APPENDIX B1

Moore Ranch Hydrologic Testing Report – 2007 Pump Tests Revised 2009

MOORE RANCH HYDROLOGIC TESTING REPORT

ENERGYMETALS CORPORATION
139 West 2nd Street
Casper, WY 82601

MOORE RANCH PROJECT, CAMPBELL COUNTY, WY

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(Revised July 2009)

Prepared By:
Petrotek Engineering Corporation
10288 West Chatfield Ave., Suite 201
Littleton, Colorado 80127
Phone: (303) 290-9414
Fax: (303) 290-9580

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EXECUTIVE SUMMARY

The Moore Ranch Pumping Test Plan was submitted by Energy Metals Corporation (EMC) to the Wyoming Department of Environmental Quality/Land Quality Division (WDEQ/LQD) in January 2007. In accordance with the Plan, EMC installed the necessary wells and performed a pumping test to evaluate hydrogeologic conditions in the vicinity of the Moore Ranch Project Area (MRPA). The pump test was designed to assess:

- The degree of hydrologic communication between the 70 Sand Production Zone pumping wells and the surrounding Production Zone monitor wells;
- The presence or absence of hydrologic boundaries within the Production Zone aquifer over the MRPA;
- The hydrologic characteristics of the Production Zone aquifer within the MRPA; and,
- The degree of confinement between the Production Zone and the overlying and underlying aquifers.

The Production Zone at the MRPA is the 70 Sand. The overlying aquifer and underlying aquifer are designated as the 72 Sand and 68 Sand, respectively. Water occurs in much of the Production Zone and all of the overlying aquifer under unconfined conditions. In the underlying aquifer, water occurs under confined conditions.

Because of limited available drawdown and high hydraulic conductivity, the hydrologic investigation included three pump tests, rather than only one that was proposed. The additional tests were necessary to assess the aquifer characteristics throughout the MRPA.

Unusually high responses to changes in barometric pressure fluctuations were observed throughout the testing operations. Water level data were evaluated and corrected for barometric pressure. It is likely that the magnitude of barometric responses observed is due to a complex geologic system, both confined and unconfined conditions, and nearby recharge to the Production Zone sand immediately south of the MRPA.

In summary, the pump test was performed in accordance with the Hydrologic Test Plan submitted by EMC to Wyoming Department of Environmental Quality/Land Quality Division (WDEQ/LQD). The testing objectives were met. The test results demonstrate that:

- The 70 Sand monitor wells located in the near proximity to the pumping well are in communication, indicating that the 70 Sand Production Zone has hydraulic continuity. While communication was not demonstrated over the entire area, geologic information clearly demonstrates that the 70 Sand is a contiguous sand body across the MRPA. Additional (mine unit) scale testing required by NRC and WDEQ will demonstrate communication throughout each mine unit between the pumping well(s) and the monitor well ring;
- On a regional scale, the 70 Sand has been adequately characterized with respect to hydrogeologic conditions;
- Adequate confinement exists between the 70 Sand Production Zone and the

overlying 72 Sand throughout MRPA;

- Adequate confinement exists between the 70 Sand Production Zone and the underlying 68 Sand at the PW-1 and MW-3 testing locations. However, the 68 and 70 Sands coalesce near the MW-2 test location. Mining operations will be designed to account for this variation in geology and mine-unit scale testing will demonstrate the validity of the recommended approach(s) for mining and monitoring; and,

- Regardless of the complications related to barometric efficiency, three successful tests were performed that provide sufficient data to proceed with NRC and WDEQ permits.

1.0 INTRODUCTION

1.1 BACKGROUND

The MRPA is located in the central Powder River Basin of Wyoming, within Campbell County. Energy Metals Corporation US (EMC) plans to develop and extract uranium from in situ recovery (ISR) wellfields within the 70 Sand of the Wasatch Formation. This report provides a summary of the regional hydrogeologic testing conducted during the months of February and March of 2007 at MRPA to support State and Federal permit applications necessary for the project.

The MRPA is located in all or parts of Sections 25 through 28, and 33 through 36 of T42N, R75W, Sections 1 through 4, 9, and 10 of T41N, R75W, Sections 30 and 31 of T42N, 74W. Figure 1-1 shows Moore Ranch Project Area (MRPA) and its relationship to the Powder River Basin. Figure 1-2 presents a proposed permit area outline, general ore trends, and the locations of the pumping wells for the hydrologic testing, which was conducted in three separate tests.

There are no operational ISR operations within ten miles of the MRPA. COGEMA's Christensen Ranch is located approximately fifteen miles to the northwest and PRI's Smith-Highland Ranch uranium project is located over thirty miles to the southeast. The primary Production Zone at Moore Ranch is the 70 Sand that occurs between depths of 100 and 300 feet, although typically the ore bearing sand is found in the lower portion of that stratigraphic unit at depths of 150 to 300 feet.

Local water use consists of (1) limited livestock and domestic use from the shallow Wasatch/Fort Union wells, and (2) water produced by coal bed methane producers (primarily the Anderson/Big George coal at an approximate depth of 1,000 to 1,200 feet).

Moore Ranch initially was identified as a significant uranium prospect in the 1970's by Continental Oil Company Minerals Department (Conoco). Conoco conducted extensive exploratory drilling and prepared a Mine Permit Application for the Moore Ranch (Conoco, 1979). Data from Conoco Mine Permit Application for the Moore Ranch (Appendices D-5-Geology and D-6-Hydrology) were utilized to develop the general hydrogeologic conceptual model for the Pump Test Plan. Additional (new) data from EMC and analysis by EMC and their subcontractors has been used to refine the work conducted by Conoco.

1.2 REGULATORY REQUIREMENTS

The objectives of the regional pumping test, 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. Baseline water quality data, and subsequent discussion, will be submitted as a component of the Permit to Mine Application.

It is noted that the regional pump test is not intended to replace wellfield-scale testing that is routinely conducted under Wyoming Department of Environmental Quality/Land Quality Division (WDEQ/LQD). Rather, this is a specific test to obtain the requisite data required for characterization of the regional hydrology at the MRPA in support of submitting an NRC Source Materials License application and a WDEQ/LQD Permit to Mine application.

1.3 PURPOSE AND OBJECTIVES

The purpose of this report is to demonstrate that the majority of the proposed Moore Ranch permit area 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:

- 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 overlying sands, and Underlying confining unit and underlying sands;
- A description of hydrologic testing, including well completion reports;
- 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 are in communication with the Production Zone; and (2) there is adequate confinement between the 70 Sand Production Zone and the overlying and underlying sands, 72 Sand and 68 Sand respectively.

1.4 REPORT ORGANIZATION

This report includes eight sections, the first being this introduction. The site-specific hydrogeologic conditions are discussed in Section 2. Information related to the monitor well locations and completions is included in Section 3. Section 4 presents the hydrologic (pump) test design and procedures; the analytical methods and test results for the 70 Sand Production Zone are discussed in Section 5. Results from monitor wells completed in the overlying and underlying aquifers are presented in Section 6. Conclusions from the testing and analysis and references are included in Sections 7 and 8, respectively.

Field activities for the Moore Ranch Pump Test were jointly performed by EMC and Petrotek personnel. Geologic interpretations were performed by EMC geologists. Aquifer test analyses were performed and this report written by Petrotek.

2.0 SITE CHARACTERIZATION

The following discussion regarding the geology and hydrogeology of the site is based on information available at the time of this report writing. EMC is currently engaged in additional exploratory and delineation drilling. Additional data collected from this ongoing effort may result in changes in the conceptual model that is presented in this report. The summary presented below represents the current (September 2007) understanding and conceptualization of site conditions.

2.1 STRATIGRAPHY

The Wasatch Formation occurs at the surface at MRPA and unconformably overlies the Fort Union Formation, which contains several coal sequences. Historic exploration companies assigned a numerical sand sequence to identify the sands in the Wasatch with increasing numbers from the bottom up. A generalized stratigraphic section of the MRPA is depicted in Figure 2-1. The geologic features associated with the MRPA are depicted in Figures 2-2 through 2-10.

Primary uranium reserves identified by historical exploration at Moore Ranch are located in the 70 Sand that occurs between 100 and 330 feet below ground surface. Typical thickness of the 70 Sand ranges from 50 to 120 feet, with 5 to 25 feet of mineralized zone. The mineralized zone occurs within the lower portion of the 70 Sand. Historic drilling within Sections 34 and 35 of T42N and R75W identified two primary areas of mineralization (ore bodies). The ore body in Section 35 was historically divided into two units, 35S and 35N (Figure 1-2).

Figures 2-2 through 2-6 depict the thicknesses of the overlying (72 Sand), production zone (70 Sand), and underlying (68 Sand) aquifers as well as the confining units between them. The elevation of the top of the 70 Sand is shown on Figure 2-7. Within the area of mineralization, the top of the 70 Sand dips generally to the northwest at approximately 40 to 50 feet per mile. The recharge area for the 70 Sand and the "E" Coal outcrops approximately 1 to 2 miles southeast of the permit area.

Figure 2-8 shows the orientation of geologic cross-sections through each of the wellfields. Stratigraphic cross-sections A-A', B-B', C-C', D-D' and E-E' are shown on Figures 2-9 through 2-13. The underlying shale beneath the 70 Sand is absent in the center portion of Section 35 as shown on Figures 2-5 and 2-9. The 70 and 68 Sands coalesce in this area. An isopach of the 70 Sand (Figure 2-4) shows that the 70 Sand is generally between 60 and 100 feet thick and thins slightly to the west.

Above the 70 Sand consists of a 50 to 250-foot thick sequence of clays, silts, discontinuous sandstones and alluvial sediments. The overlying 72 Sand is contained within this geologic sequence; alluvial sediments are confined to the low-lying areas of surface drainages. A lignite marker bed, designated the "E" coal, is present across the site above the 70 Sand. The "E" Coal is separated from the 70 Sand by 5 to 10 feet of clay.

Except for in areas where the 70 Sand and the 68 Sand coalesce, the 70 Sand is underlain by a confining shale. Beneath this confining shale is the 68 Sand. The lateral extent of the 68 Sand has been refined with new data collected during the drilling of over 150 test holes in the summer of 2006. Four monitoring wells were completed in the 68 Sand.

Within and surrounding the permit area, there is active coal bed methane production from the Powder River Basin Coal Bed Field. The producing interval is the Anderson/Big George coal (locally termed the Roland Coal) at depths of between 1,000 and 1,200 feet below ground surface. The Anderson/Big George Coal is within the Fort Union Formation and is separated from the 70 Sand by over 700 feet of interbedded clays, siltstone, and discontinuous sands. As a result, no hydrologic impacts from coalbed methane production are expected on sandstone and clay aquitards relevant to in situ mining at Moore Ranch.

Oil and gas production occurs within the area. The Pine Tree Field is located within 1 mile to the west of the Moore Ranch Permit Area. Production in that field is primarily from the Shannon Formation at depths of 10,000 to 11,000 feet. Due to great depth, this production is not relevant to the shallow ISR operations.

2.2 OVERLYING UNITS: OVERLYING SHALE AND 72 SAND

The shallowest overlying aquifer monitored during the pumping test is the 72 Sand. The 72 Sand is not continuous throughout the MRPA (Figure 2-2). The 72 Sand aquifer occurs under unconfined conditions in the MRPA. An isopach of the shale that separates the 72 and 70 Sands is shown in Figure 2-3. Other localized, perched aquifers may be present within the MRPA, based on previous investigation by Conoco (1979).

2.3 PRODUCTION ZONE: 70 SAND

The Production Zone aquifer at MRPA is the 70 Sand. The 70 Sand is continuous across the planned wellfields. The sand thickness is variable and ranges in thickness from 50 to 120 feet with an average thickness of about 60 to 80 feet (Figure 2-4). The Production Zone aquifer occurs mostly under unconfined conditions in the MRPA. The 70 Sand aquifer in the Section 34 and 35 South orebodies occurs mostly under unconfined conditions and has adequate hydrostratigraphic confinement between the production sand and/or the overlying/underlying sands. In the 35 North orebody, the 70 Sand aquifer occurs under unconfined conditions and for the most part has adequate hydrostratigraphic confinement between the 70 Sand and overlying/underlying sands. However, lack of hydrostratigraphic confinement between the 70 Sand and the underlying 68 Sand occurs in the eastern/northeastern part of the 35 North orebody. Additional mine-unit scale testing will provide additional data to validate the approach for mining and monitoring this section of the 35 North orebody.

2.4 UNDERLYING UNITS: UNDERLYING SHALE AND 68 SAND

The underlying aquifer is designated as the 68 Sand. Between the 68 and 70 Sand is the underlying shale (Figure 2-5), which serves as the confining zone throughout the majority of the MRPA. As noted above, the underlying shale is absent in the central portion of Section 35, which lends to the coalescing of the 70 and 68 Sands in this area (Figure 2-5). The 68 Sand aquifer is approximately 50 to 80 feet thick (Figure 2-6) and occurs under confined conditions in the MRPA.

2.5 HYDROGEOLOGIC CONDITIONS

As discussed, the 70 Sand outcrops south of the MRPA. Confining conditions in the 70 Sand (as defined by a water level equal to or above the top of sand) vary across the site. The 70 Sand is confined in the northern portion of the MRPA, semi-confined in the western portion, and unconfined in the southeastern portion. The overlying 72 Sand is unconfined throughout the MRPA and the 68 Sand is fully confined.

2.6 SUMMARY OF PREVIOUS TESTING RESULTS

A series of aquifer tests were conducted on the Moore Ranch project from 1977 through 1980 to assess hydraulic characteristics of the Production Zone as well as overlying and underlying hydrostratigraphic units. Initial testing was performed by Wyoming Water Resources Research Institute (WWRI). Conoco's assessment of the initial testing was that the results were unsatisfactory because of improperly developed wells, inadequate water level measurements, and inappropriate analysis methods (Conoco, 1979). Conoco redeveloped the wells using airlift pumping. Data collected during development of the wells were analyzed by Conoco to determine aquifer characteristics and additional pumping tests were conducted and analyzed by Conoco. A summary of the Conoco tests that were conducted to assess conditions within the ore bodies at Moore Ranch is presented below. Locations of the historic Conoco wells are shown on Figure 2-11; available completion information for those wells and some other historic Kerr McGee and Power Resources wells is presented in Table 2-1.

- A pump test was conducted on 8/17/77 at well 885 with wells 886, 887, and 888 as observation wells. These wells are located within the 34 ore body. Well 885 was pumped for 1 day (1440 minutes) at a rate of 3.4 gallons per minute (gpm). Observation wells 886, 887, and 888 were located 64, 115, and 50 feet, respectively, from the pumping well. Drawdown in the observation wells at end of test for 886, 887, and 888 were 0.74, 0.76, and 1.94 feet, respectively. All wells are completed within the 70 Sand except for well 887, which is completed in the 68 Sand. The response of well 887 during the pumping test indicates the possibility that there is hydraulic communication between the 70 and 68 Sands in the vicinity of the 34 ore body. The Conoco Mine Permit Application states that the seal between the sands in well 887 was questionable.

- The previously described wells were redeveloped using airlift methods. Recovery following redevelopment was recorded at wells 886 and 887. The effective pumping rate was 2 gpm for 886 and 0.1 gpm for 887 with 0.7 and 12 feet of drawdown, respectively.

- A pump test was conducted within the 35N ore body on 6/25/78. Well 1 was pumped at 3.5 gpm for 140 minutes. Observation wells 1805 and 1806, located 36 and 73 feet, respectively, from the pumping well, had measured drawdown of 0.71 and 0.54 feet at the end of the test. The pumping well and the observation wells are all completed within the 70 Sand.

- A second pump test was conducted at Well 1 on 6/25/78 to evaluate hydraulic communication with the 68 Sand within the 35N ore body. Well 1 was pumped at 2.5 gpm for 170 minutes. Observation well 1807 is located 111 feet from pumping well and completed within the 68 Sand. Drawdown of 0.37 feet was measured at well 1807 at the conclusion of the pumping test. The test results indicate that there may be hydraulic communication between the 70 and 68 Sand within the 35N ore body. However, the Conoco Mine Permit Application indicated the results are inconclusive based on concerns regarding the integrity of the well completion in 1807.

- Well 1814, located within the 35S (corresponds with EMC Wellfield #3) ore body, was pumped at 19 gpm for 1140 minutes beginning on 12/1/78. A maximum drawdown of 1.87

feet was measured at well 1816, located 55 feet from pumping well. Both the pumping and observation wells are completed within the 70 Sand.

- Well 1823 was pumped for 70 minutes at 1.7 gpm on 5/22/80. Well 1823 is located within the 35S ore body and is completed in the 68 Sand. Over 6 feet of drawdown was measured in that well during the test. Water levels were also measured in observation well 1816 during the test. Well 1816 is located 70 feet from 1823 and completed in the 70 Sand. Water levels in well 1816 showed a slight increase during the pumping test, indicating a possible lack of hydraulic communication in that area between the 68 and 70 Sands.

- Well 1814, located in the 35S ore body, was pumped at an average rate of 16.8 gpm over 3,100 minutes, beginning on 8/13/80. Maximum drawdown at the pumping well was 32 feet. The maximum drawdown in the well occurred approximately 1,170 minutes into test. The pumping rate gradually decreased after that time (from 17.1 gpm to 15.8 gpm) and the water levels showed slight recovery during the latter portion of the test. Water levels were recorded during the test at observation wells 1816, 1815, 1817, and 1823, located 34.5, 89, 228 and 75 feet from the pumping well, respectively. All of the wells are completed in the 70 Sand except for 1823, which is completed in the 68 Sand. Maximum drawdown measured in the 70 Sand observation wells was 2.87 feet (1816), 1.3 feet (1815), and 0.2 ft (1817). Water levels in Well 1823 did not show any drawdown, again indicating hydraulic separation between the 68 and 70 Sand in the vicinity of 35S ore body.

Results of the tests were variable with the highest transmissivity and hydraulic conductivity values determined for the 35S ore body. A summary of results from the Conoco aquifer tests and a comparison to recent results is presented in Table 2-2.

Additional testing was performed by Conoco in an area to the southeast that was selected as a potential site for evaporation ponds. The purpose of that testing was primarily to assess hydraulic characteristics of the near-surface soils with respect to suitability for pond placement.

3.0 MONITOR WELL LOCATIONS, INSTALLATION, AND COMPLETION

3.1 WELL LOCATIONS

The majority of the MRPA monitor wells are located near the areas identified previously as the 34, 35N and 35S orebodies. EMC anticipates that initial mining activities will be conducted in those areas in parts of Section 34 and 35 (Figure 1-2).

3.2 WELL INSTALLATION AND COMPLETION

Prior to the 2007 testing operations, EMC installed 20 new wells (Figure 1-2), including 11 Production Zone (70 Sand) monitor wells, 4 Overlying (72 Sand) monitor wells, 4 Underlying (68 Sand) monitor wells, and PW-1 (completed in the 70 Sand). PW-1 was centrally located between the identified orebodies and was installed specifically for use as a pumping well.

All of the wells used for the 2007 pump test are located in Sections 27, 34, and 35, Township 42 North, Range 75 West (Figure 1-2), and were constructed with 4.5-inch nominal diameter casing. The wells were developed using standard water well construction techniques, such as air lifting, pumping, and/or surging. Completion reports for each well are provided in Appendix A. Specific data related to well location, construction, completion interval, and initial water levels are provided in Table 3-1.

4.0 PUMP TEST DESIGN AND PROCEDURES

4.1 TEST DESIGN

The limited historic data (Conoco) suggested it might be possible to test the entire MRPA in one test (e.g., by pumping from only one well). For this reason, PW-1 was centrally located between the 34, 35N and 35S orebodies and installed specifically for use as a pumping well. However, based on the results from the first test (PW-1) that indicated greater than anticipated transmissivity and hydraulic conductivity, combined with a highly efficient barometric system, EMC elected to conduct two additional tests during field activities to better characterize the hydrologic regime. Hence, three separate tests were performed using PW-1, MW-2 and MW-3 as pumping wells. Details of each test are discussed below. The 2007 Moore Ranch Pump Tests in the 70 Sand were designed to:

1. Demonstrate hydraulic communication between the Production Zone (70 Sand) pumping well and the surrounding 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 MRPA; and,
4. Demonstrate sufficient confinement between the Production Zone and the Overlying and Underlying Sands for the purposes of ISR mining.

The general testing procedures were as follows:

- Install vented data logging transducers in wells to record changes in water levels during tests. Verify setting depths and head readings with manual water level measurements.
- Measure and record background water levels at least every 12 hours for a minimum of 48 to 96 hours prior to the test. The background monitoring was only performed prior to the first test.
- Run the pumping well at a constant rate (or as close as practical). Record water levels and barometric pressure throughout the background, pumping, and recovery periods.

4.2 PUMP TEST EQUIPMENT

The tests were performed using a 1.5 Hp electrical submersible pump powered by a portable generator. Because of limited available drawdown, the pump was set approximately 10 feet off the bottom of the screen. Flow from the pump was controlled with a manual gate valve. Surface flow monitoring equipment included two Great Plains Industries, Inc. Model TM Series totalizer meters. In accordance with a temporary discharge permit from LQD (Permit No. WYG720126), discharge water was land applied approximately 750 feet downgradient and to the southeast of the pumping well via a 2-inch diameter plastic line.

Water levels in each well were measured and recorded with vented In-Situ® Level TROLL® transducer/dataloggers. The pressure rating for the transducers ranged from 30 to 100 psi. The transducers were programmed to record depth to water measurements prior to the start of the test at 15 minute intervals (during background monitoring, and the pumping and recovery periods). A summary of the monitoring equipment used for each test is presented in Table 4-1.

Petrotek personnel installed the monitoring equipment prior to testing and EMC assisted with day-to-day data downloads. Petrotek personnel verified the datalogger programming and equipment layout, subsequently started the test, and supervised testing for the duration of pumping. Thereafter, EMC collected recovery data daily and transferred the data to Petrotek for review. Table 4-2 contains the times and responses observed for each test.

4.3 POTENTIOMETRIC SURFACES

Figure 4-1 is a potentiometric surface map of the 70 Sand Production Zone within the MRPA area from water level measurements on February 14, 2007. Based on those data, the direction of groundwater flow within the 70 Sand is predominantly to the north with the ground water gradient at approximately 0.0040 ft/ft (21.1 ft/mile). Water level data used for preparation of this map are presented in Table 3-1.

Figure 4-2 is a potentiometric surface map of the overlying 72 Sand within the MRPA area from water level measurements on February 14, 2007. Based on those data, the direction of groundwater flow within the 72 Sand is predominantly to the north with the ground water gradient at approximately 0.0039 ft/ft (20.4 ft/mile). Water level data used for preparation of this map are presented in Table 3-1.

Figure 4-3 is a potentiometric surface map of the underlying 68 Sand within the MRPA area from on water level measurements on February 14, 2007. Based on those data, the direction of groundwater flow within the 68 Sand is predominantly to the north with the ground water gradient at approximately 0.0005 ft/ft (2.6 ft/mile). Water level data used for preparation of this map are presented in Table 3-1.

