
M-119	Production Zone Monitor Well	HJ	6,947.00	6,948.65	2,210,266	596,303	432 - 450	18	183.51	6,765.14
M-120	Production Zone Monitor Well	HJ	6,944.98	6,946.52	2,210,727	596,442	410 - 441	31	178.20	6,768.32
M-121	Production Zone Monitor Well	HJ	6,950.21	6,951.71	2,211,199	596,595	436 - 455	19	181.28	6,770.43
M-122	Production Zone Monitor Well	HJ	6,950.74	6,952.39	2,211,677	596,693	433 - 447, 477 - 487	24	180.16	6,772.23
M-123	Production Zone Monitor Well	HJ	6,950.75	6,951.85	2,212,165	596,647	422 - 444	22	178.11	6,773.74
M-124	Production Zone Monitor Well	HJ	6,955.54	6,956.46	2,212,603	596,425	406 - 422	16	181.51	6,774.95
M-125	Production Zone Monitor Well	HJ	6,947.01	6,947.76	2,212,970	596,111	366 - 397, 404 - 419	46	172.01	6,775.75
M-126	Production Zone Monitor Well	HJ	6,948.12	6,949.67	2,213,464	596,087	331 - 348, 365 - 401	53	173.18	6,776.49
M-127	Production Zone Monitor Well	HJ	6,946.21	6,947.66	2,213,932	595,954	408 - 418, 450 - 471	31	172.68	6,774.98
M-128	Production Zone Monitor Well	HJ	6,947.02	6,948.55	2,214,350	595,698	427 - 446	19	173.10	6,775.45
MP-101	Production Zone Monitor Well	HJ	6,938.55	6,940.30	2,213,875	595,194	420 - 438	18	167.93	6,772.37
MP-102	Production Zone Monitor Well	HJ	6,940.18	6,941.02	2,213,299	595,400	408 - 423	15	176.63	6,764.39
MP-103	Production Zone Monitor Well	HJ	6,934.32	6,935.48	2,212,708	595,381	388 - 400	12	177.76	6,757.72
MP-104	Production Zone Monitor Well	HJ	6,936.81	6,938.45	2,212,007	595,515	424 - 440	16	183.29	6,755.16
MP-105	Production Zone Monitor Well	HJ	6,948.99	6,949.49	2,212,158	596,079	402 - 418	16	178.86	6,770.63
MP-106	Production Zone Monitor Well	HJ	6,940.20	6,941.29	2,211,488	595,980	434 - 454	20	172.36	6,768.93
MP-107	Production Zone Monitor Well	HJ	6,935.08	6,936.49	2,210,975	595,822	402 - 420	18	168.42	6,768.07
MP-108	Production Zone Monitor Well	HJ	6,934.15	6,936.15	2,210,882	595,469	424 - 438	14	169.64	6,766.51
MP-109	Production Zone Monitor Well	HJ	6,931.94	6,932.71	2,210,955	595,235	422 - 438	16	184.13	6,748.58
MP-110	Production Zone Monitor Well	HJ	6,937.29	6,938.69	2,210,185	595,648	419 - 438	19	176.91	6,761.78
MP-111	Production Zone Monitor Well	HJ	6,934.86	6,936.28	2,209,951	595,361	391 - 410	19	176.11	6,760.17
MP-112	Production Zone Monitor Well	HJ	6,935.35	6,936.64	2,209,585	595,535	422 - 441	19	177.27	6,759.37
MP-113	Production Zone Monitor Well	HJ	6,921.97	6,923.19	2,209,861	594,950	447 - 466	19	184.03	6,739.16
UKMO-101	Production Zone Monitor Well	HJ	6,940.19	6,942.28	2,212,409	595,656	465 - 487	22	177.76	6,764.52
UKMO-102	Production Zone Monitor Well	HJ	6,940.24	6,940.79	2,212,528	595,847	379 - 420	41	169.20	6,771.59
UKMO-103	Production Zone Monitor Well	HJ	6,949.28	6,950.53	2,212,823	596,269	409 - 430	21	176.35	6,774.18
HJMU-101	Underlying Monitor Well	UKM	6,947.82	6,949.03	2,211,600	595,711	499 - 535	36	200.17	6,748.86

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Well Name	Well Type	Monitored Sand	Ground Surface Elevation [feet amsl]	Top of Casing Elevation [feet amsl]	NAD 83 Easting [feet]	NAD 83 Northing [feet]	Screened Interval(s) [feet bgs]	Total Screen Length	12/08/08 Depth to Water	12/08/08 Water Level Elevation
HJMU-104	Underlying Monitor Well	UKM	6,939.01	6,940.52	2,211,214	595,620	512 - 550	38	195.80	6,744.72
HJMU-105	Underlying Monitor Well	UKM	6,936.37	6,937.58	2,211,264	595,790	502 - 542	40	192.35	6,745.23
HJMU-108	Underlying Monitor Well	UKM	6,949.97	6,951.52	2,211,799	596,011	510 - 540	30	202.36	6,749.16
HJMU-109	Underlying Monitor Well	UKM	6,933.92	6,939.38	2,212,228	595,549	524 - 574	50	189.60	6,749.78
HJMU-110	Underlying Monitor Well	UKM	6,945.97	6,947.56	2,212,008	595,909	492 - 532	40	198.16	6,749.40
HJMU-113	Underlying Monitor Well	UKM	6,935.16	6,936.99	2,212,600	595,521	524 - 555	31	185.69	6,751.30
LC17M	Underlying Monitor Well	UKM	6,935.32	6,936.90	2,212,869	595,542	478 - 531	53	185.03	6,751.87
LC20M	Underlying Monitor Well	UKM	6,949.22	6,950.52	2,211,684	596,034	511 - 543	32	201.69	6,748.83
LC24M	Underlying Monitor Well	UKM	6,942.33	6,944.33	2,212,886	595,906	478 - 531	53	190.56	6,753.77
MU-101	Underlying Monitor Well	UKM	6,938.55	6,940.37	2,213,858	595,192	520 - 540	20	186.65	6,753.72
MU-102	Underlying Monitor Well	UKM	6,939.10	6,940.43	2,213,289	595,391	525 - 553	28	187.66	6,752.77
MU-103	Underlying Monitor Well	UKM	6,934.18	6,935.35	2,212,709	595,389	525 - 560	35	182.91	6,752.44
MU-104	Underlying Monitor Well	UKM	6,936.84	6,937.88	2,212,009	595,501	550 - 580	30	191.71	6,746.17
MU-105	Underlying Monitor Well	UKM	6,948.93	6,950.08	2,212,163	596,087	507 - 545	38	201.21	6,748.87
MU-106	Underlying Monitor Well	UKM	6,940.59	6,941.75	2,211,482	595,972	500 - 546	46	193.94	6,747.81
MU-107	Underlying Monitor Well	UKM	6,935.06	6,936.06	2,210,980	595,811	500 - 540	40	191.68	6,744.38
MU-108[1]	Underlying Monitor Well	UKM	6,934.72	6,935.35	2,210,869	595,461	495 - 525	30	NA[1]	NA[1]
MU-109	Underlying Monitor Well	UKM	6,931.92	6,932.78	2,210,944	595,230	525 - 545	20	191.02	6,741.76
MU-110	Underlying Monitor Well	UKM	6,937.11	6,939.23	2,210,165	595,647	520 - 540	20	199.62	6,739.61
MU-111	Underlying Monitor Well	UKM	6,936.09	6,937.05	2,209,930	595,358	512 - 532	20	198.17	6,738.88
MU-112	Underlying Monitor Well	UKM	6,935.42	6,936.75	2,209,567	595,538	515 - 535	20	198.42	6,738.33
MU-113	Underlying Monitor Well	UKM	6,921.83	6,923.75	2,209,842	594,951	530 - 550	20	186.13	6,737.62
UKMP-101	Underlying Monitor Well	UKM	6,940.18	6,941.74	2,212,413	595,642	547 - 575	28	191.33	6,750.41
UKMP-102	Underlying Monitor Well	UKM	6,940.51	6,942.10	2,212,526	595,858	475 - 498	23	190.04	6,752.06
UKMU-103	Underlying Monitor Well	MKM	6,948.75	6,950.92	2,212,811	596,259	558 - 590	32	198.50	6,752.42

Notes:
- Easting/northing are NAD 83 WY State Plane coordinates.

[1] Well MU-108 was successfully plugged and abandoned on 12/2/08 due to faulty well completion. Not monitored during South Test.

Table 4-1
Equipment Layout
Mine Unit 1 North Test
Lost Creek ISR, LLC

PW-102 Test			
Well Name	Completion Zone	Side of Lost Creek Fault	Monitoring Equipment
PW-102	HJ	North	Level TROLL®
HJT-104	HJ	North	Level TROLL®
HJT-105	HJ	South	Level TROLL®
M-114	HJ	North	Level TROLL®
M-115	HJ	North	Level TROLL®
M-116	HJ	North	Level TROLL®
M-117	HJ	North	Level TROLL®
M-118	HJ	North	Level TROLL®
M-119	HJ	North	Level TROLL®
M-120	HJ	North	Level TROLL®
M-121	HJ	North	Level TROLL®
M-122	HJ	North	Level TROLL®
M-123	HJ	North	Level TROLL®
M-124	HJ	North	Level TROLL®
M-125	HJ	North	Level TROLL®
M-126	HJ	North	Level TROLL®
M-127	HJ	South	Level TROLL®
MP-103	HJ	South	Level TROLL®
MP-105	HJ	North	Level TROLL®
MP-106	HJ	North	Level TROLL®
MP-107	HJ	North	Level TROLL®
MP-108	HJ	North	Level TROLL®
MP-109	HJ	South	Level TROLL®
MP-110	HJ	North	Level TROLL®
MP-111	HJ	North	Level TROLL®
MP-112	HJ	North	Level TROLL®
MP-113	HJ	South	Level TROLL®
UKMO-101	HJ	South	Level TROLL®
UKMO-102	HJ	North	Level TROLL®
HJMP-101	HJ	North	E-line
HJMP-104	HJ	North	E-line
HJMP-105	HJ	North	E-line
HJMP-108	HJ	North	E-line
HJMP-109	HJ	South	E-line
HJMP-110	HJ	North	E-line
HJMP-113	HJ	South	E-line
HJT-101	HJ	North	E-line
HJT-102	HJ	North	E-line
HJT-103	HJ	South	E-line
LC16M	HJ	South	E-line
LC19M	HJ	North	E-line
MP-101	HJ	South	E-line
MP-102	HJ	South	E-line

Table 4-1
Equipment Layout
Mine Unit 1 North Test
Lost Creek ISR, LLC

PW-102 Test			
Well Name	Completion Zone	Side of Lost Creek Fault	Monitoring Equipment
MP-104	HJ	South	E-line
UKMO-103	HJ	North	E-line
MO-103	LFG	South	Level TROLL®
MO-105	LFG	North	Level TROLL®
MO-106	LFG	North	Level TROLL®
MO-107	LFG	North	Level TROLL®
MO-108	LFG	North	Level TROLL®
MO-109	LFG	South	Level TROLL®
MO-110	LFG	North	Level TROLL®
MO-111	LFG	North	Level TROLL®
MO-112	LFG	North	Level TROLL®
MO-113	LFG	South	Level TROLL®
MO-114	LFG	South	Level TROLL®
MO-115	LFG	North	Level TROLL®
HJMO-101	LFG	North	E-line
HJMO-104	LFG	North	E-line
HJMO-105	LFG	North	E-line
HJMO-108	LFG	North	E-line
HJMO-109	LFG	South	E-line
HJMO-110	LFG	North	E-line
HJMO-113	LFG	South	E-line
LC15M	LFG	South	E-line
LC18M	LFG	North	E-line
LC25M	LFG	South	E-line
MO-101	LFG	South	E-line
MO-102	LFG	South	E-line
MO-104	LFG	South	E-line
MU-103	UKM	South	Level TROLL®
MU-105	UKM	North	Level TROLL®
MU-106	UKM	North	Level TROLL®
MU-107	UKM	North	Level TROLL®
MU-108	UKM	North	Level TROLL®
MU-109	UKM	South	Level TROLL®
MU-110	UKM	North	Level TROLL®
MU-111	UKM	North	Level TROLL®
MU-112	UKM	North	Level TROLL®
MU-113	UKM	South	Level TROLL®
UKMP-101	UKM	South	Level TROLL®
UKMP-102	UKM	North	Level TROLL®
HJMU-101	UKM	North	E-line
HJMU-104	UKM	North	E-line
HJMU-105	UKM	North	E-line

Table 4-1
Equipment Layout
Mine Unit 1 North Test
Lost Creek ISR, LLC

PW-102 Test			
Well Name	Completion Zone	Side of Lost Creek Fault	Monitoring Equipment
HJMU-108	UKM	North	E-line
HJMU-109	UKM	South	E-line
HJMU-110	UKM	North	E-line
HJMU-113	UKM	South	E-line
LC17M	UKM	South	E-line
LC20M	UKM	North	E-line
LC24M	UKM	North	E-line
MU-101	UKM	South	E-line
MU-102	UKM	South	E-line
MU-104	UKM	South	E-line
UKMU-103	MKM	North	E-line
HJT-106	DE	South	E-line
HJT-107	DE	South	E-line
LC29M	DE	South	E-line

Table 4-2
Equipment Layout
Mine Unit 1 South Test
Lost Creek ISR, LLC

PW-101 Test			
Well Name	Completion Zone	Side of Lost Creek Fault	Monitoring Equipment
PW-101	HJ	South	Level TROLL®
HJMP-101	HJ	North	Level TROLL®
HJT-102	HJ	North	Level TROLL®
HJT-104	HJ	North	Level TROLL®
HJT-105	HJ	South	Level TROLL®
M-101	HJ	South	Level TROLL®
M-102	HJ	South	Level TROLL®
M-103	HJ	South	Level TROLL®
M-104	HJ	South	Level TROLL®
M-105	HJ	South	Level TROLL®
M-106	HJ	South	Level TROLL®
M-107	HJ	South	Level TROLL®
M-108	HJ	South	Level TROLL®
M-109	HJ	South	Level TROLL®
M-110	HJ	South	Level TROLL®
M-111	HJ	South	Level TROLL®
M-112	HJ	South	Level TROLL®
M-113	HJ	South	Level TROLL®
M-114	HJ	North	Level TROLL®
M-115	HJ	North	Level TROLL®
M-126	HJ	North	Level TROLL®
M-127	HJ	South	Level TROLL®
M-128	HJ	South	Level TROLL®
MP-101	HJ	South	Level TROLL®
MP-102	HJ	South	Level TROLL®
MP-103	HJ	South	Level TROLL®
MP-104	HJ	South	Level TROLL®
MP-109	HJ	South	Level TROLL®
MP-111	HJ	North	Level TROLL®
MP-113	HJ	South	Level TROLL®
UKMO-101	HJ	South	Level TROLL®
UKMO-102	HJ	North	Level TROLL®
HJMP-104	HJ	North	E-line
HJMP-105	HJ	North	E-line
HJMP-108	HJ	North	E-line
HJMP-109	HJ	South	E-line
HJMP-110	HJ	North	E-line
HJMP-113	HJ	South	E-line
HJT-101	HJ	North	E-line
HJT-103	HJ	South	E-line
LC16M	HJ	South	E-line
LC19M	HJ	North	E-line
MP-105	HJ	North	E-line

Table 4-2
Equipment Layout
Mine Unit 1 South Test
Lost Creek ISR, LLC

PW-101 Test			
Well Name	Completion Zone	Side of Lost Creek Fault	Monitoring Equipment
MP-106	HJ	North	E-line
MP-107	HJ	North	E-line
MP-108	HJ	North	E-line
MP-110	HJ	North	E-line
MP-112	HJ	North	E-line
UKMO-103	HJ	North	E-line
HJMO-101	LFG	North	Level TROLL®
MO-101	LFG	South	Level TROLL®
MO-102	LFG	South	Level TROLL®
MO-103	LFG	South	Level TROLL®
MO-104	LFG	South	Level TROLL®
MO-109	LFG	South	Level TROLL®
MO-111	LFG	North	Level TROLL®
MO-113	LFG	South	Level TROLL®
MO-114	LFG	South	Level TROLL®
MO-115	LFG	North	Level TROLL®
HJMO-104	LFG	North	E-line
HJMO-105	LFG	North	E-line
HJMO-108	LFG	North	E-line
HJMO-109	LFG	South	E-line
HJMO-110	LFG	North	E-line
HJMO-113	LFG	South	E-line
LC15M	LFG	South	E-line
LC18M	LFG	North	E-line
LC25M	LFG	South	E-line
MO-105	LFG	North	E-line
MO-106	LFG	North	E-line
MO-107	LFG	North	E-line
MO-108	LFG	North	E-line
MO-110	LFG	North	E-line
MO-112	LFG	North	E-line
HJMU-101	UKM	North	Level TROLL®
MU-101	UKM	South	Level TROLL®
MU-102	UKM	South	Level TROLL®
MU-103	UKM	South	Level TROLL®
MU-104	UKM	South	Level TROLL®
MU-109	UKM	South	Level TROLL®
MU-111	UKM	North	Level TROLL®
MU-113	UKM	South	Level TROLL®
UKMP-101	UKM	South	Level TROLL®
UKMP-102	UKM	North	Level TROLL®
HJMU-104	UKM	North	E-line

Table 4-2
Equipment Layout
Mine Unit 1 South Test
Lost Creek ISR, LLC

PW-101 Test			
Well Name	Completion Zone	Side of Lost Creek Fault	Monitoring Equipment
HJMU-105	UKM	North	E-line
HJMU-108	UKM	North	E-line
HJMU-109	UKM	South	E-line
HJMU-110	UKM	North	E-line
HJMU-113	UKM	South	E-line
LC17M	UKM	South	E-line
LC20M	UKM	North	E-line
LC24M	UKM	North	E-line
MU-105	UKM	North	E-line
MU-106	UKM	North	E-line
MU-107	UKM	North	E-line
MU-110	UKM	North	E-line
MU-112	UKM	North	E-line
UKMU-103	MKM	North	E-line
HJT-106	DE	South	E-line
HJT-107	DE	South	E-line

Note:
- Well MU-108 (UKM Sand) was plugged and abandoned prior to start of testing and not monitored during South Test.

Table 4-3
Distances to Pumping Well and Observed Drawdown
Mine Unit 1 North Test
Lost Creek ISR, LLC

Completion Type	Well Name	Distance from Pumping Well (ft)	Side of Fault	Water Level Instrument	Drawdown Observed Prior to Shut-in [ft]
Production Zone Pumping Well	PW-102	0	North	Level TROLL®	111.1
Production Zone Monitor Wells (HJ Horizon)	MP-107	73	North	Level TROLL®	48.6
	HJMP-105	354	North	E-Line	37.3
	MP-108	378	North	E-Line	40.3
	HJMP-104	383	North	Level TROLL®	40.0
	HJT-101	523	North	E-Line	34.2
	HJT-102	531	North	E-Line	39.6
	MP-106	597	North	Level TROLL®	30.8
	M-120	622	North	Level TROLL®	36.5
	HJMP-101	717	North	E-Line	30.7
	MP-110	748	North	Level TROLL®	25.7
	M-119	786	North	Level TROLL®	30.6
	LC19M	798	North	E-Line	28.8
	M-121	804	North	Level TROLL®	16.0
	HJMP-108	894	North	E-Line	27.0
	MP-111	1,072	North	Level TROLL®	22.8
	HJT-104	1,097	North	Level TROLL®	24.1
	HJMP-110	1,099	North	E-Line	23.6
	M-122	1,145	North	Level TROLL®	11.3
	M-118	1,149	North	Level TROLL®	19.1
	MP-105	1,273	North	Level TROLL®	20.0
	MP-112	1,357	North	Level TROLL®	18.3
	M-123	1,492	North	Level TROLL®	9.8
	UKMO-102	1,622	North	Level TROLL®	12.8
	M-117	1,627	North	Level TROLL®	15.8
	M-124	1,793	North	Level TROLL®	9.1
	M-116	1,948	North	Level TROLL®	11.0
	UKMO-103	1,963	North	E-Line	7.3
	M-125	2,081	North	Level TROLL®	7.4
	M-115	2,094	North	Level TROLL®	10.1
	M-114	2,210	North	Level TROLL®	2.8
	M-126	2,569	North	Level TROLL®	5.7
	MP-109	613	South	Level TROLL®	2.7
	HJT-103	755	South	E-Line	1.6
	MP-104	1,150	South	E-Line	0.4
	HJMP-109	1,346	South	E-Line	0.3
	MP-113	1,377	South	Level TROLL®	0.5
	UKMO-101	1,514	South	Level TROLL®	2.4
	HJMP-113	1,723	South	E-Line	0.3
	HJT-105	1,856	South	Level TROLL®	1.9
	MP-103	1,861	South	Level TROLL®	0.3
	LC16M	1,989	South	E-Line	0.2
	MP-102	2,434	South	E-Line	0.0
	M-127	3,028	South	Level TROLL®	0.4
	MP-101	3,040	South	E-Line	0.1

Table 4-3
Distances to Pumping Well and Observed Drawdown
Mine Unit 1 North Test
Lost Creek ISR, LLC

Completion Type	Well Name	Distance from Pumping Well (ft)	Side of Fault	Water Level Instrument	Drawdown Observed Prior to Shut-in [ft]
Overlying Monitor Wells (LFG Sand)	MO-107	71	North	Level TROLL®	1.2
	MO-108	372	North	Level TROLL®	1.1
	HJMO-105	373	North	E-Line	0.9
	HJMO-104	392	North	E-Line	0.8
	MO-106	595	North	Level TROLL®	1.0
	HJMO-101	712	North	E-Line	0.7
	MO-110	753	North	Level TROLL®	0.7
	LC18M	782	North	E-Line	0.5
	HJMO-108	889	North	E-Line	0.1
	MO-111	1,080	North	Level TROLL®	0.5
	HJMO-110	1,093	North	E-Line	0.4
	MO-105	1,264	North	Level TROLL®	0.3
	MO-112	1,367	North	Level TROLL®	0.1
	MO-115	1,622	North	Level TROLL®	0.7
	MO-109	625	South	Level TROLL®	0.6
	LC25M	962	South	E-Line	0.8
	MO-104	1,165	South	E-Line	3.4
	HJMO-109	1,357	South	E-Line	1.8
	MO-113	1,388	South	Level TROLL®	0.7
	MO-114	1,514	South	Level TROLL®	2.0
	HJMO-113	1,713	South	E-Line	0.9
	MO-103	1,850	South	Level TROLL®	0.7
	LC15M	1,973	South	E-Line	0.5
	MO-102	2,439	South	E-Line	0.4
	MO-101	3,032	South	E-Line	0.1
Overlying Monitor Wells (DE Sand)	HJT-106	1,731	South	E-Line	-0.1
	LC29M	1,972	South	E-Line	0.1
	HJT-107	2,664	South	E-Line	0.0
Underlying Monitor Wells (UKM Sand)	MU-107	82	North	Level TROLL®	2.1
	HJMU-105	363	North	E-Line	1.8
	HJMU-104	382	North	E-Line	2.0
	MU-108	387	North	Level TROLL®	24.7a
	MU-106	589	North	Level TROLL®	0.9
	HJMU-101	707	North	E-Line	0.7
	MU-110	767	North	Level TROLL®	0.6
	LC20M	800	North	E-Line	0.6
	HJMU-108	908	North	E-Line	0.5
	MU-111	1,092	North	Level TROLL®	0.6
	HJMU-110	1,103	North	E-Line	0.5
	MU-105	1,280	North	Level TROLL®	0.3
	MU-112	1,374	North	Level TROLL®	0.4
	UKMP-102	1,620	North	Level TROLL®	0.4
	UKMU-103	1,949	North	E-Line	-0.3
	LC24M	1,981	North	E-Line	0.4
	MU-109	617	South	Level TROLL®	0.8
	MU-104	1,155	South	E-Line	0.2
	HJMU-109	1,355	South	E-Line	0.0
	MU-113	1,391	South	Level TROLL®	0.4
	UKMP-101	1,521	South	Level TROLL®	0.1
	HJMU-113	1,725	South	E-Line	0.0
	MU-103	1,860	South	Level TROLL®	0.0
	LC17M	1,986	South	E-Line	-0.1
	MU-102	2,426	South	E-Line	0.1
	MU-101	3,023	South	E-Line	0.0

Notes:
a - Anomalous value due to faulty well completion.
Drawdown for wells instrumented with TROLLs determined by the difference in water level elevations at the start and end of pumping. E-line monitored wells were measured ~1-2 hours before the start and end of pumping.

Table 4-4
Distances to Pumping Well and Observed Drawdown
Mine Unit 1 South Test
Lost Creek ISR, LLC

Completion Type	Well Name	Distance from Pumping Well (ft)	Side of Fault	Water Level Instrument	Drawdown Observed in Feet Prior to Shut-in (ft)
Production Zone Pumping Well	PW-101	0	South	Level TROLL®	63.5
Production Zone Monitor Wells (HJ Horizon)	HJMP-109	291	South	E-Line	41.7
	MP-104	297	South	Level TROLL®	48.1
	UKMO-101	469	South	Level TROLL®	17.4
	HJMP-113	504	South	E-Line	35.3
	MP-103	564	South	Level TROLL®	36.1
	M-107	582	South	Level TROLL®	29.1
	M-106	663	South	Level TROLL®	34.1
	M-108	663	South	Level TROLL®	25.7
	HJT-103	667	South	E-Line	28.1
	LC16M	758	South	E-Line	29.6
	HJT-105	770	South	Level TROLL®	12.2
	M-105	1,092	South	Level TROLL®	30.7
	M-109	1,141	South	Level TROLL®	21.1
	MP-102	1,149	South	Level TROLL®	19.5
	MP-109	1,204	South	Level TROLL®	18.7
	M-104	1,549	South	Level TROLL®	22.5
	M-110	1,571	South	Level TROLL®	15.2
	MP-101	1,718	South	Level TROLL®	8.3
	M-127	1,905	South	Level TROLL®	5.1
	M-103	1,959	South	Level TROLL®	8.5
	M-111	2,054	South	Level TROLL®	8.1
	M-128	2,236	South	Level TROLL®	5.2
	MP-113	2,318	South	Level TROLL®	7.2
	M-102	2,358	South	Level TROLL®	7.1
	M-101	2,461	South	Level TROLL®	6.7
	M-112	2,534	South	Level TROLL®	6.9
	M-113	2,945	South	Level TROLL®	4.8
	HJT-104	391	North	Level TROLL®	2.0
	HJMP-110	656	North	E-Line	0.8
	UKMO-102	694	North	Level TROLL®	0.6
	HJMP-101	711	North	E-Line	0.7
	MP-105	820	North	E-Line	0.5
	HJMP-108	840	North	E-Line	0.4
	LC19M	896	North	E-Line	0.4
	HJT-102	961	North	Level TROLL®	0.5
	MP-106	984	North	E-Line	0.4
	HJMP-104	1,013	North	E-Line	0.4
	HJMP-105	1,046	North	Level TROLL®	0.4
	UKMO-103	1,209	North	E-Line	0.4
	HJT-101	1,277	North	E-Line	1.0
	MP-108	1,294	North	E-Line	0.4
	MP-107	1,310	North	E-Line	0.3
	M-126	1,546	North	Level TROLL®	0.5
	MP-110	2,012	North	E-Line	0.2
	MP-111	2,210	North	Level TROLL®	0.5
	MP-112	2,588	North	E-Line	0.2
	M-114	3,245	North	Level TROLL®	1.2
	M-115	3,280	North	Level TROLL®	0.1

Table 4-4
Distances to Pumping Well and Observed Drawdown
Mine Unit 1 South Test
Lost Creek ISR, LLC

Completion Type	Well Name	Distance from Pumping Well (ft)	Side of Fault	Water Level Instrument	Drawdown Observed in Feet Prior to Shut-in (ft)
Overlying Monitor Wells (LFG Sand)	MO-104	281	South	Level TROLL®	0.8
	HJMO-109	287	South	E-Line	0.9
	LC25M	450	South	E-Line	-0.1
	MO-114	469	South	Level TROLL®	1.9
	HJMO-113	502	South	E-Line	0.8
	MO-103	555	South	Level TROLL®	0.3
	LC15M	744	South	E-Line	0.2
	MO-102	1,151	South	Level TROLL®	0.3
	MO-109	1,202	South	Level TROLL®	-0.1
	MO-101	1,712	South	Level TROLL®	0.0
	MO-113	2,325	South	Level TROLL®	-0.1
	HJMO-110	668	North	E-Line	-0.1
	MO-115	694	North	Level TROLL®	0.0
	HJMO-101	709	North	Level TROLL®	-0.1
	MO-105	825	North	E-Line	0.0
	HJMO-108	834	North	E-Line	-0.1
	LC18M	906	North	E-Line	-0.1
	MO-106	971	North	E-Line	-0.1
	HJMO-104	1,002	North	E-Line	-0.1
	HJMO-105	1,029	North	E-Line	-0.2
	MO-108	1,304	North	E-Line	-0.1
	MO-107	1,312	North	E-Line	0.2
	MO-110	2,011	North	E-Line	0.0
	MO-111	2,223	North	Level TROLL®	0.0
	MO-112	2,595	North	E-Line	0.0
Overlying Monitor Wells (DE Sand)	HJT-106	387	South	E-Line	0.0
	HJT-107	1,426	South	E-Line	0.0
Underlying Monitor Wells (UKM Sand)	MU-104	285	South	Level TROLL®	5.7
	HJMU-109	298	South	E-Line	1.8
	UKMP-101	460	South	Level TROLL®	0.4
	HJMU-113	514	South	E-Line	1.2
	MU-103	566	South	Level TROLL®	1.3
	LC17M	765	South	E-Line	1.2
	MU-102	1,138	South	Level TROLL®	0.9
	MU-109	1,215	South	Level TROLL®	3.8
	MU-101	1,701	South	Level TROLL®	0.6
	MU-113	2,337	South	Level TROLL®	0.7
	HJMU-110	667	North	E-Line	0.5
	UKMP-102	703	North	Level TROLL®	1.1
	HJMU-101	718	North	Level TROLL®	0.4
	MU-105	828	North	E-Line	0.3
	HJMU-108	834	North	E-Line	0.4
	LC20M	908	North	E-Line	0.3
	LC24M	974	North	E-Line	0.5
	MU-106	983	North	E-Line	0.3
	HJMU-104	1,011	North	E-Line	0.2
	HJMU-105	1,040	North	E-Line	0.2
	UKMU-103	1,194	North	E-Line	0.4
	MU-107	1,301	North	E-Line	0.2
	MU-110	2,031	North	E-Line	0.1
	MU-111	2,231	North	Level TROLL®	0.1
	MU-112	2,606	North	E-Line	0.1

Notes:
Drawdown for wells instrumented with TROLLs determined by the difference in water level elevations at the start and end of pumping. E-line monitored wells were measured ~1-2 hours before the start and end of pumping.