The potentiometric surface of the 70 Sand, dependent upon location, is about 30 to 50 feet lower than the potentiometric surface of the overlying 72 Sand and suggests that the 72 Sand is not in communication with the 70 sand, but has the potential to drain to it if an artificial pathway was created (improperly constructed well or improperly abandoned borehole).

The potentiometric surface of the 70 Sand is approximately 7.6 feet lower than the potentiometric surface of the underlying 68 Sand at the MW-3/UMW-3 location and 2.2 feet lower at the MW-1 location. Conversely, the potentiometric surface of the 70 Sand is 9.2 feet higher than in the 68 Sand at MW-4/UMW-4. At the MW-2/UMW-2 location, the potentiometric surface of the 70 Sand is 0.5 feet higher than the underlying 68 Sand where coalescing of the 68 and 70 Sands occurs (Figures 2-5 and 2-9).

4.4 BACKGROUND MONITORING, TEST PROCEDURES AND DATA COLLECTION

The majority of the testing equipment (e.g., pump, flow meters, LevelTROLLs) was installed and checked by Petrotek on February 09, 2007. A step-rate test was conducted on February 10, 2007. However, the utility of the results from this test were limited due to a plug in the discharge line that limited the maximum achievable pumping rate during the step-rate test.

The background monitoring period for the 2007 Moore Ranch Pump Test began on February 9, 2007. Water levels were recorded every 15 minutes for 5.8 days prior to beginning the first test. In this regard, the background monitoring duration and frequency significantly exceeded the minimum requirements specified in the Hydrologic Test Plan. Additional discussion regarding background monitoring is provided in Section 6.2 of this document.

The rate during the PW-1 test was increased twice due to the less than expected drawdown (Table 4-3). Additionally, generator problems (gelling of fuel) attributed to varying pumping rates observed twice during the last step. Because of high hydraulic conductivity, limited available drawdown, limited radius of influence and high barometric efficiency, the decision was made in the field to run two additional tests using MW-2, and MW-3 as pumping wells rather than rerun the PW-1 test (see summary table below). The strategy was to provide general characterization across a larger portion of the MRPA rather than provide extensive data of limited areal extent at a single location.

SUMMARY OF MOORE RANCH PUMP TESTS					
Test No.	*Pumping Well*	*Duration (minutes)*	*Duration (days)*	*Avg. Flow Rate (gpm)*	*Comments*
1	PW-1	13,275	9.2	16.5	20.6' DD in PW; only response observed was in MW-1 (109' distant); test performed in three steps due to less than expected drawdown.
2	MW-2	1,465	1.0	26.0	19.4' DD in PW; response in Well 1805 (346' distant in 70 Sand); UMW-2 (68 Sand; 10' away), 1807 (68 Sand; 252' away)
3	MW-3	5,535	3.8	14.4	17.8' DD in PW; no response in any other monitor wells

All of the 70 Sand monitor wells, in addition to the underlying and overlying wells, were monitored during the PW-1 test. Because of the limited radius of influence observed during the PW-1 Test, only wells in close proximity to the pumping well were monitored during the MW-2 and MW-3 tests. Background monitoring was not conducting prior to commencing with the MW-2 and MW-3 tests because of the extensive monitoring conducted prior to the PW-1 test.

In-Situ® LevelTROLLS® were programmed to record 70 Sand water levels every 15 minutes during the pumping and recovery periods. Pumping rate data for the pump tests are shown on Tables 4-3 through 4-5. A CD containing water level data is included in Appendix D.

5.0 BAROMETRIC PRESSURE CORRELATIONS AND CORRECTIONS

5.1 Observed Responses

High variations in water levels corresponding to changes in barometric pressure (e.g., on the order of 0.4 to 0.9 feet) were observed in most of the monitor wells at Moore Ranch (Figure 5-1; Appendix B). As discussed in Section 4, vented In-Situ LevelTROLL transducer/dataloggers were used in all the monitor and pumping wells. In-Situ has stated that if vented transducers are used, the vent eliminates the impact of barometric pressure on the sensor, which is correct. However, the 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 automatically correct the water level measurements. In this regard, the TROLLs are barometrically *compensated*, but not *corrected*. Hence, the data require correction for fluctuations in water levels associated with changes in barometric pressure.

5.2 Barometric Corrections

To account for the water level/barometric changes, three different corrections were evaluated. The first correction was simply evaluating the data based on total head (i.e., the elevation of 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. This correction is referred to as Manual correction. Example input parameters and calculations follow:

Input Parameters:

Initial water elevation (feet)
Initial barometric pressure (equivalent feet of water)
Barometric pressure at time X (feet of water)
Water elevation at time X

Manual Barometric Correction:

(Raw elevation + barometric pressure [ft H_2O]) - Initial Barometric Pressure [ft H_2O]

Example - MW-1 Manual Barometric Pressure Correction						
Date/Time	Raw DTH_2O Level [ft]	Raw Elevation [ft]	BP [in. Hg]	BP [ft H_2O]	Total Elevation = Raw Elevation + BP [ft H_2O]	Manual BP Correction = Total Elevation - 1st BP [ft H_2O]
2/9/2007 16:00	191.91	5,187.367	24.704	27.792	5,215.159	5,187.367
2/9/2007 16:15	191.89	5,187.387	24.708	27.797	5,215.184	5,187.392
2/9/2007 16:30	191.87	5,187.407	24.710	27.799	5,215.206	5,187.414
2/9/2007 16:45	191.84	5,187.437	24.704	27.792	5,215.229	5,187.438
2/9/2007 17:00	191.81	5,187.467	24.716	27.805	5,215.272	5,187.481
2/9/2007 17:15	191.78	5,187.497	24.719	27.808	5,215.305	5,187.514

Example - MW-1 Manual Barometric Pressure Correction (con't)						
Date/Time	Raw DTH_2O Level [ft]	Raw Elevation [ft]	BP [in. Hg]	BP [ft H_2O]	Total Elevation = Raw Elevation + BP [ft H_2O]	Manual BP Correction = Total Elevation - 1st BP [ft H_2O]
2/9/2007 17:30	191.76	5,187.517	24.718	27.808	5,215.325	5,187.533
2/9/2007 17:45	191.74	5,187.537	24.714	27.804	5,215.341	5,187.549
2/9/2007 18:00	191.72	5,187.557	24.721	27.811	5,215.368	5,187.576
2/9/2007 18:15	191.70	5,187.577	24.719	27.809	5,215.386	5,187.594
2/9/2007 18:30	191.68	5,187.597	24.715	27.804	5,215.401	5,187.610
2/9/2007 18:45	191.66	5,187.617	24.709	27.797	5,215.414	5,187.623
2/9/2007 19:00	191.65	5,187.627	24.707	27.795	5,215.422	5,187.631
2/9/2007 19:15	191.63	5,187.647	24.699	27.787	5,215.434	5,187.642
2/9/2007 19:30	191.61	5,187.667	24.702	27.789	5,215.456	5,187.665
2/9/2007 19:45	191.59	5,187.687	24.701	27.789	5,215.476	5,187.684
Manual Barometric Correction: (Raw elevation + barometric pressure [ft H2O]) - Initial BP [ft H2O]						
1" Hg = 1.125' water						
MW-1 TOC = 5379.277						

Manual Corrections for plots of water level versus time are shown on Figures 5-1 to 5-3.

The second method employed to assess barometric impacts is referred to as BETCO (Sandia Corporation, 2005), which is a program that was developed to analyze barometric and tidal effects for the Waste Isolation Pilot Project (WIPP) in New Mexico. BETCO was written to remove water level fluctuations due to barometric pressure and earth tides through the application of a multiple regression analysis. The BETCO software is publicly available at http://www.sandia.gov/betco as freeware. To correct the data, water level, time, and barometric pressure are entered into the program. BETCO then calculates corrected water level values. Examples of the manual, BETCO, and Aquifer Test corrections for MW-10 and MW-1 are presented in Figures 5-2 and 5-3.

The third correction was performed using the Aquifer Test 4.0 software. In Aquifer Test, water levels, barometric pressure, and time data are entered. Aquifer Test then calculates a barometric efficiency and corrects the raw data accordingly (Figures 5-2 and 5-3).

In summary, all three correction methods were applied and the data analyzed. A comparison of the results from analysis of the manually corrected and raw uncorrected data is shown on Figure 5-4. The transmissivity analysis from the corrected data was lower than the uncorrected data by approximately 16 percent. For the data analysis discussed in Section 6, the manually corrected data were used. In some cases, all three correction methods correlated well; in other cases they were less consistent. It is possible that these inconsistencies are due to variable barometric responses (e.g., MW-11 showed little response), along with the change in the 70 Sand from unconfined conditions (southern portion of Moore Ranch) to semi-confined conditions (western portion) to confined conditions (northern portion).

5.3 Barometric Efficiency and System Conceptualization

Physical System

Most discussion of barometric efficiency in published literature focuses on the observed responses rather than the physical phenomena behind the responses. To fully conceptualize the system, both approaches are needed and discussed below. Domenico & Schwartz (1990) suggest that the physical system must be considered in terms of effective stress and pore pressure, where a portion of the system stress is carried by the pore fluid (represented as barometric efficiency [BE]), and a portion of the stress is carried by the aquifer matrix (represented as Tidal Efficiency [TE]). Hence, the total stress of the system is represented by BE + TE = 1.0.

Commonly barometric efficiency ranges from 0.20 (younger sediments that are highly compressible) to 0.75 (competent rock with low matrix compressibility). Tidal efficiency may vary over a similar range, but inversely to barometric efficiency.

Barometric Efficiency

From Domenico & Schwartz (1990) and Bear (1988);

$BE = (N\beta)/(\alpha + N\beta)$

Where:

N = effective porosity (percent),
α = matrix compressibility (ft^2/lb); and,
β = compressibility of water (ft^2/lb)

As no core data for the 70 Sand at Moore Ranch are available, the value for matrix compressibility is not known and another calculation method is required. Matrix compressibility can be calculated from Storativity as follows:

$S = \rho gh(\alpha + N\beta)$ (Freeze & Cherry, 1979; Domenico & Schwartz (1990)

Where:

S = Storativity (dimensionless)
ρg = specific weight of water
b = aquifer thickness
α = matrix compressibility (ft^2/lb); and,
β = compressibility of water (ft^2/lb)

Rearranging, the equation can be solved for matrix compressibility as follows:

$\alpha = (S/\rho gb) - N\beta$

Assuming that $S = 4 \times 10^{-3}$; $N = 25\%$; $b = 80$ feet; and $\beta = 2.36 \times 10^{-8}$ ft^2/lb

$$\alpha = [(4 \times 10^{-3})/(62.4\#/ft^3)(80\ ft)] - (0.25)(2.36 \times 10^{-8} ft^2/lb)$$

$$\alpha = (8.0 \times 10^{-7}\ ft^2/lb - 5.9 \times 10^{-9}\ ft^2/lb) = 7.95 \times 10^{-7}\ ft^2/lb$$

Inserting the value for α into the equation: $BE = (N\beta)/(\alpha + N\beta)$

$$BE = [(0.25)(2.36 \times 10^{-8} ft^2/lb)]/(7.95 \times 10^{-7}\ ft^2/lb) - ((0.25)(2.36 \times 10^{-8} ft^2/lb))$$

$$BE = (5.9 \times 10^{-9}\ ft^2/lb)/[(7.95 \times 10^{-7}\ ft^2/lb) + (5.9 \times 10^{-9}\ ft^2/lb)]$$

$$BE = 0.0074 = 0.74\%$$

Tidal Efficiency

Domenico & Schwartz (1990) define Tidal Efficiency as follows:

$$TE = \alpha/(\alpha + N\beta)$$

From previous calculations,

$$\alpha = 7.95 \times 10^{-7}\ ft^2/lb$$

$$\beta = 2.36 \times 10^{-8}\ ft^2/lb$$

$$TE = (7.95 \times 10^{-7}\ ft^2/lb)/[7.95 \times 10^{-7}\ ft^2/lb + (0.25)(2.36 \times 10^{-8} ft^2/lb)]$$

$$TE = 0.99 = 99\%$$

In this example, BE + TE = 99.7%

Observed Responses

As discussed previously, both an analysis of observed responses and an understanding of the physical stresses of the system are required. BE and TE, from a total system stress standpoint, have been evaluated in the previous section. This section discussed the physical responses that were observed.

Spane (1999), Kruseman & de Ridder (1991) and Domenico & Schwartz (1990) state that BE can be defined as a change in the water level in the well versus a change in atmospheric pressure as follows:

$$BE = \gamma_{fc}\ (\Delta h_w/\Delta P_a)$$

Where:

γ_{fc} = average specific weight of the fluid column in the well, (F/L^3)
Δh_w = change in elevation of the well fluid column associated with atmospheric pressure change (L)
ΔP_a = change in atmospheric pressure (F/L^2)

For water, γ_{fc} = 62.4 $\#/ft^3$

An example to convert ΔP_a (0.586 inches Hg) to psi follows:

ΔP_a (psi) = (0.586 in Hg) x (0.33337 atm/in Hg) x (14.682 psi/ATM)

ΔP_a (psi) = 0.2779 psi

If we assume γ_{fc} = 62.4 $\#/ft^{3;}$ Δh_w = 0.66 feet; and ΔP_a = 0.586 in Hg

Then:

BE = [(62.4 $\#/ft^3$) x (0.66 ft)]/[(0.2779 psi) x (144 in^2/ft^2)]

BE = (41.18 $\#/ft^2$)/(40.01$\#/ft^2$) = 1.09

Examples of BE calculations for MW-10 follow (Figure 5-1):

Δh_w	= 0.20'	ΔP_a	= 0.43 in Hg (0.2104 psi)	BE = 41.9%
Δh_w	= 0.66'	ΔP_a	= 0.59 in Hg (0.2779 psi)	BE = 109%
Δh_w	= 0.32'	ΔP_a	= 0.42 in Hg (0.2055 psi)	BE = 67.5%

Discussion and Summary

Normally, because of a highly compressible matrix, the BE in a shallow tertiary system is expected to be low, as would the water level responses associated with barometric fluctuations. The opposite is observed at MRPA. However, the BE calculated based on formation properties is low and the TE is high.

Conceptually, it is possible to explain the observed responses as follows:

- Low compressibility of the aquifer matrix (as would be expected in a shallow sand/shale);
- Differential loading (e.g., barometric pressure) on the 70 Sand recharge area to the south of MRPA that is similar conceptually to tidal loading;
- Effective transfer of the changes in barometric pressure as a stress load to the 70 Sand caused by the coal that overlies the 70 Sand; and/or,
- a combination of all three.

Regardless, the data from the pump test can be corrected and the analyses used in a manner such that they are representative of the formation properties. These data can be used in the NRC and LQD applications.

6.0 ANALYTICAL METHODS AND TEST RESULTS – PRODUCTION ZONE

6.1 ANALYTICAL METHODS

Drawdown data collected from the monitor wells were graphically analyzed to assess aquifer properties. As previously described, the radius of influence of the first pump test was less than anticipated. Therefore two additional tests were performed. The limited radius of influence during the tests resulted in measureable drawdown in only two production zone (70 Sand) observation wells.

Most of the analyses are focused on the drawdown measured at the pumping wells. The primary method of analysis for the pumping wells was the Theis Recovery solution (1935). The Theis steptest solution provided a reasonable fit to the drawdown data from well MW-1, located 109 feet from the pumping well (PW-1). This method was used to account for the variability in the pumping rate during the PW-1 test. The Neuman (1975) method was used for the MW-2 test at observation well 1805 (346 feet from the pumping well) to account for both unconfined conditions and leaky aquifer conditions. The MW2 test was conducted in an area where the 70 Sand is unconfined and where the 68 and 70 Sands coalesce. The drawdown data for well 1805 appear to indicate additional recharge during the test which would be accounted for by contribution from the underlying aquifer and or delayed yield that is characteristic of an unconfined aquifer system response to pumping. No responses of significance were measured in 70 Sand observation wells other than MW-1 and 1805. Water elevation plots for all the wells monitored during the pump tests are presented in Appendix B.

The test data were analyzed using the Theis method because this method is mathematically valid for all distances and times. The significant 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 piezometric 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.

Although some of these assumptions are not fully satisfied, such as the aquifer being confined or a uniformly thick aquifer, the Theis method still provides a reasonable approximation of the transmissivity of the pumped aquifer. (Figure 2-4). Locally, the 70 Sand at MRPA is not homogeneous and isotropic; however, over the scale of the pump test, it can be treated in this manner. The unconfined conditions present where testing was attempted (at the MW2 test) were addressed using modifications to the Theis solution.

Hydrogeologic information shows that the 70 Sand is unconfined in the south portion of MRPA. Evidence of unconfined conditions is demonstrated by water levels below the top of the 70 Sand (see Table 3-1 and Figures 2-9 and 2-10). Because the Theis solution assumes confined conditions, a correction for unconfined conditions is required prior to using the Theis solution. This correction was applied to those data where the 70 Sand is unconfined.

Leaky aquifer solutions such as presented by Hantush (1955; referred to in Aquifer Test as Walton) were not applicable to the data from the 70 Sand. A leaky solution developed by Walton was applied to Monitor Well 1807 (68 Sand) data from the MW-2 test, but this method does not fit the data well. It should be noted that these methods are designed to evaluate the effects of leakage on a well completed within the pumped aquifer,not a well completed in the leaking aquifer. The method of Neuman (1975) was applied to the data and appears to be more applicable.

Because none of the monitor wells were completed within the confining units, a Neuman-Witherspoon (1972) analysis was not performed. The software used to graphically analyze the data was AquiferTest Pro V. 3.5 (Waterloo Hydrogeologic, Inc., 2002).

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

6.2 BACKGROUND TRENDS

Water level stability data were collected for 5.8 days prior to the start of the PW-1 pump test. Plots of the background, pumping, and recovery data throughout the PW-1 pump test for select wells completed in the 70 Sand are shown in Figures 6-1 through 6-3. Although there was significant fluctuation in water levels prior in the start of the PW-1 pump test, the changes were inversely correlated with fluctuation in barometric pressure (i.e, increases in barometric pressure resulted in decreases in water elevations). Other than the inverse correlation with barometric pressure there were no discernible trends in water levels. Background water levels were not measured at wells MW-11, UMW-1 or UMW-3 for various reasons, primarily because of transducer malfunctions. Water level plots for all wells monitored during each test are presented in Appendix B.

The relationship between barometric pressure and water level elevation fluctuations had been adequately demonstrated during background monitoring prior to the first test. Appropriate barometric corrections were applied to the data prior to analysis. Therefore, background monitoring was not conducted prior to the MW-2 and MW-3 pump tests. However, monitoring was continued for four days after the end of the second test and for one day following the third test. Both pumping wells showed rapid recovery to near static conditions within a few hours following termination of the tests. No trends were observed during the post-recovery period of background monitoring with the exception of well UMW-3. The water levels in this well showed a steady decline that began during the beginning of the first pump test and continued throughout the entire testing and recovery periods of the third test. The decrease in water levels in UMW-3 occurs at a very linear rate and does not appear to coincide with any pumping activity.

6.3 TEST RESULTS

6.3.1 Drawdown

As discussed, the 70 Sand at Moore Ranch has limited available drawdown (e.g., water in the screen interval below the top of the sand). Further, the high hydraulic conductivity of the 70 Sand resulted in minimal drawdown at distance from the pumping wells. Hence, maps of drawdown over time during the pump tests are not included. The potentiometric surfaces before pumping for the 72, 70, and 68 Sands are presented in Figures 4-1 through 4-3.

To assess the degree of confinement near the MW-2 location, two additional historic Conoco wells (1805 and 1807) were used during the MW-2 test. Well 1805 is a 70 Sand (production zone) completion and well 1807 is a 68 Sand (underlying aquifer) completion. Plots for the MW-2 test are included as Figures 6-4 and 6-5; Figure 6-6 shows the MW-3 . Water level data for the overlying (72 Sand) and underlying (68 Sand) wells are presented in Figures 6-7 through 6-12.

6.3.2 Analytical Results

Transmissivity results from the Theis analysis for the 70 Sand range from 329 to 724 ft^2/d, with an average T value of 538 ft^2/d. Based on an average saturated thickness of 71 feet, the average hydraulic conductivity (K) is 7.5 ft/d (Tables 6-1 and 6-2). Assuming a water viscosity of 1.35 cp (50 degrees F) and a density of 1.0, this equates to a permeability of approximately 2,000 millidarcies (md). Storativity of the aquifer was not determined during the tests because two of the tests were conducted in areas of unconfined conditions and in the third test (MW-3), there was no response in any observation wells.

Type curve matches for all of the 70 Sand monitor wells included in the pump test for which there was a measureable response are provided in Appendix C. Water level data for all monitor wells from background through pumping and recovery are included in Appendix D on a CD ROM.

6.4 DIRECTIONAL PERMEABILITY

Hydrologically, the range of transmissivity determined from the three distinct tests were on the same order of magnitude. The density of observation wells monitored during the test was insufficient to determine directional permeability. Additional pump tests will be performed and results submitted as part of the initial Wellfield data package that will provide sufficient monitoring coverage to determine directional components of transmissivity, if any. On a regional scale, the observed variation in transmissivity is not expected to significantly impact ISR mining and has no apparent regulatory implications. The test data to date are limited and the issue of directional transmissivity will be further investigated during mine unit-scale testing required by NRC and WDEQ/LQD.

6.5 RADIUS OF INFLUENCE

The test results suggest a radius of influence (ROI) for the PW-1 test of less than 1,000 feet (this is supported by the lack of measurable response in MW-10, located 1,420 feet from

PW-1. The ROI for the MW-2 and MW-3 tests is on the order of 400 feet (based on the response in Well 1805) and 250 feet (estimated), respectively. As noted previously, additional mine unit scale testing will be required prior to initiation of operations at Moore Ranch. That testing will demonstrate communication between the pumping and monitor wells over the entire proposed mine unit.

7.0 TEST RESULTS – CONFINING UNITS

Few data (e.g., laboratory analyses or detailed pump test data) regarding the vertical hydraulic conductivity of the confining units are available for the MRPA. However, geologic and hydrologic conditions at other ISR operations in the Powder River Basin (COGEMA and PRI) are similar to Moore Ranch and the data from these sites can be used as analogies for Moore Ranch. In this regard, the COGEMA and PRI data indicate the vertical hydraulic conductivity of clays/shales in the Wasatch are on the order of 10^{-7} to 10^{-11} cm/sec (10^{-4} to 10^{-7} ft/d).

Plots of water levels in the overlying (72 Sand) completions and the underlying (68 Sand) wells for the background monitoring, pumping, and recovery periods are presented in Figures 6-7 through 6-12. The water levels are compared to barometric pressure for the entire period.

No significant change in water levels was observed in the overlying OMW-1 or underlying UMW-1 completions as a result of pumping PW-1 (Figures 6-7 and 6-8). Review of these data indicated that, while minor background trends are present, the nature of those trends continues independently of the pump test. The UMW-1/OMW-1 wells are located approximately 109 feet from PW-1.

No significant change in water levels was observed in the overlying OMW-2 during the MW-2 pump test (Figure 6-9). OMW-2 declined slightly during the pumping period; however, the decline continued during recovery. Wells UMW-2 and 1807 that are completed in the 68 Sand (located 10 and 252 feet, respectively from the pumping well) directly responded to pumping, which is not unexpected as the 70 and 68 Sands coalesce in that area.

No significant change in water level was observed in OMW-3 (overlying completion) during the MW-3 pump test (Figure 6-11). The underlying well (UMW-3) declined steadily during the background monitoring, pumping, and recovery periods (Figure 6-12). The declining trend in UMW-3 continued through July 25, 2007. This trend has since reversed and water levels have recovered in this well approximately 13 feet in the beginning of September. The cause of the decline or most recently observed recovery is not known; however, long-term monitoring data clearly indicate that the decline was not a result of the MW-3 pump test.

The potentiometric surface of the overlying 72 Sand is approximately 30-50 feet higher than the 70 Sand. This difference in potentiometric surfaces supports the testing data that demonstrate isolation between the 72 and 70 Sands.

The potentiometric surface of the 70 Sand is approximately 7.6 feet lower than the potentiometric surface of the underlying 68 Sand at the MW-3/UMW-3 location and 2.2 feet lower at the MW-1 location. Conversely, the potentiometric surface of the 70 Sand is 9.2 feet higher than in the 68 Sand at MW-4/UMW-4. At the MW-2/UMW-2 location, the potentiometric surface of the 70 Sand is 0.5 feet higher than the 68 Sand where coalescing of the 68 and 70 Sands occurs (Figures 2-5 and 2-9).

In summary, the potentiometric levels in the 70 and 68 Sands support the geologic information that indicate hydraulic isolation in the western and northern portions of Moore Ranch and communication where the two sands join in the center of Section 35.

8.0 SUMMARY AND CONCLUSIONS

In accordance with the Moore Ranch Hydrologic Test Plan, EMC installed the necessary wells and performed a series of pump tesst to evaluate hydrogeologic conditions in the vicinity of Moore Ranch.

The pump tests were performed in Moore Ranch during February and March 2007. Because of high hydraulic conductivity, the MRPA could not be evaluated with one pump test as originally planned. Three tests were conducted using PW-1, MW-2, and MW-3 as pumping wells. The closest 70 Sand observation well was monitored for each test, as well and the closest overlying (72 Sand) and underlying (68 Sand) wells.

Testing at multiple locations resulted in sufficient stress in the 70 Sand Production Zone and the confining layers for the purposes of the test and EMC's anticipated ISR permit requirements. For the PW-1 test monitor well MW-1, at a distance of 109 feet from the pumping well, showed adequate drawdown (e.g., greater than 1.0 foot).

Analysis of the test data for the Production Zone wells resulted in an average transmissivity of 538 ft^2/day, an average hydraulic conductivity of 7.5 ft/day, and an average permeability (assuming a water viscosity of 1.35 cp and specific gravity of 1.0) of 2,000 millidarcies (md). Storativity was not determined from the tests because of unconfined conditions and limited radius of influence during the tests. The data analysis did not indicate the presence of significant geologic boundaries within the Production Zone aquifer over the area evaluated by the testing.

No water level changes of concern were observed in any of the overlying wells during the testing.

Two underlying monitor wells (UMW-2 and 1807) did respond to pumping MW-2. This response is expected as the 68 and 70 Sands coalesce in the area of MW-2.

The testing results indicate that the transmissivity of the 70 Sand in the MRPA is relatively consistent. Based on the data evaluated to date, this variance may impact mining operations (e.g., well spacing, completion interval, and injection/production rates), but is not anticipated to impact regulatory issues.

In summary, the pump tests were performed in accordance with the Hydrologic Test Plan submitted by EMC to WDEQ. The testing objectives were met. The test results demonstrate that:

- Fluctuations in barometric pressure impact water levels at MRPA such that pump test data require correction. These corrections have been applied to the Moore Ranch Pump Test data.
- The magnitude of water level changes due to barometric pressure complicate data analysis; however, those changes are not expected to impact mining operations at MRPA. It is anticipated that the mining wells will be operated under injection and pumping heads that will greatly exceed the changed induced by barometric pressure.
- The 70 Sand monitor wells located near to the pumping wells are in communication,

demonstrating that the 70 Sand Production Zone has hydraulic continuity. While communication was not demonstrated over the entire area, geologic information clearly demonstrates that the 70 Sand is a contiguous sand body across MRPA. Additional (mine unit) scale testing will required by NRC and WDEQ will demonstrate communication throughout each mine unit between the pumping well(s) and the monitor well ring;

- To adequately stress the 70 Sand, future pump tests may need to incorporate larger-diameter (e.g., 6- or 8-inch) completions to accommodate a 6-inch pump. However, due to limited available head and unconfined conditions present over portions of the permit area, multiple pump tests will be required to contact all monitor wells within a monitor well ring.

- On a regional scale, the 70 Sand has been adequately characterized with respect to hydrogeologic conditions within the test area at MRPA;

- Adequate confinement exists between the 70 Sand Production Zone and the overlying 72 Sand throughout MRPA;

- Adequate hydrostratigraphic confinement exists between the 70 Sand Production Zone and the underlying 68 Sand in two of the three areas tested. Where the 68 and 70 Sands coalesce, in the vicinity of MW-2 hydraulic communication is indicated. Mining operations will be designed to account for this variation in geology and mine-unit scale testing will demonstrate the validity of the recommended approach(s) for mining and monitoring; and,

- Sufficient testing has been conducted to date at Moore Ranch to proceed with a Class III permit application and a NRC license application.

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Tables

Table 2-1
Summary of Historic Monitor Wells at Moore Ranch

Well	Northing	Easting	Township/ Range	Section	TOC Elevation (ft; amsl)	Hole Depth (ft; bgs)	Casing Depth (ft; bgs)	Top Screen (ft; bgs)	Bottom Screen (ft; bgs)	Screen Length (ft; bgs)	Aquifer	Casing I.D. (inches)
1822	321,574	1,060,356	T42N R75W	35	5,355	740	560	560	600	40	50/40 Sand	NI
887	318,000	1,058,278	T42N R75W	34	5,347	320	290	290	320	30	68 Sand	3
1823	320,630	1,056,440	T42N R75W	35	5,345	240	210	210	240	30	68 Sand	NI
1807	322,729	1,057,976	T42N R75W	35	5,328	290	250	250	290	40	68 Sand	3
1	322,598	1,058,010	T42N R75W	35	5,331	240	200	200	240	40	70 Sand	5
885	317,898	1,058,399	T42N R75W	34	5,350	240	180	180	240	60	70 Sand	5
886	317,819	1,058,258	T42N R75W	34	5,349	240	180	180	240	60	70 Sand	3
888	317,910	1,058,398	T42N R75W	34	5,352	250	180	180	240	60	70 Sand	3
889	315,219	1,057,936	T42N R75W	34	5,334	260	200	200	260	60	70 Sand	3
893	317,890	1,058,318	T42N R75W	34	5,348	240	153	153	240	87	70 Sand	5
1805	322,638	1,058,047	T42N R75W	35	5,331	240	120	120	240	120	70 Sand	3
1806	322,578	1,057,946	T42N R75W	35	5,324	220	120	120	200	80	70 Sand	3
1809	325,349	1,058,177	T42N R75W	35	5,356	230	135	135	225	90	70 Sand	3
1810	320,128	1,057,966	T42N R75W	35	5,378	265	200	200	260	60	70 Sand	3
1814	320,620	1,056,541	T42N R75W	35	5,345	207	143	143	207	64	70 Sand	5
1815	320,550	1,056,471	T42N R75W	35	5,348	208	142	142	208	66	70 Sand	3
1816	320,701	1,056,501	T42N R75W	35	5,343	207	137	138	207	69	70 Sand	3
1817	320,610	1,056,752	T42N R75W	35	5,350	233	143	143	233	90	70 Sand	3
22-2	322,809	1,054,603	T41N R75W	2	5,287	165	85	85	165	80	70 Sand	3
890	317,428	1,060,376	T42N R75W	34	5,410	330	240	240	330	90	70/68 Sand	3
1808	322,427	1,060,516	T42N R75W	35	5,377	275	195	195	275	80	70/68 Sand	5
8-3	318,060	1,054,523	T41N R75W	3	5,308	175	105	105	175	70	70/68 Sand	5
1821	321,534	1,060,275	T42N R75W	35	5,355	1,200	1,120	1,120	1,200	80	Roland Coal	6

Northing and Easting coordinates were converted from historic Conoco survey data to NAD 27 East State Plane Datum, accuracy is unknown.
NI - No information provided

Table 2-2
Summary of Pumping Test Results

Summary of Aquifer Test Results– 70 Sand (Conoco 1979)		
	Range of Values	**Representative Value**
34-Orebody		
Transmissivity (T; ft2/d)	23 to 240	110
Hydraulic Conductivity (k; ft/day)	0.38 to 4.0	1.9
Net Sand Thickness (h; ft)	60	60
Storativity (S)	5.3 x 10-6 to 2.9 x 10^{-3}	9.8 x 10^{-4}
35N-Orebody		
Transmissivity (T; ft2/d)	112 to 297	165
Hydraulic Conductivity (k; ft/day)	0.95 to 1.52	1.4 ft/d
Net Sand Thickness (h; ft)	80	80
Storativity (S)	8.0 x 10-5 to 5.2 x 10^{-4}	2.5 x 10^{-4}
35S-Orebody		
Transmissivity (T; ft2/d)	374 to 735 ft2/d	555
Hydraulic Conductivity (k; ft/day)	9.35 to 18.3	13.8
Net Sand Thickness (h; ft)	40	40
Storativity (S)	3.2 x 10^{-4} to 4.3 x 10^{-3}	1.4 x 10^{-3}
Specific Yield	0.01 to 0.058	0.032

Summary of Aquifer Test Results– 70 Sand (Petrotek 2007)	
	Representative Value
Between 34 & 35-Orebody (PW-1 Test)	
Transmissivity (T; ft2/d)	542
Hydraulic Conductivity (k; ft/day)	8.4
Net Sand Thickness (h; ft)	64
Storativity (S)	NA
34-Orebody (MW-3 Test)	
Transmissivity (T; ft2/d)	329
Hydraulic Conductivity (k; ft/day)	4.6
Net Sand Thickness (h; ft)	72
Storativity (S)	NA
35N-Orebody (MW-2 Test)	
Transmissivity (T; ft2/d)	640
Hydraulic Conductivity (k; ft/day)	8.2
Net Sand Thickness (h; ft)	78
Storativity (S)	NA

Table 3-1
Energy Metals Corporation
Well Information

Well	Northing	Easting	Township/ Range	Section	Ground Surface Elevation (ft; amsl)	TOC Elevation (ft; amsl)	Hole Depth (ft; bgs)	Casing Depth (ft; bgs)	Top Screen (ft; bgs)	Bottom Screen (ft; bgs)	Screen Length (ft; bgs)	Aquifer	Casing I.D. (inches)	02/14/07 Static Depth to Water (ft from TOC)	2/14/2007 Water Elevation	Top of Sand Elevation	02/14/07 Water Elevation	Feet of H2O Above/Below Screen	Confined/ Unconfined
PW-1	320,209.00	1,057,961.00	T42N R75W	35	5,373.80	5,373.88	280	174	176	246	70	PZ '70' Sand	4.5	186.16	5,187.72	5,200.88	5187.72	-13.16	Unconfined
MW-1	320,100.00	1,057,961.00	T42N R75W	35	5,379.00	5,379.28	280	180	182	250	68	PZ '70' Sand	4.5	191.33	5,187.95	5,200.28	5187.95	-12.33	Unconfined
MW-2	322,635.00	1,057,708.00	T42N R75W	35	5,312.30	5,312.40	200	128	130	195	65	PZ '70' Sand	4.5	124.27	5,188.13	5,207.40	5188.13	-19.27	Unconfined
MW-3	317,948.00	1,060,543.00	T42N R75W	34	5,426.90	5,428.19	320	267	269	317	48	PZ '70' Sand	4.5	250.50	5,177.69	5,167.19	5177.69	10.50	Confined
MW-4	318,697.00	1,056,272.00	T42N R75W	34	5,312.60	5,312.59	220	120	126	164	38	PZ '70' Sand	4.5	116.05	5,196.54	5,189.59	5196.54	6.95	Confined
MW-5	321,452.00	1,056,678.00	T42N R75W	35	5,328.20	5,328.85	220	126	128	198	70	PZ '70' Sand	4.5	135.55	5,193.30	5,216.85	5193.30	-23.55	Unconfined
MW-6	323,791.00	1,058,277.00	T42N R75W	35	5,351.90	5,352.34	280	175	177	257	80	PZ '70' Sand	4.5	168.95	5,183.39	5,202.34	5183.39	-18.95	Unconfined
MW-7	322,535.00	1,056,299.00	T42N R75W	35	5,311.10	5,311.73	200	88	90	177	87	PZ '70' Sand	4.5	118.61	5,193.12	5,224.73	5193.12	-31.61	Unconfined
MW-8	317,921.00	1,057,961.00	T42N R75W	34	5,335.40	5,336.06	220	150	152	205	53	PZ '70' Sand	4.5	149.40	5,186.66	5,190.06	5186.66	-3.40	Unconfined
MW-9	317,099.00	1,059,198.00	T42N R75W	34	5,365.90	5,366.78	280	190	192	252	60	PZ '70' Sand	4.5	184.94	5,181.84	5,185.78	5181.84	-3.94	Unconfined
MW-10	320,115.00	1,059,378.00	T42N R75W	35	5,366.60	5,367.28	280	180	182	250	68	PZ '70' Sand	4.5	185.34	5,181.94	5,189.28	5181.94	-7.34	Unconfined
MW-11	317,693.00	1,061,868.00	T42N R75W	27	5,413.20	5,414.43	340	280	281	331	50	PZ '70' Sand	4.5	242.21	5,172.22	5,155.43	5172.22	16.79	Confined
OMW-1	320,090.00	1,057,961.00	T42N R75W	35	5,379.70	5,379.79	180	146	148	168	20	Overlying '72' Sand	4.5	141.05	5,238.74	5,239.79	5238.74	-1.05	Unconfined
OMW-2	322,625.00	1,057,708.00	T42N R75W	35	5,312.50	5,312.32	100	59	60	78	18	Overlying '72' Sand	4.5	67.35	5,244.97	5,272.32	5244.97	-27.35	Unconfined
OMW-3	317938	1,060,543.00	T42N R75W	34	5,427.00	5,427.72	250	200	205	245	40	Overlying '72' Sand	4.5	188.34	5,239.38	5,266.72	5239.38	-27.34	Unconfined
OMW-4	318687	1,056,272.00	T42N R75W	34	5,312.60	5,312.41	120	74	76	91	15	Overlying '72' Sand	4.5	66.10	5,246.31	5,258.41	5246.31	-12.10	Unconfined
UMW-1	320,110.00	1,057,961.00	T42N R75W	35	5,378.70	5,379.39	340	280	282	312	30	Underlying '68' Sand	4.5	193.58	5,185.81	5,105.39	5185.81	80.42	Confined
UMW-2	322,645.00	1,057,708.00	T42N R75W	35	5,312.40	5,313.07	280	228	230	250	20	Underlying '68' Sand	4.5	125.48	5,187.59	5,111.07	5187.59	76.52	Confined
UMW-3	317958	1,060,543.00	T42N R75W	34	5,426.50	5,426.89	380	351	353	378	25	Underlying '68' Sand	4.5	241.67	5,185.22	5,075.89	5185.22	109.33	Confined
UMW-4	318707	1,056,272.00	T42N R75W	34	5,312.70	5,313.37	300	220	222	252	30	Underlying '68' Sand	4.5	126.06	5,187.31	5,100.37	5187.31	86.94	Confined

Table 4-1
Monitoring Equipment List

Test 1 - PW-1		
Location	Monitoring Equipment	PSI Range
PW-1	In-Situ LevelTROLL	100
MW-1	In-Situ LevelTROLL	30
MW-2	In-Situ LevelTROLL	30
MW-3	In-Situ LevelTROLL	30
MW-4	In-Situ LevelTROLL	30
MW-5	In-Situ LevelTROLL	30
MW-6	In-Situ LevelTROLL	30
MW-7	In-Situ LevelTROLL	30
MW-8	In-Situ LevelTROLL	30
MW-9	In-Situ LevelTROLL	30
MW-10	In-Situ LevelTROLL	30
MW-11	In-Situ LevelTROLL	30
OMW-1	In-Situ LevelTROLL	30
OMW-2	In-Situ LevelTROLL	30
OMW-3	In-Situ LevelTROLL	30
OMW-4	In-Situ LevelTROLL	30
UMW-1	In-Situ LevelTROLL	30
UMW-2	In-Situ LevelTROLL	30
UMW-3	In-Situ LevelTROLL	30
UMW-4	In-Situ LevelTROLL	30

Test No. 2 - MW-2		
Location	Monitoring Equipment	PSI Range
MW-2	In-Situ LevelTROLL	30
MW-5	In-Situ LevelTROLL	30
MW-6	In-Situ LevelTROLL	30
MW-7	In-Situ LevelTROLL	30
1805	In-Situ LevelTROLL	30
OMW-2	In-Situ LevelTROLL	30
UMW-2	In-Situ LevelTROLL	30
1807	In-Situ LevelTROLL	30

Test No. 3 - MW-3		
Location	Monitoring Equipment	PSI Range
MW-3	In-Situ LevelTROLL	30
MW-8	In-Situ LevelTROLL	30
MW-9	In-Situ LevelTROLL	30
MW-10	In-Situ LevelTROLL	30
MW-11	In-Situ LevelTROLL	30
OMW-3	In-Situ LevelTROLL	30
UMW-3	In-Situ LevelTROLL	30

Table 4-2
Distances to Pumping Well and Observed Drawdown

Test 1 - PW-1			
Start Date & Time:	2/15/07 11:00		
End Date & Time:	2/24/07 19:40		
Duration (minutes):	13,480		
Ave. Pumping Rate:	16.53	(variable)	
Completion Type	**Well No.**	**Distance from Pumping Well (ft)**	**Drawdown At End of Test (ft)**
Pumping Well	PW-1	0	20.61
Production Zone Completions	MW-1	109	2.17
	MW-2	2,440	No response
	MW-3	3,432	No response
	MW-4	2,268	No response
	MW-5	1,787	No response
	MW-6	3,596	No response
	MW-7	2,859	No response
	MW-8	2,288	No response
	MW-9	3,347	No response
	MW-10	1,420	No response
	MW-11	4,647	No response
Overlying Completions	OMW-1	~109	No response
	OMW-2	~ 2439	No response
	OMW-3	~ 3432	No response
	OMW-4	~ 2267	No response
Underlying Completions	UMW-1	~109	No response
	UMW-2	~ 2439	No response
	UMW-3	~ 3432	No response
	UMW-4	~ 2267	No response

Table 4-2
Distances to Pumping Well and Observed Drawdown

Test 2 - MW-2

Start Date & Time:	3/20/07 13:45
End Date & Time:	3/21/07 14:10
Duration (minutes):	1,465
Ave. Pumping Rate:	26.00

Completion Type	Well No.	Distance from Pumping Well (ft)	Drawdown At End of Test (ft)
Pumping Well	MW-2	0	19.24
Production Zone Completions	MW-5	1,569	No response
	MW-6	1,289	No response
	MW-7	1,413	No response
	1805	346	0.71
Overlying Completions	OMW-2	10	No response
Underlying Completions	UMW-2	10	1.98
	1807	252	1.32

Test 3 - MW-3

Start Date & Time:	3/21/07 15:45
End Date & Time:	3/25/07 12:00
Duration (minutes):	5,535
Ave. Pumping Rate:	14.4

Completion Type	Well No.	Distance from Pumping Well (ft)	Drawdown At End of Test (ft)
Pumping Well	MW-3	0	17.87
Production Zone Completions	MW-8	2,584	No response
	MW-9	1,592	No response
	MW-10	2,461	No response
	MW-11	1,349	No response
Overlying Completions	OMW-3	10	No response
Underlying Completions	UMW-3	10	No response

Table 4-3
Pump Rate vs. Time
(Test No. 1 - PW-1)

Test No. 1 - PW-1												
DATE/TIME	MINUTES	INCREMENTAL MINUTES	TOTALIZER 1	TOTALIZER 2	T1 INCREMENTAL	CALC. T1 RATE	CALC. T2 RATE	CALC. T1T2 AVG	INSTANTANEOUS T1 RATE	INSTANTANEOUS T2 RATE	Comments
			(gallons)	(gallons)	(gallons)	(gpm)	(gpm)	(gpm)	(gpm)	(gpm)	
2/15/07 10:15	-----	-----	0	0	0	-----	-----	-----	-----		Attempted to start pump test but couldn't get pump to run. After several phone calls and troubleshooting, discovered that riser pipe had frozen at 3.4' below top of riser. Had no tools to fix problem....will stop by Home Depot tonight to get tools to break through ice.
2/15/07 10:20	-----	-----	30	1	30	-----	-----	-----	-----		Turn pump on after clearing ice in riser. Bumped pump on at 10:10 to clear any ice debris and prevent damage to totalizers.
2/15/07 11:00	0	-----	30	1	0	-----	-----	-----	-----		Pump off due to totalizers zeroing. Inspect discharge line and discover it is frozen in places. Totalizer numbers shown here were recorded after bleeding back pressure on the upgradient side of the first totalizer. Some water from the backpressure may have subtracted gallons from the totalizers. Discover blue plug in line at coupling ~ 400 - 500' downgradient. Removed obstructions and blue plug.
2/15/07 11:12	12	12	146	108	116	9.6	-----	-----	10.6	9.9	Pump back on at 11:00...adjusting rate at 11:00 - 11:08.
2/15/07 14:20	200	188	2,020	1,868	1,874	10.0	-----	-----	10.1	9.3	
2/16/07 9:00	1,320	1120	13,157	12,387	11,137	9.9	-----	-----	9.4	8.8	
2/16/07 15:30	1,710	390	16,564	15,588	3,407	8.7	-----	-----	9.8	9.1	
2/16/07 15:50	1,730	20	16,886	15,903	322	16.1	-----	-----	16.3	15.9	Bump rate to 16.35 at T1 and 16.0 at T2 at 15:30
2/16/07 16:30	1,770	40	17,529	-----	643	16.1	-----	-----	16.0	-----	
2/16/07 16:51	1,791	21	17,873	-----	344	16.4	-----	-----	16.0	-----	Lost T2 while toggling between totalizer and rate
2/17/07 10:32	2,852	1061	34,535	-----	16,662	15.7	-----	-----	15.0	-----	T2 still down
2/17/07 13:15	3,015	163	36,952	-----	2,417	14.8	-----	-----	14.7	-----	T2 still down
2/17/07 14:30	3,090	75	38,050	-----	1,098	14.6	-----	-----	14.7	-----	5 gallon bucket = 20 seconds = 15 gpm
2/17/07 14:46	3,106	16	38,343	-----	293	18.3	-----	-----	18.2	-----	Bump rate to 18.34 @14:30, valve is wide open
2/17/07 16:00	3,180	74	39,693	-----	1,350	18.2	-----	-----	18.3	-----	5 gallon bucket = 17.23 seconds = 17.41 gpm
2/18/07 8:50	4,190	1010	58,113	-----	18,420	18.2	-----	-----	18.3	-----	
2/19/07 8:55	5,635	1445	84,610	-----	26,497	18.3	-----	-----	18.4	-----	5 gallon bucket = 16.5 seconds = 18.18 gpm
2/19/07 12:51	5,871	236	88,950	-----	4,340	18.4	-----	-----	18.4	-----	5 gallon bucket = 16.5 seconds = 18.18 gpm
2/20/07 8:10	7,030	1159	102,846	-----	13,896	12.0	-----	-----	varying	-----	
2/20/07 9:08	7,088	58	103,862	-----	1,016	17.5	-----	-----	18.1	-----	onsite at 08:00 generator has 1/2 tank of fuel but is not idling at normal throttle...idling in and out. Power down at 0813 and restart at 0814 and back to operating at normal throttle. Suspect jelling of fuel...added anti-jelling agent to tank and topped off tank.
2/21/07 8:20	8,480	1392	129,219	-----	25,357	18.2	-----	-----	18.3	-----	
2/22/07 8:07	9,907	1427	155,362	-----	26,143	18.3	-----	-----	18.3	-----	
2/23/07 8:05	11,345	1438	181,748	-----	26,386	18.3	-----	-----	18.4	-----	
2/24/07 19:40	13,480	2135	222,855	-----	41,107	19.3	-----	-----	varying	-----	generator is surging again, so is pump rate. Based on water level response, pump essentially shutoff at 19:40 on 2/24/07. Minor surging afterwords. Pump off at 09:05, Recovery essentially began at 19:40 2/24/07
					Average calculated incremental rate				Average instantaneous rate		
						15.6			15.6		
									Average Pump Rate for Duration of test		16.53