Table 4-5
Calculated Vertical Hydraulic Gradients
Mine Unit 1
Lost Creek ISR, LLC

Well Cluster	Sand	Date / Time	Well Name	DTW (ft)	TOC Elev (ft amsl)	WT Elev (ft amsl)	Screen Top (ft)	Screen Bottom (ft)	Screen Length (ft)	Screen Midpoint (ft amsl)	Vert. Grad., LFG to HJ	Vert. Grad., LFG to UKM	Vert. Grad., HJ to UKM
M112	LFG	12/8/08 8:36	MO-112	167.61	6936.66	6769.05	315	335	20	6611.66	0.09	0.15	0.23
M112	HJ	12/8/08 8:36	MP-112	177.27	6936.64	6759.37	422	441	19	6505.14			
M112	UKM	12/8/08 8:36	MU-112	198.42	6936.75	6738.33	515	535	20	6411.75			
M105	LFG	12/8/08 10:53	MO-105	166.90	6950.46	6783.56	303	330	27	6633.96	0.14	0.17	0.19
M105	HJ	12/8/08 10:53	MP-105	178.86	6949.49	6770.63	402	418	16	6539.49			
M105	UKM	12/8/08 10:53	MU-105	201.21	6950.08	6748.87	507	545	38	6424.08			
HJ101	LFG	12/8/08 11:45	HJMO-101	169.61	6949.70	6780.09	295	326	31	6639.20	0.08	0.15	0.31
HJ101	HJ	12/8/08 11:45	HJMP-101	179.38	6948.64	6769.26	438	465	27	6497.14			
HJ101	UKM	12/8/08 11:45	HJMU-101	200.17	6949.03	6748.86	499	535	36	6432.03			
M113	LFG	12/8/08 11:25	MO-113	159.19	6922.29	6763.10	346	366	20	6566.29	0.24	0.14	0.02
M113	HJ	12/8/08 11:25	MP-113	184.03	6923.19	6739.16	447	466	19	6466.69			
M113	UKM	12/8/08 11:25	MU-113	186.13	6923.75	6737.62	530	550	20	6383.75			
M104	LFG	12/8/08 11:50	MO-104	165.41	6937.86	6772.45	339	369	30	6583.86	0.22	0.12	0.07
M104	HJ	12/8/08 11:50	MP-104	183.29	6938.45	6755.16	424	440	16	6506.45			
M104	UKM	12/8/08 11:50	MU-104	191.71	6937.88	6746.17	550	580	30	6372.88			
M101	LFG	12/8/08 12:50	MO-101	156.31	6940.24	6783.93	310	340	30	6615.24	0.11	0.15	0.18
M101	HJ	12/8/08 12:50	MP-101	167.93	6940.30	6772.37	420	438	18	6511.30			
M101	UKM	12/8/08 12:50	MU-101	186.65	6940.37	6753.72	520	540	20	6410.37			

Notes:
DTW - Depth to water
TOC - Top of casing
Vertical hydraulic gradients between sand intervals calculated from screen midpoints

Table 4-6
Pumping Rate Versus Time
Mine Unit 1 North Test
Lost Creek ISR, LLC

PW-102 Test											
Date/Time	Interval Minutes	Total Minutes	Totalizer 1 (gal)	T1 Rate (gpm)	Totalizer 2 (gal)	T2 Rate (gpm)	Interval Gallons, T1	Interval Gallons, T2	Calculated Rate, T1	Calculated Rate, T2	Notes
11/18/08 10:30	0	0	0	78	0	78	0	0	0	0	BEGIN Test, PW-102
11/18/08 10:56	26	26	1,959	75	1,975	76	1,959	1,975	75.3	76.0	
11/18/08 11:40	70	44	5,264	74	5,281	74	3,305	3,306	75.1	75.1	
11/18/08 12:17	107	37	7,995	74	8,019	74	2,731	2,738	73.8	74.0	
11/18/08 13:01	151	44	11,268	73	11,305	73	3,273	3,286	74.4	74.7	
11/18/08 13:59	209	58	15,473	73	15,523	73	4,205	4,218	72.5	72.7	
11/18/08 14:43	253	44	18,615	72	18,674	73	3,142	3,151	71.4	71.6	
11/18/08 16:15	345	92	25,526	72	25,607	72	6,911	6,933	75.1	75.4	
11/18/08 16:36	366	21	26,723	72	26,805	73	1,197	1,198	57.0	57.0	
11/18/08 17:00	390	24	28428	72	28512	73	1,705	1,707	71.0	71.1	
11/18/08 17:29	419	29	30563	73	30654	73	2,135	2,142	73.6	73.9	
11/18/08 18:00	450	31	32715	72	32821	72	2,152	2,167	69.4	69.9	
11/18/08 18:30	480	30	34862	72	34875	72	2,147	2,054	71.6	68.5	
11/18/08 19:00	510	30	36982	72	37107	73	2,120	2,232	70.7	74.4	
11/18/08 19:30	540	30	39218	72	39250	72	2,236	2,143	74.5	71.4	
11/18/08 20:30	600	60	43525	72	43679	72	4,307	4,429	71.8	73.8	
11/18/08 21:06	636	36	46288	72	46446	72	2,763	2,767	76.7	76.9	
11/18/08 21:30	660	24	47827	72	47988	72	1,539	1,542	64.1	64.2	
11/18/08 22:00	690	30	49959	72	50120	72	2,132	2,132	71.1	71.1	
11/18/08 22:30	720	30	52163	72	52330	72	2,204	2,210	73.5	73.7	
11/18/08 23:00	750	30	54309	72	54476	72	2,146	2,146	71.5	71.5	

Table 4-6
Pumping Rate Versus Time
Mine Unit 1 North Test
Lost Creek ISR, LLC

PW-102 Test											
Date/Time	Interval Minutes	Total Minutes	Totalizer 1 (gal)	T1 Rate (gpm)	Totalizer 2 (gal)	T2 Rate (gpm)	Interval Gallons, T1	Interval Gallons, T2	Calculated Rate, T1	Calculated Rate, T2	Notes
11/18/08 23:35	785	35	57943	71	57118	71	3,634	2,642	103.8	75.5	
11/19/08 0:00	810	25	57800	72	58790	71	-143	1,672	-5.7	66.9	
11/19/08 0:34	844	34	61088	71	61260	71	3,288	2,470	96.7	72.6	
11/19/08 1:05	875	31	63258	71	63428	71	2,170	2,168	70.0	69.9	
11/19/08 1:30	900	25	65070	71	67470	71	1,812	4,042	72.5	161.7	
11/19/08 2:00	930	30	67102	71	67282	71	2,032	-188	67.7	-6.3	
11/19/08 2:30	960	30	69189	71	69370	71	2,087	2,088	69.6	69.6	
11/19/08 3:00	990	30	71480	71	71660	71	2,291	2,290	76.4	76.3	
11/19/08 3:30	1020	30	73508	71	73692	71	2,028	2,032	67.6	67.7	
11/19/08 4:05	1055	35	76150	71	76338	71	2,642	2,646	75.5	75.6	
11/19/08 4:35	1085	30	78450	71	78644	71	2,300	2,306	76.7	76.9	
11/19/08 5:30	1140	55	82044	71	82240	71	3,594	3,596	65.3	65.4	
11/19/08 6:30	1200	60	86210	71	86405	71	4,166	4,165	69.4	69.4	
11/19/08 7:02	1232	32	88605	71	88802	71	2,395	2,397	74.8	74.9	
11/19/08 7:29	1259	27	90449	71	90644	71	1,844	1,842	68.3	68.2	
11/19/08 9:48	1398	139	100275	70	100480	70	9,826	9,836	70.7	70.8	
11/19/08 11:21	1491	93	106838	70	107059	70	6,563	6,579	70.6	70.7	
11/19/08 12:24	1554	63	110388	70	110623	70	3,550	3,564	56.3	56.6	
11/19/08 16:40	1810	256	125895	70	126138	70	15,507	15,515	60.6	60.6	
11/19/08 18:10	1900	90	135470	70	135728	70	9,575	9,590	106.4	106.6	
11/19/08 19:02	1952	52	138983	70	139244	70	3,513	3,516	67.6	67.6	

Table 4-6
Pumping Rate Versus Time
Mine Unit 1 North Test
Lost Creek ISR, LLC

PW-102 Test											
Date/Time	Interval Minutes	Total Minutes	Totalizer 1 (gal)	T1 Rate (gpm)	Totalizer 2 (gal)	T2 Rate (gpm)	Interval Gallons, T1	Interval Gallons, T2	Calculated Rate, T1	Calculated Rate, T2	Notes
11/19/08 20:00	2010	58	142944	70	143210	70	3,961	3,966	68.3	68.4	
11/19/08 20:58	2068	58	147060	70	147332	70	4,116	4,122	71.0	71.1	
11/19/08 22:10	2140	72	152175	70	152455	70	5,115	5,123	71.0	71.2	
11/20/08 1:28	2338	198	165997	70	166285	70	13,822	13,830	69.8	69.8	
11/20/08 4:49	2539	201	180060	70	183600	70	14,063	17,315	70.0	86.1	
11/20/08 6:21	2631	92	186477	70	186780	70	6,417	3,180	69.8	34.6	
11/20/08 7:48	2718	87	192514	70	192822	70	6,037	6,042	69.4	69.4	
11/20/08 8:39	2769	51	196073	69	196384	70	3,559	3,562	69.8	69.8	
11/20/08 10:30	2880	111	203895	69	204219	69	7,822	7,835	70.5	70.6	END of test

Summary	
T1 Cummulative Average Rate (total gal ÷ total time)	70.8 gpm
T2 Cummulative Average Rate (total gal ÷ total time)	70.9 gpm
Combined Average Rate	70.9 gpm
Total Minutes	2880

Notes:

Totalizers 1 & 2 - 1.5" turbine flow meter (Turbines Incorporated, FW Series)

Table 4-7
Pumping Rate Versus Time
Mine Unit 1 South Test
Lost Creek ISR, LLC

PW-101 Test											
Date/Time	Interval Minutes	Total Minutes	Totalizer 1 (gal)	T1 Rate (gpm)	Totalizer 2 (gal)	T2 Rate (gpm)	Interval Gallons, T1	Interval Gallons, T2	Calculated Rate, T1	Calculated Rate, T2	Notes
12/10/08 14:00	0	0	0	63	0	63	0	0	0	0	BEGIN Test, PW-101
12/10/08 14:32	32	32	1954	61	1,966	61	1,954	1,966	61.1	61.4	
12/10/08 15:04	32	64	3966	61	3,973	61	2,012	2,007	62.9	62.7	
12/10/08 17:41	157	221	13380	60	13,417	60	9,414	9,444	60.0	60.2	
12/10/08 19:21	100	321	19647	59	19,725	60	6,267	6,308	62.7	63.1	
12/10/08 20:31	70	391	23399	59	23,513	60	3,752	3,788	53.6	54.1	
12/10/08 21:16	45	436	26230	59	26,361	60	2,831	2,848	62.9	63.3	
12/10/08 23:41	145	581	34679	59	34,890	59	8,449	8,529	58.3	58.8	
12/11/08 2:07	146	727	43285	59	43578	59	8,606	8,688	58.9	59.5	
12/11/08 5:20	193	920	54538	59	54920	59	11,253	11,342	58.3	58.8	
12/11/08 8:34	194	1114	66032	58	66461	59	11,494	11,541	59.2	59.5	
12/11/08 11:48	194	1308	77389	58	77839	58	11,357	11,378	58.5	58.6	
12/11/08 12:25	37	1345	79464	58	79913	58	2,075	2,074	56.1	56.1	
12/11/08 14:10	105	1450	85808	58	86257	58	6,344	6,344	60.4	60.4	
12/11/08 18:16	246	1696	100030	58	100457	58	14,222	14,200	57.8	57.7	
12/11/08 20:48	152	1848	108442	58	108870	58	8,412	8,413	55.3	55.3	
12/11/08 22:40	112	1960	115467	58	115868	58	7,025	6,998	62.7	62.5	
12/12/08 2:08	208	2168	127398	58	127761	58	11,931	11,893	57.4	57.2	
12/12/08 7:43	335	2503	146748	58	147028	58	19,350	19,267	57.8	57.5	
12/12/08 11:48	245	2748	160881	57	161119	57	14,133	14,091	57.7	57.5	
12/12/08 12:55	67	2815	164694	57	164794	57	3,813	3,675	56.9	54.9	

Table 4-7
Pumping Rate Versus Time
Mine Unit 1 South Test
Lost Creek ISR, LLC

PW-101 Test											
Date/Time	Interval Minutes	Total Minutes	Totalizer 1 (gal)	T1 Rate (gpm)	Totalizer 2 (gal)	T2 Rate (gpm)	Interval Gallons, T1	Interval Gallons, T2	Calculated Rate, T1	Calculated Rate, T2	Notes
12/12/08 13:58	63	2878	168189	57	168367	57	3,495	3,573	55.5	56.7	
12/12/08 15:19	81	2959	172957	57	173114	57	4,768	4,747	58.9	58.6	
12/12/08 16:42	83	3042	177708	57	177837	57	4,751	4,723	57.2	56.9	
12/12/08 19:19	157	3199	186649	57	186740	57	8,941	8,903	56.9	56.7	
12/12/08 21:36	137	3336	194465	57	194523	57	7,816	7,783	57.1	56.8	
12/13/08 1:13	217	3553	207059	57	207062	57	12,594	12,539	58.0	57.8	
12/13/08 4:52	219	3772	219475	57	219402	57	12,416	12,340	56.7	56.3	
12/13/08 7:20	148	3920	228007	57	227850	57	8,532	8,448	57.6	57.1	
12/13/08 10:27	187	4107	238788	57	238530	57	10,781	10,680	57.7	57.1	
12/13/08 11:45	78	4185	243188	0	242889	0	4,400	4,359	56.4	55.9	END of test

Summary	
T1 Cummulative Average Rate (total gal ÷ total time)	58.1 gpm
T1 Cummulative Average Rate (total gal ÷ total time)	58.0 gpm
Combined Average Rate	58.1 gpm
Total Minutes	4185

Notes:

Totalizers 1 & 2 - 1.5" turbine flow meter (Turbines Incorporated, FW Series)

Table 7-1
Summary of Pump Test Results
Mine Unit 1 North Test
Lost Creek ISR, LLC

Well Name	Distance from Pumping Well (ft)	Theis Drawdown			Theis Recovery		
		T (ft²/d)	K (ft/d)	S	T (ft²/d)	K (ft/d)	S
PW-102	Pumping	--	--	--	55.0	0.46	--
HJT-104	1097	53.5	0.45	7.2E-05	--	--	--
M-114	2210	98.2	0.82	1.5E-04	--	--	--
M-115	2094	53.3	0.45	5.4E-05	--	--	--
M-116	1948	50.9	0.42	5.8E-05	--	--	--
M-117	1627	56.7	0.47	5.8E-05	--	--	--
M-118	1149	59.6	0.50	9.1E-05	--	--	--
M-119	786	81.5	0.68	6.7E-05	53.0	0.44	--
M-120	622	79.8	0.67	6.8E-05	57.4	0.48	--
M-121	804	97.7	0.81	2.0E-04	57.5	0.48	--
M-122	1145	94.2	0.79	1.6E-04	--	--	--
M-123	1492	92.0	0.77	1.1E-04	--	--	--
M-124	1793	97.5	0.81	8.3E-05	--	--	--
M-125	2081	102.0	0.85	7.6E-05	--	--	--
M-126	2569	104.0	0.87	6.5E-05	--	--	--
MP-105	1273	74.3	0.62	6.1E-05	--	--	--
MP-106	597	67.9	0.57	1.4E-04	57.2	0.48	--
MP-107	73	--[1]	--[1]	--[1]	54.7	0.46	--
MP-108	378	88.1	0.73	1.2E-04	56.2	0.47	--
MP-110	748	75.4	0.63	1.2E-04	52.2	0.44	--
MP-112	1357	60.7	0.51	6.9E-05	--	--	--
UKMO-102	1622	93.8	0.78	6.6E-05	--	--	--
	Maximum	**104.0**	**0.87**	**2.0E-04**	**57.5**	**0.48**	**--**
	Minimum	**50.9**	**0.42**	**5.4E-05**	**52.2**	**0.44**	**--**
	Average	**79.1**	**0.66**	**9.3E-05**	**55.4**	**0.46**	**--**
	Std. Deviation	**18.3**	**0.15**	**4.0E-05**	**2.0**	**0.02**	**--**

Groundwater Linear Velocity, North Side of Fault			
	Average	Maximum	Minimum
Hydraulic Conductivity (K, ft/d)	0.66	0.87	0.42
Average Hydraulic Gradient (dh/dl, ft/ft)	0.0052	0.0052	0.0052
Effective Porosity (n_e, dimensionless)	0.28	0.28	0.28
Calculated Velocity (ft/day)	0.012	0.016	0.008
Calculated Velocity (ft/year)	4.5	5.9	2.9

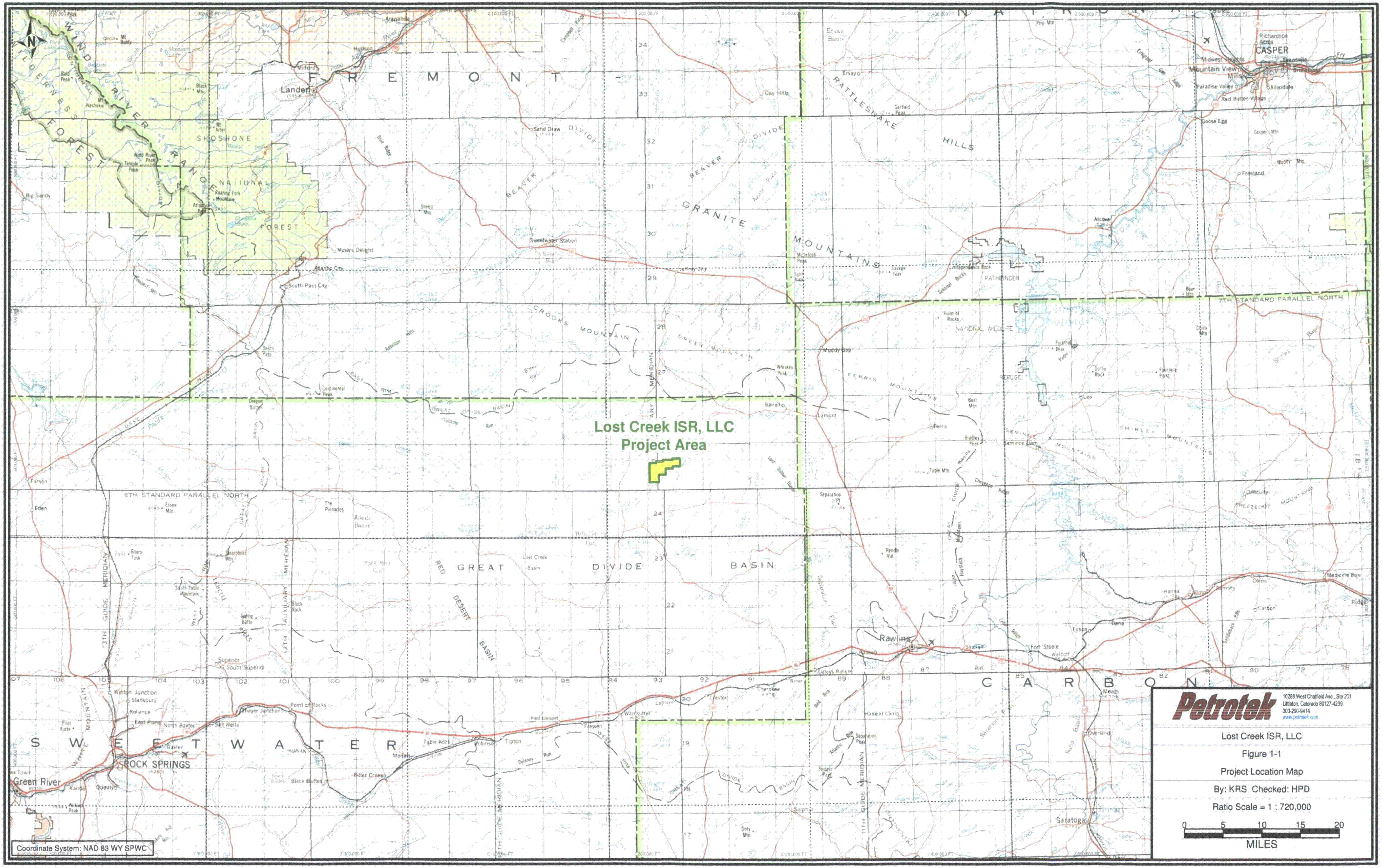
Notes:
T - Transmissivity
K - Hydraulic conductivity; calculated based on 120 ft aquifer thickness.
S - Storativity
[1] - Theis drawdown was not analyzed due to partial penetration effects and proximity to pumping well.
No analytical solutions calculated for MP-111, due to erratic pressure transducer data.
Linear velocity = (K * dh/dl) / n_e

Table 7-2
Summary of Pump Test Results
Mine Unit 1 South Test
Lost Creek ISR, LLC

Well Name	Distance from Pumping Well (ft)	Theis Drawdown			Theis Recovery		
		T (ft²/d)	K (ft/d)	S	T (ft²/d)	K (ft/d)	S
PW-101	Pumping	--	--	--	61.5	0.51	--
M-101	2461	97.4	0.81	7.16E-05	--	--	--
M-102	2358	95.4	0.80	7.31E-05	--	--	--
M-103	1959	86.8	0.72	8.95E-05	--	--	--
M-104	1549	69.4	0.58	3.55E-05	--	--	--
M-105	1092	69.8	0.58	3.59E-05	60.5	0.50	--
M-106	663	73.7	0.61	6.83E-05	58.3	0.49	--
M-107	582	79.6	0.66	1.22E-04	65.6	0.55	--
M-108	663	79.9	0.67	1.29E-04	66.9	0.56	--
M-109	1141	78.6	0.66	6.80E-05	--	--	--
M-110	1571	108.0	0.90	4.82E-05	--	--	--
M-111	2054	98.0	0.82	8.20E-05	--	--	--
M-112	2534	104.0	0.86	6.46E-05	--	--	--
M-113	2945	114.0	0.95	6.93E-05	--	--	--
M-127	1905	129.0	1.08	1.55E-04	--	--	--
M-128	2236	116.0	0.96	1.11E-04	--	--	--
MP-101	1718	94.7	0.79	1.17E-04	--	--	--
MP-102	1149	77.0	0.64	7.88E-05	--	--	--
MP-103	564	77.0	0.64	7.26E-05	63.3	0.53	--
MP-104	297	89.1	0.74	5.78E-05	58.8	0.49	--
MP-109	1204	70.9	0.59	8.18E-05	--	--	--
MP-113	2318	98.1	0.82	7.34E-05	--	--	--
UKMO-101	469	109.0	0.91	4.26E-04	97.1	0.81	--
HJT-105	770	114.0	0.95	3.02E-04	109.0	0.91	--
	Maximum	**129.0**	**1.08**	**4.3E-04**	**109.0**	**0.91**	**--**
	Minimum	**69.4**	**0.58**	**3.6E-05**	**58.3**	**0.49**	**--**
	Average	**92.6**	**0.77**	**1.1E-04**	**71.2**	**0.59**	**--**
	Std. Deviation	**17.1**	**0.14**	**8.8E-05**	**18.5**	**0.15**	**--**

Groundwater Linear Velocity, South Side of Fault			
	Average	**Maximum**	**Minimum**
Hydraulic Conductivity (K, ft/d)	0.77	1.08	0.58
Average Hydraulic Gradient (dh/dl, ft/ft)	0.0087	0.0087	0.0087
Effective Porosity (n_e, dimensionless)	0.28	0.28	0.28
Calculated Velocity (ft/day)	0.024	0.034	0.018
Calculated Velocity (ft/year)	8.7	12.2	6.6

Notes:
T - Transmissivity
K - Hydraulic conductivity; calculated based on 120 ft aquifer thickness.
S - Storativity
Linear velocity = (K * dh/dl) / n_e



Lost Creek ISR, LLC
Project Area
F R E M O N T
N A T R O N A
S W E E T W A T E R
C A R B O N
CASPER
Lander
Rawlins
ROCK SPRINGS
Green River
Saratoga
GREAT DIVIDE BASIN
GRANITE MOUNTAINS
RATTLESNAKE HILLS
CROOKS MOUNTAIN
GREEN MOUNTAIN
FERRIS MOUNTAINS
SHIRLEY MOUNTAINS
SHOSHONE NATIONAL FOREST
WIND RIVER RANGE
6TH STANDARD PARALLEL NORTH
7TH STANDARD PARALLEL NORTH
Coordinate System: NAD 83 WY SPWC
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303-290-9414
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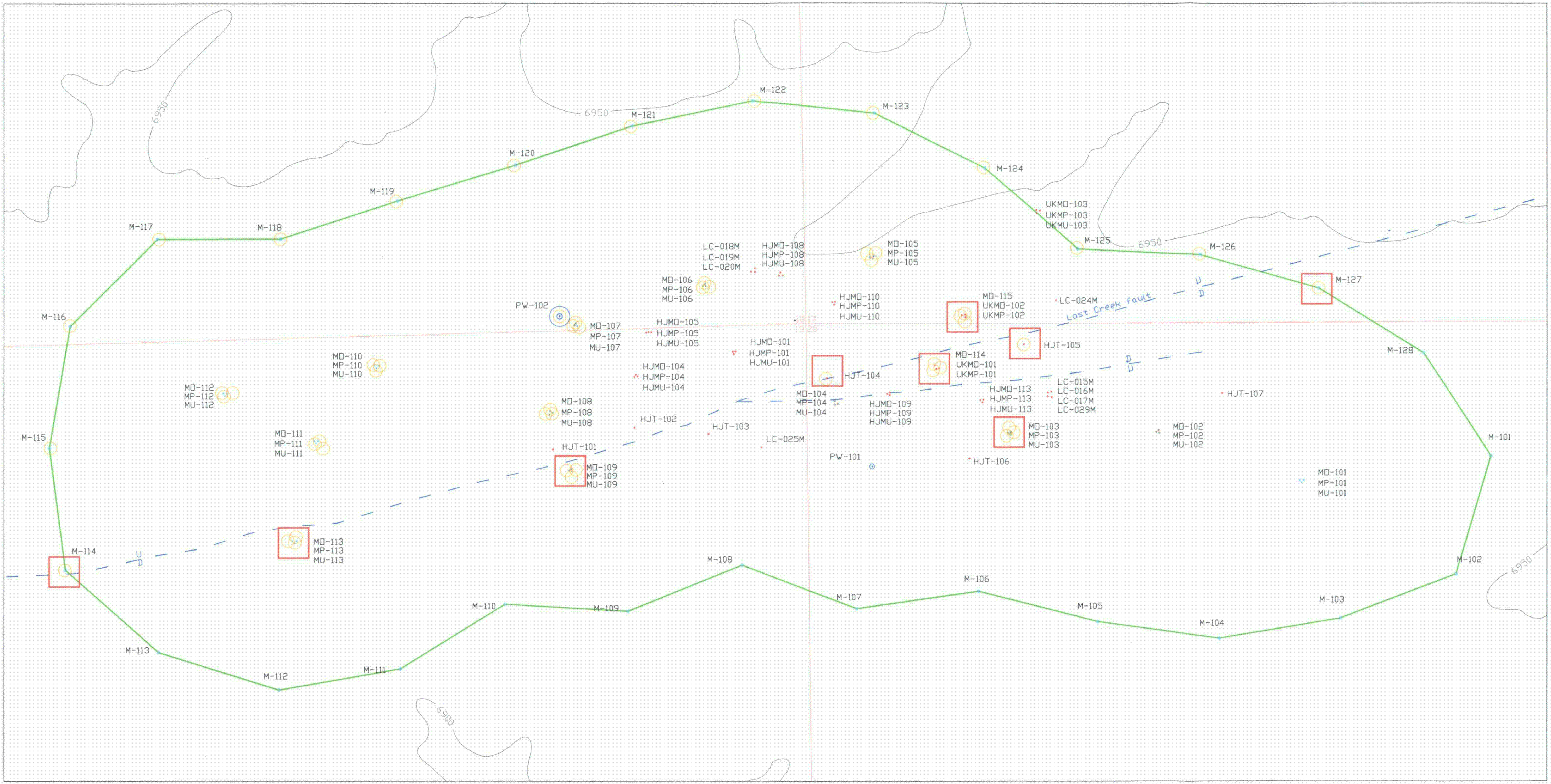
Lost Creek ISR, LLC
Figure 1-1
Project Location Map
By: KRS Checked: HPD
Ratio Scale = 1 : 720,000
0 5 10 15 20
MILES



Legend

- Pumping Well
- Wells monitored with LevelTROLLS during North Test
- Wells monitored with LevelTROLLS during both Tests

0 200 400 800

Scale: 1" = 400 Feet

N

W — E

Coordinate System: NAD 83 WY SPWC

Lost Creek ISR, LLC

Figure 1-2
Lost Creek Mine Unit 1 Pump Test Layout
North Test

Project: MU1 PTests	Date: October 2009
MU1_PTRpt_Fig_123	By: KRS / Checked: AAP

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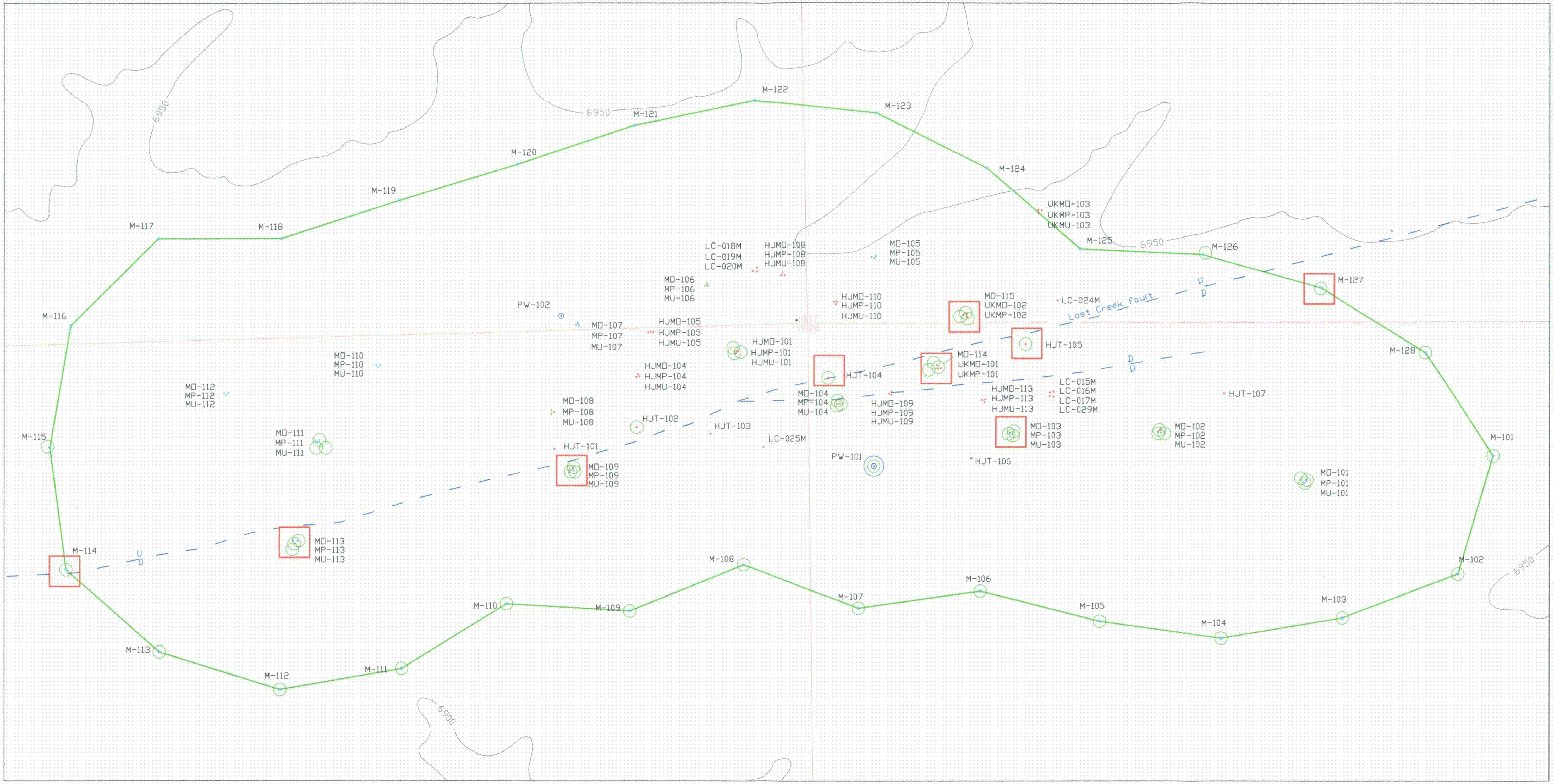