Table 4-4
Pump Rate vs. Time
(Test No. 2 - MW-2)

Test No. 2 - MW-2 Rate Data											
DATE/TIME	**MINUTES**	**INCREMENTAL MINUTES**	**TOTALIZER 1**	**TOTALIZER 2**	**T1 INCREMENTAL**	**CALC. T1 RATE**	**CALC. T2 RATE**	**CALC. T1T2 AVG**	**INSTANTANEOUS T1 RATE**	**INSTANTANEOUS T2 RATE**	**Comments**
			(gallons)	(gallons)	(gallons)	(gpm)	(gpm)	(gpm)	(gpm)	(gpm)	
3/20/07 12:45	0	0	0	-----	0	0.0	-----	-----	0.0	-----	Pump on
3/20/07 12:50	5	5	136	-----	136	24.8	-----	-----	26.2	-----	
3/20/07 13:05	20	15	516	-----	380	26.2	-----	-----	26.2	-----	
3/20/07 13:43	58	38	1,510	-----	994	26.2			26.1	-----	
3/20/07 15:56	191	133	4,979	-----	3,469	26.1			26.1	-----	
3/21/07 8:17	1,172	981	30,543	-----	25,564	26.1			25.9	-----	
3/21/07 11:41	1,376	204	35,833	-----	5,290	25.9			25.9	-----	
3/21/07 13:10	1,465	89	38,142	-----	2,309	25.9			25.9	-----	Pump off
					Average calculated incremental rate				Average instantaneous rate		
						25.9			**26.0**		
									Average Pump Rate for Duration of test		**26.04**

Table 4-5
Pump Rate vs. Time
(Test No. 3 - MW-3)

Test No. 3 - MW-3 Rate Data											
DATE/TIME	MINUTES	INCREMENTAL MINUTES	TOTALIZER 1	TOTALIZER 2	T1 INCREMENTAL	CALC. T1 RATE	CALC. T2 RATE	CALC. T1T2 AVG	INSTANTANEOUS T1 RATE	INSTANTANEOUS T2 RATE	Comments
			(gallons)	(gallons)	(gallons)	(gpm)	(gpm)	(gpm)	(gpm)	(gpm)	
3/21/07 15:45	0	0	38,142	-----	0	-----	-----	-----	0.0	-----	Pump on
3/21/07 16:00	15	15	38,358	-----	216	14.4	-----	-----	14.8	-----	
3/21/07 17:00	75	60	39,242	-----	884	14.7	-----	-----	14.7	-----	
3/22/07 8:43	1,018	943	53,007	-----	13,765	14.6	-----	-----	14.3	-----	
3/22/07 12:10	1,225	207	55,957	-----	2,950	14.3	-----	-----	14.3	-----	
3/23/07 8:52	2,467	1242	73,700	-----	17,743	14.3	-----	-----	14.3	-----	
3/24/07 14:21	4,236	1769	98,966	-----	25,266	14.3	-----	-----	14.3	-----	
3/25/07 11:30	5,505	1269	117,635	-----	18,669	14.7	-----	-----	14.7	-----	
3/25/07 12:00	5,535	30	118,078	-----	443	14.8	-----	-----	-----	-----	Pump off
					Average calculated incremental rate				Average instantaneous rate		
						14.5			**14.5**		
									Average Pump Rate for Duration of test		**14.44**

Table 6-1
Summary of Pump Test Results
Moore Ranch Regional Aquifer Tests

Test No. 1 - PW-1

Well	Distance from Pumping Well (feet)	Analytical Results	Analytical Method: Theis	Analytical Method: Theis Recovery
MW-1	109	Transmissivity (ft²/day)	7.07E+02	446
		Hyd. Cond. (ft/day)	1.10E+01	7.59
		Storativity	NA	NA
MW-2	2,440	Transmissivity (ft²/day)	DNR	DNR
		Hyd. Cond. (ft/day)	DNR	DNR
		Storativity	DNR	DNR
MW-3	3,432	Transmissivity (ft²/day)	DNR	DNR
		Hyd. Cond. (ft/day)	DNR	DNR
		Storativity	DNR	DNR
MW-4	2,268	Transmissivity (ft²/day)	DNR	DNR
		Hyd. Cond. (ft/day)	DNR	DNR
		Storativity	DNR	DNR
MW-5	1,787	Transmissivity (ft²/day)	DNR	DNR
		Hyd. Cond. (ft/day)	DNR	DNR
		Storativity	DNR	DNR
MW-6	3,596	Transmissivity (ft²/day)	DNR	DNR
		Hyd. Cond. (ft/day)	DNR	DNR
		Storativity	DNR	DNR
MW-7	2,859	Transmissivity (ft²/day)	DNR	DNR
		Hyd. Cond. (ft/day)	DNR	DNR
		Storativity	DNR	DNR
MW-8	2,288	Transmissivity (ft²/day)	DNR	DNR
		Hyd. Cond. (ft/day)	DNR	DNR
		Storativity	DNR	DNR
MW-9	3,347	Transmissivity (ft²/day)	DNR	DNR
		Hyd. Cond. (ft/day)	DNR	DNR
		Storativity	DNR	DNR
MW-10	1,420	Transmissivity (ft²/day)	DNR	DNR
		Hyd. Cond. (ft/day)	DNR	DNR
		Storativity	DNR	DNR
MW-11	4,647	Transmissivity (ft²/day)	DNR	DNR
		Hyd. Cond. (ft/day)	DNR	DNR
		Storativity	DNR	DNR
PW-1	Pumping Well	Transmissivity (ft²/day)	NA	3.76E+02
		Hyd. Cond. (ft/day)	NA	5.87E+00
		Storativity	NA	NA

Test No. 2 - MW-2

Well	Distance from Pumping Well (feet)	Analytical Results	Analytical Method: Neuman	Analytical Method: Theis Recovery
MW-5	1,569	Transmissivity (ft²/day)	DNR	DNR
		Hyd. Cond. (ft/day)	DNR	DNR
		Storativity	DNR	DNR
MW-6	1,289	Transmissivity (ft²/day)	DNR	DNR
		Hyd. Cond. (ft/day)	DNR	DNR
		Storativity	DNR	DNR
MW-7	1,413	Transmissivity (ft²/day)	DNR	DNR
		Hyd. Cond. (ft/day)	DNR	DNR
		Storativity	DNR	DNR
1805	346	Transmissivity (ft²/day)	5.55E+02	NA
		Hyd. Cond. (ft/day)	7.12E+00	NA
		Storativity	NA	NA
MW-2	Pumping Well	Transmissivity (ft²/day)	NA	7.24E+02
		Hyd. Cond. (ft/day)	NA	9.28E+00
		Storativity	NA	NA

Test No. 3 - MW-3

Well	Distance from Pumping Well (feet)	Analytical Results	Analytical Method: Theis	Analytical Method: Theis Recovery
MW-8	2,584	Transmissivity (ft²/day)	DNR	DNR
		Hyd. Cond. (ft/day)	DNR	DNR
		Storativity	DNR	DNR
MW-9	1,592	Transmissivity (ft²/day)	DNR	DNR
		Hyd. Cond. (ft/day)	DNR	DNR
		Storativity	DNR	DNR
MW-10	2,461	Transmissivity (ft²/day)	DNR	DNR
		Hyd. Cond. (ft/day)	DNR	DNR
		Storativity	DNR	DNR
MW-11	1,349	Transmissivity (ft²/day)	DNR	DNR
		Hyd. Cond. (ft/day)	DNR	DNR
		4693.61	DNR	DNR
MW-3	Pumping Well	Transmissivity (ft²/day)	NA	3.29E+02
		Hyd. Cond. (ft/day)	NA	4.58E+00
		Storativity	NA	NA

Average Transmissivity (ft²/day) = 5.38E+02
Average Hyd. Cond. (ft/day) = 7.57E+00

Table 6-2
Summary of Transmissivity Results:
Energy Metals Corporation
Moore Ranch Regional Aquifer Tests

Test No. 1 - PW-1	
Well	Transmissivity (ft²/d)
MW-1	707
MW-2	Did not respond
MW-3	Did not respond
MW-4	Did not respond
MW-5	Did not respond
MW-6	Did not respond
MW-7	Did not respond
MW-8	Did not respond
MW-9	Did not respond
MW-10	Did not respond
MW-11	Did not respond
PW-1	376

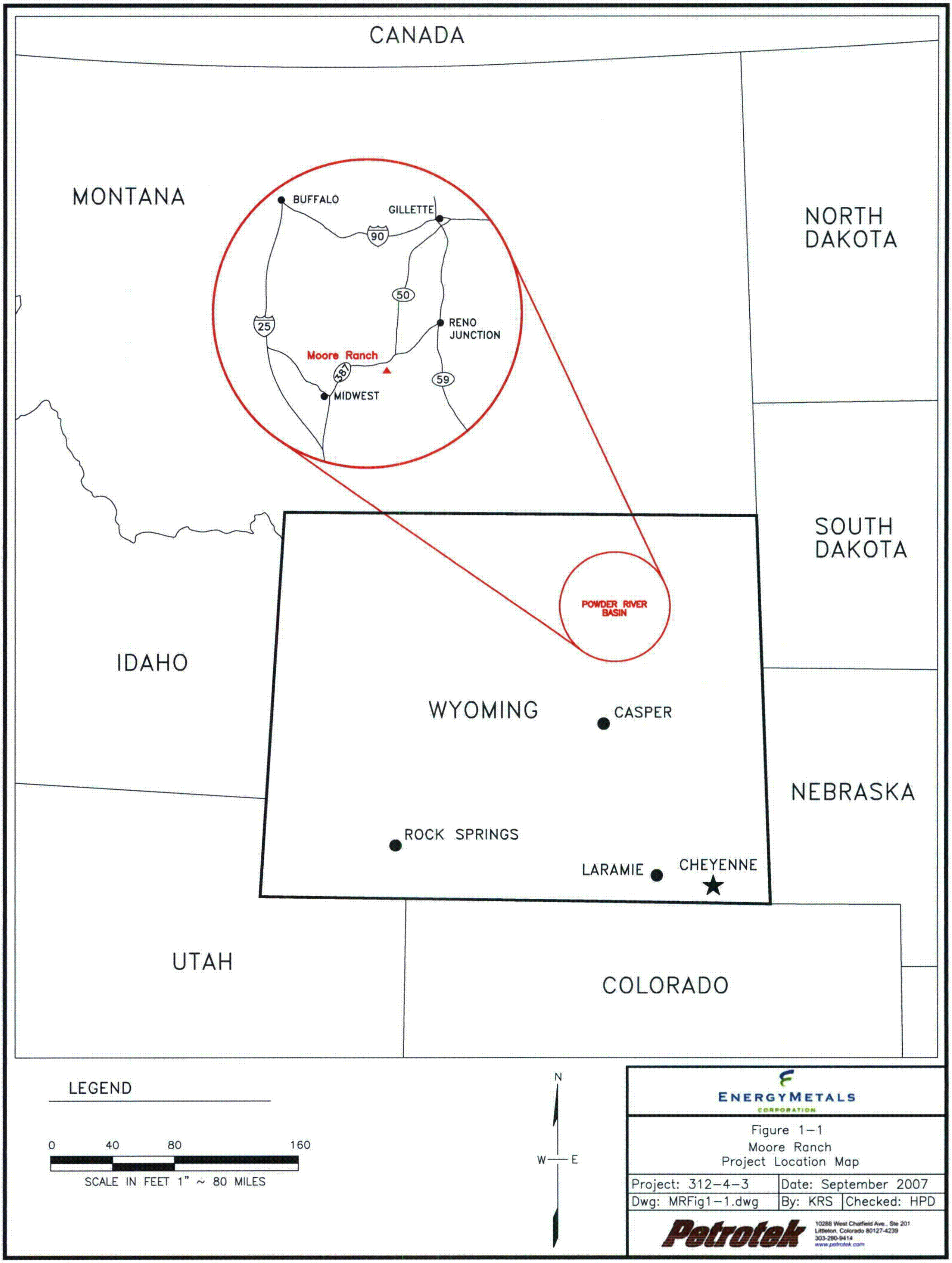
Test No. 2 - MW-2	
Well	Transmissivity (ft²/d)
MW-5	Did not respond
MW-6	Did not respond
MW-7	Did not respond
1805	555
MW-2	724

Test No. 3 - MW-3	
Well	Transmissivity (ft²/d)
MW-8	Did not respond
MW-9	Did not respond
MW-10	Did not respond
MW-11	Did not respond
MW-3	329

Average T = 540 ft^2/day

Moore Ranch Hydrologic Testing Report – 2007 Pump Tests Revised July 2009

Figures


CANADA
MONTANA
NORTH DAKOTA
SOUTH DAKOTA
IDAHO
WYOMING
NEBRASKA
UTAH
COLORADO
BUFFALO
GILLETTE
90
50
25
RENO JUNCTION
Moore Ranch
387
59
MIDWEST
POWDER RIVER BASIN
CASPER
ROCK SPRINGS
LARAMIE
CHEYENNE
LEGEND
0 40 80 160
SCALE IN FEET 1" ~ 80 MILES
N
W
E
ENERGYMETALS CORPORATION
Figure 1-1
Moore Ranch
Project Location Map
Project: 312-4-3
Date: September 2007
Dwg: MRFig1-1.dwg
By: KRS
Checked: HPD
Petrotek
10288 West Chatfield Ave., Ste 201
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303-290-9414
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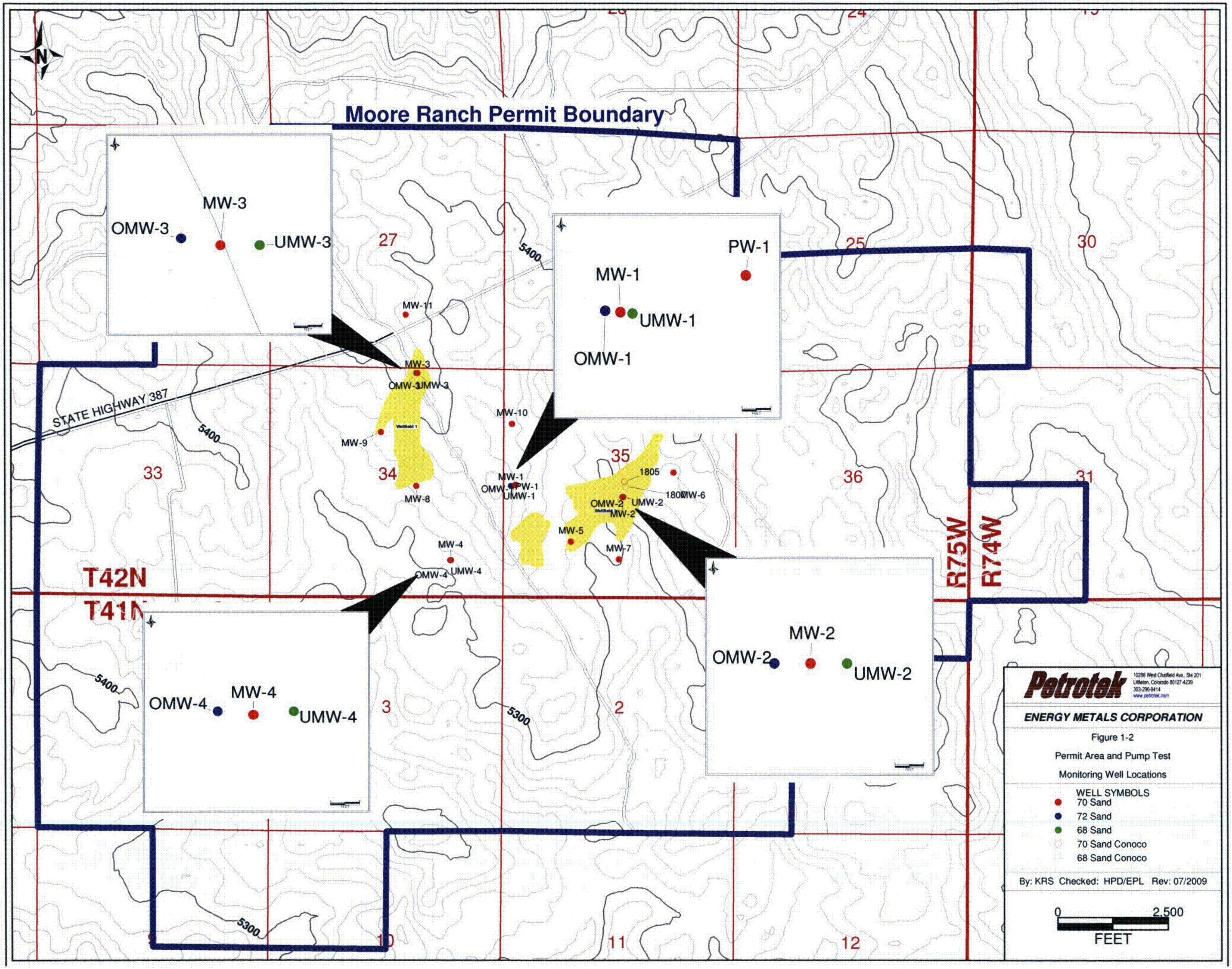
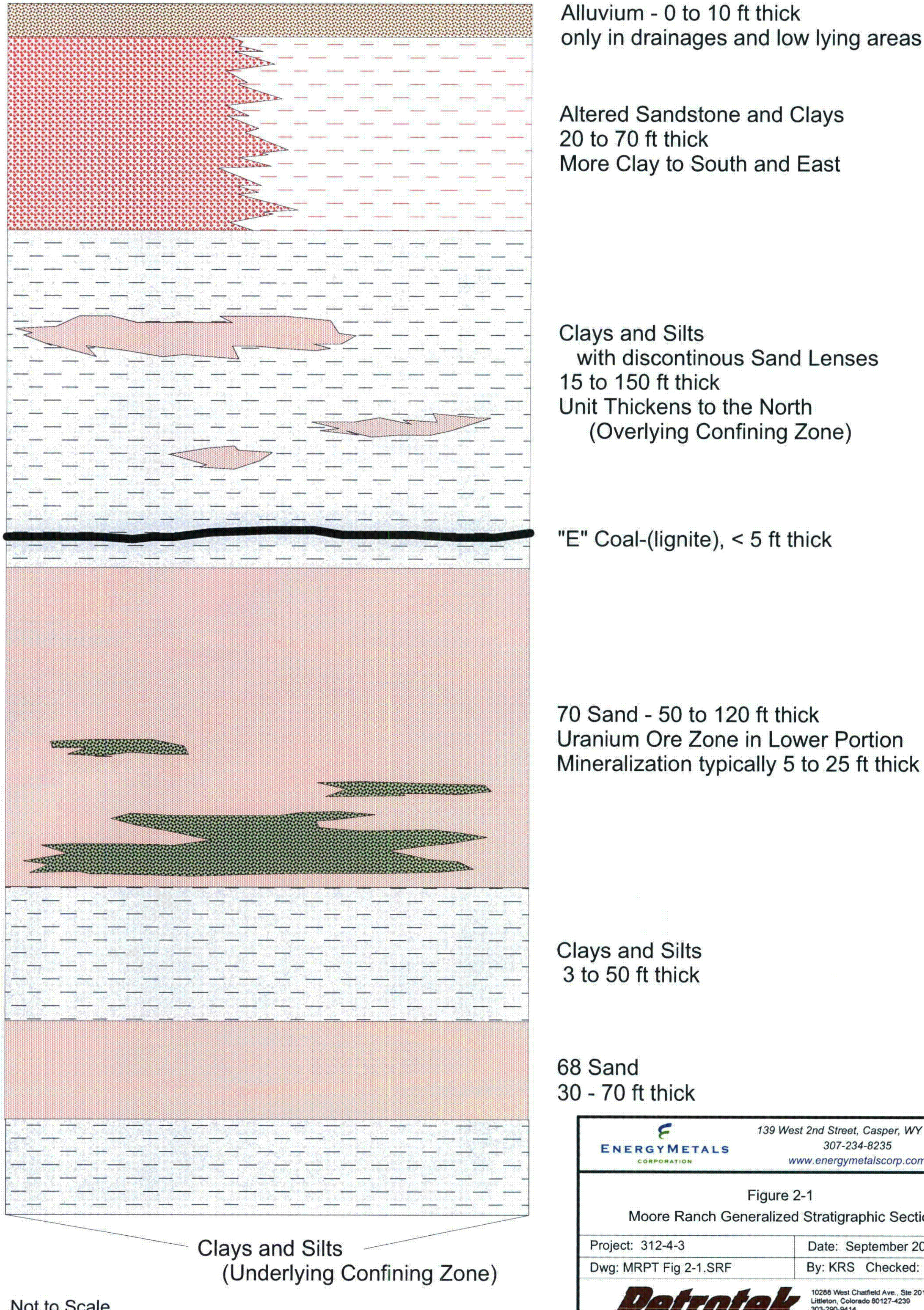


Moore Ranch Permit Boundary
MW-3
OMW-3
UMW-3
27
5400
PW-1
MW-1
UMW-1
OMW-1
25
30
MW-11
STATE HIGHWAY 387
MW-10
MW-9
33
34
MW-8
MW-1
PW-1
UMW-1
35
1805
MW-6
OMW-2
UMW-2
MW-2
MW-5
MW-7
36
31
MW-4
UMW-4
OMW-4
T42N
T41N
R75W
R74W
MW-2
OMW-2
UMW-2
MW-4
OMW-4
UMW-4
3
2
5300
11
12
10
Petrotek
ENERGY METALS CORPORATION
Figure 1-2
Permit Area and Pump Test
Monitoring Well Locations
WELL SYMBOLS
70 Sand
72 Sand
68 Sand
70 Sand Conoco
68 Sand Conoco
By: KRS Checked: HPD/EPL Rev: 07/2009
0
2,500
FEET