Legend

- Pumping Well
- Wells monitored with LevelTROLLS during South Test
- Wells monitored with LevelTROLLS during both Tests

0 200 400 800

Scale: 1" = 400 Feet

N
W — E

Coordinate System: NAD 83 WY SPWC

Lost Creek ISR, LLC

Figure 1-3
Lost Creek Mine Unit 1 Pump Test Layout
South Test

Project: MU1 PTests	Date: October 2009
MU1_PTRpt_Fig_123	By: KRS Checked: AAP

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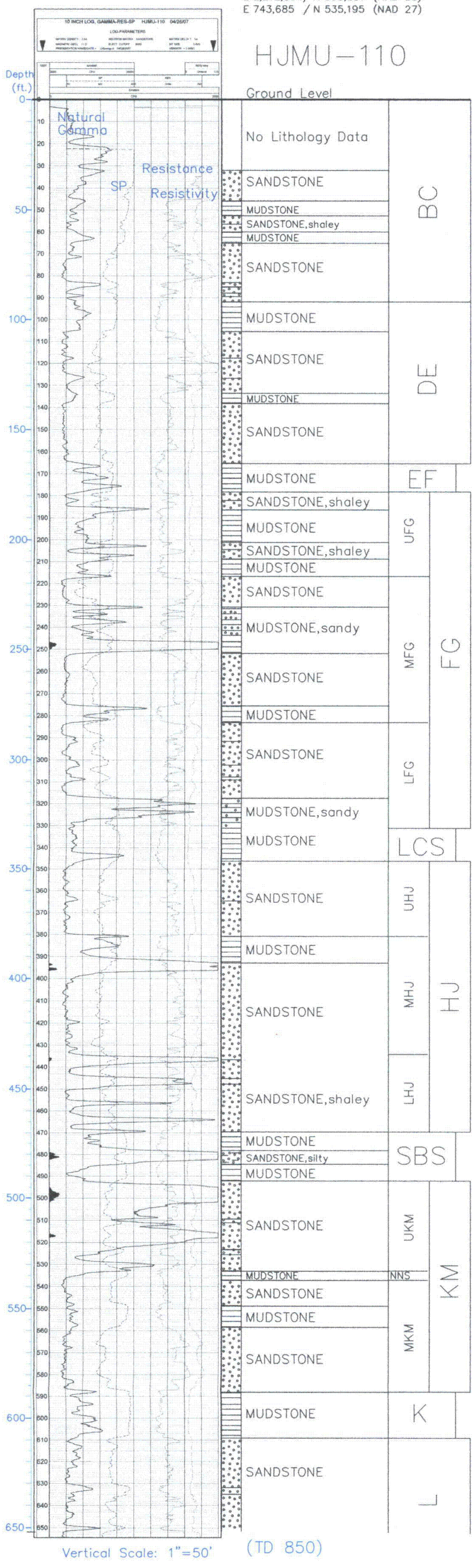
TYPE LOG – LOST CREEK PROJECT

WELL # HJMU–110

E 2,212,004/ N 595,897 (NAD 83)
E 743,685 / N 535,195 (NAD 27)



Battle Springs Formation –Typical Lithology

SANDSTONE: arkosic; medium to very coarse-grained, locally fine-grain; poorly-sorted; subangular to angular; weakly to moderately consolidated, moderately firm.

Represents bed-load to mixed-load, channel-fill fluvial environments within a distal alluvial fan system.

MUDSTONE, commonly very silty and/or sandy; soft to very firm; and CLAYSTONE, moderately firm to very firm, dense, blocky.
Secondary amounts of SILTSTONE, commonly very sandy, firm to very firm.

Represents inter-channel and overbank fluvial environments.

Considerable lateral facies changes, inter-tonguing, and overlapping occurs between between the two dominant lithologies. This can be very dramatic within short distances.

DE Horizon: Multiple sandstone units interbedded with mudstones Host to secondary amounts of uranium mineralization.

EF:(upper No-Name Shale): Mudstone and claystone, commonly silty and/or sandy; locally with interbedded very fine-grained sands. Does not exhibit lateral continuity throughout project area. Represents a series of overlapping shaley units.

Overlying Aquifer

FG Horizon: Multiple sandstone units interbedded with mudstones Host to secondary amounts of uranium mineralization.

Upper Confining Unit

LCS (Lost Creek Shale): Mudstone and claystone, commonly silty and/or sandy; locally with interbedded very fine-grained sands. Exhibits lateral continuity throughout project area. Commonly intertongues with upper portions of the HJ and lower portions of the FG.

Production Zone Aquifer

HJ Horizon: Multiple sandstone units interbedded with mudstones Primary host to uranium mineralization.

Lower Confining Unit

SBS (Sagebrush Shale): Mudstone and claystone, commonly silty and/or sandy; locally with interbedded very fine-grained sands. Exhibits lateral continuity throughout project area. Commonly intertongues with upper portions of the KM and lower portions of the HJ.

Underlying Aquifer

KM Horizon: Multiple sandstone units interbedded with mudstones Host to significant uranium mineralization.

Includes NNS (No Name Shale) separating UKM from MKM. Does not exhibit regional continuity.

(Note: MKM has recently been renamed LKM).

K (K Shale): Mudstone and claystone, commonly silty and/or sandy.

Lost Creek ISR, LLC

Figure 2–1

Lost Creek Stratigraphic Section

Project: MU1 PTests	Date: October 2009
UrEMU1PTPlanFig2–1	By: CVH

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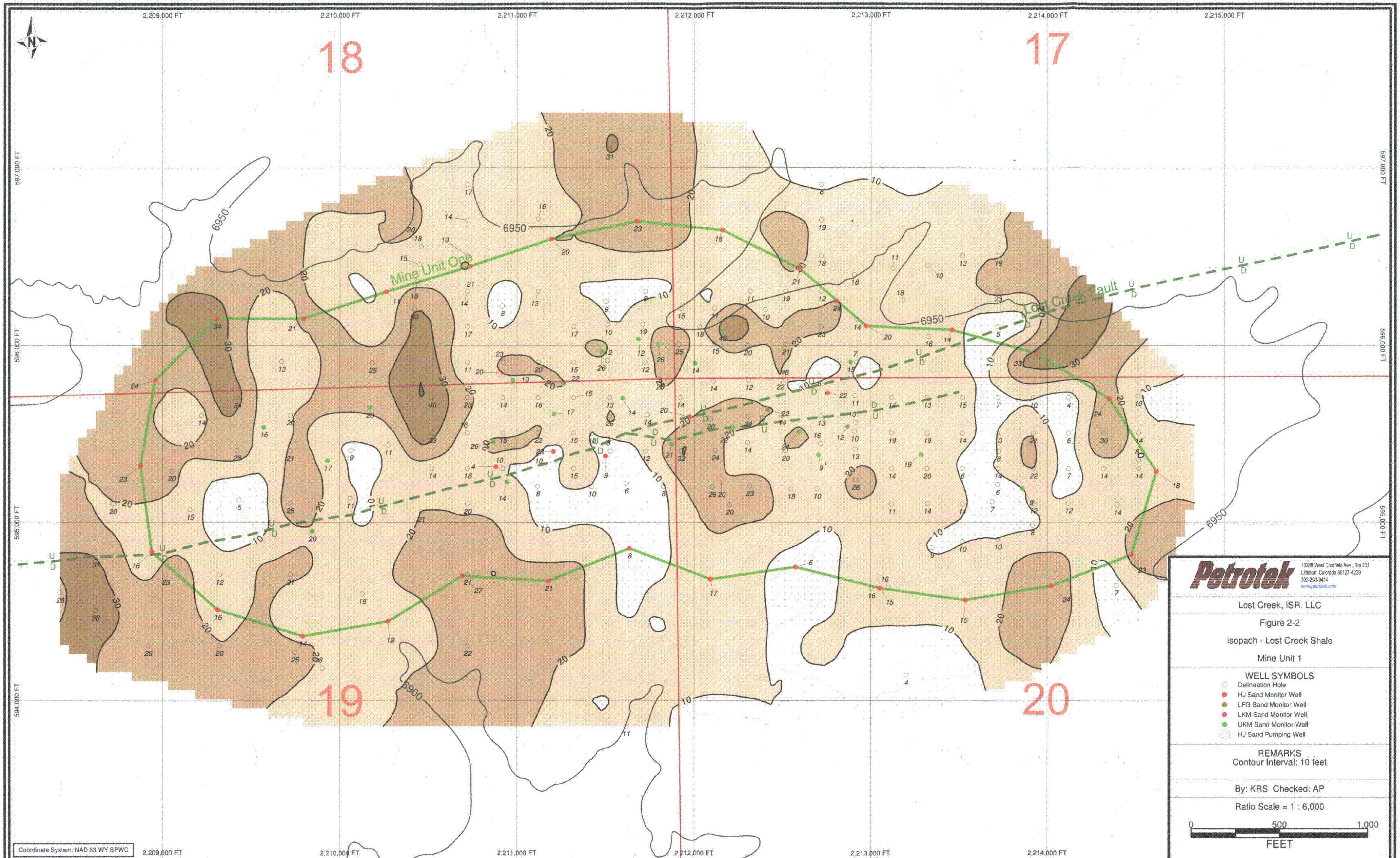

18
17
19
20
Mine Unit One
Lost Creek Fault
6950
5900
2,209,000 FT
2,210,000 FT
2,211,000 FT
2,212,000 FT
2,213,000 FT
2,214,000 FT
2,215,000 FT
597,000 FT
596,000 FT
595,000 FT
594,000 FT
Coordinate System: NAD 83 WY SPWC
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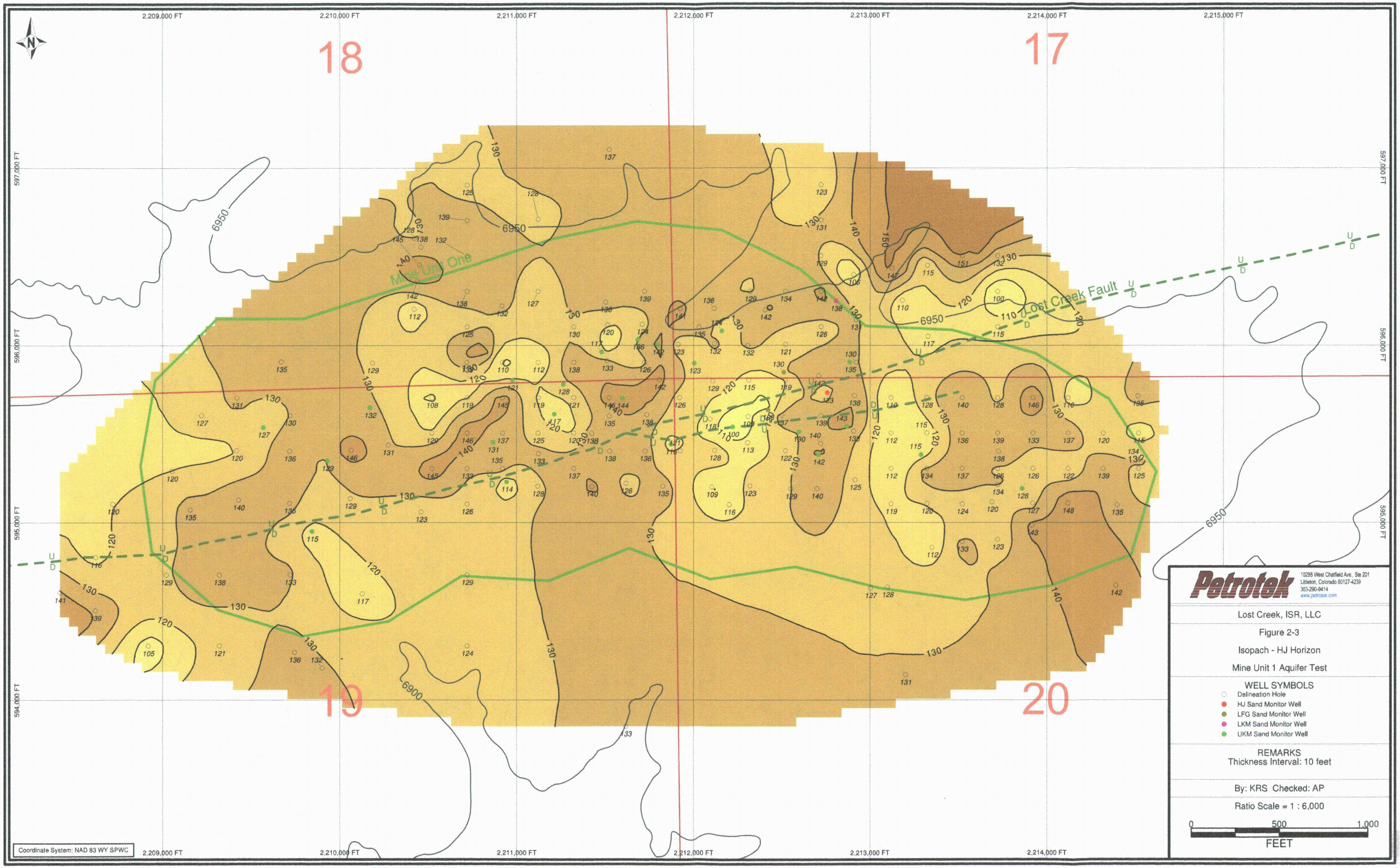
Lost Creek, ISR, LLC
Figure 2-2
Isopach - Lost Creek Shale
Mine Unit 1
WELL SYMBOLS
Delineation Hole
HJ Sand Monitor Well
LFG Sand Monitor Well
LKM Sand Monitor Well
UKM Sand Monitor Well
HJ Sand Pumping Well
REMARKS
Contour Interval: 10 feet
By: KRS Checked: AP
Ratio Scale = 1 : 6,000
0
500
1,000
FEET



18
17
19
20
Mine Unit One
Lost Creek Fault
6950
6900
2,209,000 FT
2,210,000 FT
2,211,000 FT
2,212,000 FT
2,213,000 FT
2,214,000 FT
2,215,000 FT
597,000 FT
596,000 FT
595,000 FT
594,000 FT
Coordinate System: NAD 83 WY SPWC
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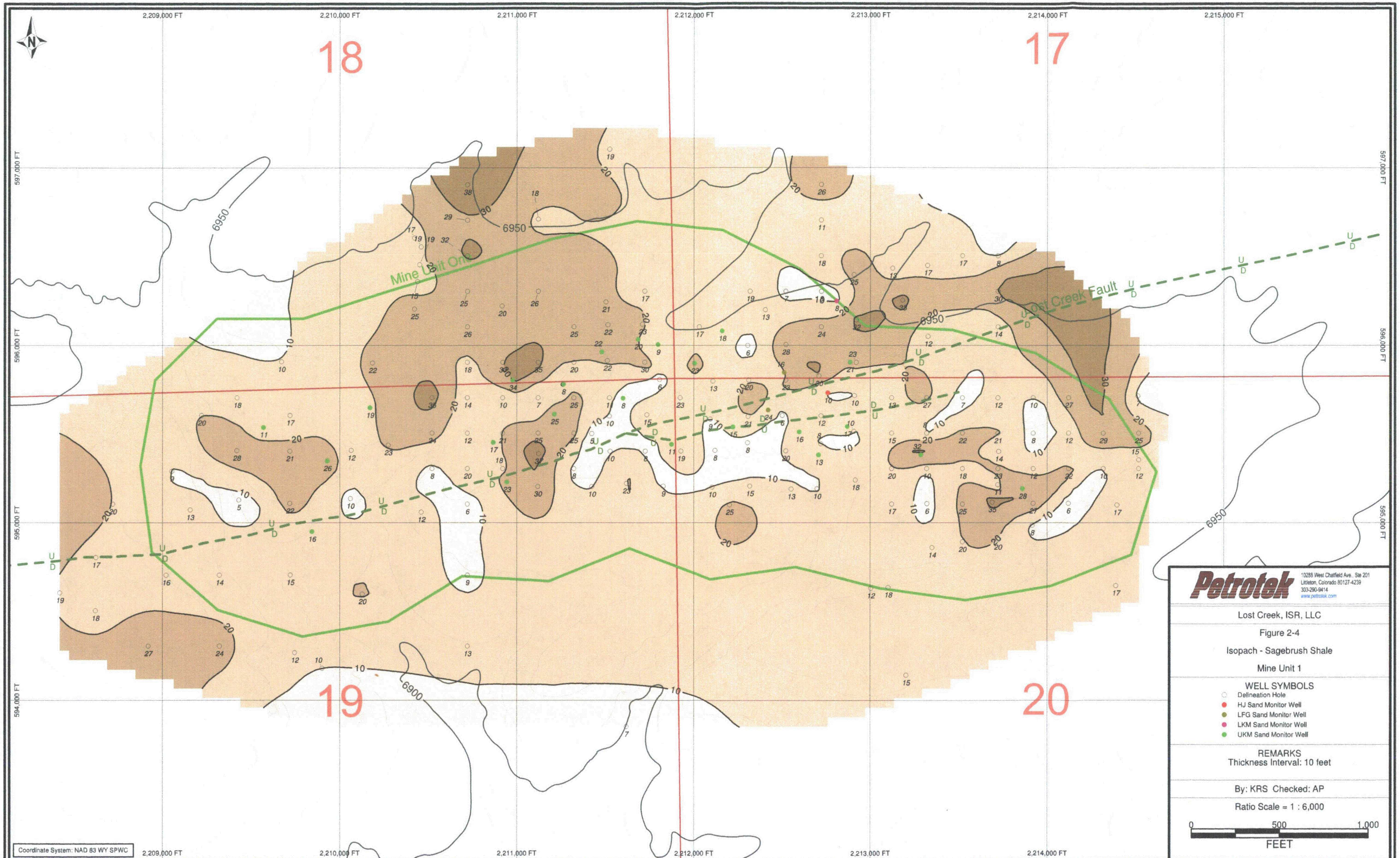
Figure 2-3
Isopach - HJ Horizon
Mine Unit 1 Aquifer Test
WELL SYMBOLS
Delineation Hole
HJ Sand Monitor Well
LFG Sand Monitor Well
LKM Sand Monitor Well
UKM Sand Monitor Well
REMARKS
Thickness Interval: 10 feet
By: KRS Checked: AP
Ratio Scale = 1 : 6,000
0
500
1,000
FEET



2,209,000 FT
2,210,000 FT
2,211,000 FT
2,212,000 FT
2,213,000 FT
2,214,000 FT
2,215,000 FT
597,000 FT
596,000 FT
595,000 FT
594,000 FT
18
17
19
20
Mine Unit One
Lost Creek Fault
6950
6900
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Figure 2-4
Isopach - Sagebrush Shale
Mine Unit 1
WELL SYMBOLS
Delineation Hole
HJ Sand Monitor Well
LFG Sand Monitor Well
LKM Sand Monitor Well
UKM Sand Monitor Well
REMARKS
Thickness Interval: 10 feet
By: KRS Checked: AP
Ratio Scale = 1 : 6,000
0
500
1,000
FEET
Coordinate System: NAD 83 WY SPWC

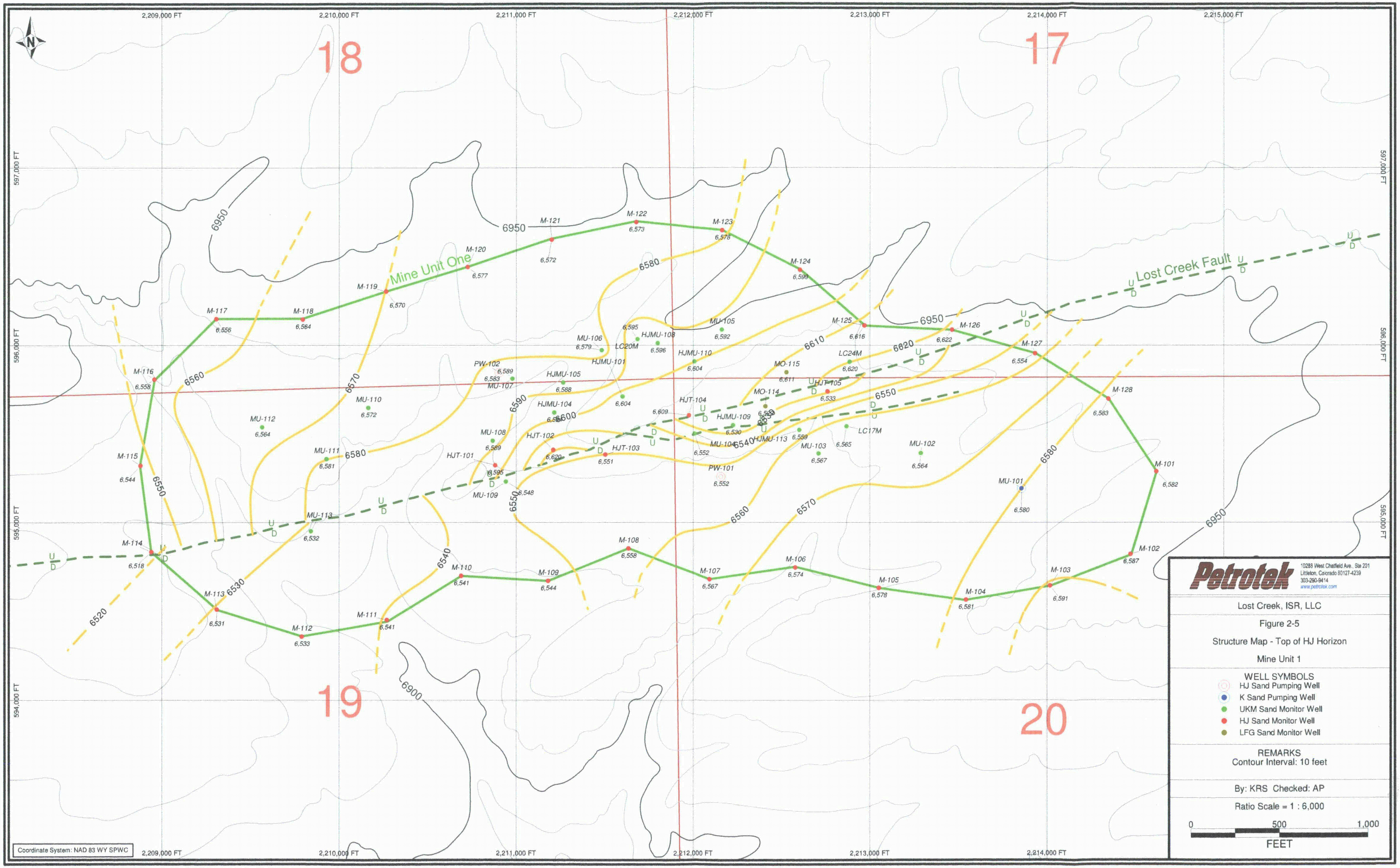
18
17
19
20
Mine Unit One
Lost Creek Fault
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Figure 2-5
Structure Map - Top of HJ Horizon
Mine Unit 1
WELL SYMBOLS
HJ Sand Pumping Well
K Sand Pumping Well
UKM Sand Monitor Well
HJ Sand Monitor Well
LFG Sand Monitor Well
REMARKS
Contour Interval: 10 feet
By: KRS Checked: AP
Ratio Scale = 1 : 6,000
0
500
1,000
FEET
Coordinate System: NAD 83 WY SPWC
2,209,000 FT
2,210,000 FT
2,211,000 FT
2,212,000 FT
2,213,000 FT
2,214,000 FT
2,215,000 FT
597,000 FT
596,000 FT
595,000 FT
594,000 FT

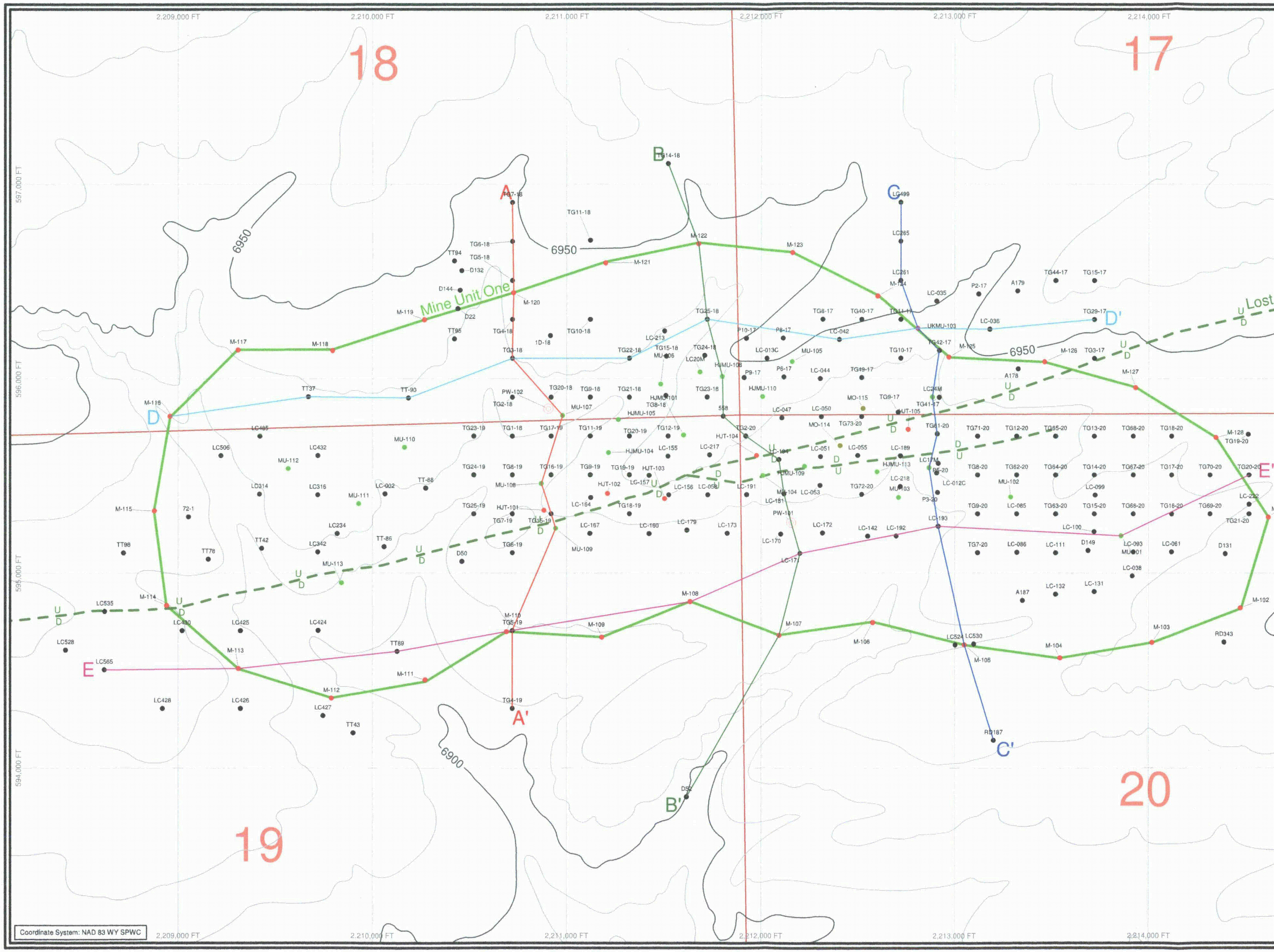

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Figure 2-6

Cross Section Location Map

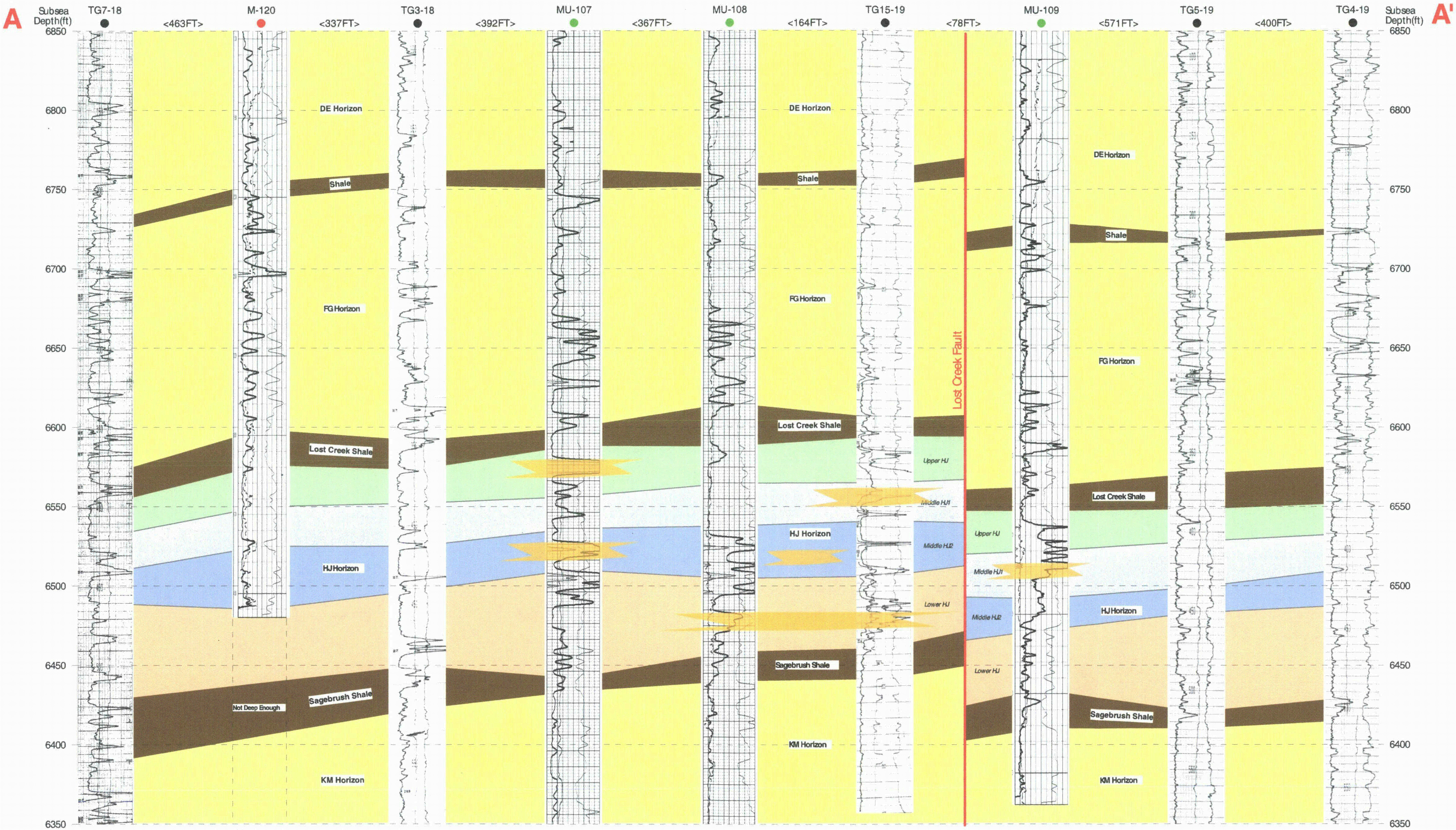
Mine Unit 1

WELL SYMBOLS
- HJ Sand Pumping Well
- UKM Sand Monitor Well
- LKM Sand Monitor Well
- HJ Sand Monitor Well
- LFG Sand Monitor Well
- Delineation Hole

By: KRS Checked: AP

Ratio Scale = 1 : 6,000

0 500 1,000
FEET



Note: Tops are auto-interpolated for logs that are not deep enough

Proposed Mining Interval

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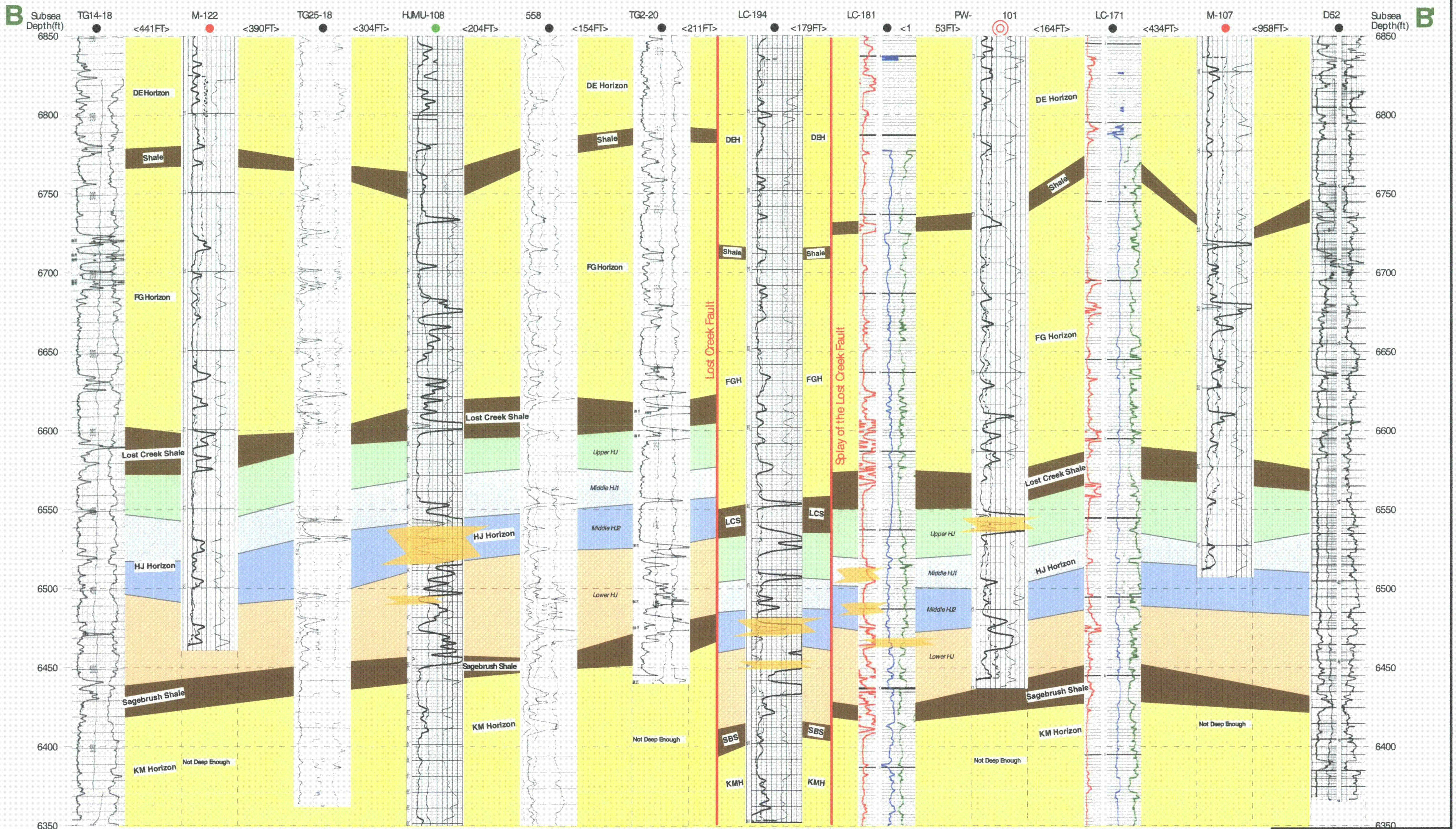
Lost Creek ISR, LLC

Figure 2-7

Structural Cross Section A - A'

Mine Unit 1

By: KRS Checked: AP



Note: Tops are auto-interpolated for logs that are not deep enough

Proposed Mining Interval

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Lost Creek ISR, LLC

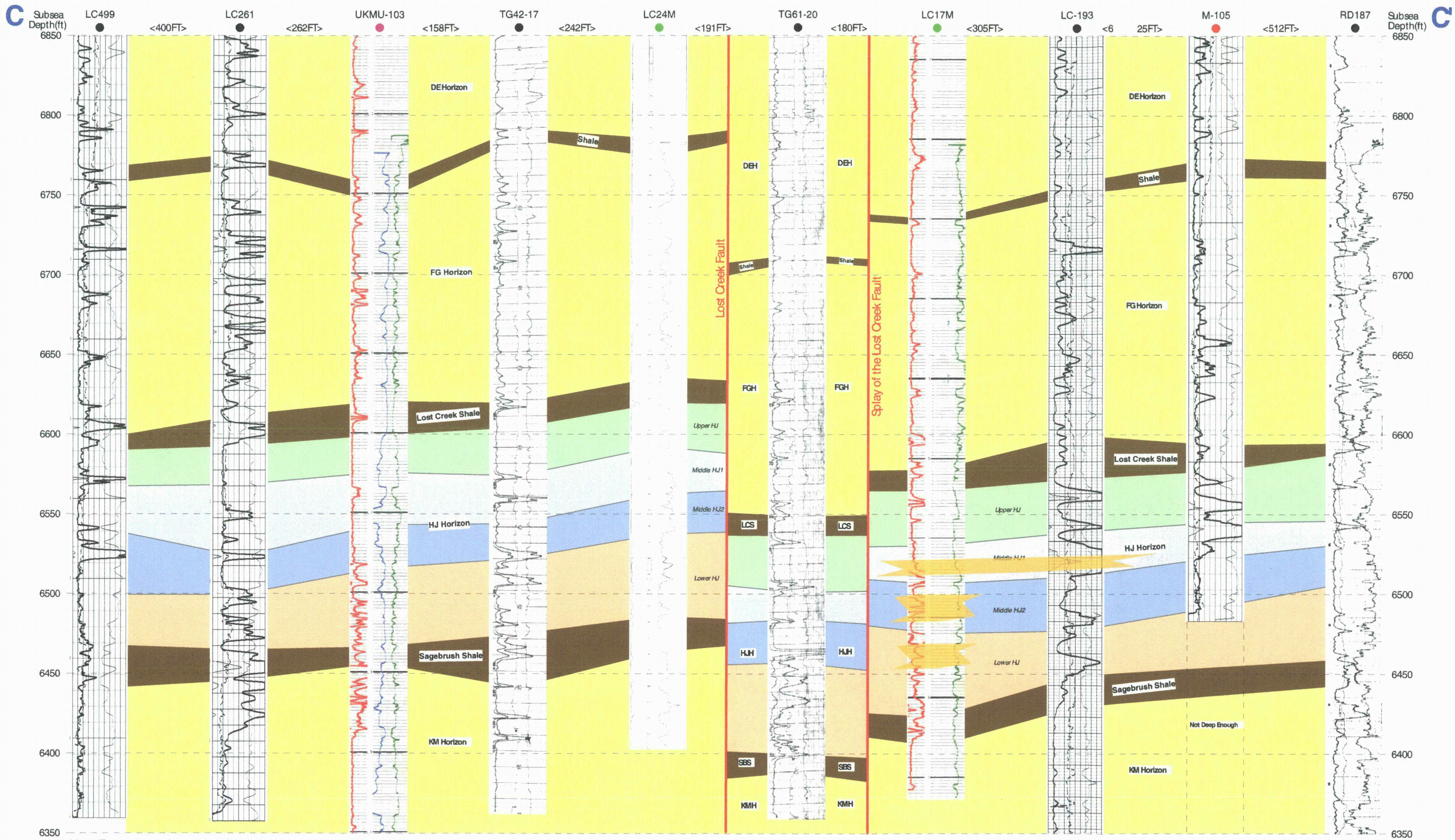
Figure 2-8

Structural Cross Section B - B'

Mine Unit 1

By: KRS Checked: AP

March 4,2010 9:03 AM



Note: Tops are auto-interpolated for logs that are not deep enough

Proposed Mining Interval

Petrotek

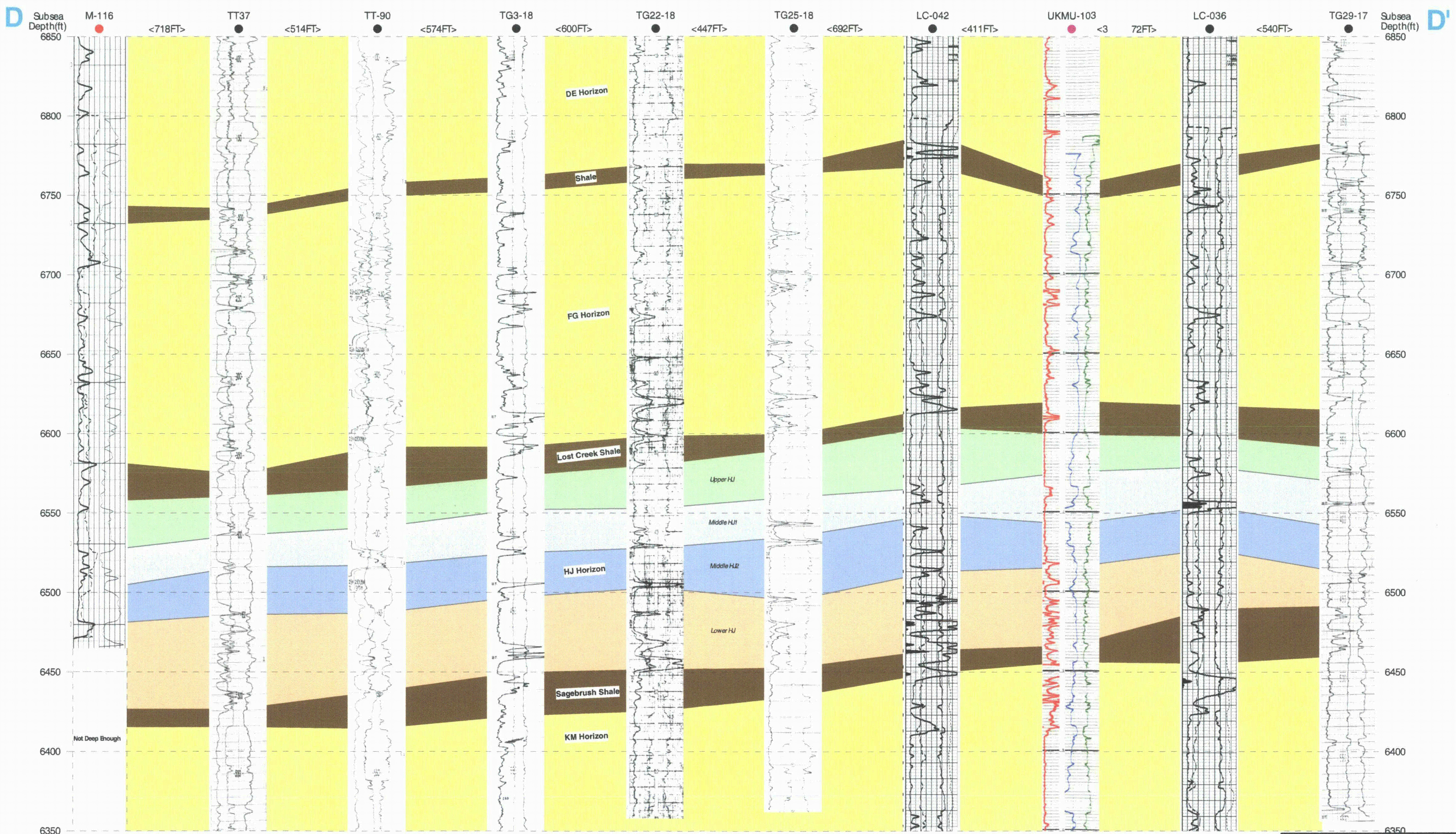
Lost Creek ISR, LLC

Figure 2-9

Structural Cross Section C - C'

Minue Unit 1

By: KRS Checked: AP



Petrotek

Lost Creek ISR, LLC

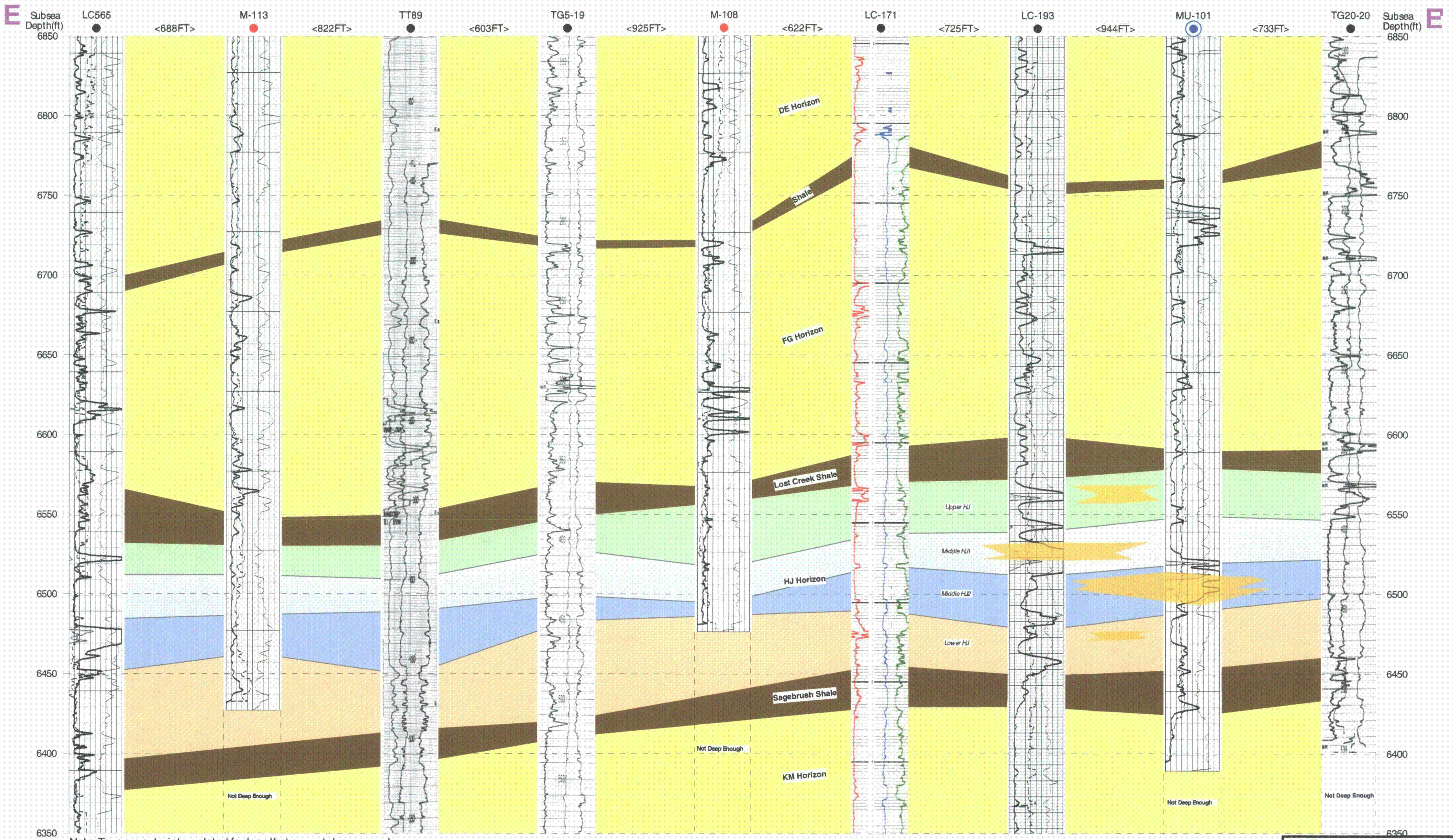
Figure 2-10

Structural Cross Section D- D'

Mine Unit 1

By: KRS Checked: AP

March 4,2010 9:15 AM



Note: Tops are auto-interpolated for logs that are not deep enough

Proposed Mining Interval

Petrotek

Lost Creek ISR, LLC

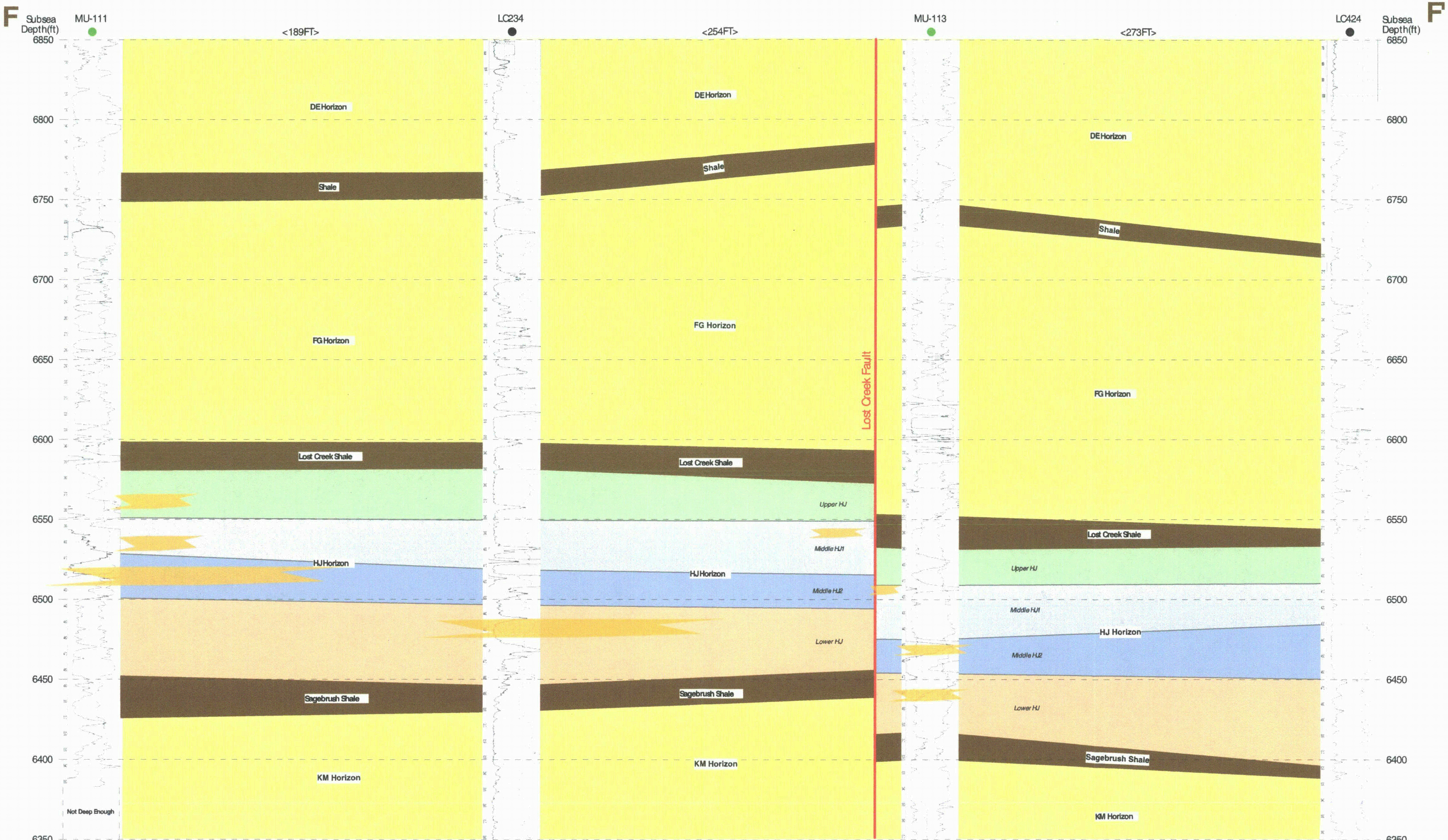
Figure 2-11

Structural Cross Section E- E'

Mine Unit 1

By: KRS Checked: AP

March 4,2010 9:45 AM



Note: Tops are auto-interpolated for logs that are not deep enough

Proposed Mining Interval

Petrotek

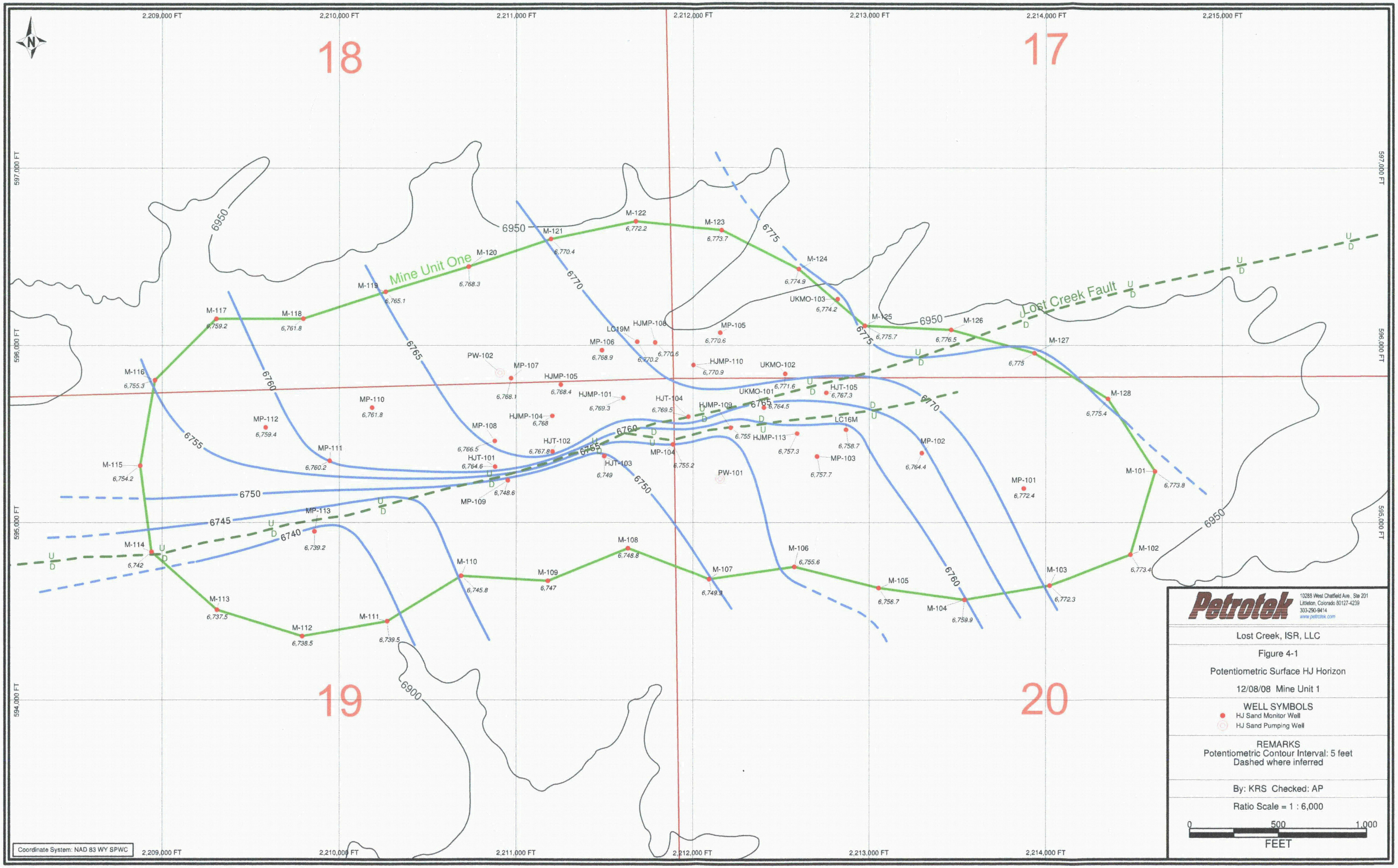
Lost Creek ISR, LLC

Figure 2-12

Structural Cross Section F - F'

Mine Unit 1

By: KRS Checked: AP



18
17
19
20
Mine Unit One
Lost Creek Fault
2,209,000 FT
2,210,000 FT
2,211,000 FT
2,212,000 FT
2,213,000 FT
2,214,000 FT
2,215,000 FT
597,000 FT
596,000 FT
595,000 FT
594,000 FT
6950
6900
6775
6770
6765
6760
6755
6750
6745
6740
Coordinate System: NAD 83 WY SPWC
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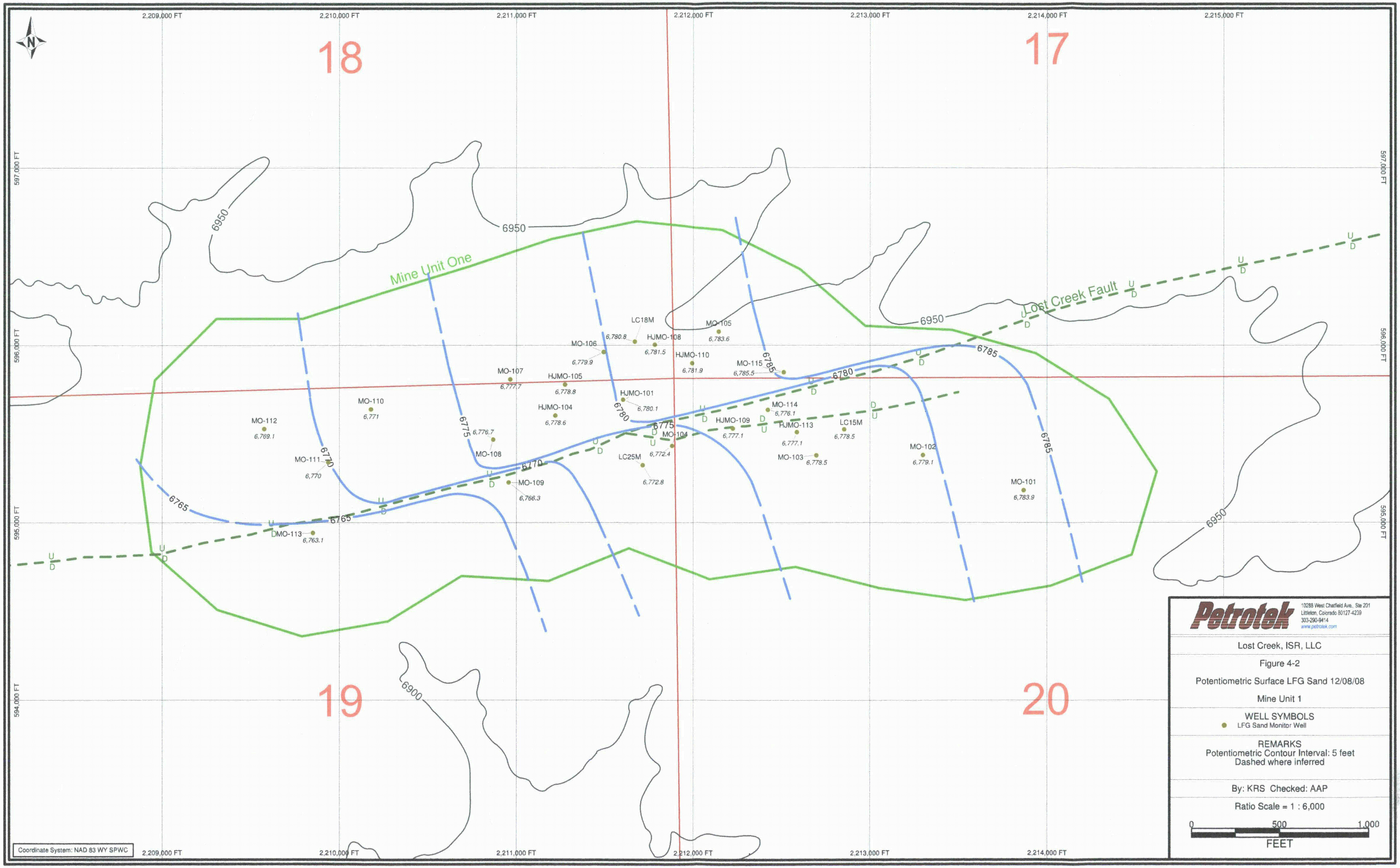
Figure 4-1
Potentiometric Surface HJ Horizon
12/08/08 Mine Unit 1
WELL SYMBOLS
HJ Sand Monitor Well
HJ Sand Pumping Well
REMARKS
Potentiometric Contour Interval: 5 feet
Dashed where inferred
By: KRS Checked: AP
Ratio Scale = 1 : 6,000
0
500
1,000
FEET