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139 West 2nd Street, Casper, WY 82601
307-234-8235
www.energymetalscorp.com

Figure 2-1
Moore Ranch Generalized Stratigraphic Section

Project: 312-4-3	Date: September 2007
Dwg: MRPT Fig 2-1.SRF	By: KRS Checked: HPD

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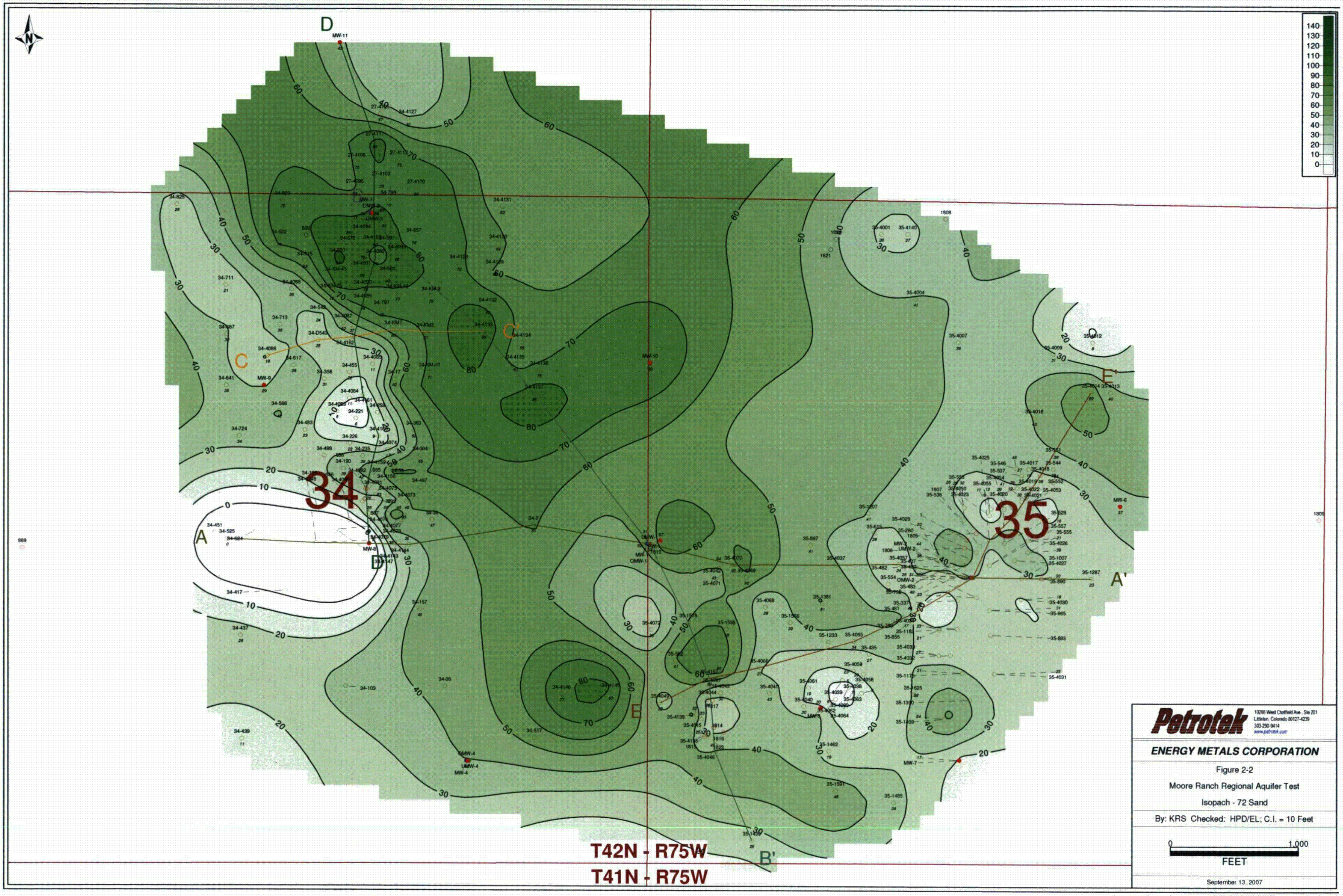
www.petrotek.com



D
D'
C
C'
A
A'
B'
E
E'
34
35
T42N - R75W
T41N - R75W
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
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Figure 2-2
Moore Ranch Regional Aquifer Test
Isopach - 72 Sand
By: KRS Checked: HPD/EL; C.I. = 10 Feet
0
1,000
FEET
September 13, 2007

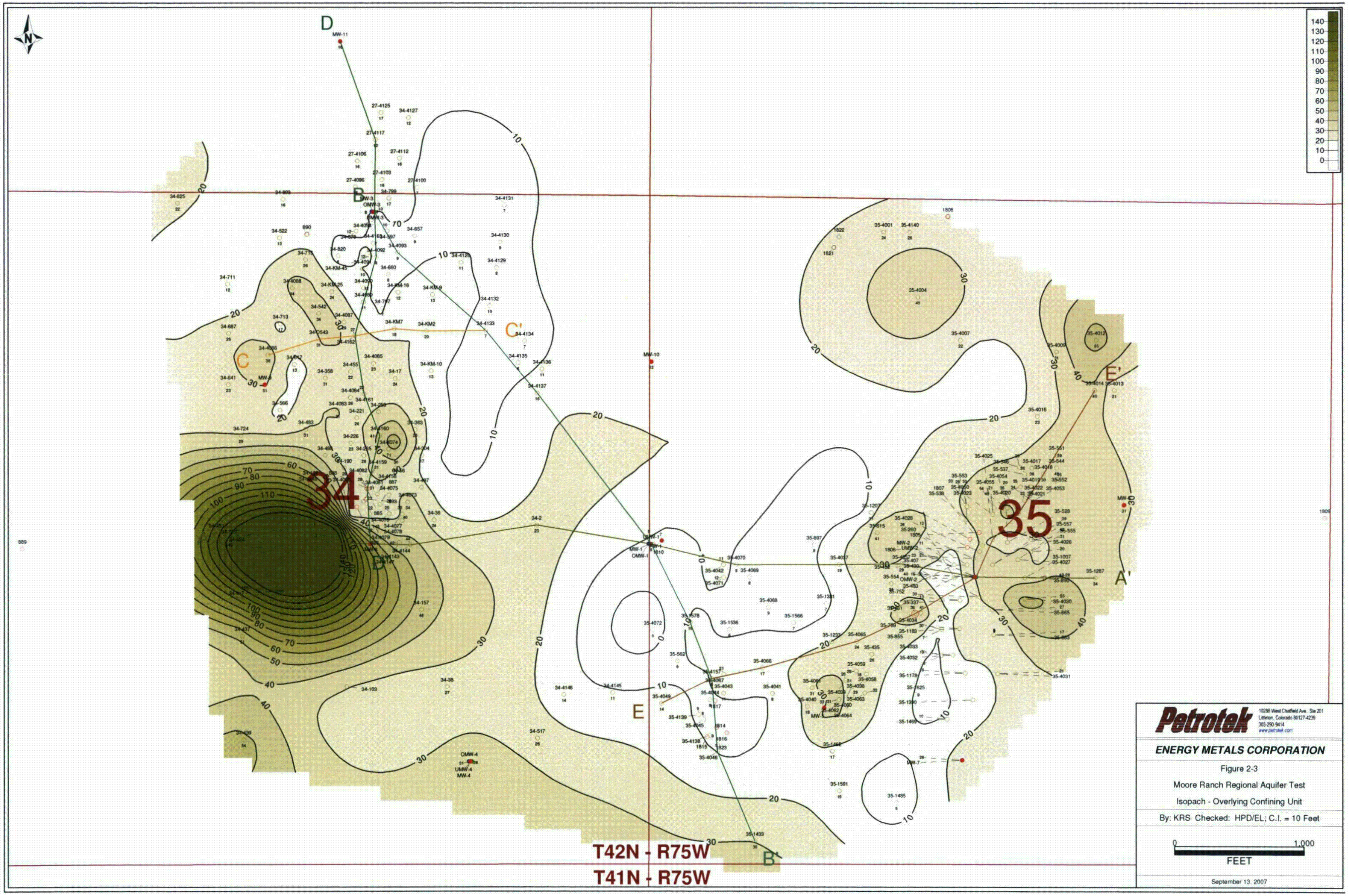

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Figure 2-3

Moore Ranch Regional Aquifer Test

Isopach - Overlying Confining Unit

By: KRS Checked: HPD/EL; C.I. = 10 Feet

0 1,000

FEET

September 13, 2007

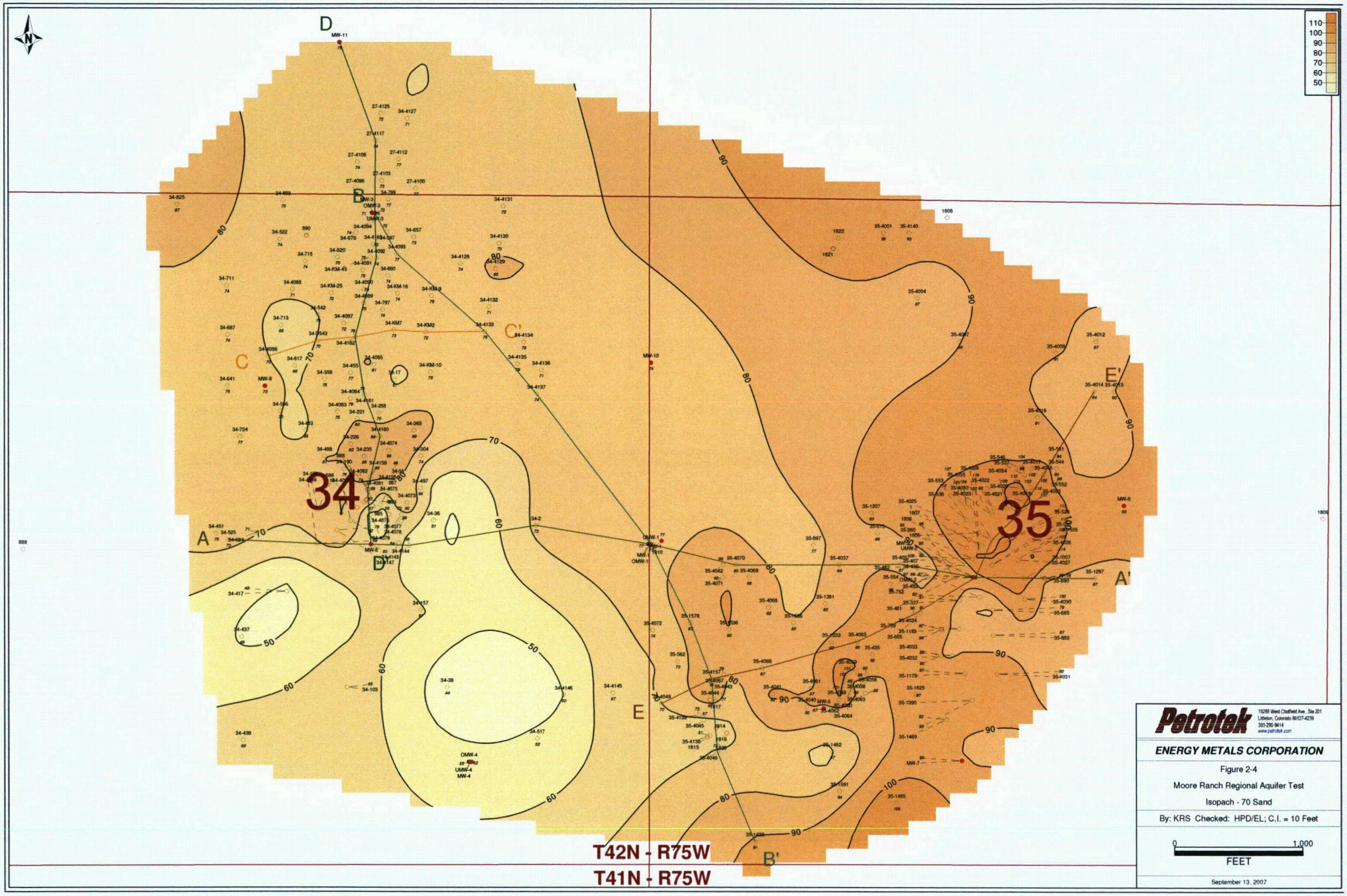

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Figure 2-4

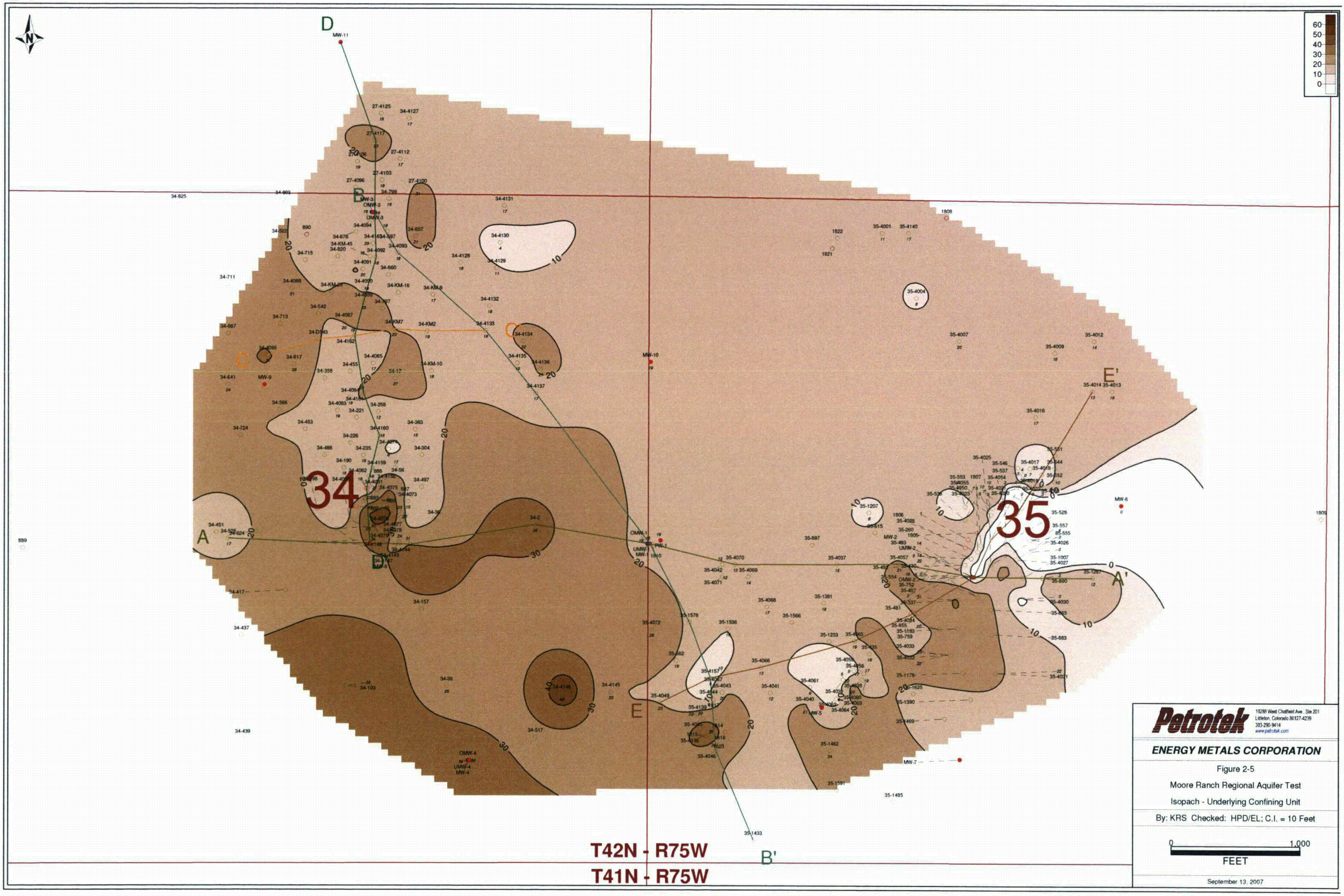
Moore Ranch Regional Aquifer Test

Isopach - 70 Sand

By: KRS Checked: HPD/EL; C.I. = 10 Feet

0 1,000 FEET

September 13, 2007



ENERGY METALS CORPORATION

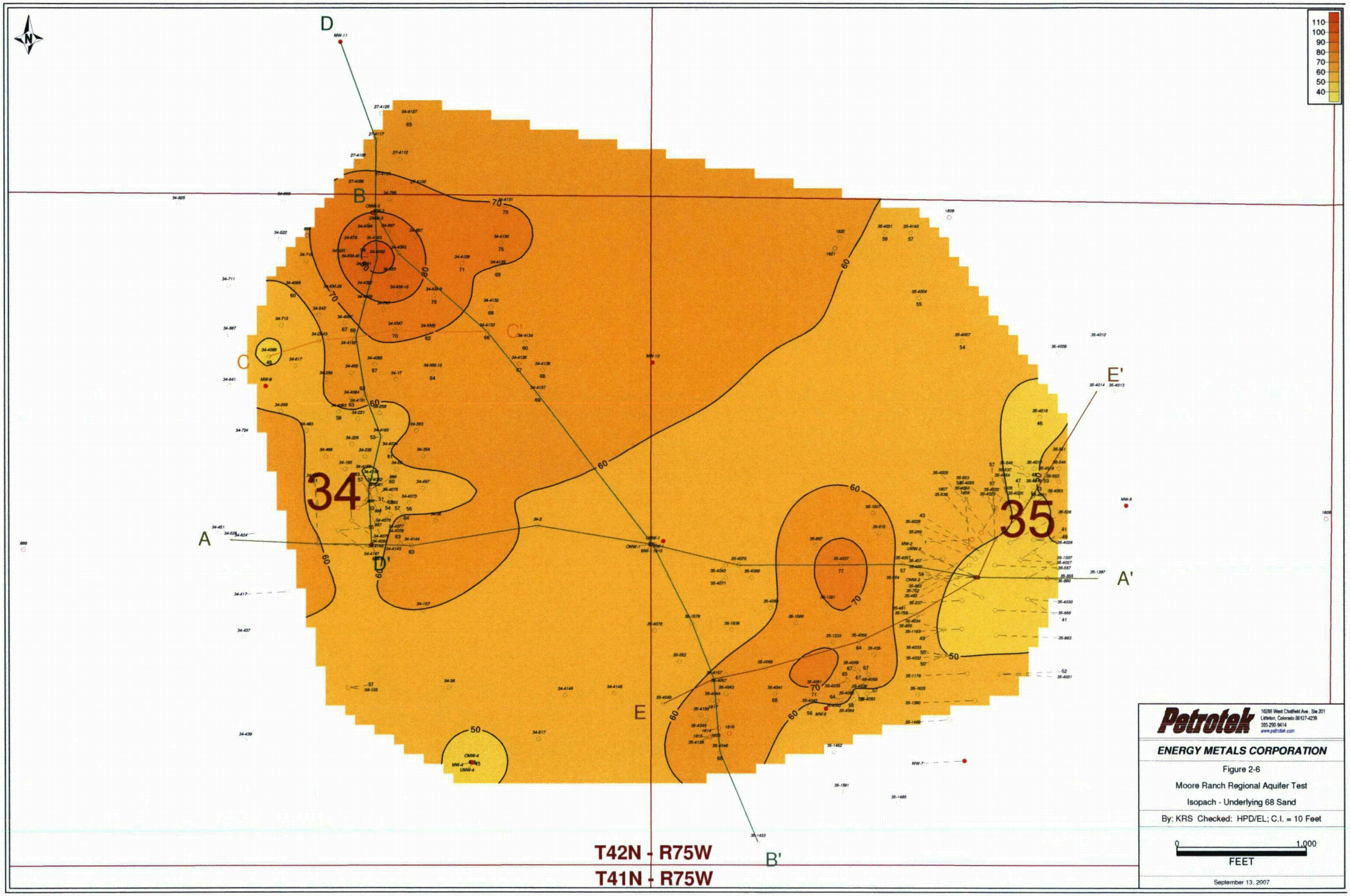
Figure 2-5

Moore Ranch Regional Aquifer Test

Isopach - Underlying Confining Unit

By: KRS Checked: HPD/EL; C.I. = 10 Feet

September 13, 2007



N
110
100
90
80
70
60
50
40
D
D'
A
A'
B
B'
C
C'
E
E'
34
35
T42N - R75W
T41N - R75W
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Figure 2-6
Moore Ranch Regional Aquifer Test
Isopach - Underlying 68 Sand
By: KRS Checked: HPD/EL; C.I. = 10 Feet
0
1,000
FEET
September 13, 2007

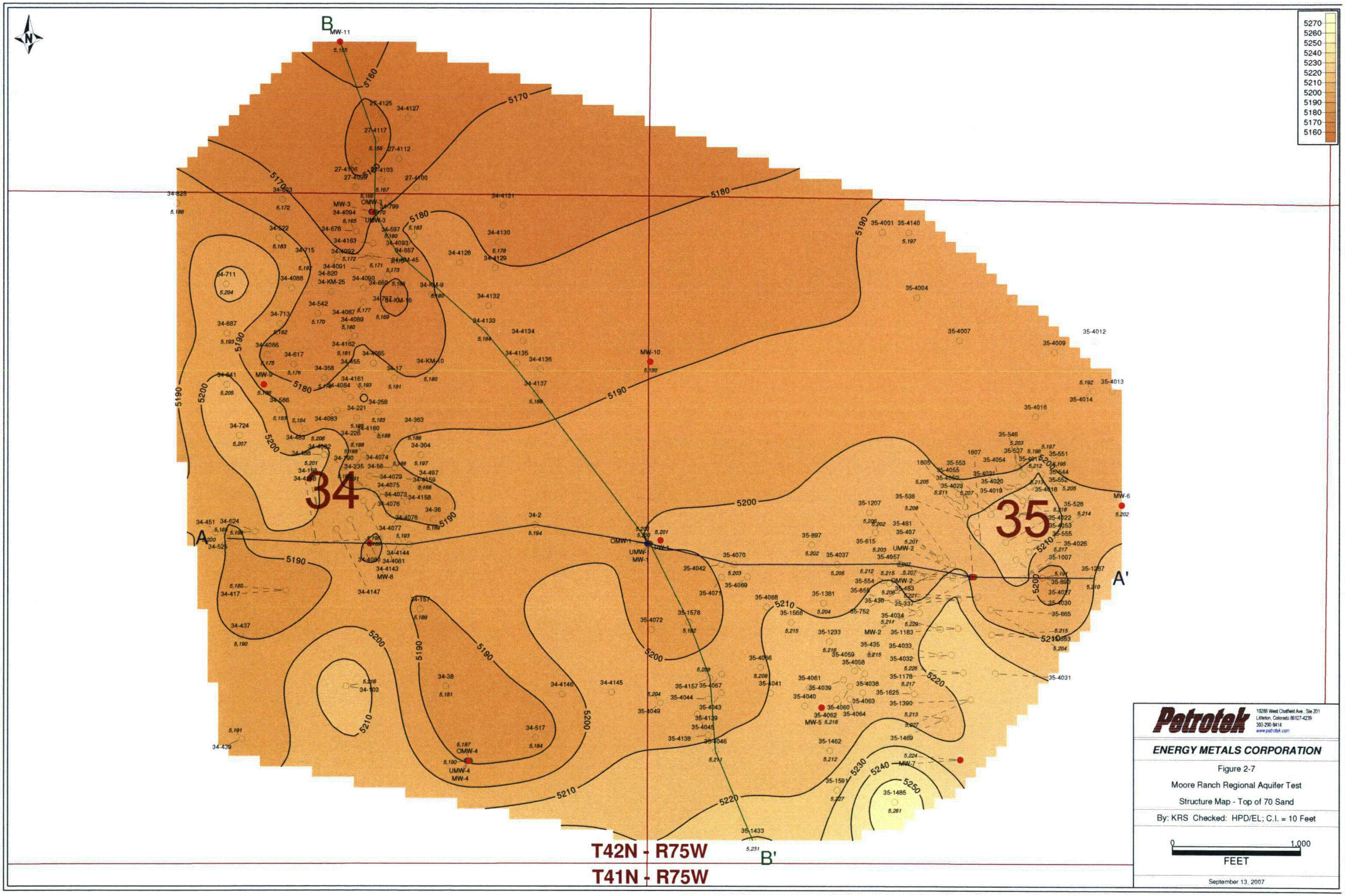
N
B
B'
A
A'
34
35
5270
5260
5250
5240
5230
5220
5210
5200
5190
5180
5170
5160
T42N - R75W
T41N - R75W
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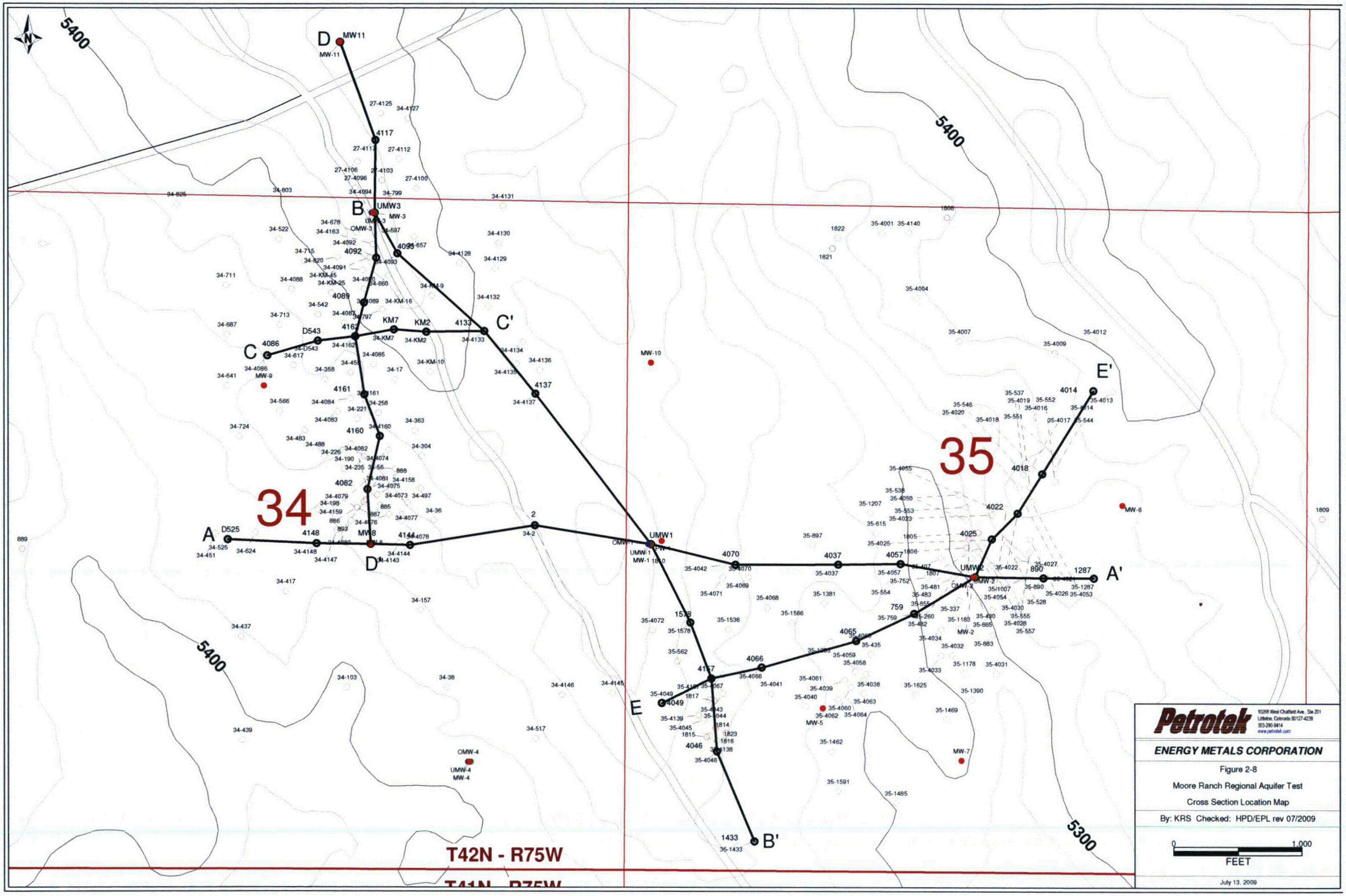
Figure 2-7
Moore Ranch Regional Aquifer Test
Structure Map - Top of 70 Sand
By: KRS Checked: HPD/EL; C.I. = 10 Feet
0
1,000
FEET
September 13, 2007



ENERGY METALS CORPORATION

Figure 2-8

Moore Ranch Regional Aquifer Test

Cross Section Location Map

By: KRS Checked: HPD/EPL rev 07/2009

July 13, 2009

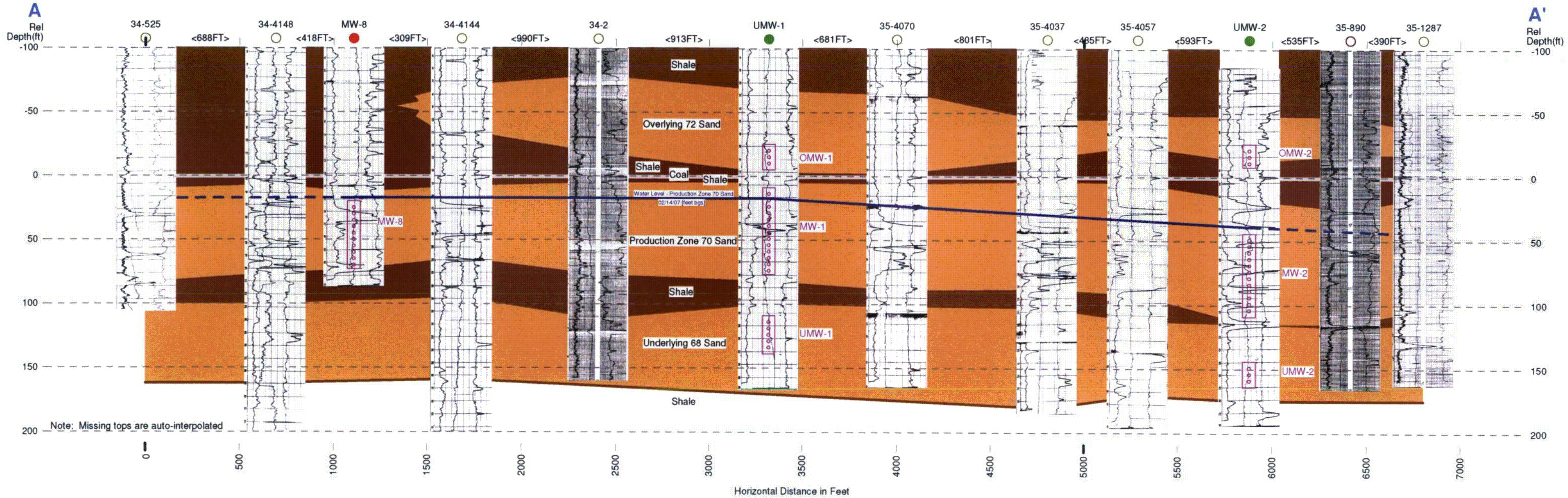


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Figure 2-9

Moore Ranch Regional Aquifer Test

Stratigraphic Cross Section A-A'

September 2007

By: KRS Checked: HPD/EL

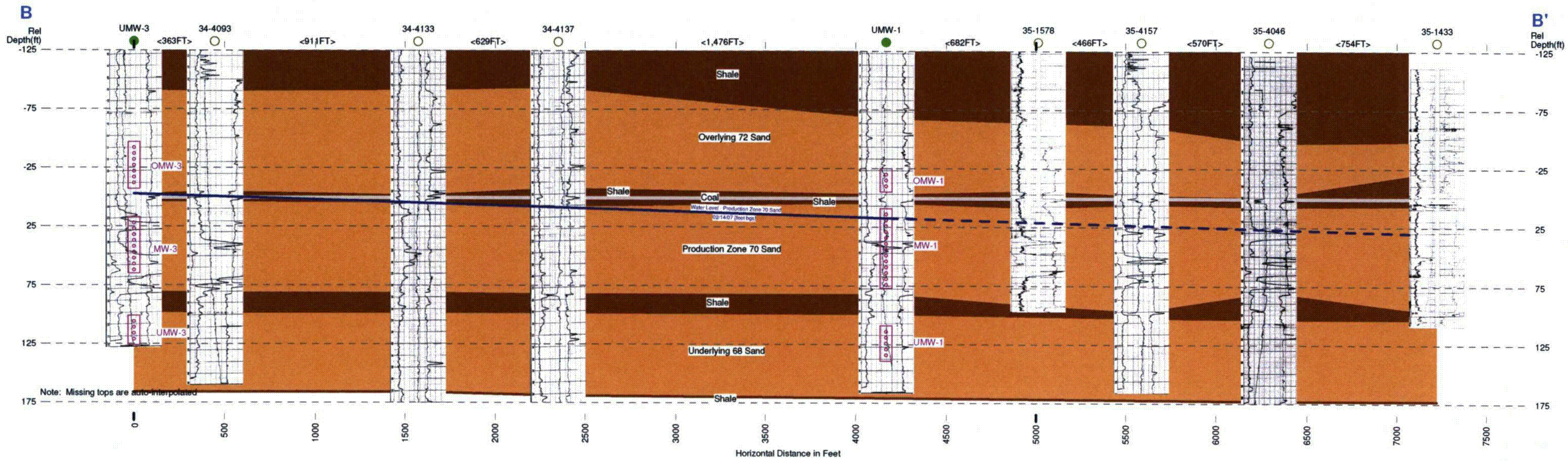

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Figure 2-10

Moore Ranch Regional Aquifer Test

Stratigraphic Cross Section B-B'

September 2007

By: KRS Checked: HPD/EL

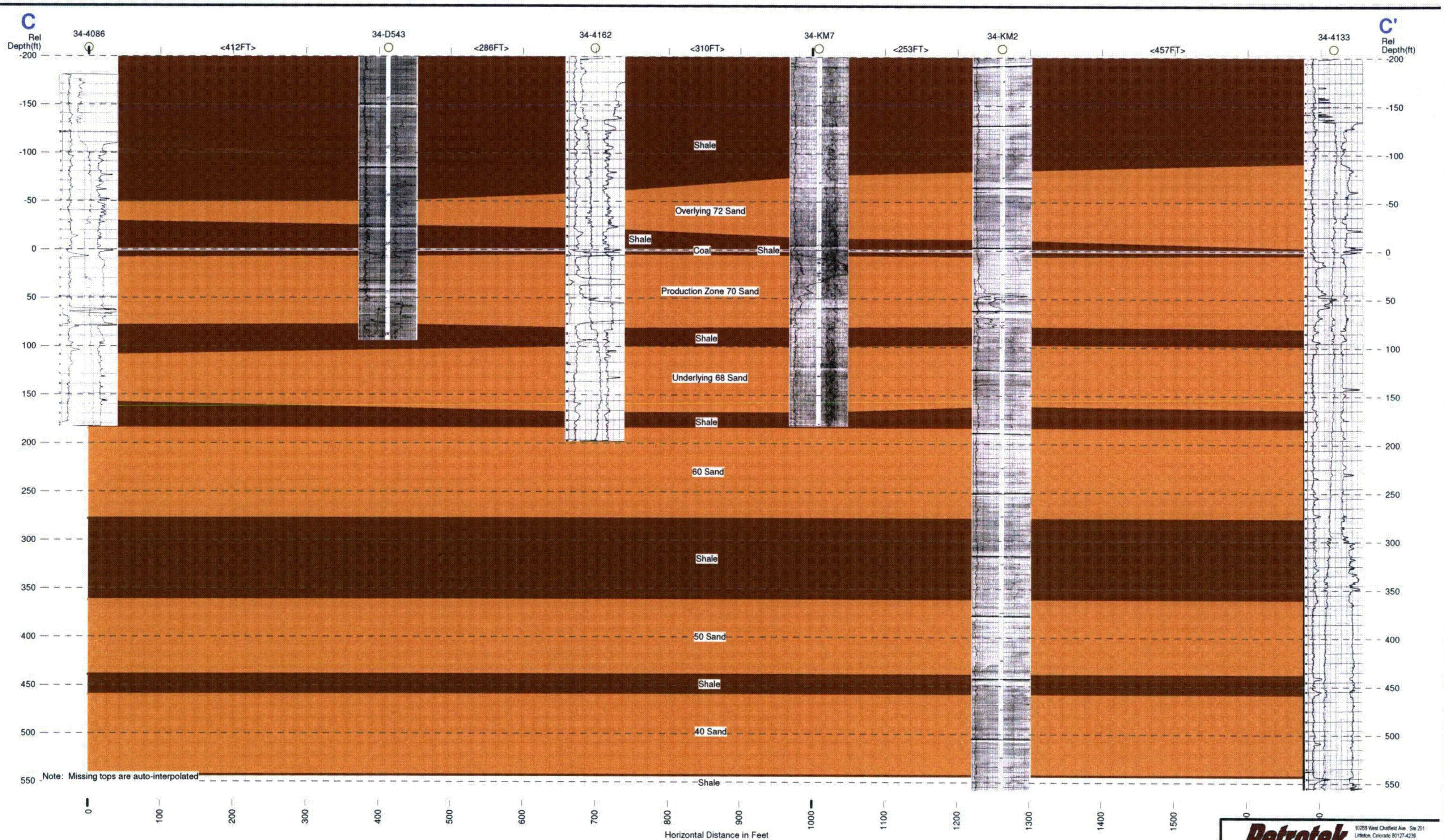

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Figure 2-11

Moore Ranch Regional Aquifer Test

Stratigraphic Cross Section C-C'

September 2007

By: KRS Checked: HPD/EL

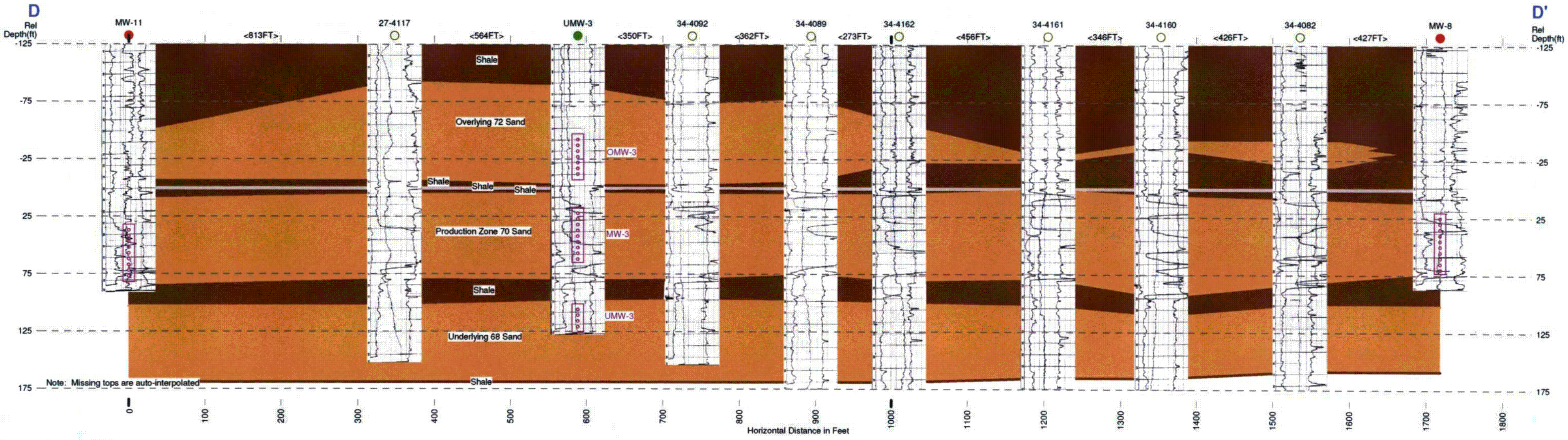

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Figure 2-12

Moore Ranch Regional Aquifer Test

Stratigraphic Cross Section D-D'

September 2007

By: KRS Checked: HPD/EL

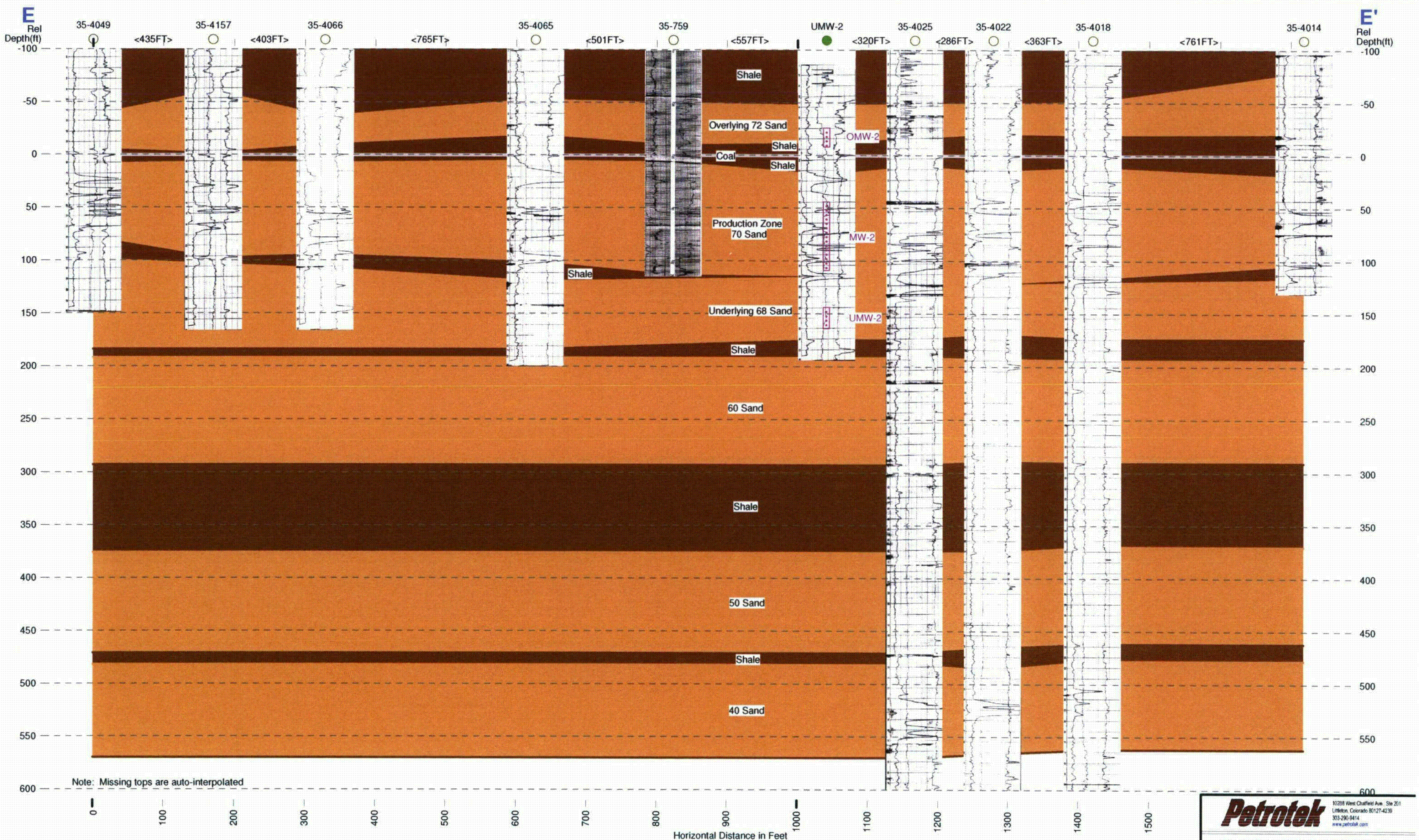

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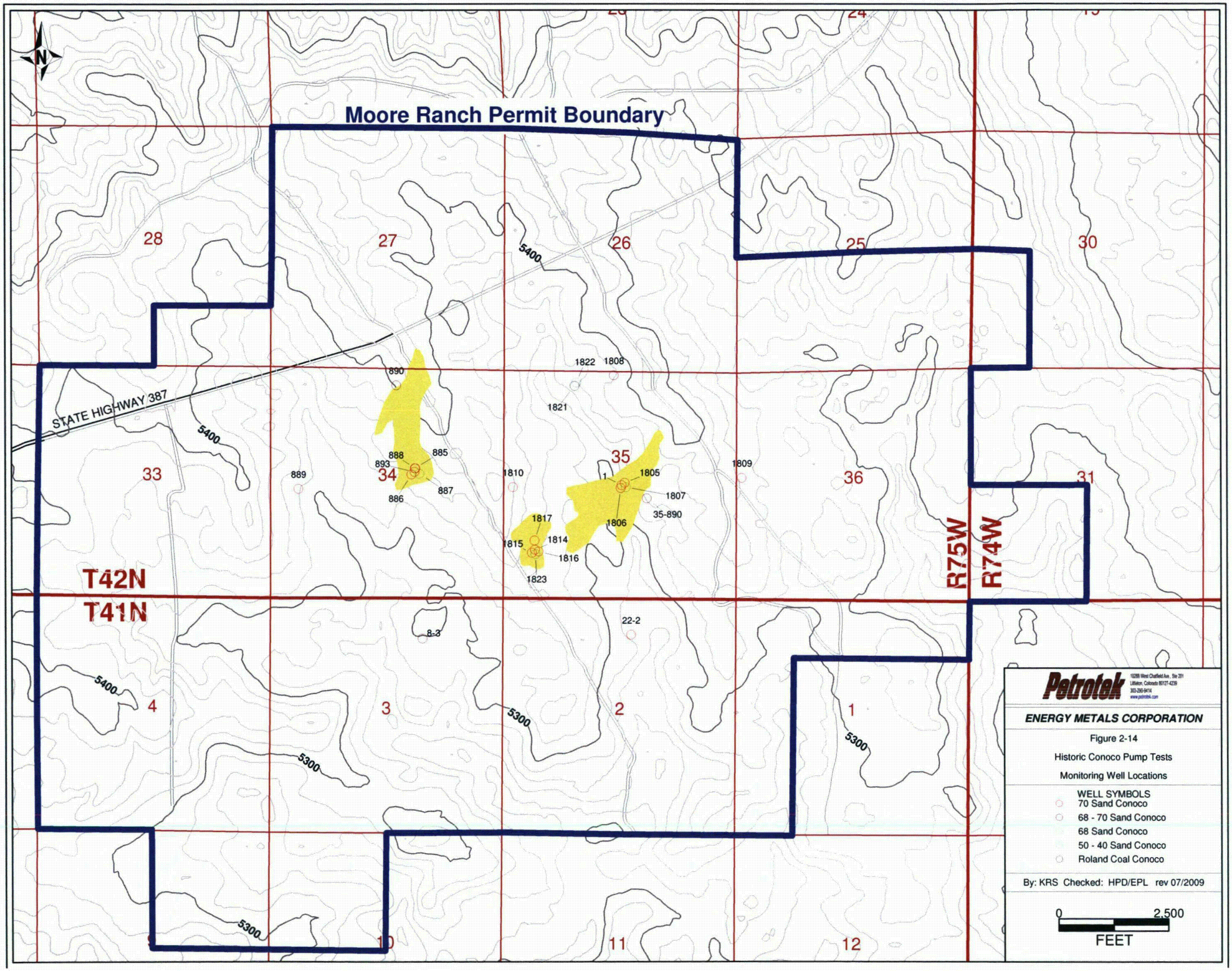
Figure 2-13