2,209,000 FT
2,210,000 FT
2,211,000 FT
2,212,000 FT
2,213,000 FT
2,214,000 FT
2,215,000 FT
597,000 FT
596,000 FT
595,000 FT
594,000 FT
N
18
17
19
20
6950
6900
Mine Unit One
Lost Creek Fault
6765
6770
6775
6780
6785
U
D
LC18M
MO-105
6,783.6
MO-106
6,779.9
6,780.8
HJMO-108
6,781.5
HJMO-110
6,781.9
MO-115
6,785.5
MO-107
6,777.7
HJMO-105
6,778.8
HJMO-101
6,780.1
MO-110
6,771
HJMO-104
6,778.6
MO-112
6,769.1
MO-114
6,776.1
HJMO-109
6,777.1
HJMO-113
6,777.1
LC15M
6,778.5
MO-104
6,772.4
6,776.7
MO-108
MO-111
6,770
LC25M
6,772.8
MO-103
6,778.5
MO-102
6,779.1
MO-109
6,766.3
MO-101
6,783.9
MO-113
6,763.1
Coordinate System: NAD 83 WY SPWC
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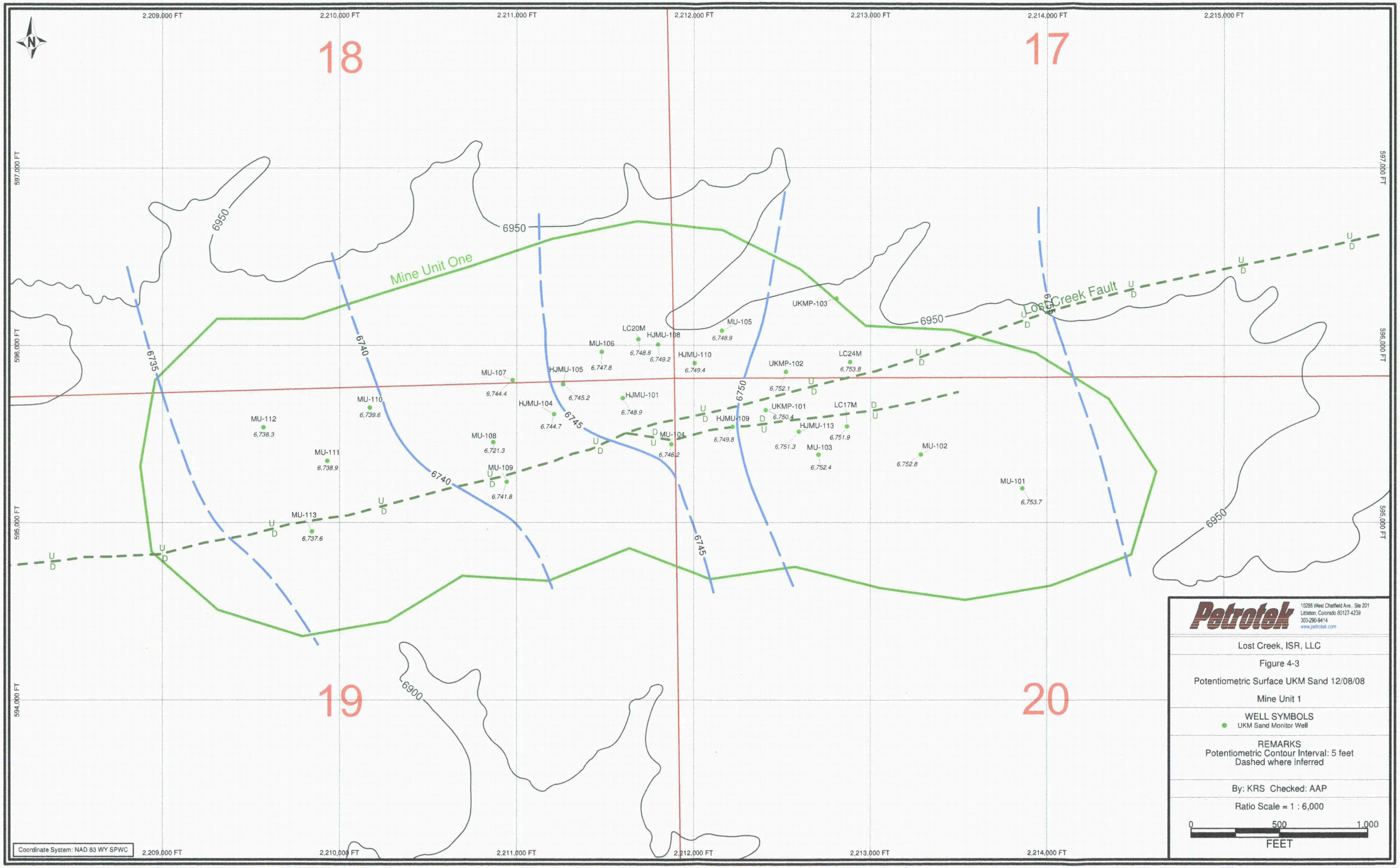
Figure 4-2
Potentiometric Surface LFG Sand 12/08/08
Mine Unit 1
WELL SYMBOLS
LFG Sand Monitor Well
REMARKS
Potentiometric Contour Interval: 5 feet
Dashed where inferred
By: KRS Checked: AAP
Ratio Scale = 1 : 6,000
0
500
1,000
FEET



2,209,000 FT
2,210,000 FT
2,211,000 FT
2,212,000 FT
2,213,000 FT
2,214,000 FT
2,215,000 FT
597,000 FT
596,000 FT
595,000 FT
594,000 FT
18
17
19
20
6950
6900
6735
6740
6745
6750
Mine Unit One
Lost Creek Fault
U
D
MU-112 6,738.3
MU-110 6,739.6
MU-111 6,738.9
MU-113 6,737.6
MU-107 6,744.4
MU-108 6,721.3
MU-109 6,741.8
HJMU-104 6,744.7
HJMU-105 6,745.2
MU-106 6,747.8
LC20M 6,748.8
HJMU-108 6,749.2
HJMU-101 6,748.9
HJMU-110 6,749.4
MU-104 6,746.2
MU-105 6,748.9
HJMU-109 6,749.8
UKMP-103
UKMP-102 6,752.1
UKMP-101 6,750.4
HJMU-113 6,751.3
LC24M 6,753.8
LC17M 6,751.9
MU-103 6,752.4
MU-102 6,752.8
MU-101 6,753.7
Coordinate System: NAD 83 WY SPWC
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Figure 4-3
Potentiometric Surface UKM Sand 12/08/08
Mine Unit 1
WELL SYMBOLS
UKM Sand Monitor Well
REMARKS
Potentiometric Contour Interval: 5 feet
Dashed where inferred
By: KRS Checked: AAP
Ratio Scale = 1 : 6,000
0
500
1,000
FEET

Figure 5-1
Barometric Corrections and Observed Water Level Elevations
North Test, Well MP-106

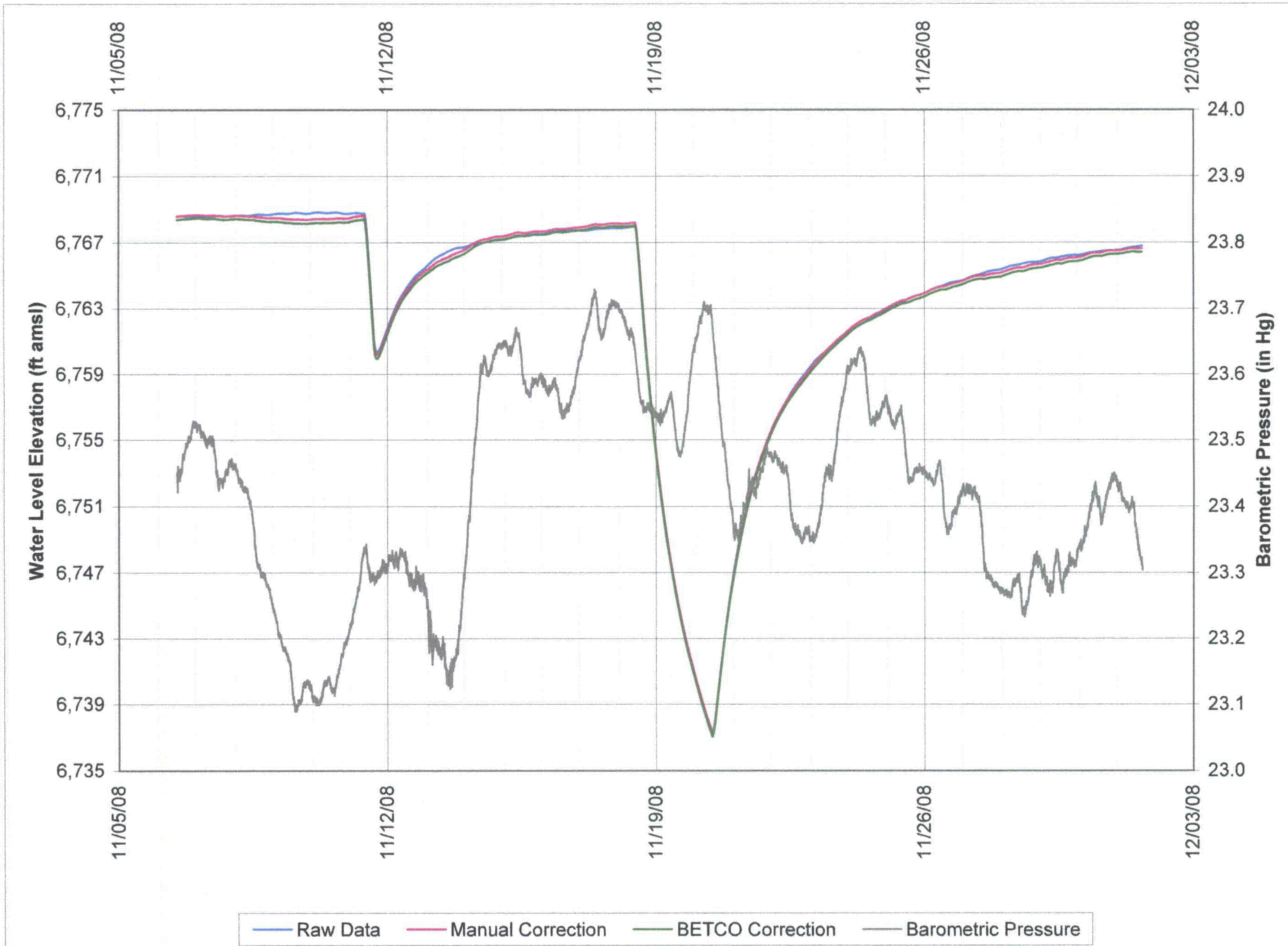
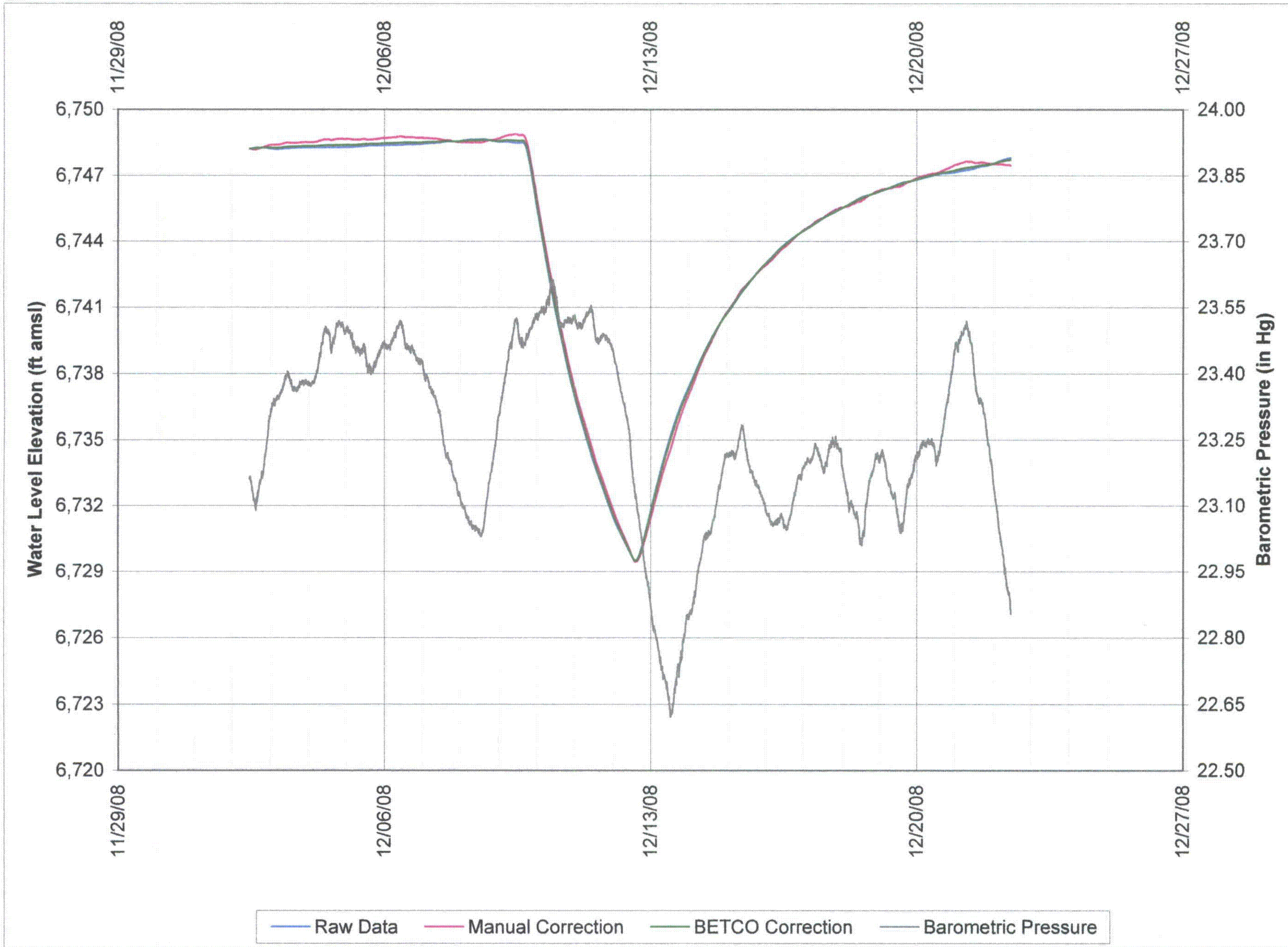
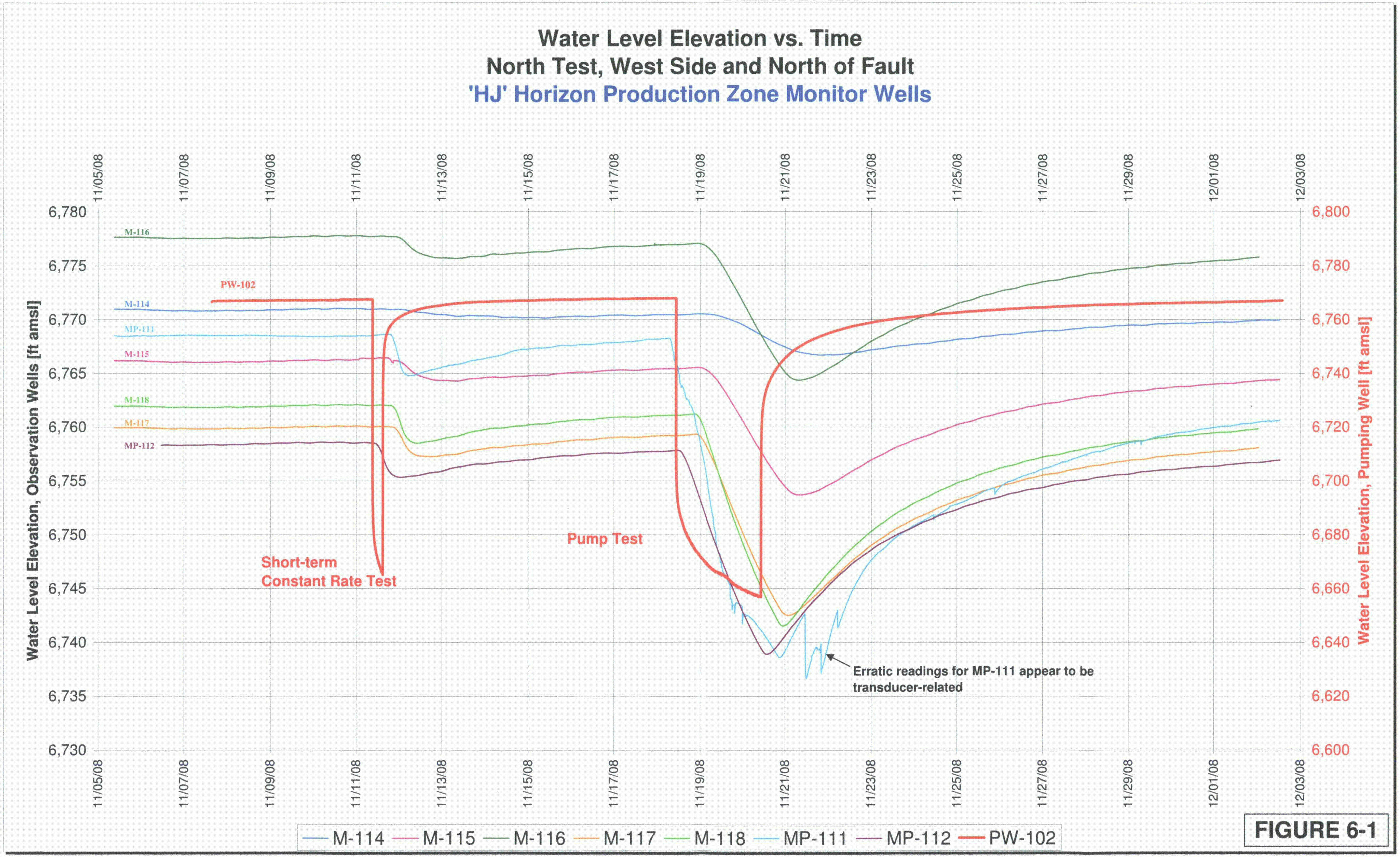


Figure 5-2
Barometric Corrections and Observed Water Level Elevation
South Test, Well MP-109





Water Level Elevation vs. Time
North Test, West Side and North of Fault
'HJ' Horizon Production Zone Monitor Wells
Water Level Elevation, Observation Wells [ft amsl]
Water Level Elevation, Pumping Well [ft amsl]
M-116
PW-102
M-114
MP-111
M-115
M-118
M-117
MP-112
Short-term
Constant Rate Test
Pump Test
Erratic readings for MP-111 appear to be transducer-related
M-114
M-115
M-116
M-117
M-118
MP-111
MP-112
PW-102

FIGURE 6-1

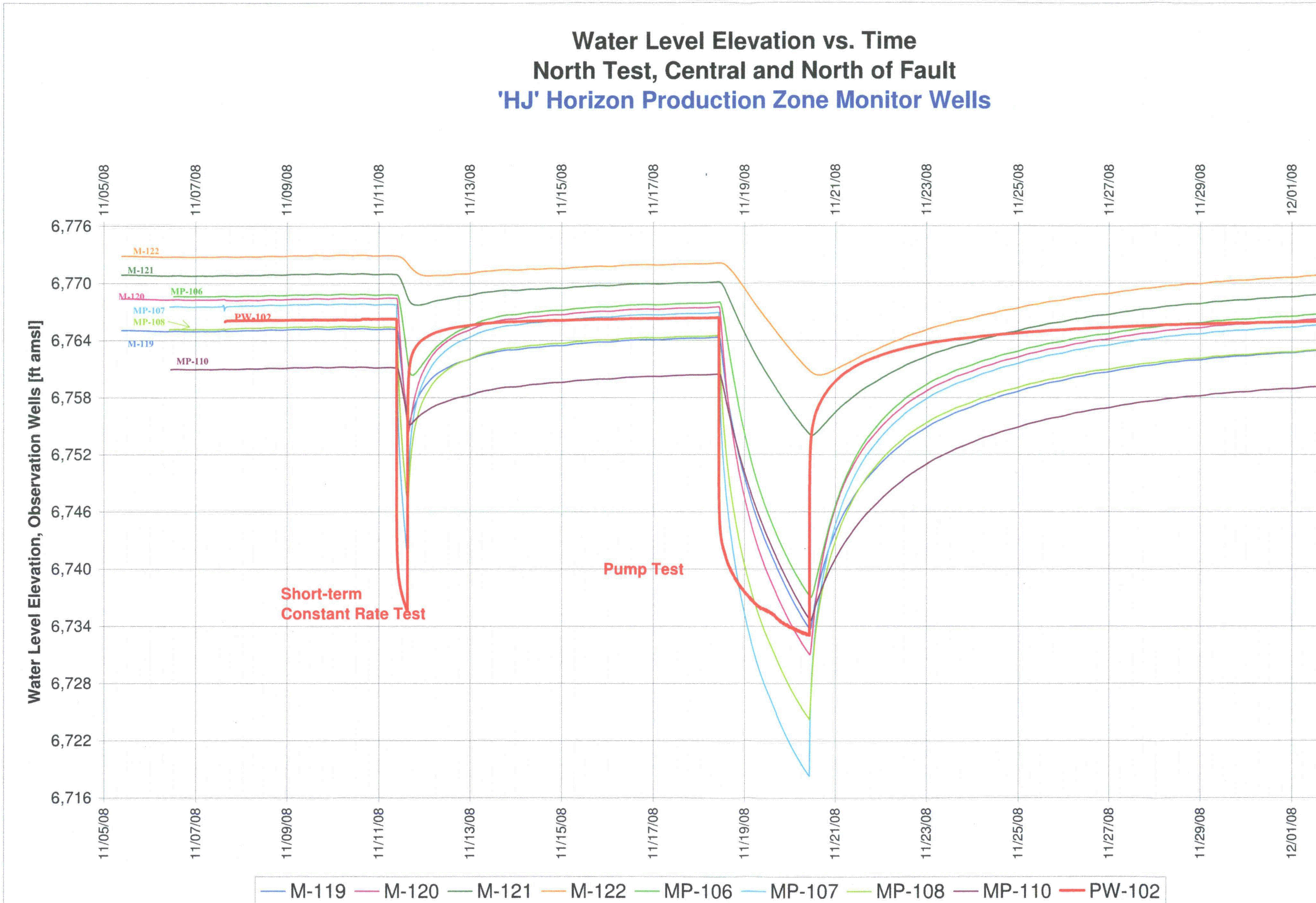
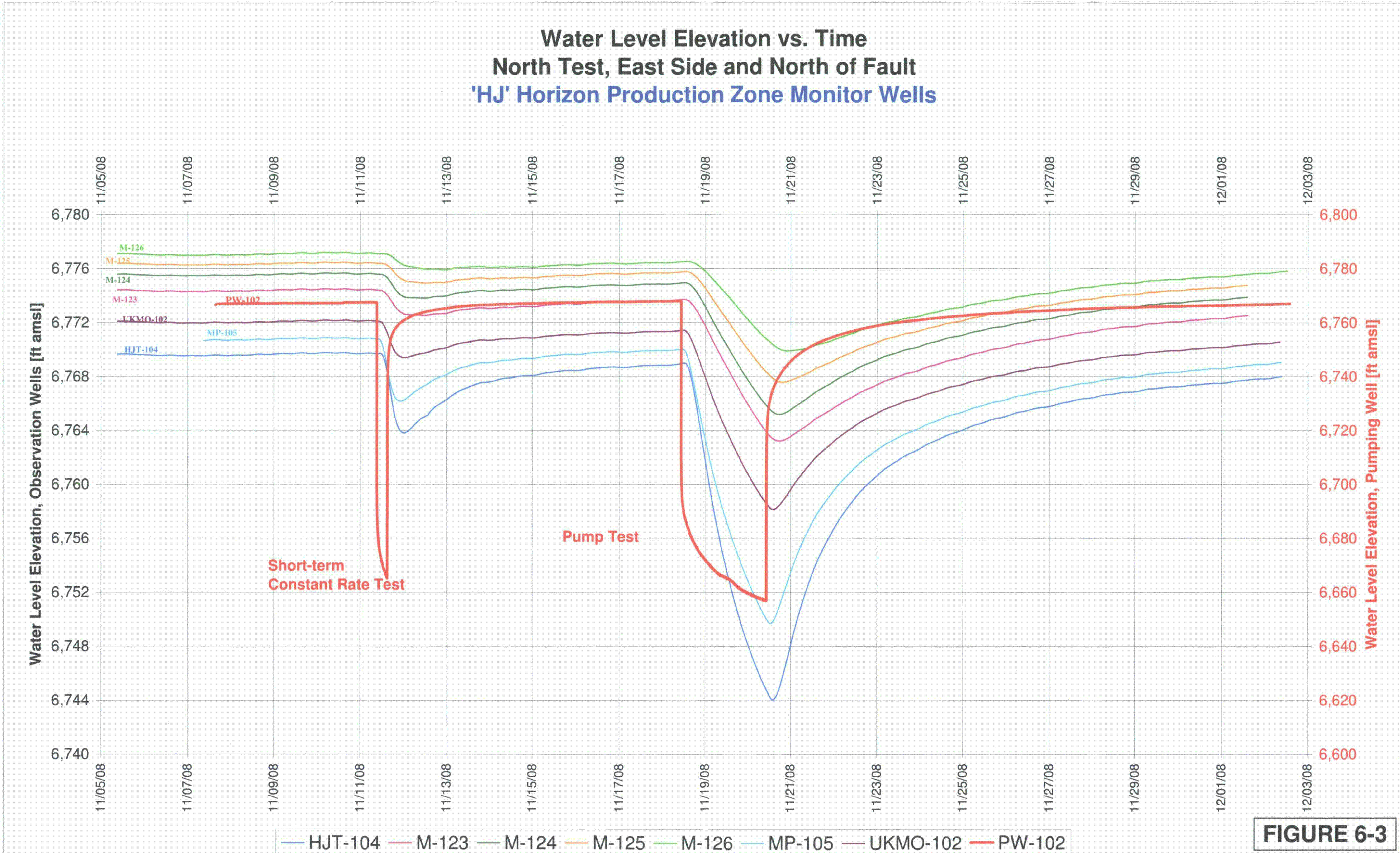
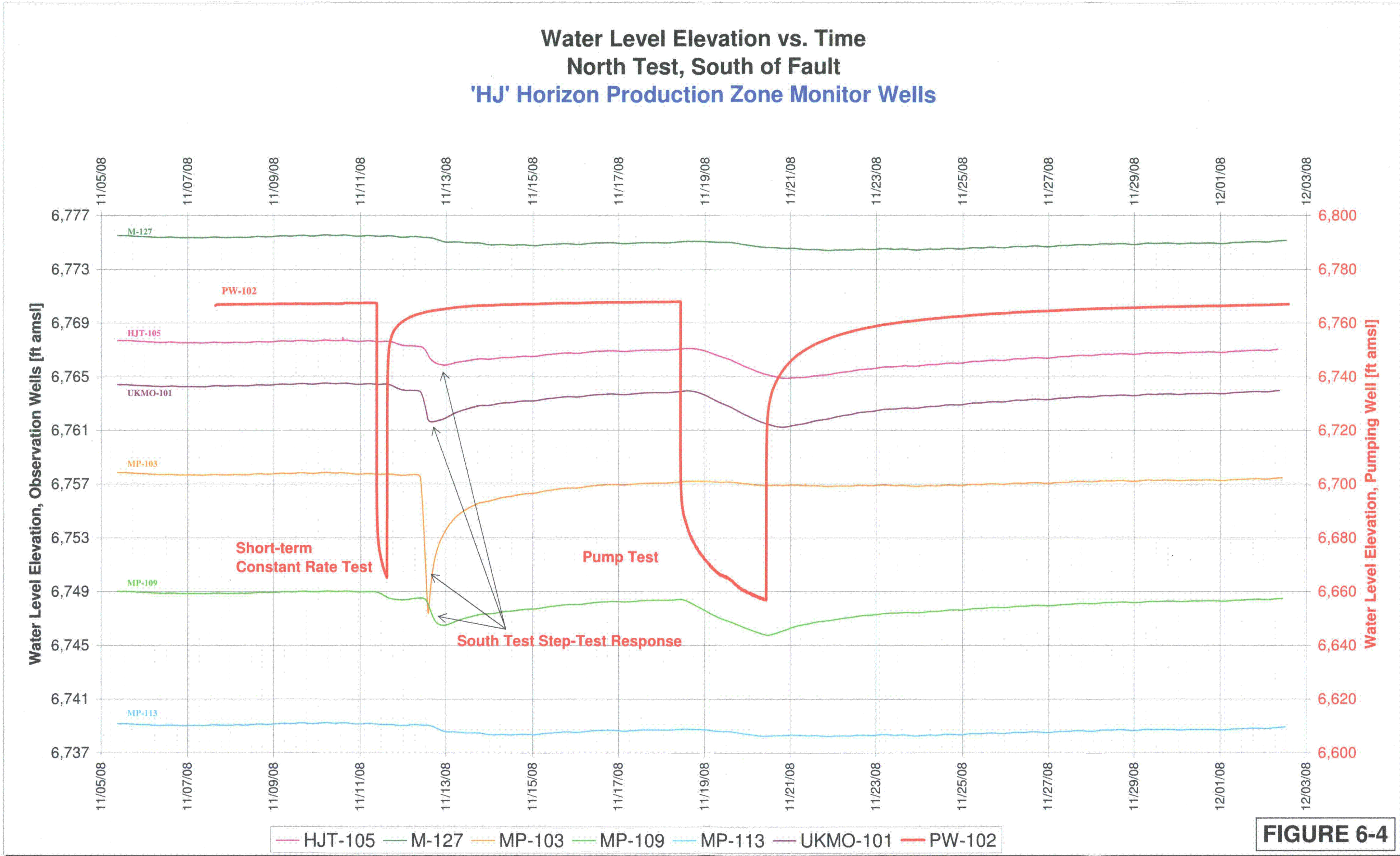

Water Level Elevation vs. Time
North Test, Central and North of Fault
'HJ' Horizon Production Zone Monitor Wells
Water Level Elevation, Observation Wells [ft amsl]
Water Level Elevation, Pumping Well [ft amsl]
6,776
6,770
6,764
6,758
6,752
6,746
6,740
6,734
6,728
6,722
6,716
6,800
6,780
6,760
6,740
6,720
6,700
6,680
6,660
6,640
6,620
6,600
11/05/08
11/07/08
11/09/08
11/11/08
11/13/08
11/15/08
11/17/08
11/19/08
11/21/08
11/23/08
11/25/08
11/27/08
11/29/08
12/01/08
12/03/08
M-122
M-121
M-120
MP-106
MP-107
MP-108
PW-102
M-119
MP-110
Short-term
Constant Rate Test
Pump Test
M-119
M-120
M-121
M-122
MP-106
MP-107
MP-108
MP-110
PW-102