Moore Ranch Regional Aquifer Test

Stratigraphic Cross Section E-E'

September 2007

By: KRS Checked: HPD/EL



Moore Ranch Permit Boundary
N
STATE HIGHWAY 387
28
27
26
25
30
33
34
35
36
31
4
3
2
1
10
11
12
T42N
T41N
R75W
R74W
5400
5300
890
1822
1808
1821
888
885
893
889
887
886
1810
1805
1807
35-890
1809
1806
1817
1814
1815
1816
1823
22-2
8-3
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Figure 2-14
Historic Conoco Pump Tests
Monitoring Well Locations
WELL SYMBOLS
70 Sand Conoco
68 - 70 Sand Conoco
68 Sand Conoco
50 - 40 Sand Conoco
Roland Coal Conoco
By: KRS Checked: HPD/EPL rev 07/2009
0
2,500
FEET

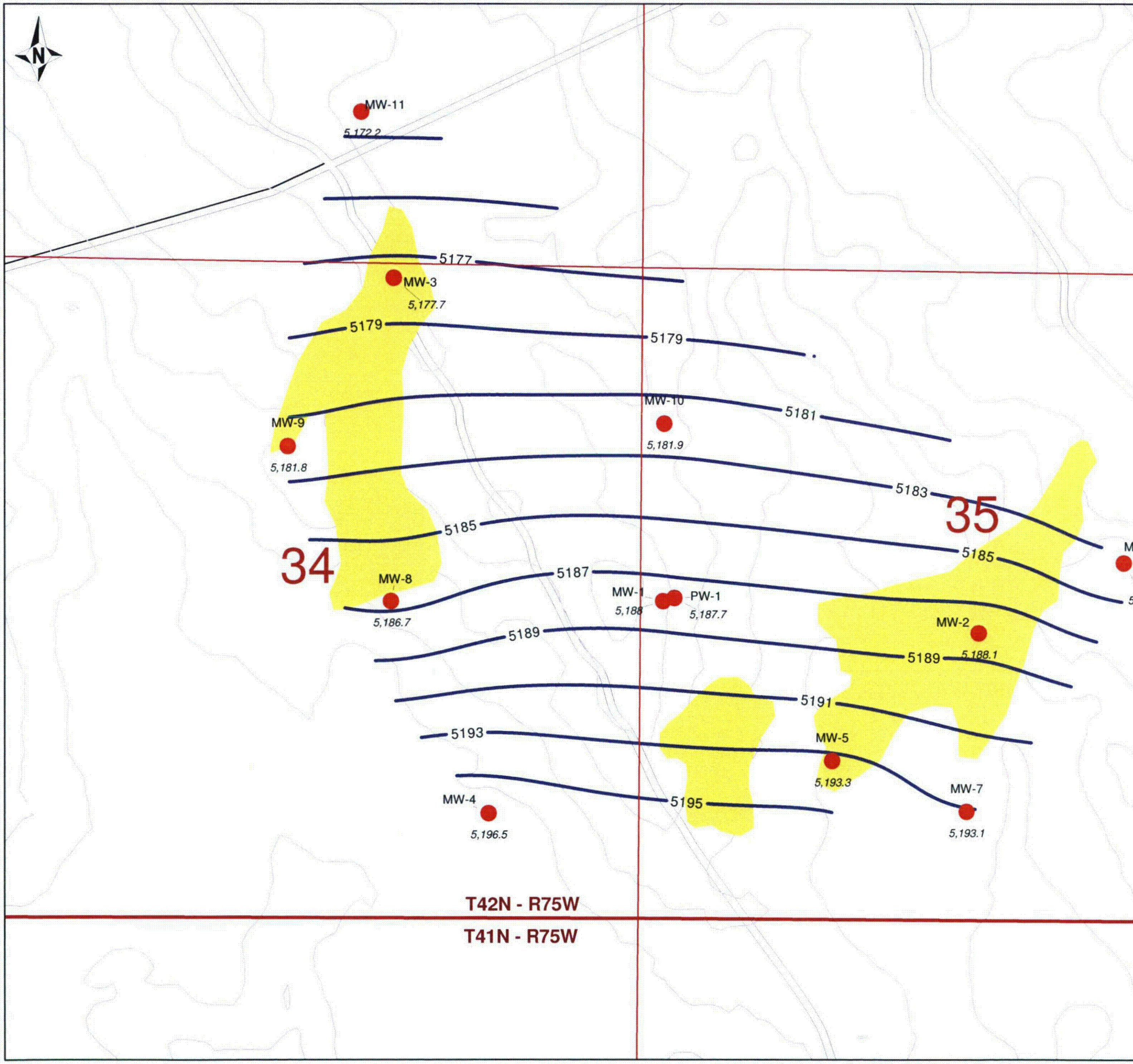

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Figure 4-1

Moore Ranch Regional Aquifer Test

02/14/07 Potentiometric Surface 70 Sand

REMARKS
Contour Interval = 2 Feet [amsl]

By: KRS Checked: HPD/EPL 07/2009

0 1,000
FEET

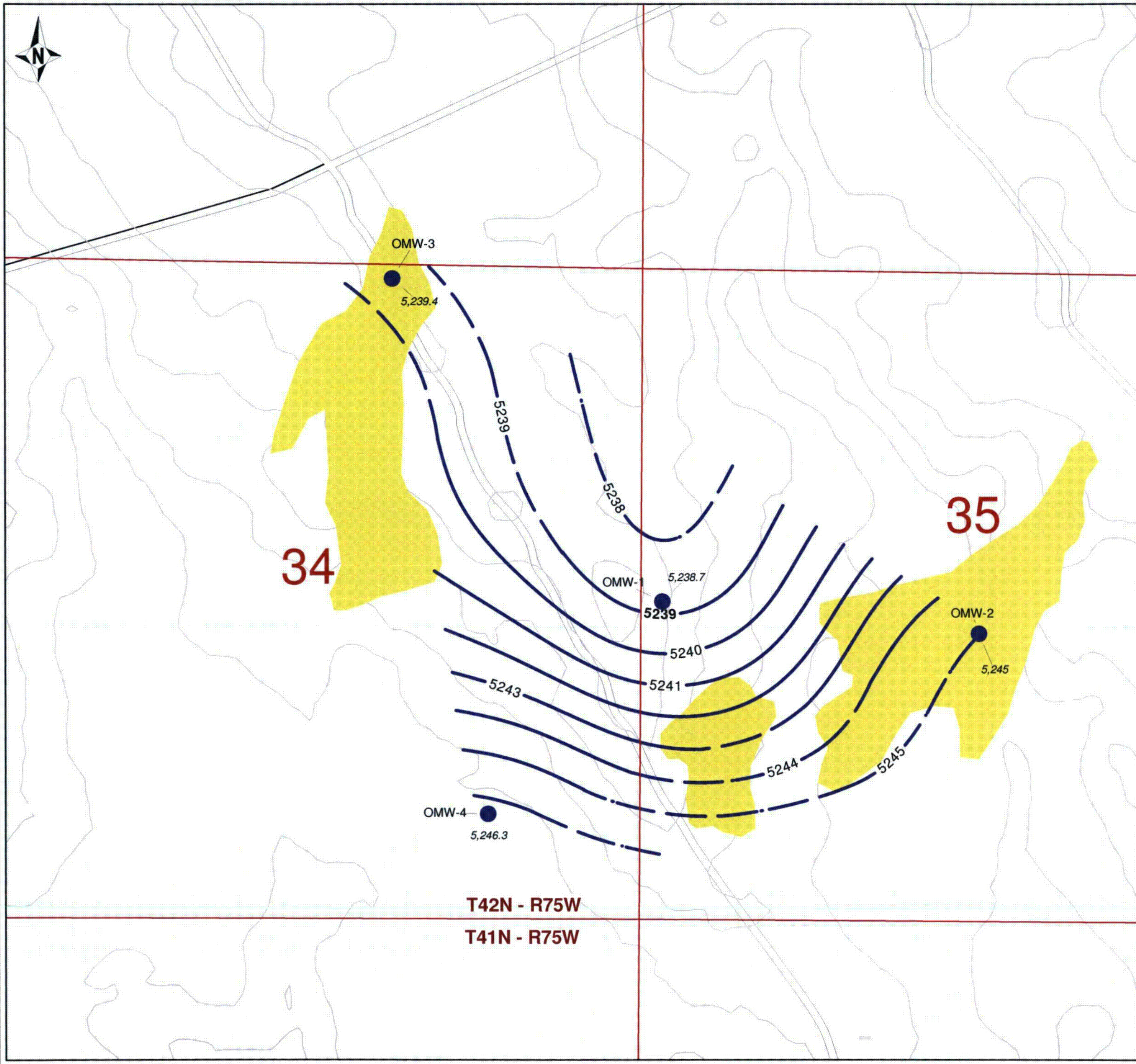

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Figure 4-2

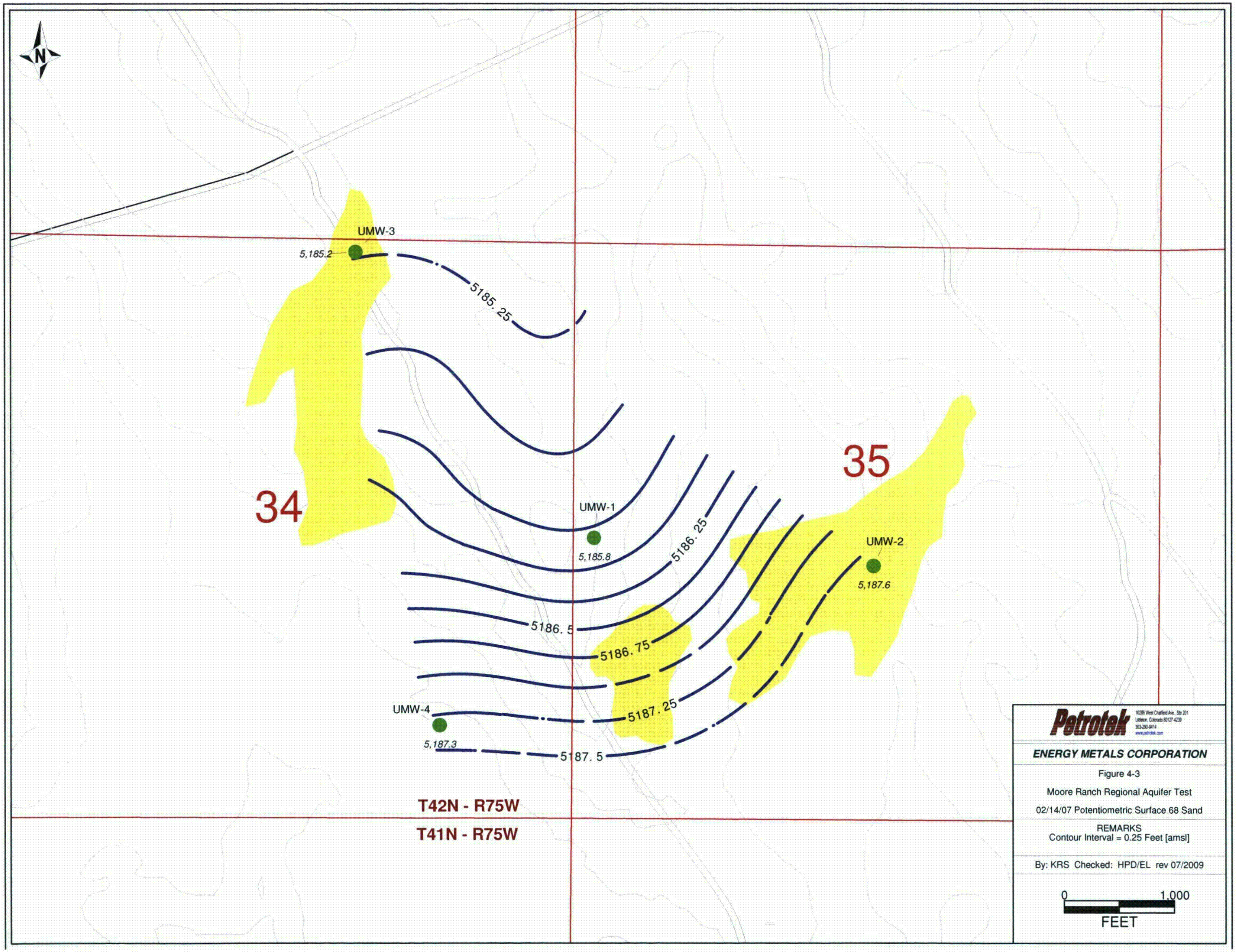
Moore Ranch Regional Aquifer Test

02/14/07 Potentiometric Surface 72 Sand

REMARKS
Contour Interval = 1 Feet [amsl]

By: KRS Checked: HPD/EPL rev 07/2009

0 1,000
FEET



UMW-3
5,185.2
UMW-1
5,185.8
UMW-2
5,187.6
UMW-4
5,187.3
5185.25
5186.25
5186.5
5186.75
5187.25
5187.5
34
35
T42N - R75W
T41N - R75W
N
Petrotek
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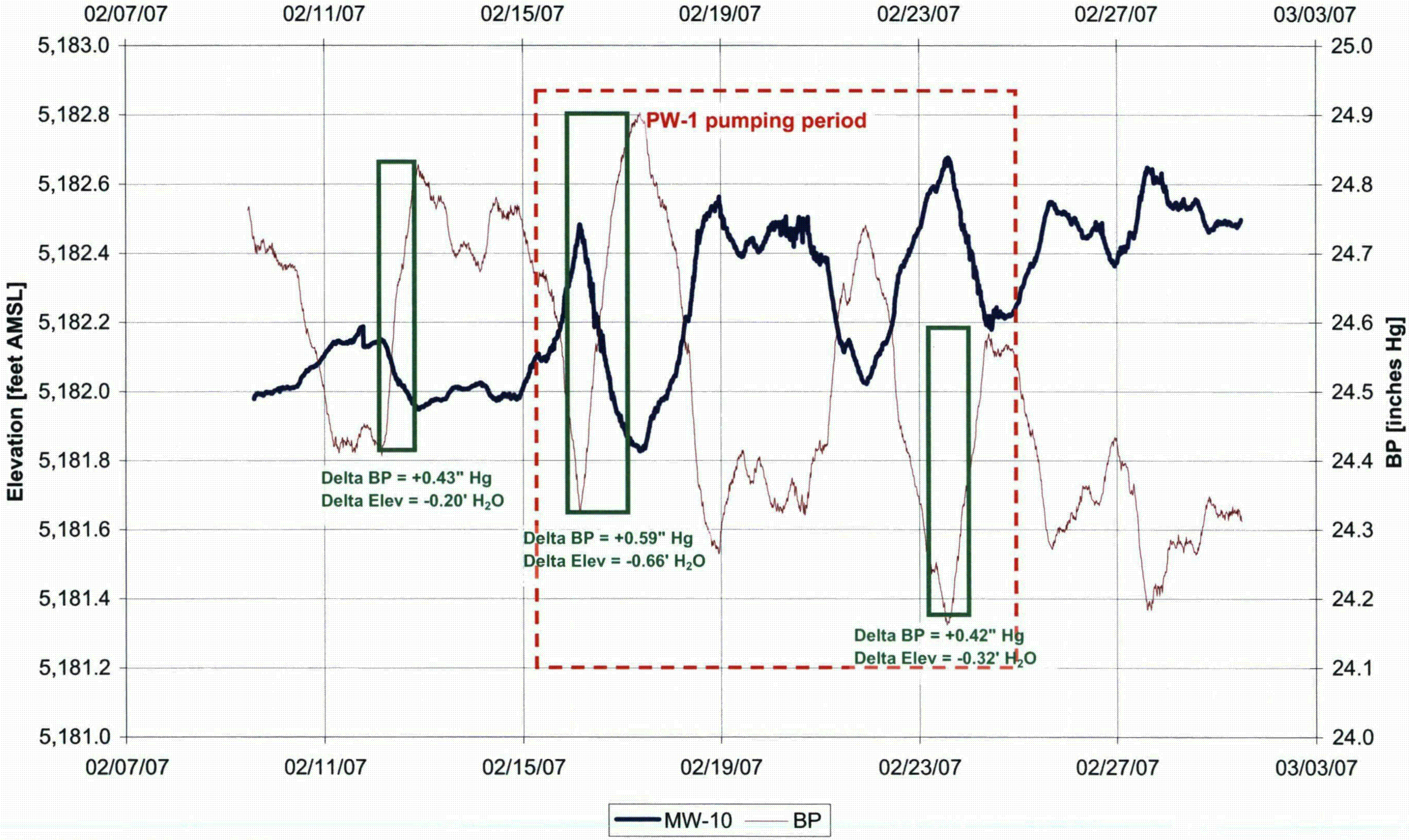
Figure 4-3
Moore Ranch Regional Aquifer Test
02/14/07 Potentiometric Surface 68 Sand
REMARKS
Contour Interval = 0.25 Feet [amsl]
By: KRS Checked: HPD/EL rev 07/2009
0
1,000
FEET

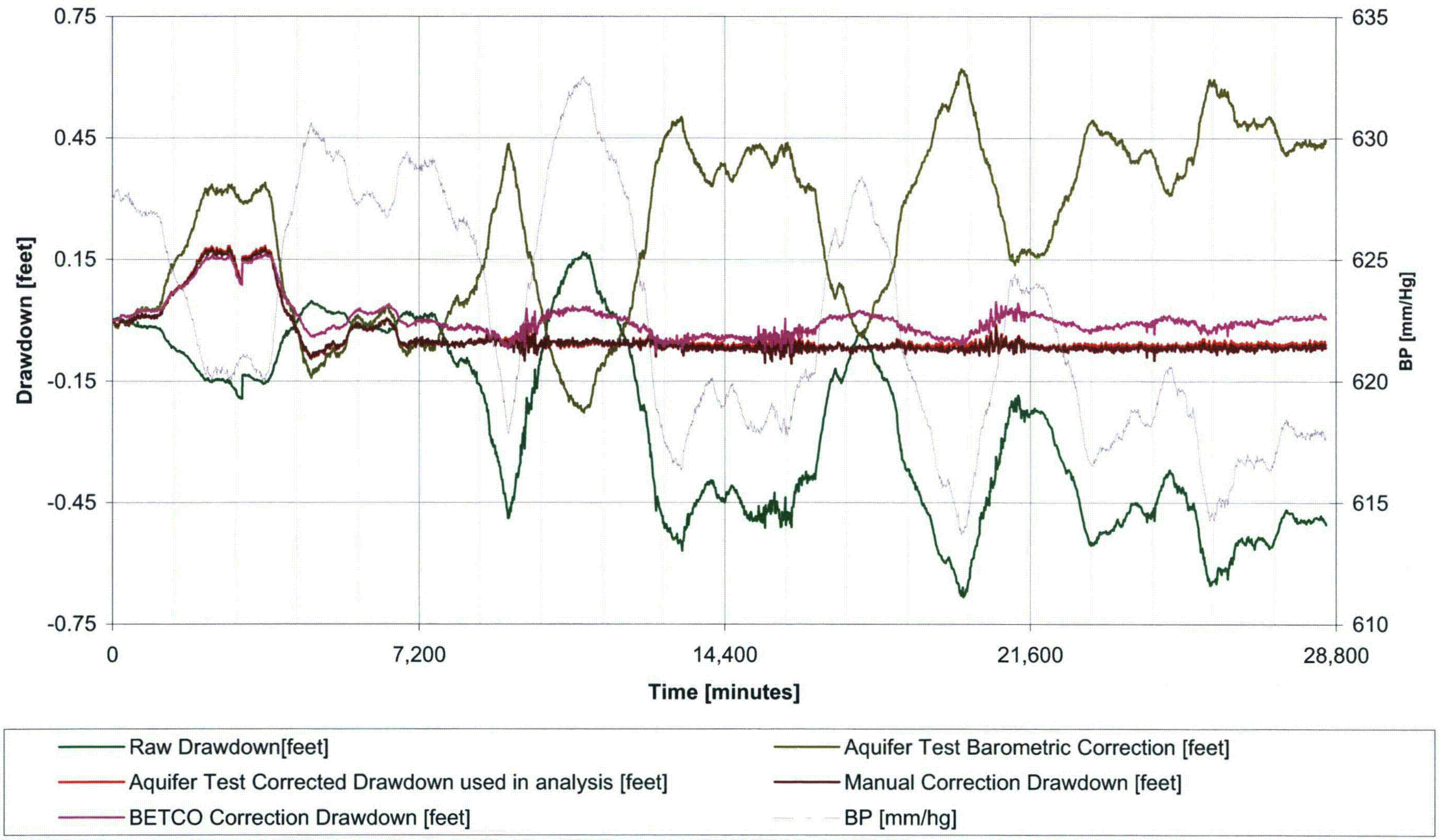
Moore Ranch Hydrologic Testing Report
Energy Metals Corporation
September 2007