FIGURE 6-2



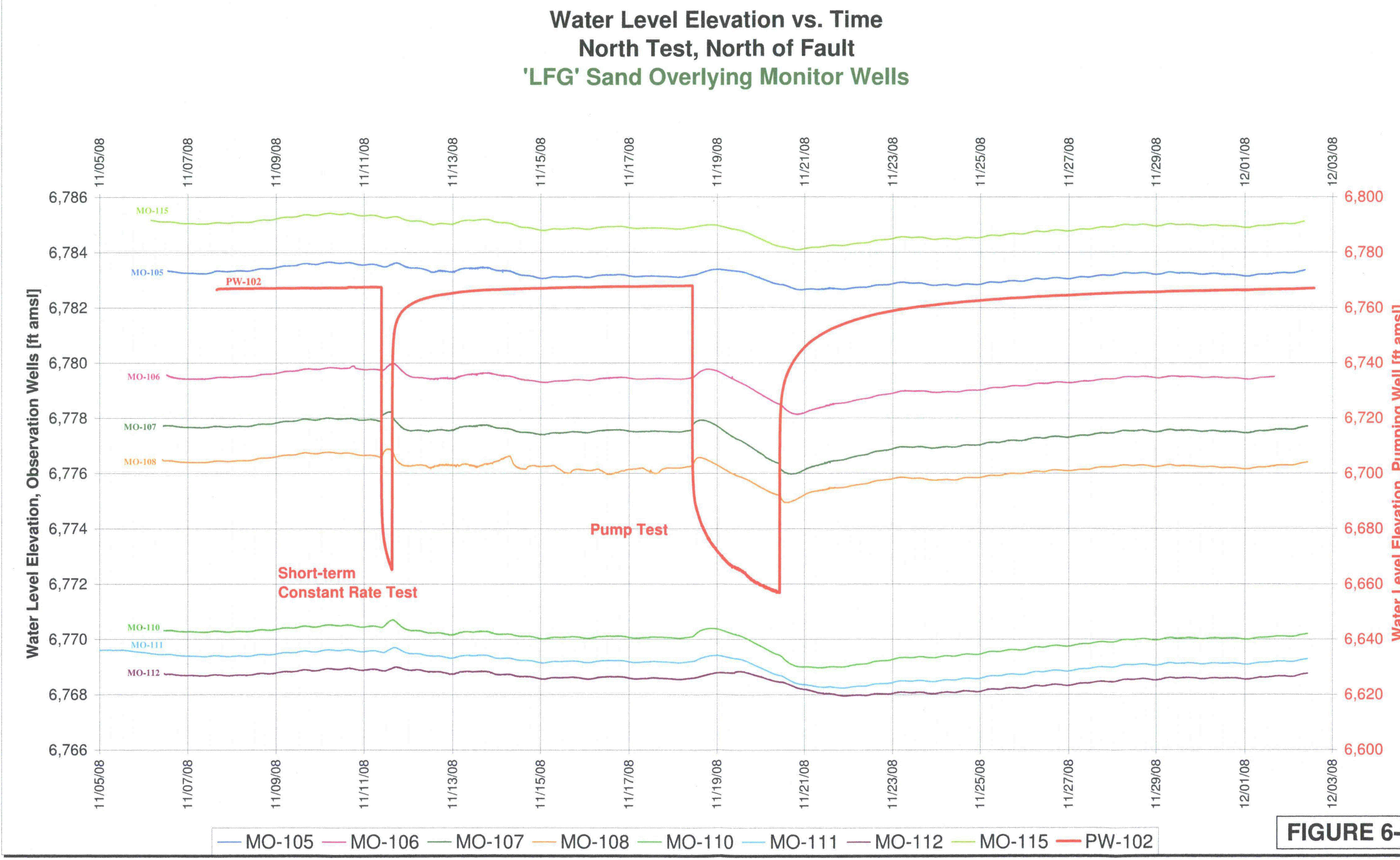
Water Level Elevation vs. Time
North Test, East Side and North of Fault
'HJ' Horizon Production Zone Monitor Wells
Water Level Elevation, Observation Wells [ft amsl]
Water Level Elevation, Pumping Well [ft amsl]
6,780
6,776
6,772
6,768
6,764
6,760
6,756
6,752
6,748
6,744
6,740
6,800
6,780
6,760
6,740
6,720
6,700
6,680
6,660
6,640
6,620
6,600
11/05/08
11/07/08
11/09/08
11/11/08
11/13/08
11/15/08
11/17/08
11/19/08
11/21/08
11/23/08
11/25/08
11/27/08
11/29/08
12/01/08
12/03/08
M-126
M-125
M-124
M-123
PW-102
UKMO-102
MP-105
HJT-104
Pump Test
Short-term
Constant Rate Test
HJT-104
M-123
M-124
M-125
M-126
MP-105
UKMO-102
PW-102

FIGURE 6-3



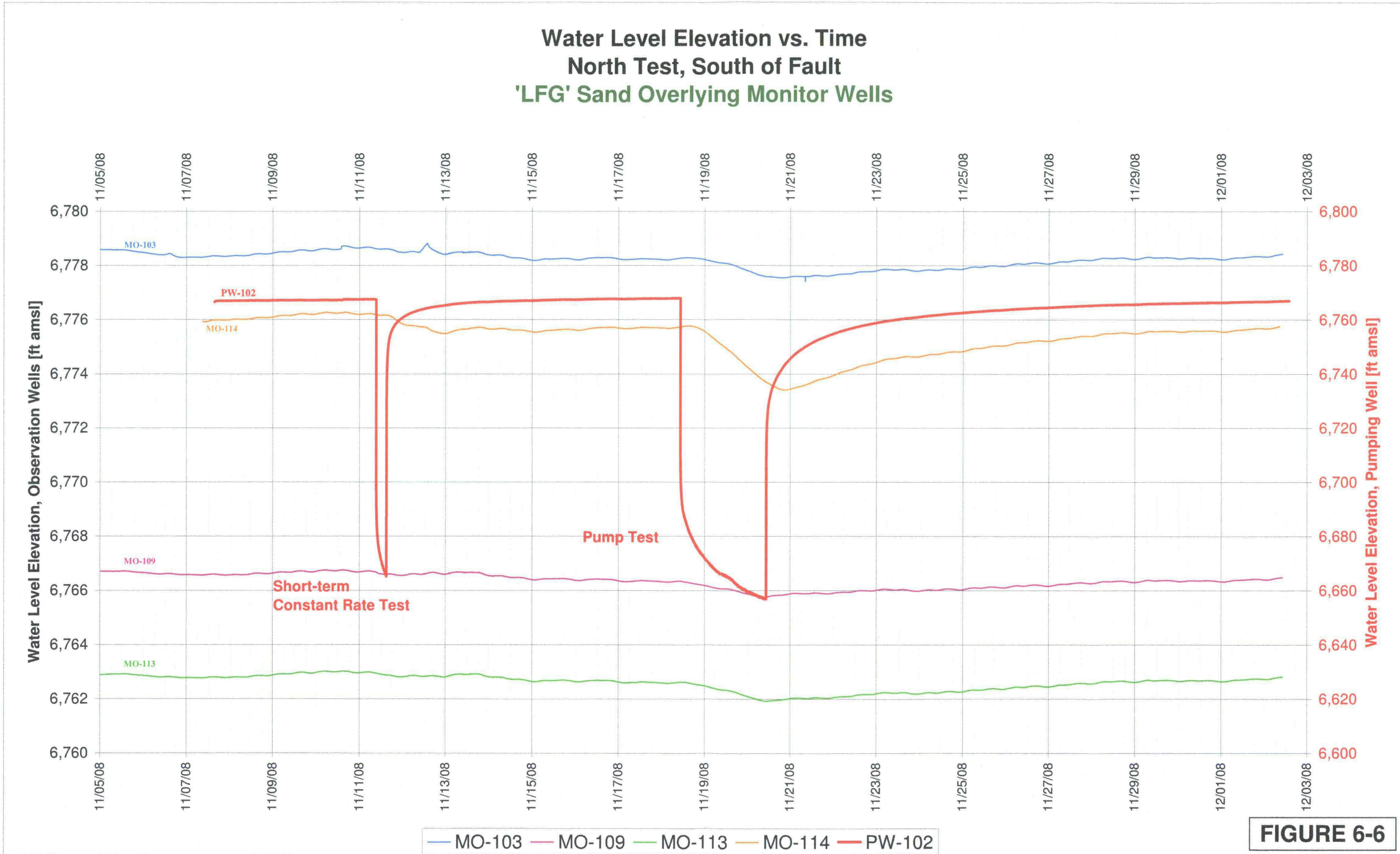
Water Level Elevation vs. Time
North Test, South of Fault
'HJ' Horizon Production Zone Monitor Wells
Water Level Elevation, Observation Wells [ft amsl]
Water Level Elevation, Pumping Well [ft amsl]
6,777
6,773
6,769
6,765
6,761
6,757
6,753
6,749
6,745
6,741
6,737
6,800
6,780
6,760
6,740
6,720
6,700
6,680
6,660
6,640
6,620
6,600
11/05/08
11/07/08
11/09/08
11/11/08
11/13/08
11/15/08
11/17/08
11/19/08
11/21/08
11/23/08
11/25/08
11/27/08
11/29/08
12/01/08
12/03/08
M-127
PW-102
HJT-105
UKMO-101
MP-103
MP-109
MP-113
Short-term
Constant Rate Test
Pump Test
South Test Step-Test Response
HJT-105
M-127
MP-103
MP-109
MP-113
UKMO-101
PW-102

FIGURE 6-4



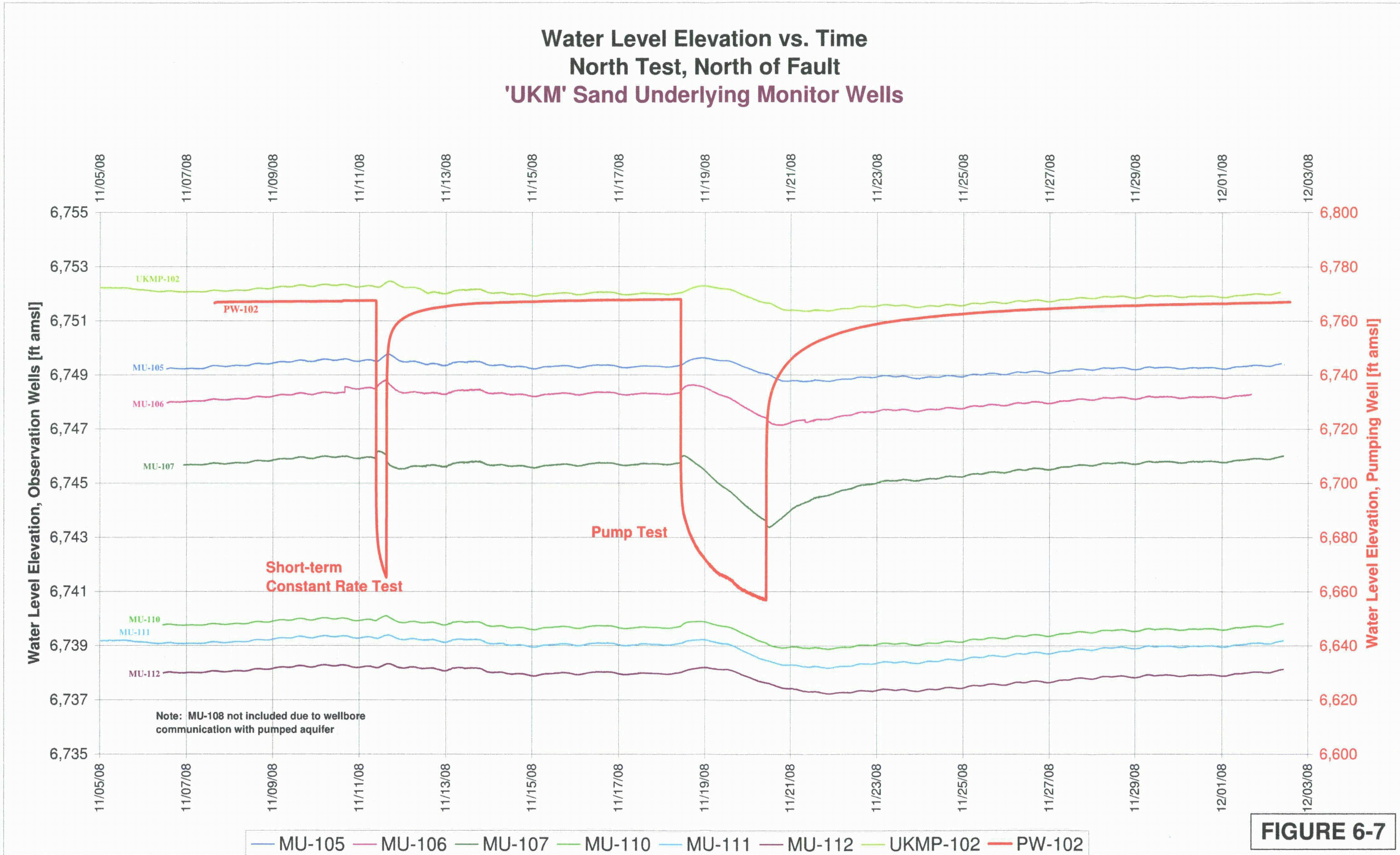
Water Level Elevation vs. Time
North Test, North of Fault
'LFG' Sand Overlying Monitor Wells
Water Level Elevation, Observation Wells [ft amsl]
Water Level Elevation, Pumping Well [ft amsl]
6,786
6,784
6,782
6,780
6,778
6,776
6,774
6,772
6,770
6,768
6,766
6,800
6,780
6,760
6,740
6,720
6,700
6,680
6,660
6,640
6,620
6,600
11/05/08
11/07/08
11/09/08
11/11/08
11/13/08
11/15/08
11/17/08
11/19/08
11/21/08
11/23/08
11/25/08
11/27/08
11/29/08
12/01/08
12/03/08
MO-115
MO-105
PW-102
MO-106
MO-107
MO-108
Pump Test
Short-term
Constant Rate Test
MO-110
MO-111
MO-112
MO-105
MO-106
MO-107
MO-108
MO-110
MO-111
MO-112
MO-115
PW-102

FIGURE 6-5



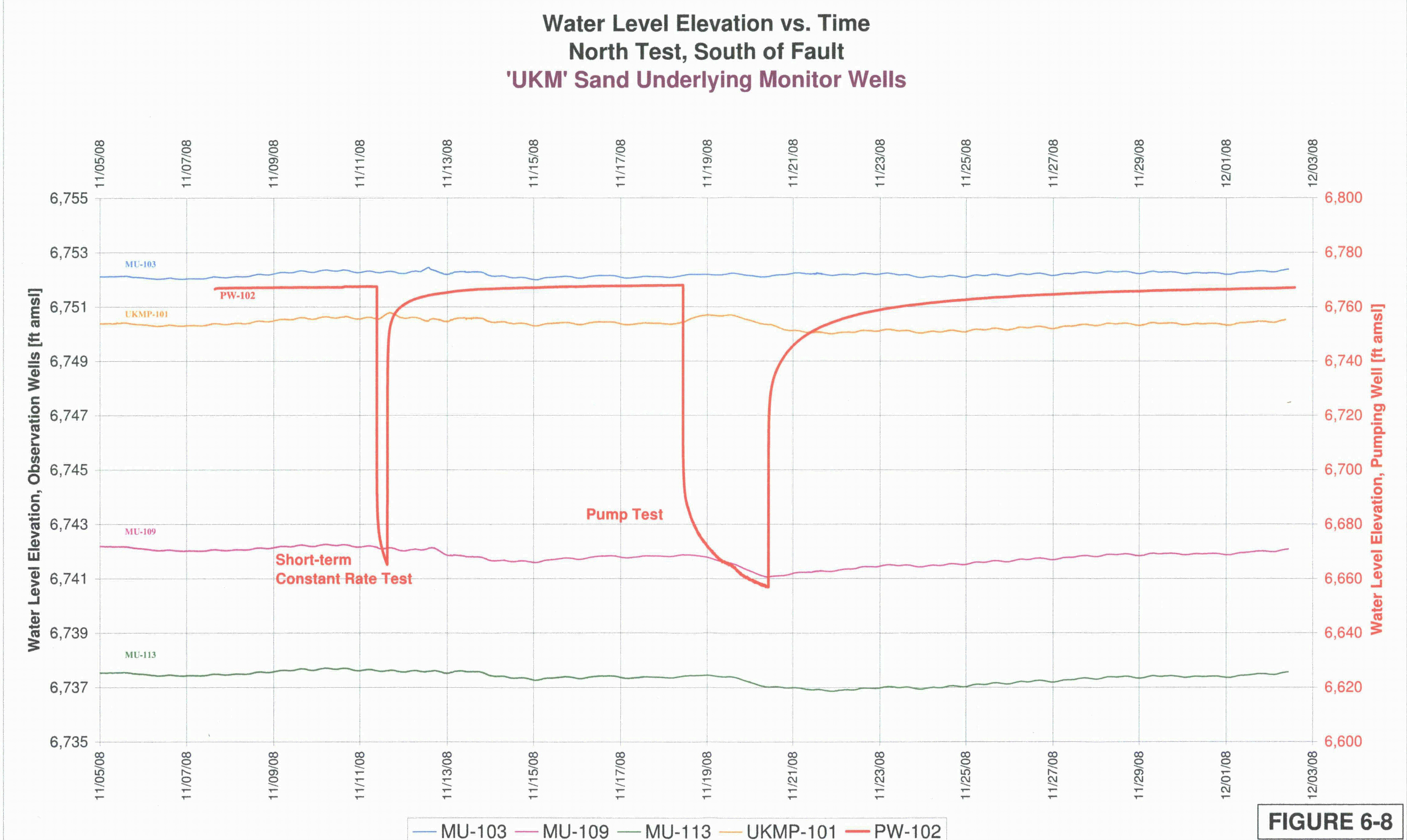
Water Level Elevation vs. Time
North Test, South of Fault
'LFG' Sand Overlying Monitor Wells
11/05/08
11/07/08
11/09/08
11/11/08
11/13/08
11/15/08
11/17/08
11/19/08
11/21/08
11/23/08
11/25/08
11/27/08
11/29/08
12/01/08
12/03/08
6,780
6,778
6,776
6,774
6,772
6,770
6,768
6,766
6,764
6,762
6,760
6,800
6,780
6,760
6,740
6,720
6,700
6,680
6,660
6,640
6,620
6,600
Water Level Elevation, Observation Wells [ft amsl]
Water Level Elevation, Pumping Well [ft amsl]
MO-103
PW-102
MO-114
MO-109
MO-113
Pump Test
Short-term
Constant Rate Test
MO-103
MO-109
MO-113
MO-114
PW-102

FIGURE 6-6



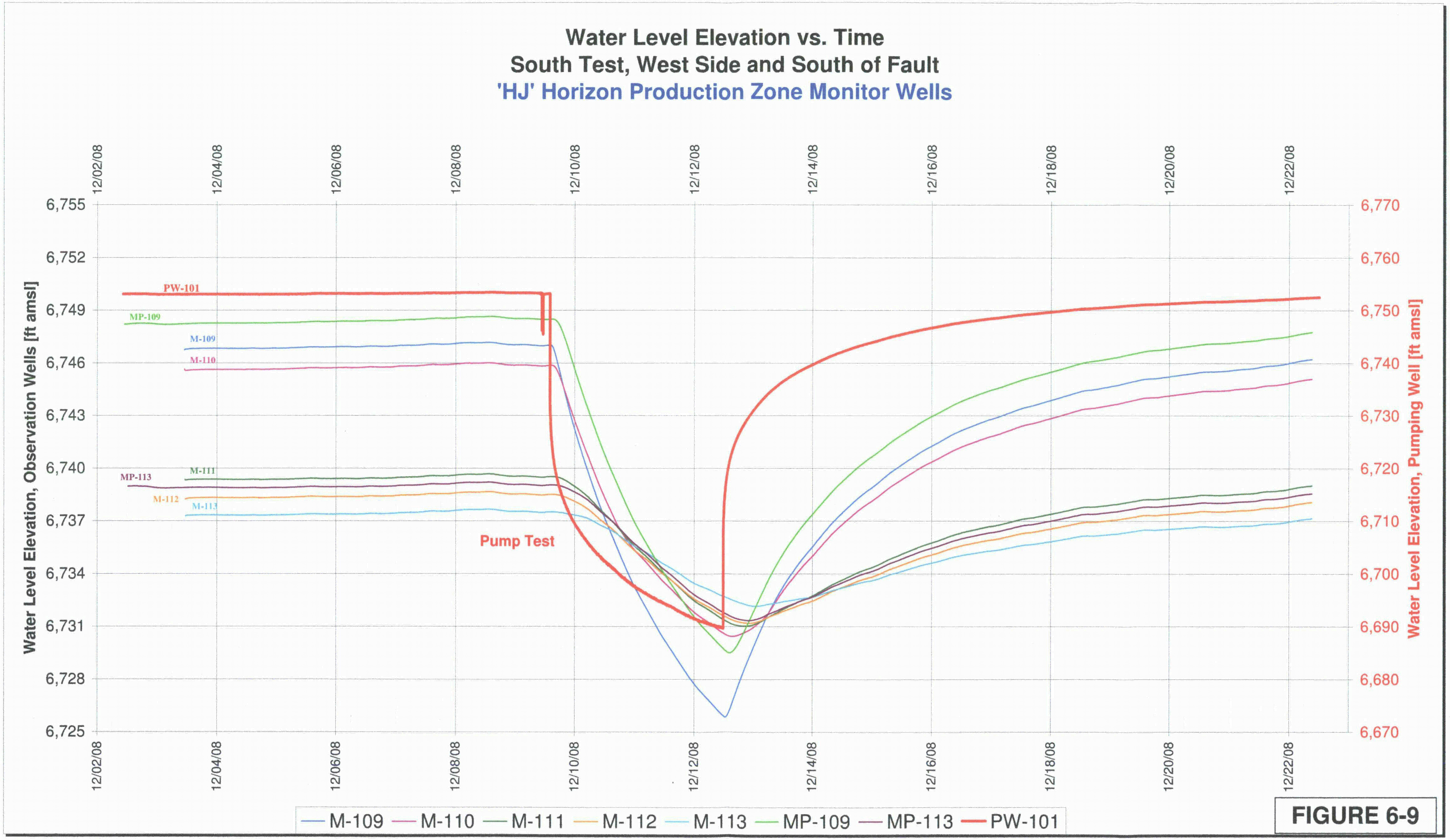
Water Level Elevation vs. Time
North Test, North of Fault
'UKM' Sand Underlying Monitor Wells
Water Level Elevation, Observation Wells [ft amsl]
Water Level Elevation, Pumping Well [ft amsl]
6,755
6,753
6,751
6,749
6,747
6,745
6,743
6,741
6,739
6,737
6,735
6,800
6,780
6,760
6,740
6,720
6,700
6,680
6,660
6,640
6,620
6,600
11/05/08
11/07/08
11/09/08
11/11/08
11/13/08
11/15/08
11/17/08
11/19/08
11/21/08
11/23/08
11/25/08
11/27/08
11/29/08
12/01/08
12/03/08
UKMP-102
PW-102
MU-105
MU-106
MU-107
MU-110
MU-111
MU-112
Short-term
Constant Rate Test
Pump Test
Note: MU-108 not included due to wellbore communication with pumped aquifer
MU-105
MU-106
MU-107
MU-110
MU-111
MU-112
UKMP-102
PW-102

FIGURE 6-7



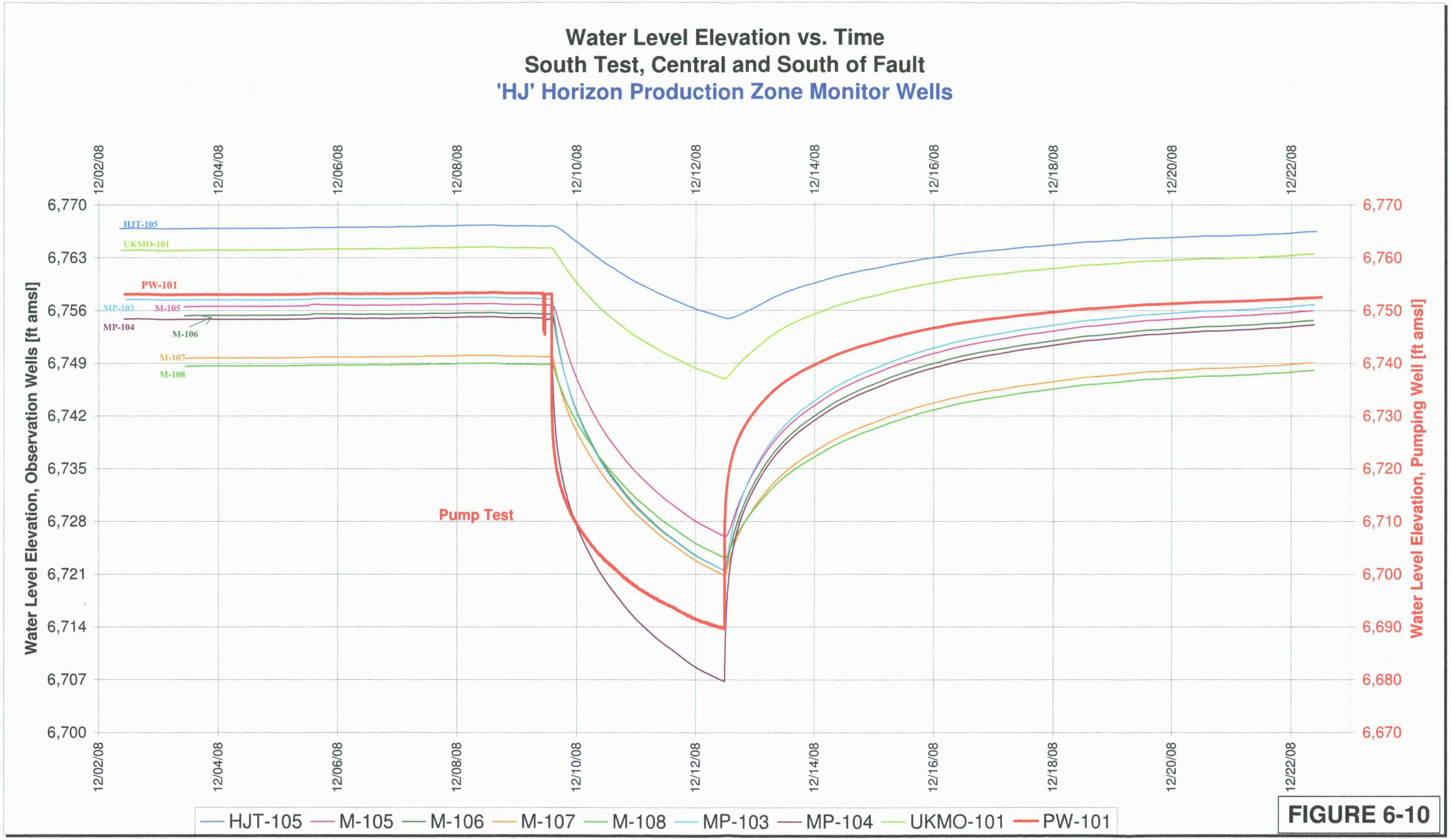
Water Level Elevation vs. Time
North Test, South of Fault
'UKM' Sand Underlying Monitor Wells
Water Level Elevation, Observation Wells [ft amsl]
Water Level Elevation, Pumping Well [ft amsl]
6,755
6,753
6,751
6,749
6,747
6,745
6,743
6,741
6,739
6,737
6,735
6,800
6,780
6,760
6,740
6,720
6,700
6,680
6,660
6,640
6,620
6,600
11/05/08
11/07/08
11/09/08
11/11/08
11/13/08
11/15/08
11/17/08
11/19/08
11/21/08
11/23/08
11/25/08
11/27/08
11/29/08
12/01/08
12/03/08
MU-103
PW-102
UKMP-101
MU-109
MU-113
Short-term
Constant Rate Test
Pump Test
MU-103 MU-109 MU-113 UKMP-101 PW-102

FIGURE 6-8



Water Level Elevation vs. Time
South Test, West Side and South of Fault
'HJ' Horizon Production Zone Monitor Wells
Water Level Elevation, Observation Wells [ft amsl]
Water Level Elevation, Pumping Well [ft amsl]
6,755
6,752
6,749
6,746
6,743
6,740
6,737
6,734
6,731
6,728
6,725
6,770
6,760
6,750
6,740
6,730
6,720
6,710
6,700
6,690
6,680
6,670
12/02/08
12/04/08
12/06/08
12/08/08
12/10/08
12/12/08
12/14/08
12/16/08
12/18/08
12/20/08
12/22/08
PW-101
MP-109
M-109
M-110
MP-113
M-111
M-112
M-113
Pump Test
M-109
M-110
M-111
M-112
M-113
MP-109
MP-113
PW-101

FIGURE 6-9



Water Level Elevation vs. Time
South Test, Central and South of Fault
'HJ' Horizon Production Zone Monitor Wells
12/02/08
12/04/08
12/06/08
12/08/08
12/10/08
12/12/08
12/14/08
12/16/08
12/18/08
12/20/08
12/22/08
6,770
6,763
6,756
6,749
6,742
6,735
6,728
6,721
6,714
6,707
6,700
Water Level Elevation, Observation Wells [ft amsl]
6,770
6,760
6,750
6,740
6,730
6,720
6,710
6,700
6,690
6,680
6,670
Water Level Elevation, Pumping Well [ft amsl]
HJT-105
UKMO-101
PW-101
MP-103
M-105
MP-104
M-106
M-107
M-108
Pump Test
HJT-105
M-105
M-106
M-107
M-108
MP-103
MP-104
UKMO-101
PW-101

FIGURE 6-10

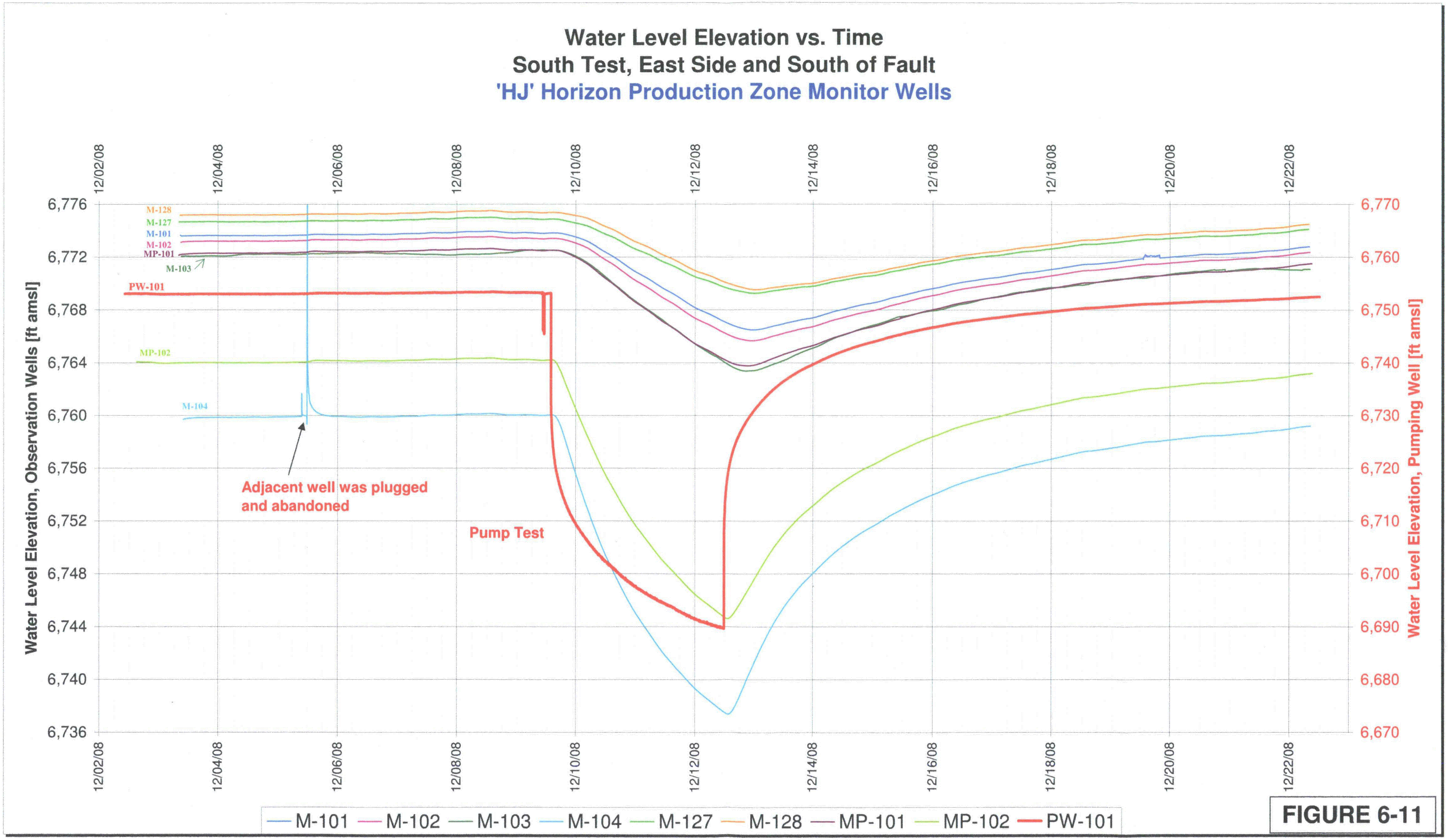

Water Level Elevation vs. Time
South Test, East Side and South of Fault
'HJ' Horizon Production Zone Monitor Wells
Water Level Elevation, Observation Wells [ft amsl]
Water Level Elevation, Pumping Well [ft amsl]
M-128
M-127
M-101
M-102
MP-101
M-103
PW-101
MP-102
M-104
Adjacent well was plugged and abandoned
Pump Test
M-101
M-102
M-103
M-104
M-127
M-128
MP-101
MP-102
PW-101

FIGURE 6-11

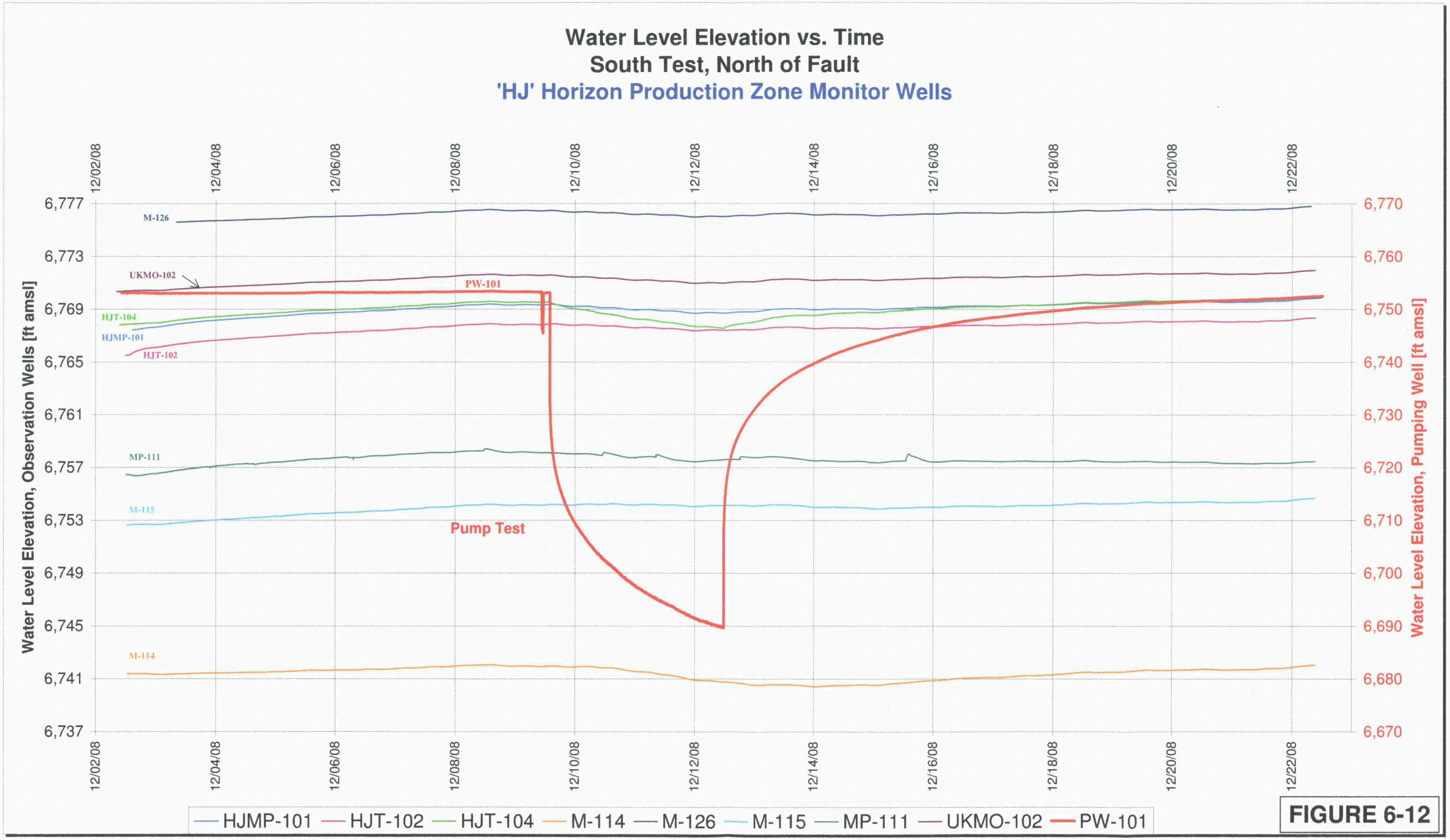
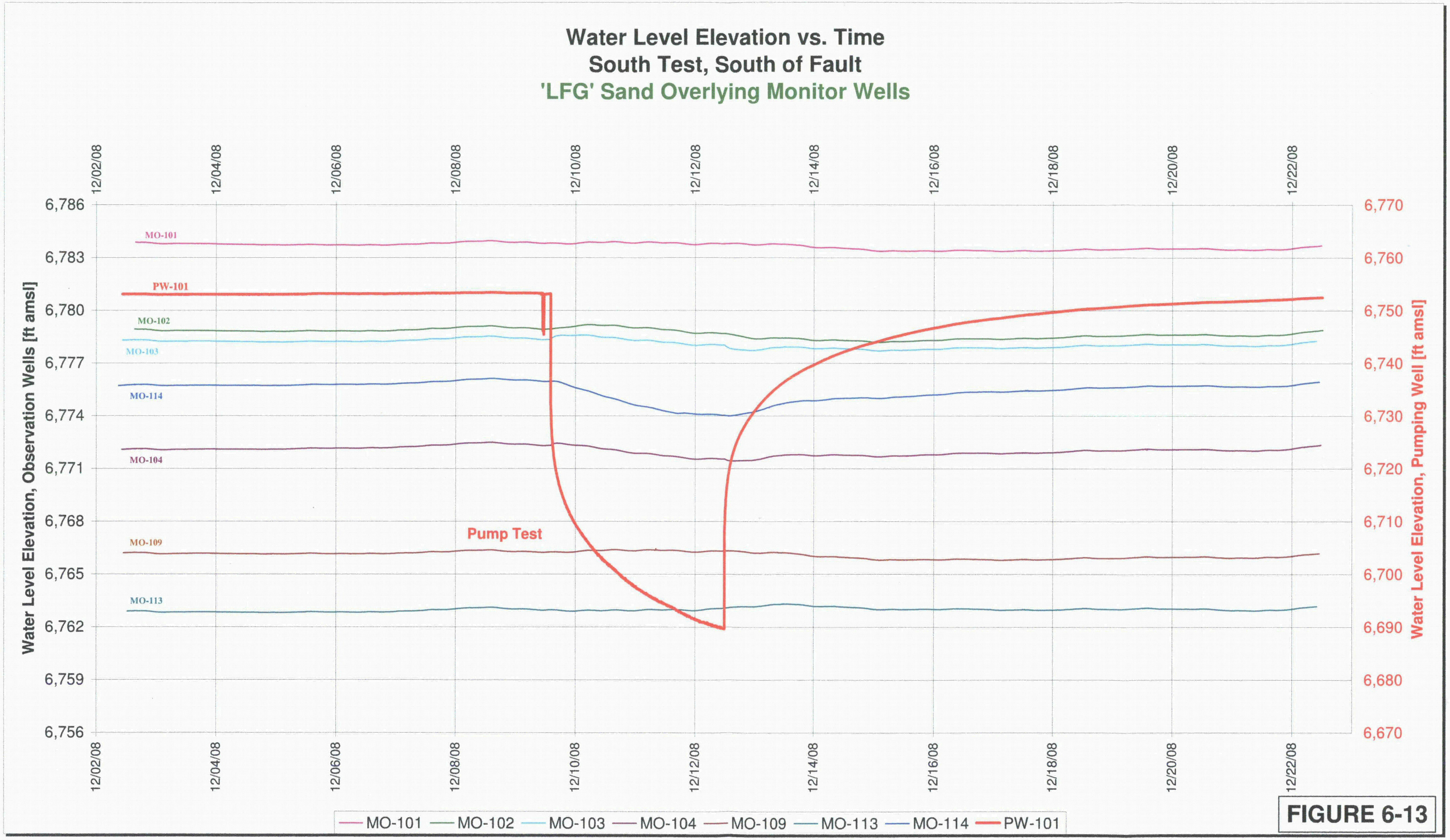
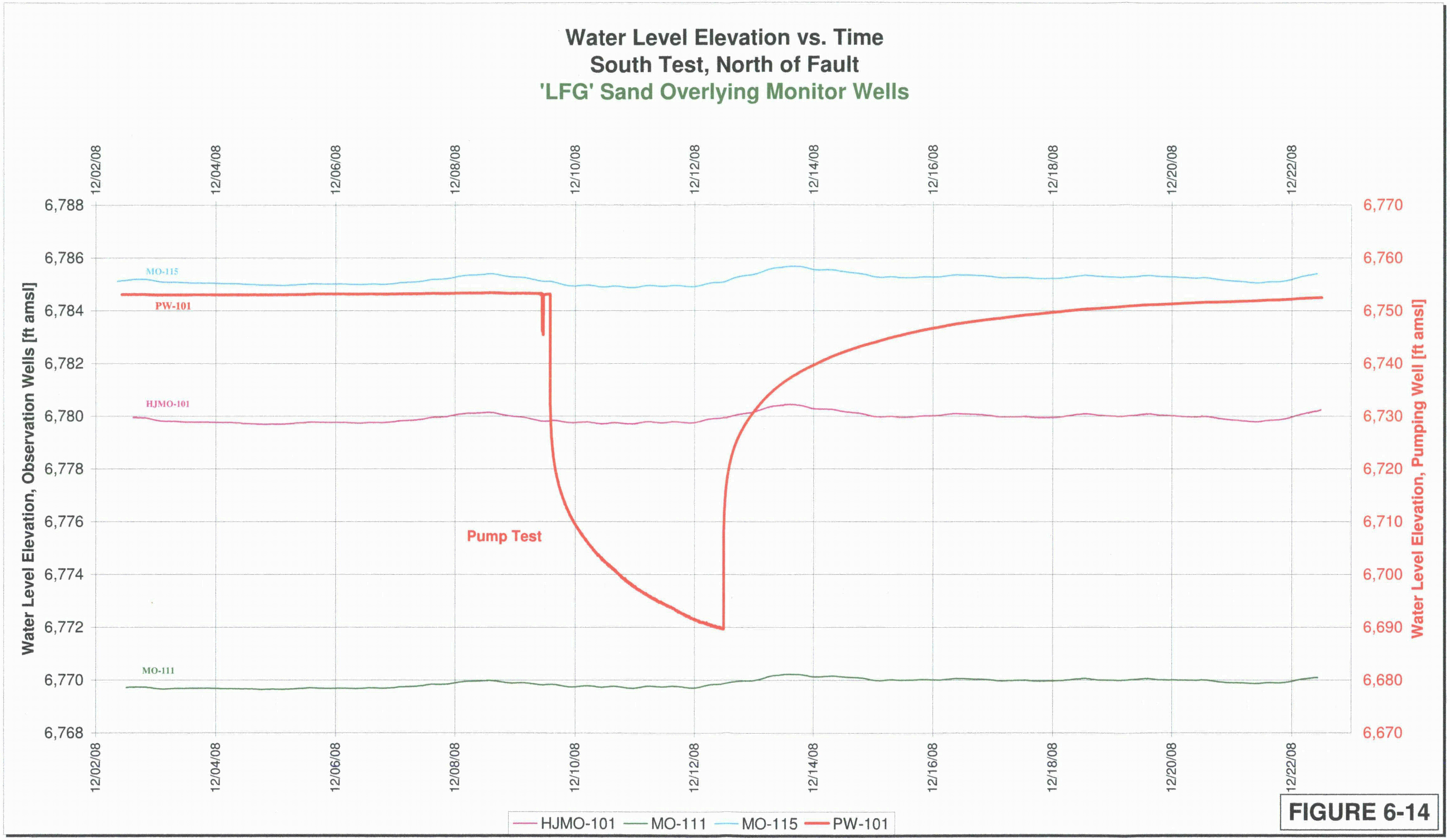

Water Level Elevation vs. Time
South Test, North of Fault
'HJ' Horizon Production Zone Monitor Wells
Water Level Elevation, Observation Wells [ft amsl]
Water Level Elevation, Pumping Well [ft amsl]
6,777
6,773
6,769
6,765
6,761
6,757
6,753
6,749
6,745
6,741
6,737
6,770
6,760
6,750
6,740
6,730
6,720
6,710
6,700
6,690
6,680
6,670
12/02/08
12/04/08
12/06/08
12/08/08
12/10/08
12/12/08
12/14/08
12/16/08
12/18/08
12/20/08
12/22/08
M-126
UKMO-102
PW-101
HJT-104
HJMP-101
HJT-102
MP-111
M-115
Pump Test
M-114
HJMP-101
HJT-102
HJT-104
M-114
M-126
M-115
MP-111
UKMO-102
PW-101

FIGURE 6-12



Water Level Elevation vs. Time
South Test, South of Fault
'LFG' Sand Overlying Monitor Wells
12/02/08
12/04/08
12/06/08
12/08/08
12/10/08
12/12/08
12/14/08
12/16/08
12/18/08
12/20/08
12/22/08
6,786
6,783
6,780
6,777
6,774
6,771
6,768
6,765
6,762
6,759
6,756
Water Level Elevation, Observation Wells [ft amsl]
6,770
6,760
6,750
6,740
6,730
6,720
6,710
6,700
6,690
6,680
6,670
Water Level Elevation, Pumping Well [ft amsl]
MO-101
PW-101
MO-102
MO-103
MO-114
MO-104
MO-109
MO-113
Pump Test
MO-101 MO-102 MO-103 MO-104 MO-109 MO-113 MO-114 PW-101

FIGURE 6-13



Water Level Elevation vs. Time
South Test, North of Fault
'LFG' Sand Overlying Monitor Wells
12/02/08
12/04/08
12/06/08
12/08/08
12/10/08
12/12/08
12/14/08
12/16/08
12/18/08
12/20/08
12/22/08
6,788
6,786
6,784
6,782
6,780
6,778
6,776
6,774
6,772
6,770
6,768
6,770
6,760
6,750
6,740
6,730
6,720
6,710
6,700
6,690
6,680
6,670
Water Level Elevation, Observation Wells [ft amsl]
Water Level Elevation, Pumping Well [ft amsl]
MO-115
PW-101
HJMO-101
MO-111
Pump Test
HJMO-101
MO-111
MO-115
PW-101

FIGURE 6-14

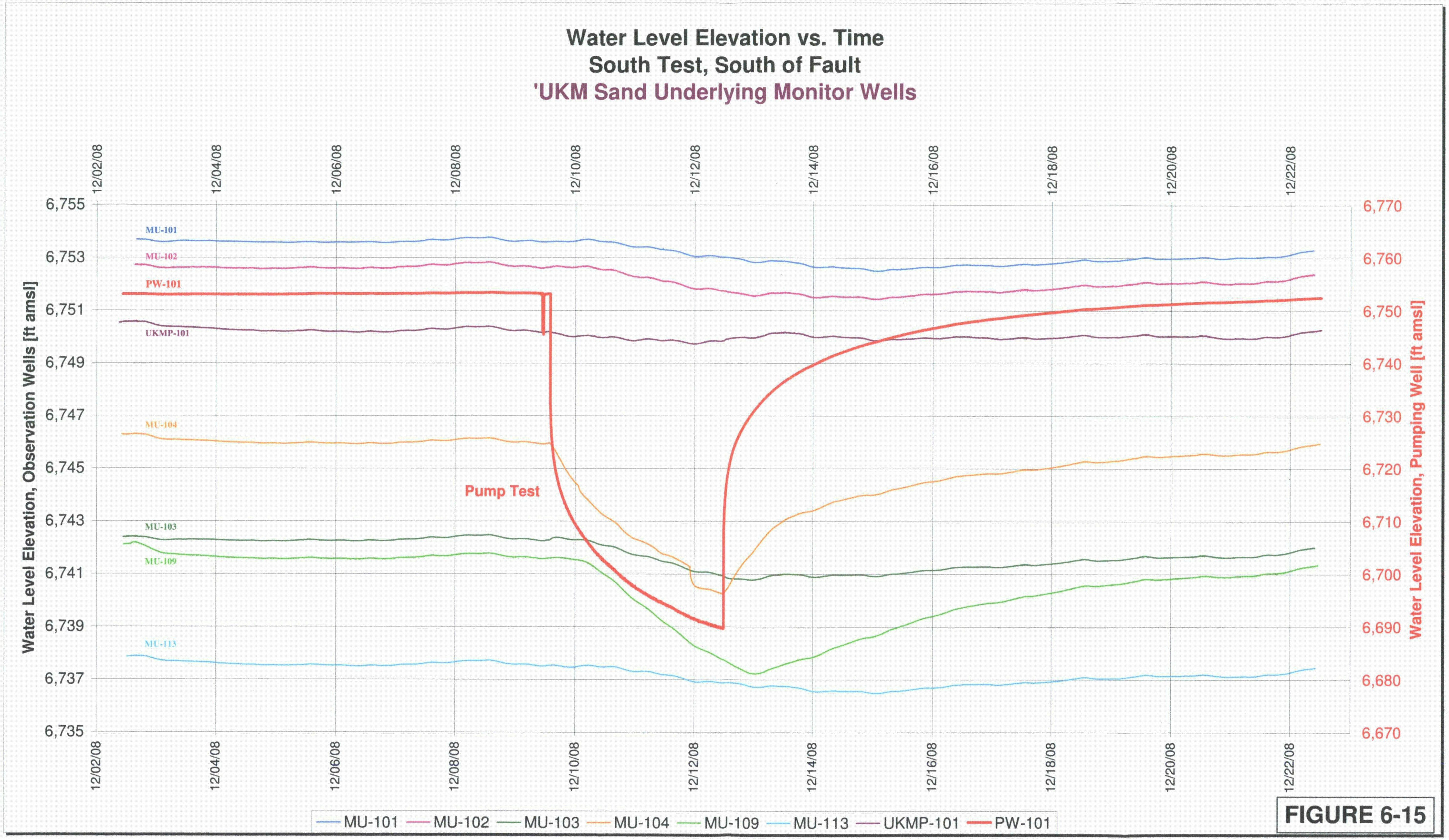

Water Level Elevation vs. Time
South Test, South of Fault
'UKM Sand Underlying Monitor Wells
12/02/08
12/04/08
12/06/08
12/08/08
12/10/08
12/12/08
12/14/08
12/16/08
12/18/08
12/20/08
12/22/08
6,755
6,753
6,751
6,749
6,747
6,745
6,743
6,741
6,739
6,737
6,735
Water Level Elevation, Observation Wells [ft amsl]
6,770
6,760
6,750
6,740
6,730
6,720
6,710
6,700
6,690
6,680
6,670
Water Level Elevation, Pumping Well [ft amsl]
MU-101
MU-102
PW-101
UKMP-101
MU-104
Pump Test
MU-103
MU-109
MU-113
MU-101 MU-102 MU-103 MU-104 MU-109 MU-113 UKMP-101 PW-101

FIGURE 6-15

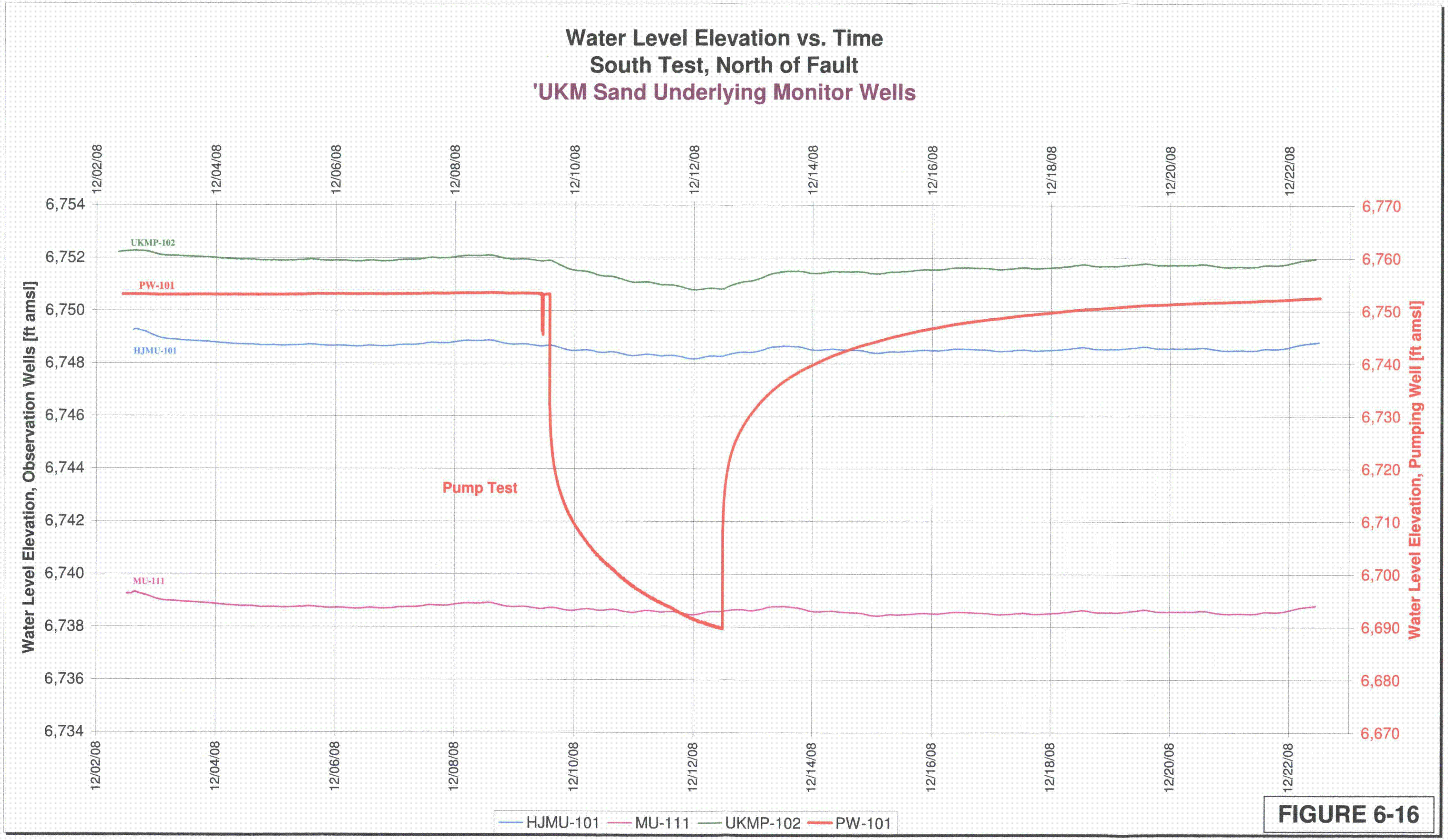
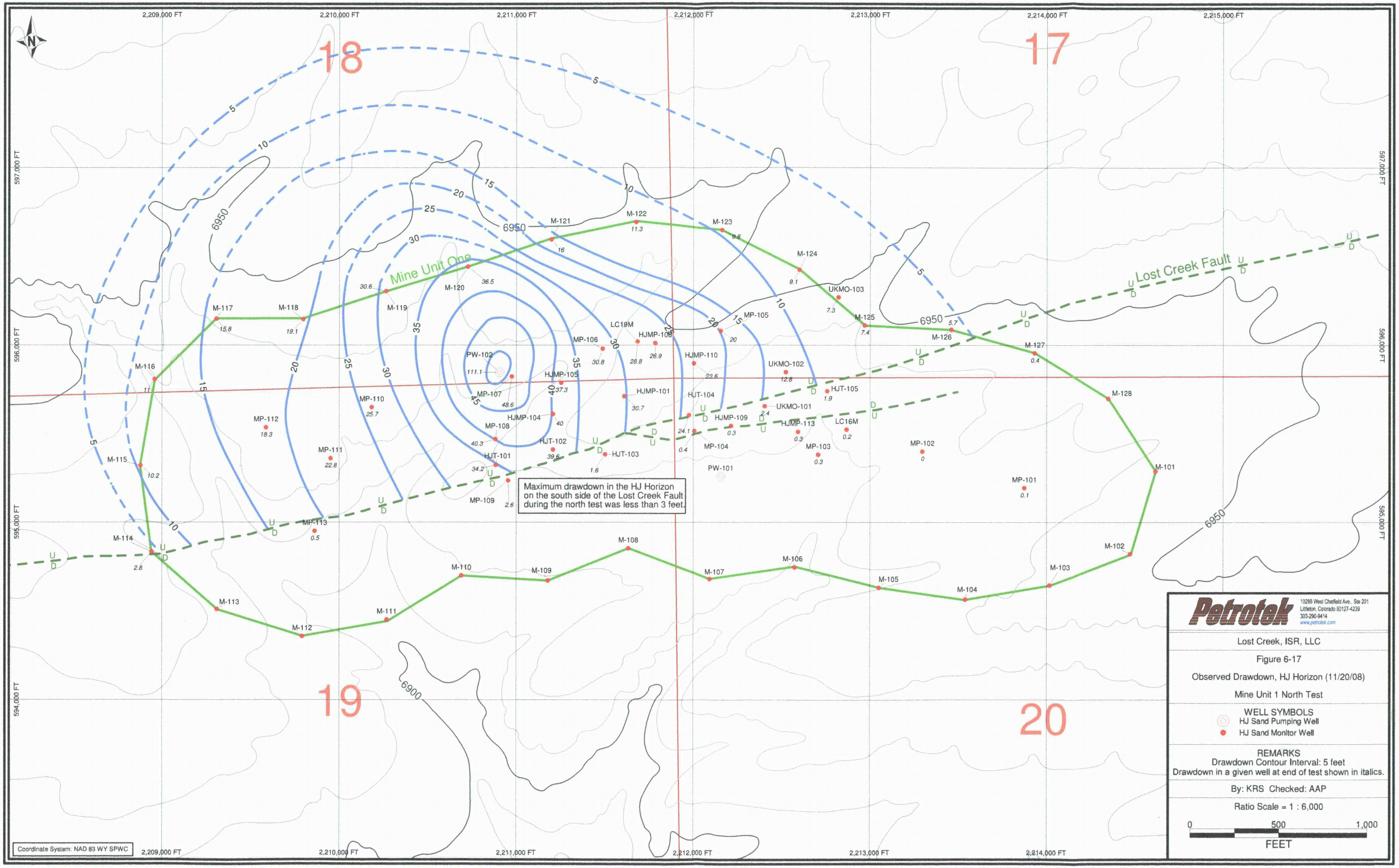

Water Level Elevation vs. Time
South Test, North of Fault
'UKM Sand Underlying Monitor Wells
Water Level Elevation, Observation Wells [ft amsl]
Water Level Elevation, Pumping Well [ft amsl]
UKMP-102
PW-101
HJMU-101
MU-111
Pump Test
HJMU-101
MU-111
UKMP-102
PW-101

FIGURE 6-16



Petrotek
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303-290-9414
www.petrotek.com

Lost Creek, ISR, LLC

Figure 6-17

Observed Drawdown, HJ Horizon (11/20/08)

Mine Unit 1 North Test

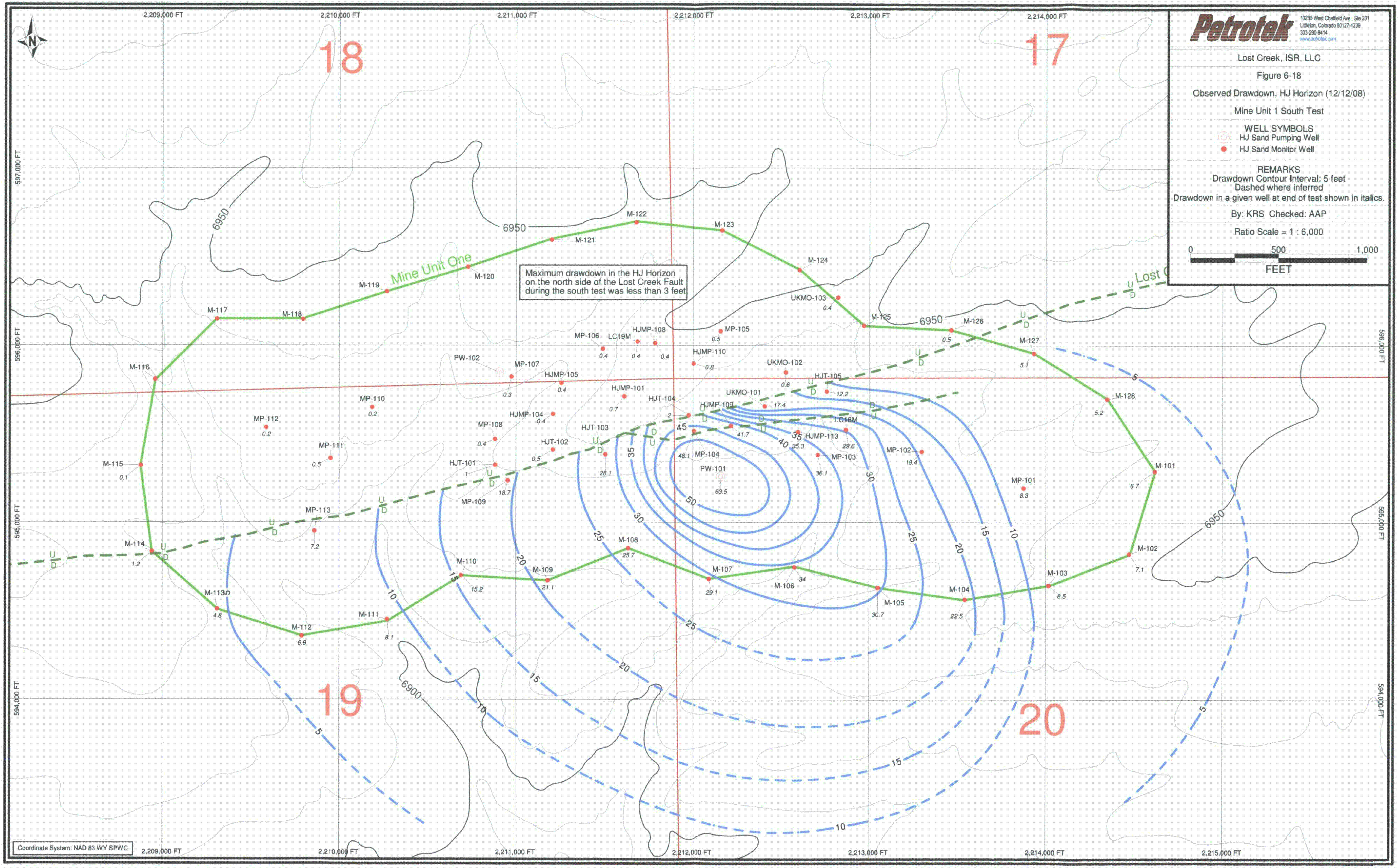
WELL SYMBOLS
HJ Sand Pumping Well
HJ Sand Monitor Well

REMARKS
Drawdown Contour Interval: 5 feet
Drawdown in a given well at end of test shown in italics.

By: KRS Checked: AAP

Ratio Scale = 1 : 6,000

0 500 1,000
FEET



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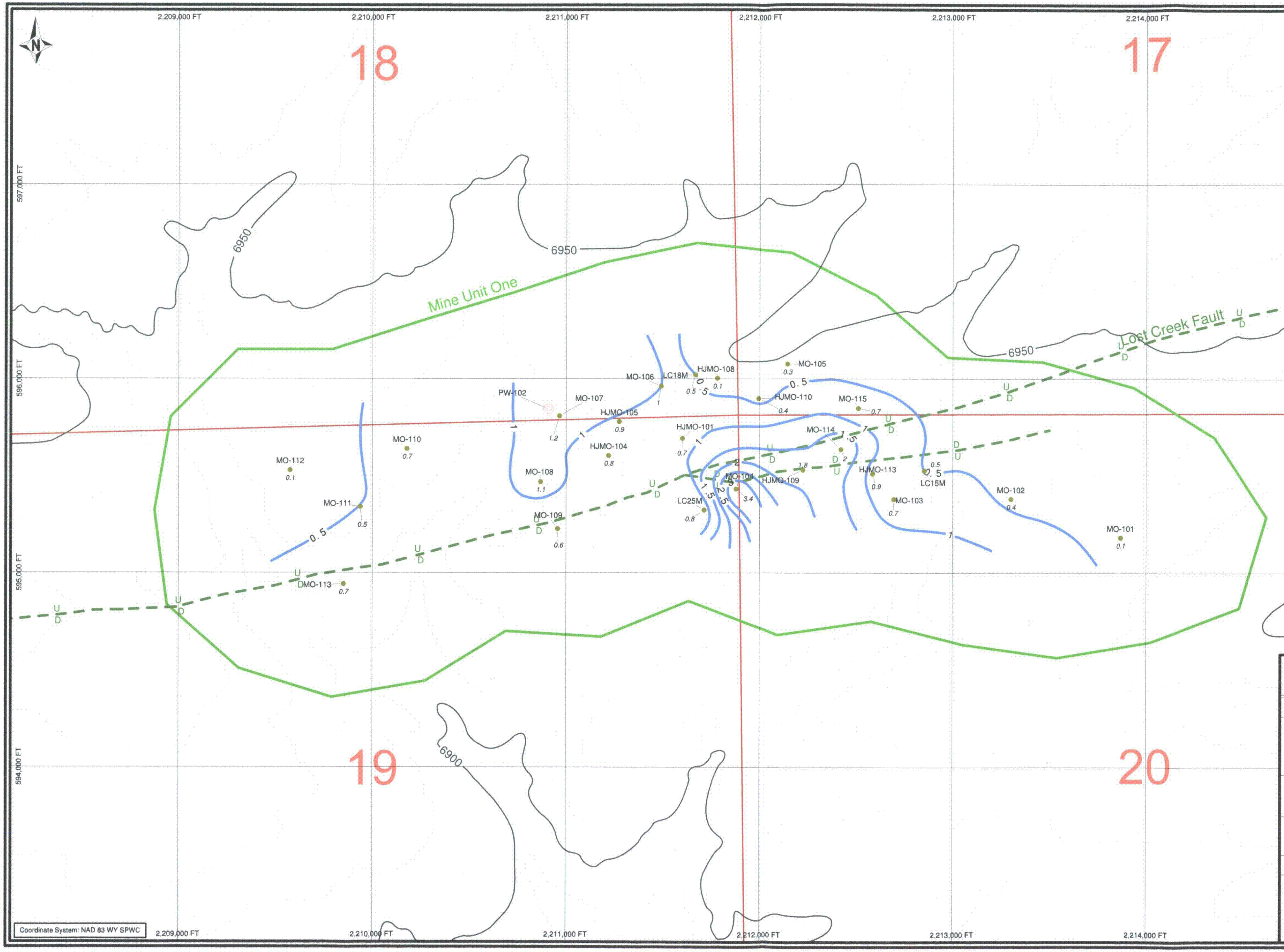
303-290-9414
www.petrotek.com
Lost Creek, ISR, LLC
Figure 6-18
Observed Drawdown, HJ Horizon (12/12/08)
Mine Unit 1 South Test
WELL SYMBOLS
HJ Sand Pumping Well
HJ Sand Monitor Well
REMARKS
Drawdown Contour Interval: 5 feet
Dashed where inferred
Drawdown in a given well at end of test shown in italics.
By: KRS Checked: AAP
Ratio Scale = 1 : 6,000
0
500
1,000
FEET
Maximum drawdown in the HJ Horizon on the north side of the Lost Creek Fault during the south test was less than 3 feet
Mine Unit One
Lost C
18
17
19
20
6950
6900
2,209,000 FT
2,210,000 FT
2,211,000 FT
2,212,000 FT
2,213,000 FT
2,214,000 FT
2,215,000 FT
597,000 FT
596,000 FT
595,000 FT
594,000 FT
M-101
M-102
M-103
M-104
M-105
M-106
M-107
M-108
M-109
M-110
M-111
M-112
M-113
M-114
M-115
M-116
M-117
M-118
M-119
M-120
M-121
M-122
M-123
M-124
M-125
M-126
M-127
M-128
MP-101
MP-102
MP-103
MP-104
MP-105
MP-106
MP-107
MP-108
MP-109
MP-110
MP-111
MP-112
MP-113
PW-101
PW-102
HJMP-101
HJMP-104
HJMP-105
HJMP-108
HJMP-109
HJMP-110
HJMP-113
HJT-101
HJT-102
HJT-103
HJT-104
HJT-105
UKMO-101
UKMO-102
UKMO-103
LC16M
LC19M
Coordinate System: NAD 83 WY SPWC



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www.petrotek.com

Lost Creek, ISR, LLC

Figure 6-19

Observed Drawdown, LFG Sand (11/20/08)

Mine Unit 1 North Test

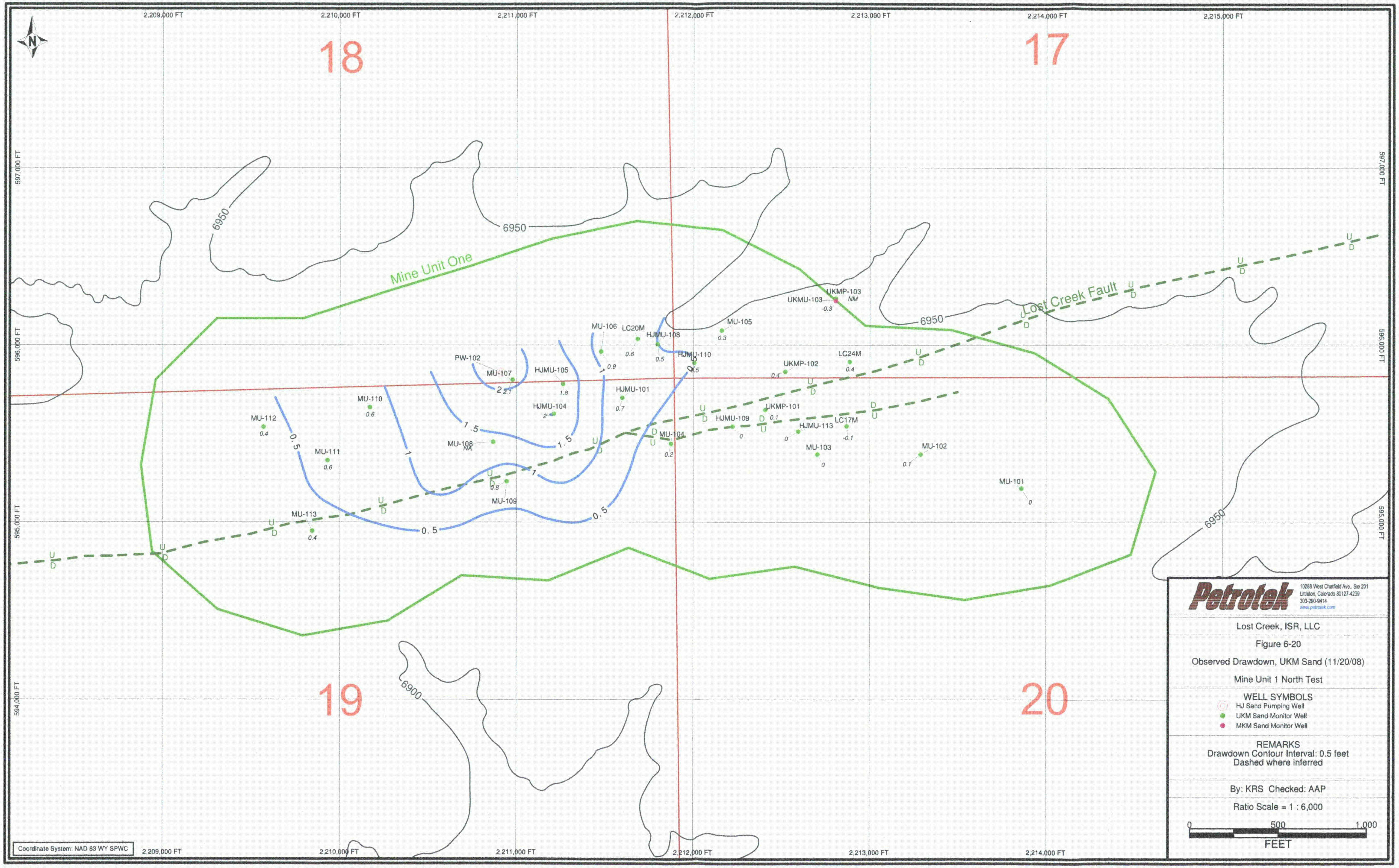
WELL SYMBOLS
HJ Sand Pumping Well
LFG Sand Monitor Well

REMARKS
Drawdown Contour Interval: 0.5 feet

By: KRS Checked: AAP

Ratio Scale = 1 : 6,000

0 500 1,000
FEET



18
17
19
20
Mine Unit One
Lost Creek Fault
6950
6900
2,209,000 FT
2,210,000 FT
2,211,000 FT
2,212,000 FT
2,213,000 FT
2,214,000 FT
2,215,000 FT
597,000 FT
596,000 FT
595,000 FT
594,000 FT
MU-106
LC20M
HJMU-108
HJMU-110
MU-105
UKMU-103
UKMP-103
PW-102
MU-107
HJMU-105
HJMU-104
HJMU-101
MU-110
MU-112
MU-111
MU-108
MU-109
MU-113
MU-104
HJMU-109
UKMP-101
UKMP-102
LC24M
HJMU-113
LC17M
MU-103
MU-102
MU-101
Coordinate System: NAD 83 WY SPWC
Petrotek
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Littleton, Colorado 80127-4239
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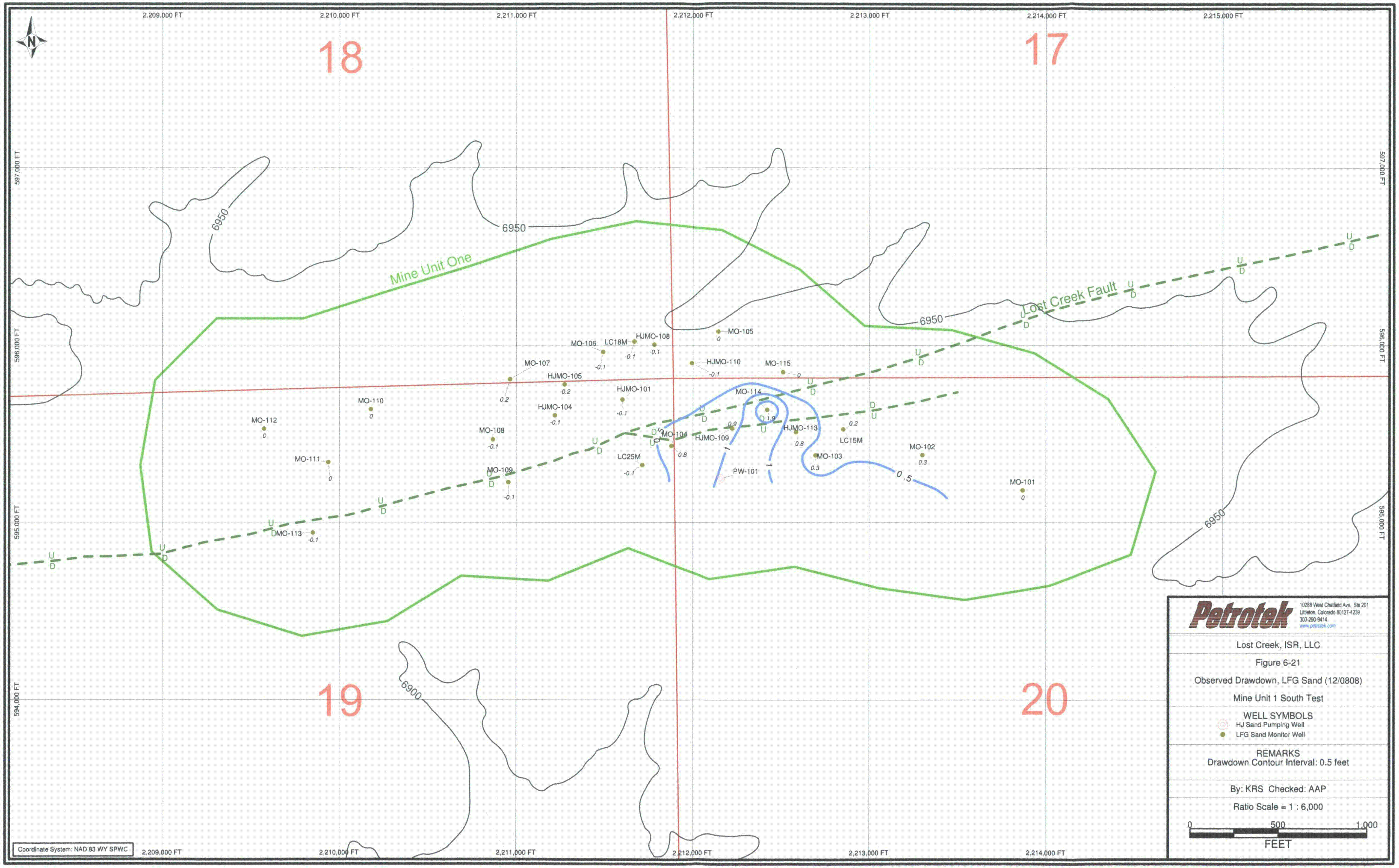
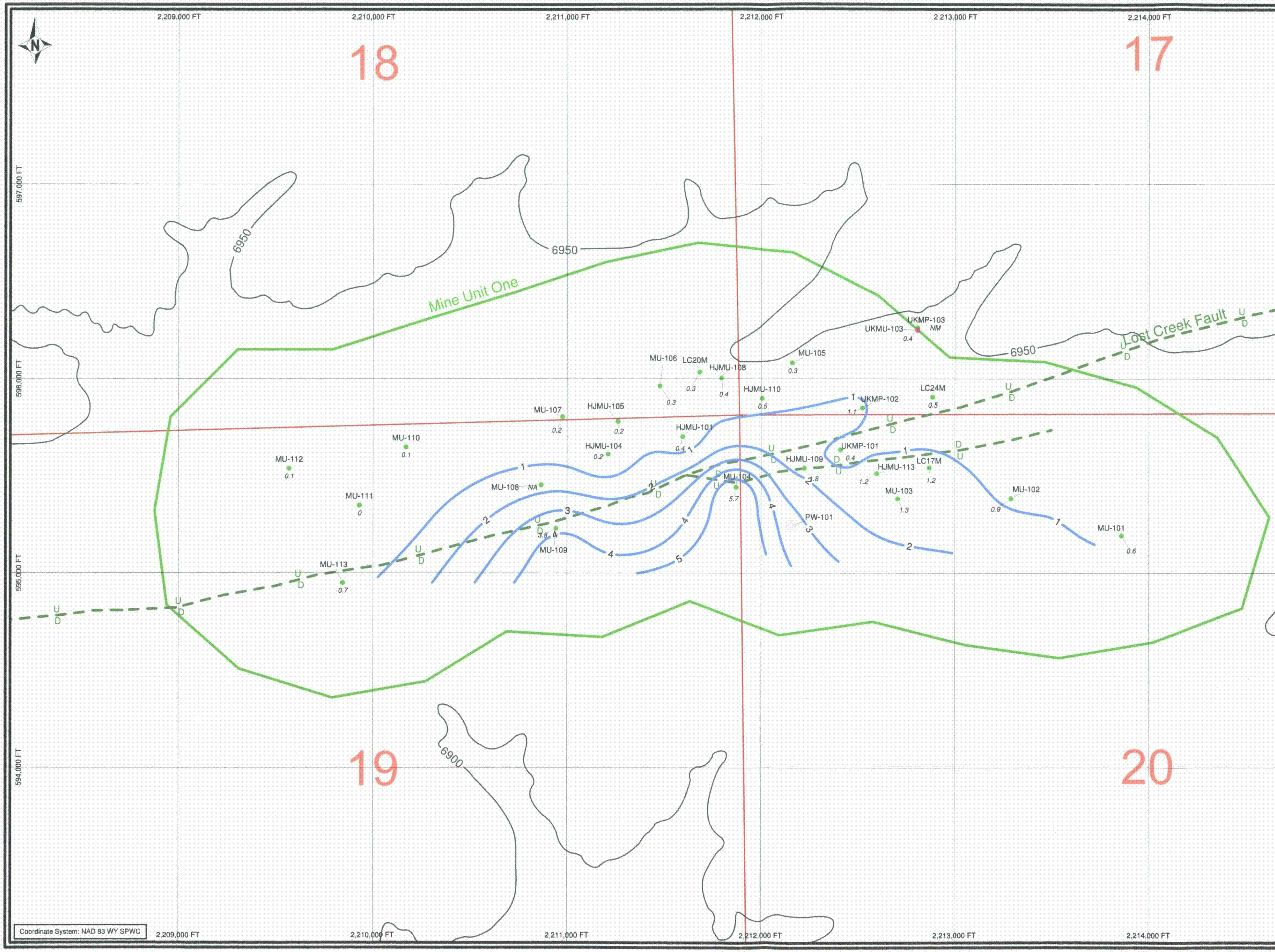
www.petrotek.com
Lost Creek, ISR, LLC
Figure 6-20
Observed Drawdown, UKM Sand (11/20/08)
Mine Unit 1 North Test
WELL SYMBOLS
HJ Sand Pumping Well
UKM Sand Monitor Well
MKM Sand Monitor Well
REMARKS
Drawdown Contour Interval: 0.5 feet
Dashed where inferred
By: KRS Checked: AAP
Ratio Scale = 1 : 6,000
0
500
1,000
FEET



2,209,000 FT
2,210,000 FT
2,211,000 FT
2,212,000 FT
2,213,000 FT
2,214,000 FT
2,215,000 FT
597,000 FT
596,000 FT
595,000 FT
594,000 FT
N
18
17
19
20
6950
6900
Mine Unit One
Lost Creek Fault
U
D
MO-105
MO-106
LC18M
HJMO-108
MO-107
HJMO-110
MO-115
HJMO-105
HJMO-101
MO-110
MO-114
MO-112
HJMO-104
MO-108
MO-104
HJMO-109
HJMO-113
LC15M
MO-111
LC25M
MO-103
MO-102
MO-109
PW-101
MO-101
MO-113
0.5
1
Coordinate System: NAD 83 WY SPWC
Petrotek
10288 West Chatfield Ave., Ste 201
Littleton, Colorado 80127-4239
303-290-9414
www.petrotek.com
Lost Creek, ISR, LLC
Figure 6-21
Observed Drawdown, LFG Sand (12/0808)
Mine Unit 1 South Test
WELL SYMBOLS
HJ Sand Pumping Well
LFG Sand Monitor Well
REMARKS
Drawdown Contour Interval: 0.5 feet
By: KRS Checked: AAP
Ratio Scale = 1 : 6,000
0
500
1,000
FEET



Petrotek

10285 West Chatfield Ave., Ste 201
Littleton, Colorado 80127-4239
303-290-9414
www.petrotek.com

Lost Creek, ISR, LLC

Figure 6-22

Observed Drawdown, UKM Sand (12/0808)

Mine Unit 1 South Test

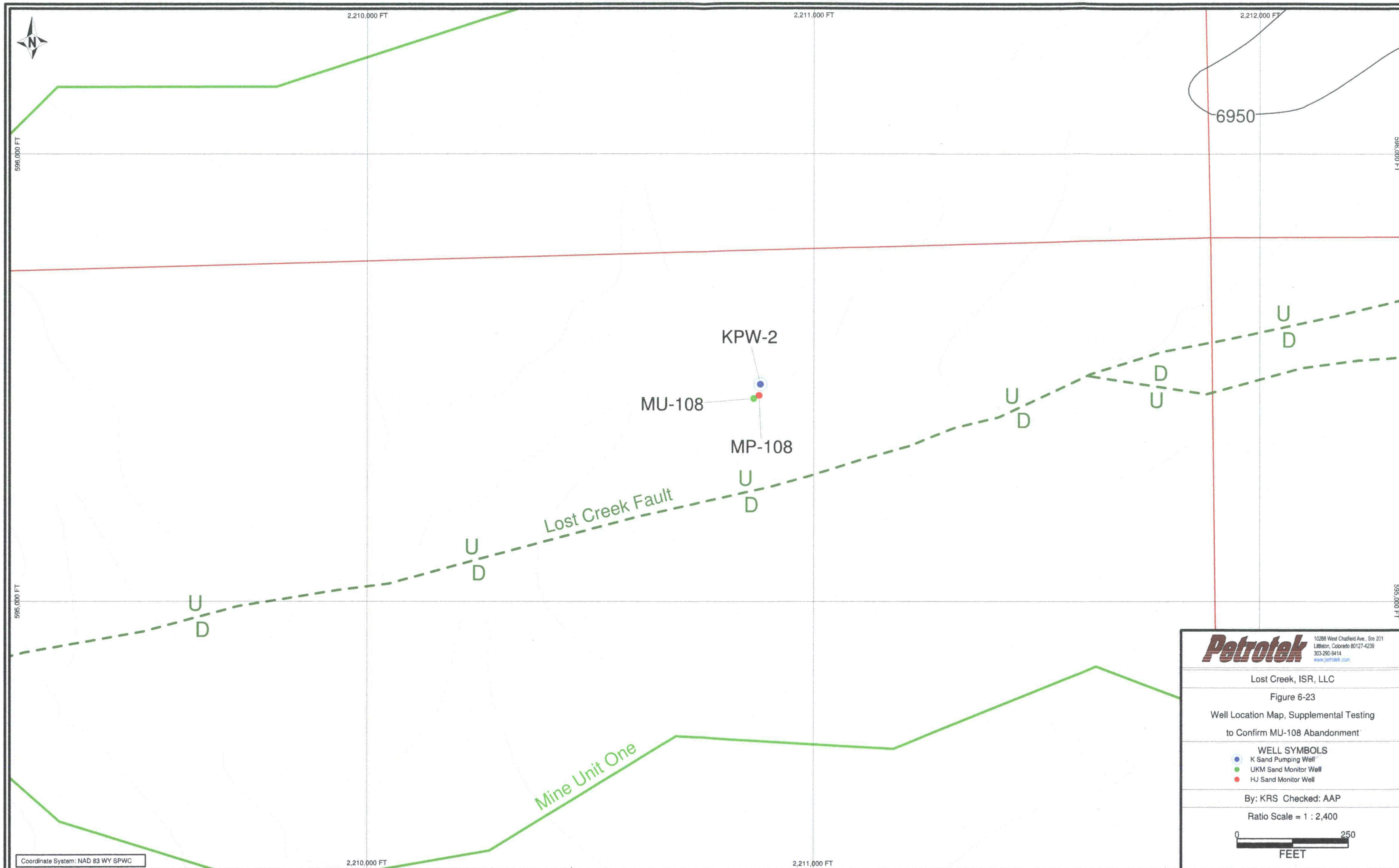
WELL SYMBOLS
- HJ Sand Pumping Well
- UKM Sand Monitor Well
- MKM Sand Monitor Well

REMARKS
Drawdown Contour Interval: 1 foot

By: KRS Checked: AAP

Ratio Scale = 1 : 6,000

0 500 1,000
FEET



Lost Creek, ISR, LLC

Figure 6-23

Well Location Map, Supplemental Testing to Confirm MU-108 Abandonment

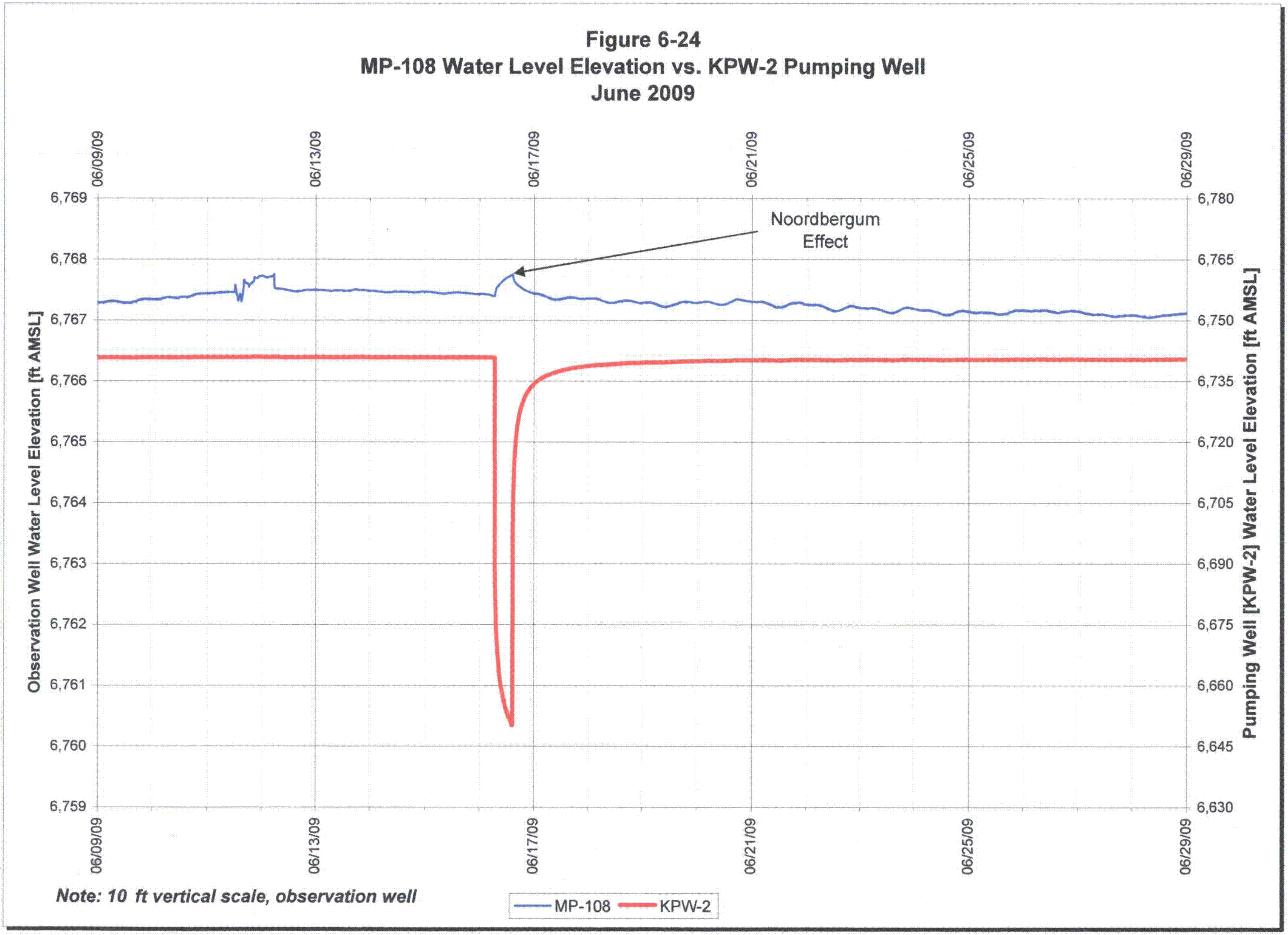


Figure 6-24
MP-108 Water Level Elevation vs. KPW-2 Pumping Well
June 2009
Noordbergum Effect
Observation Well Water Level Elevation [ft AMSL]
Pumping Well [KPW-2] Water Level Elevation [ft AMSL]
6,769
6,768
6,767
6,766
6,765
6,764
6,763
6,762
6,761
6,760
6,759
6,780
6,765
6,750
6,735
6,720
6,705
6,690
6,675
6,660
6,645
6,630
06/09/09
06/13/09
06/17/09
06/21/09
06/25/09
06/29/09
Note: 10 ft vertical scale, observation well
MP-108
KPW-2