Figure 5-1. Effect of Barometric Pressure Fluctuation on Water Elevation at MW10



Moore Ranch Hydrologic Testing Report
Energy Metals Corporation
September 2007

Figure 5-2. Comparison of Barometric Corrections to Drawdown Observed at MW-10



Comparing BETCO-MAN-AQT BEs for MW-10.xls

Moore Ranch Hydrologic Testing Report
Energy Metals Corporation
September 2007

Figure 5-3. Comparison of Barometric Corrections to Drawdown Observed at MW-1

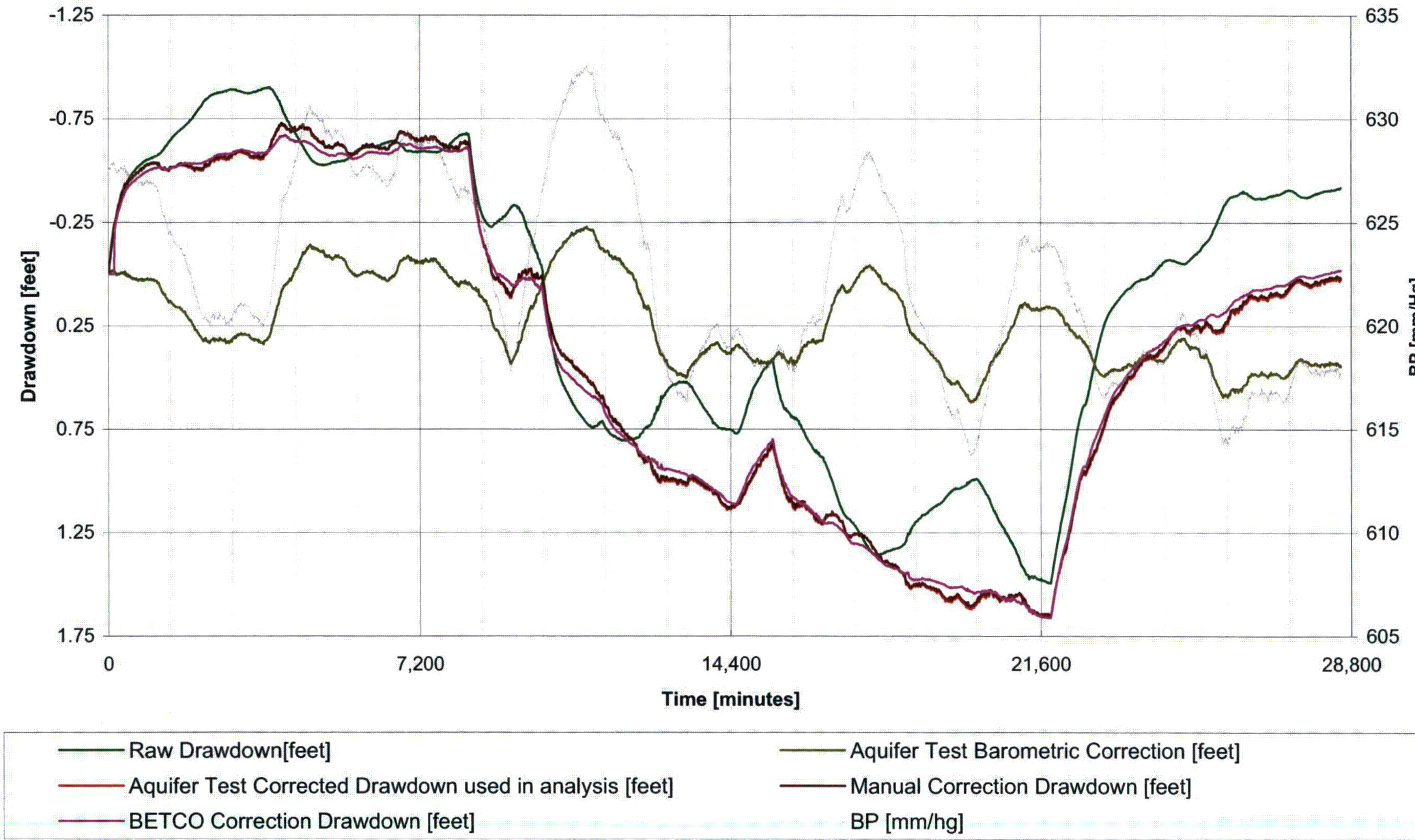
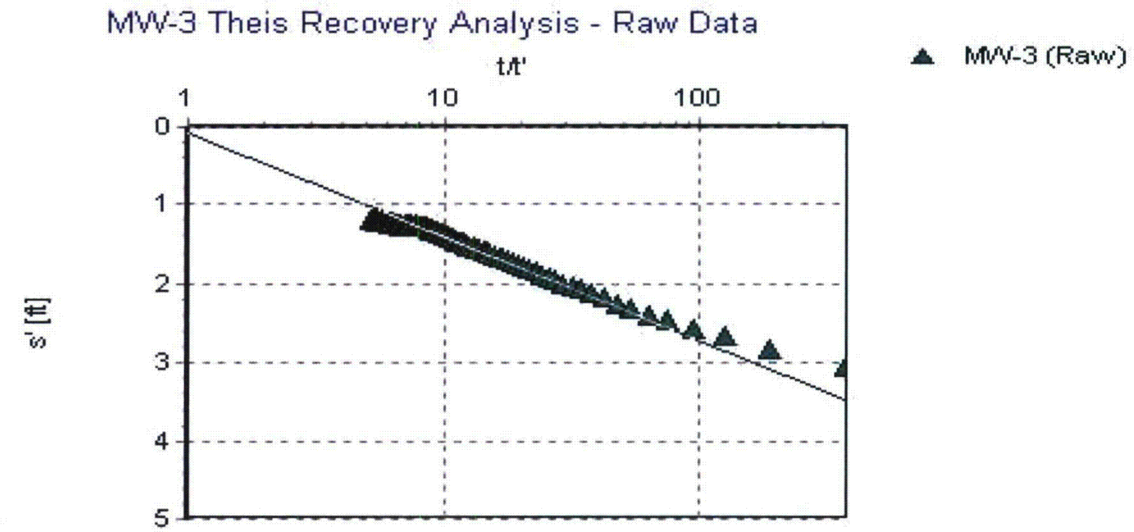
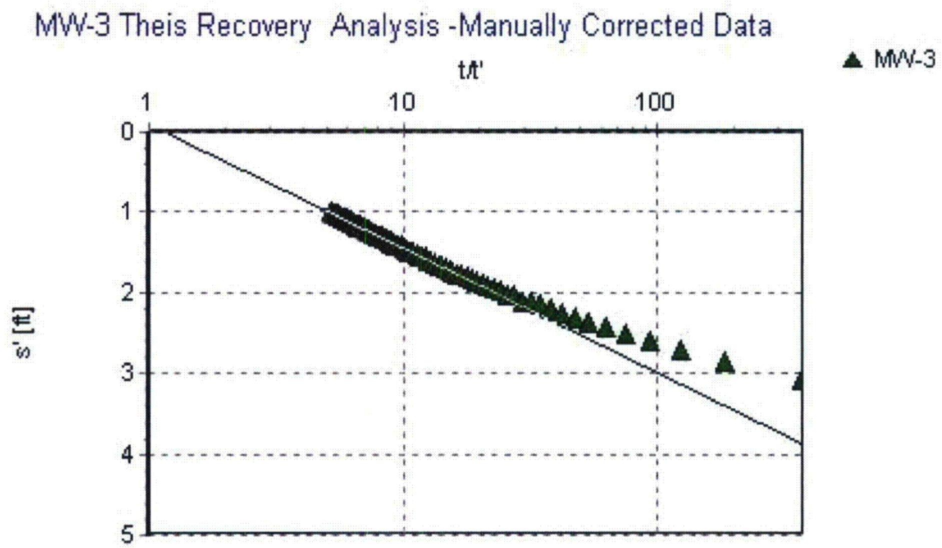


Figure 5-4. Comparison of Raw Data vs Manually Corrected Data Theis Recovery Method; MW-3



Transmissivity: 3.84E+2 ft²/d
Conductivity: 5.34E+0 ft/d



Transmissivity: 3.29E+2 ft²/d
Conductivity: 4.58E+0 ft/d

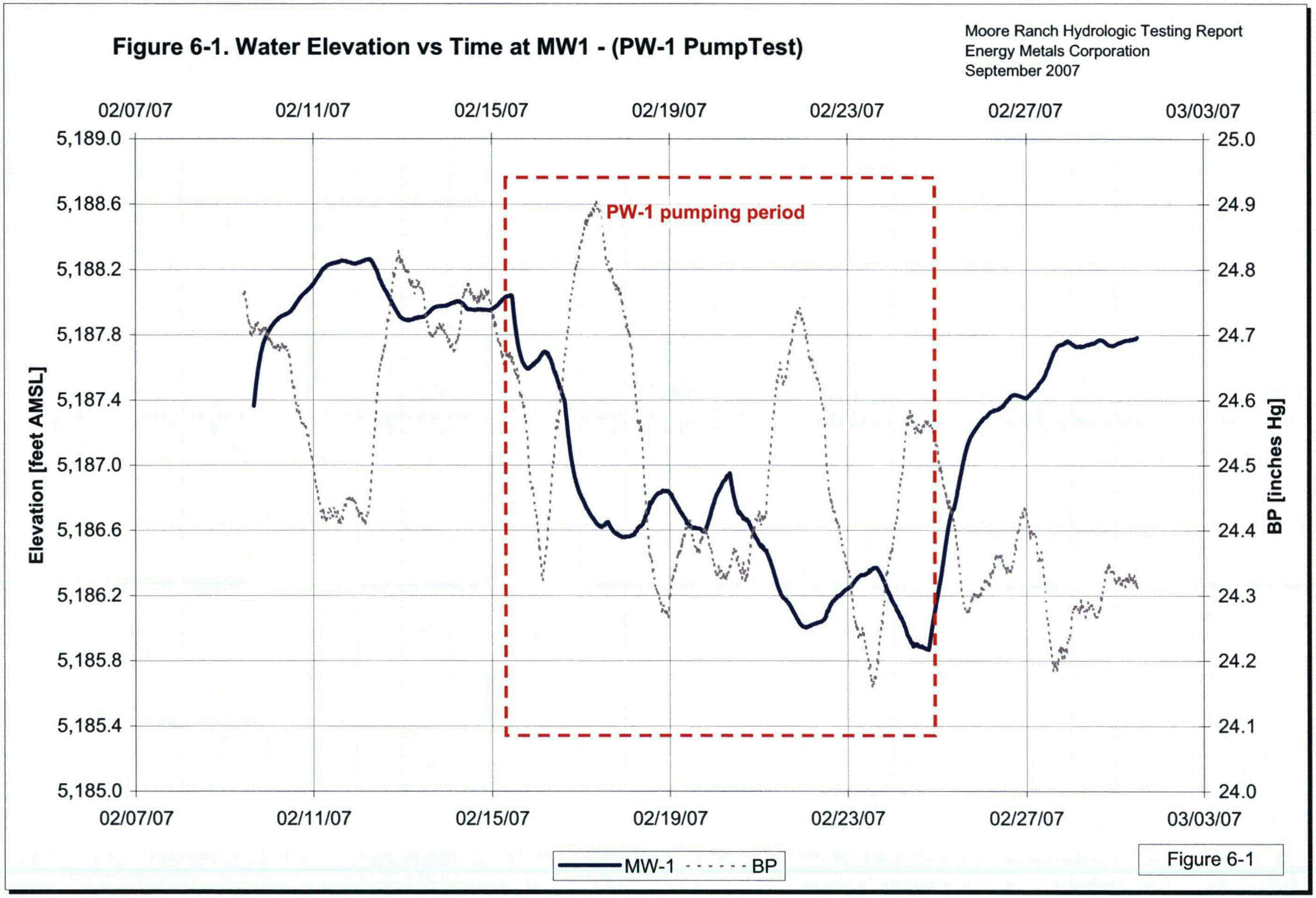
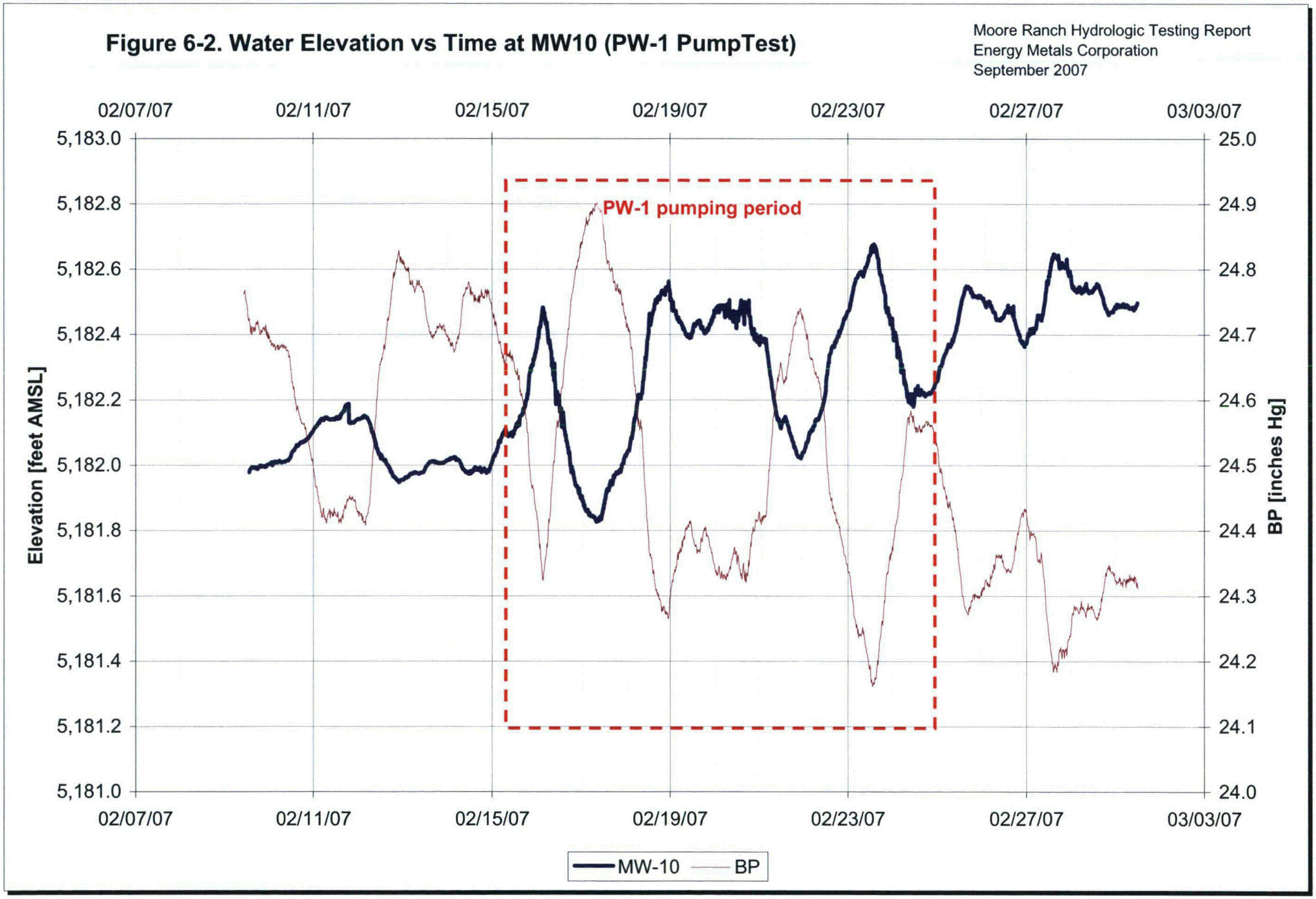
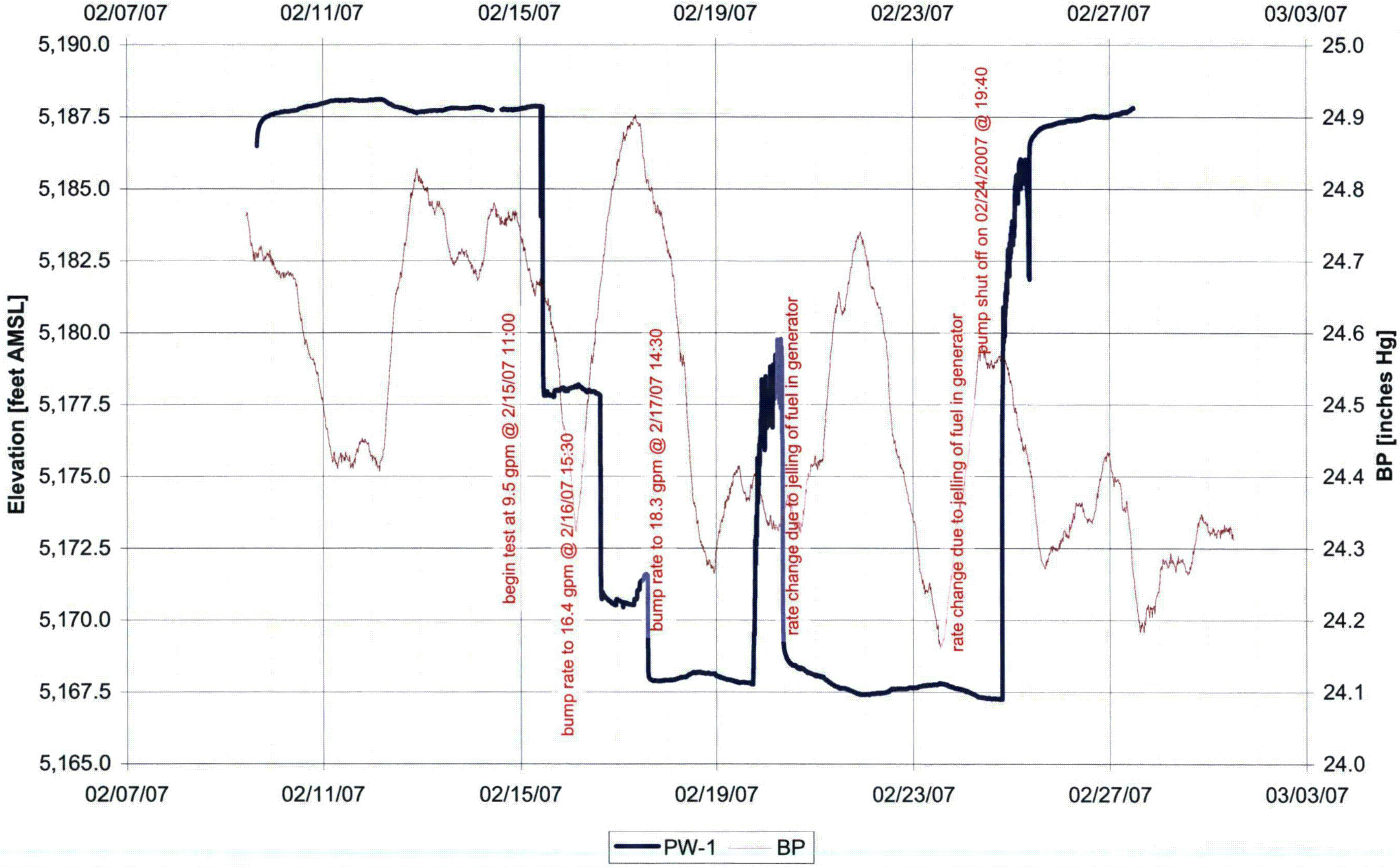


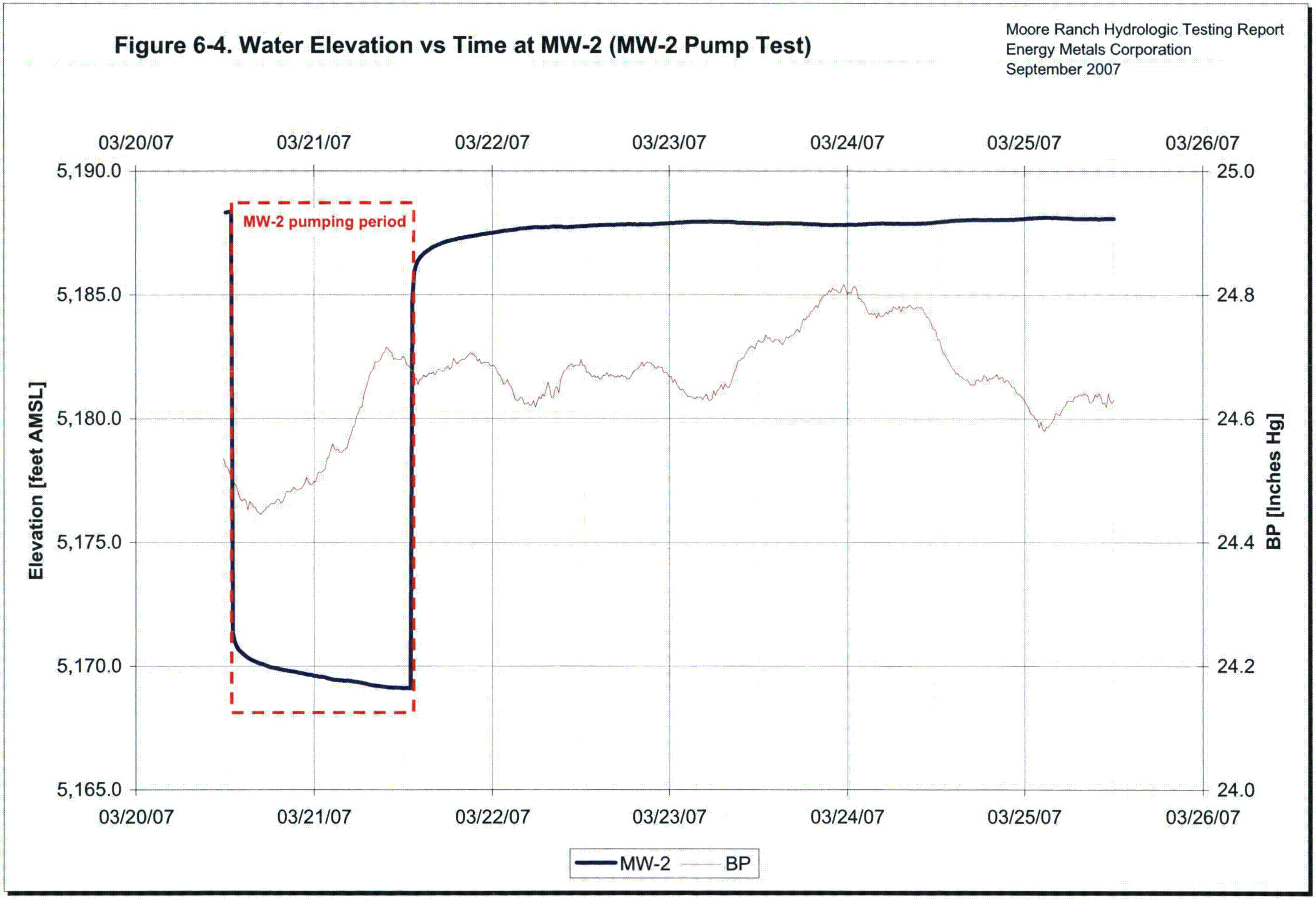
Figure 6-1. Water Elevation vs Time at MW1 - (PW-1 PumpTest)
Moore Ranch Hydrologic Testing Report
Energy Metals Corporation
September 2007
PW-1 pumping period
Elevation [feet AMSL]
BP [inches Hg]
02/07/07
02/11/07
02/15/07
02/19/07
02/23/07
02/27/07
03/03/07
5,189.0
5,188.6
5,188.2
5,187.8
5,187.4
5,187.0
5,186.6
5,186.2
5,185.8
5,185.4
5,185.0
25.0
24.9
24.8
24.7
24.6
24.5
24.4
24.3
24.2
24.1
24.0
MW-1
BP
Figure 6-1



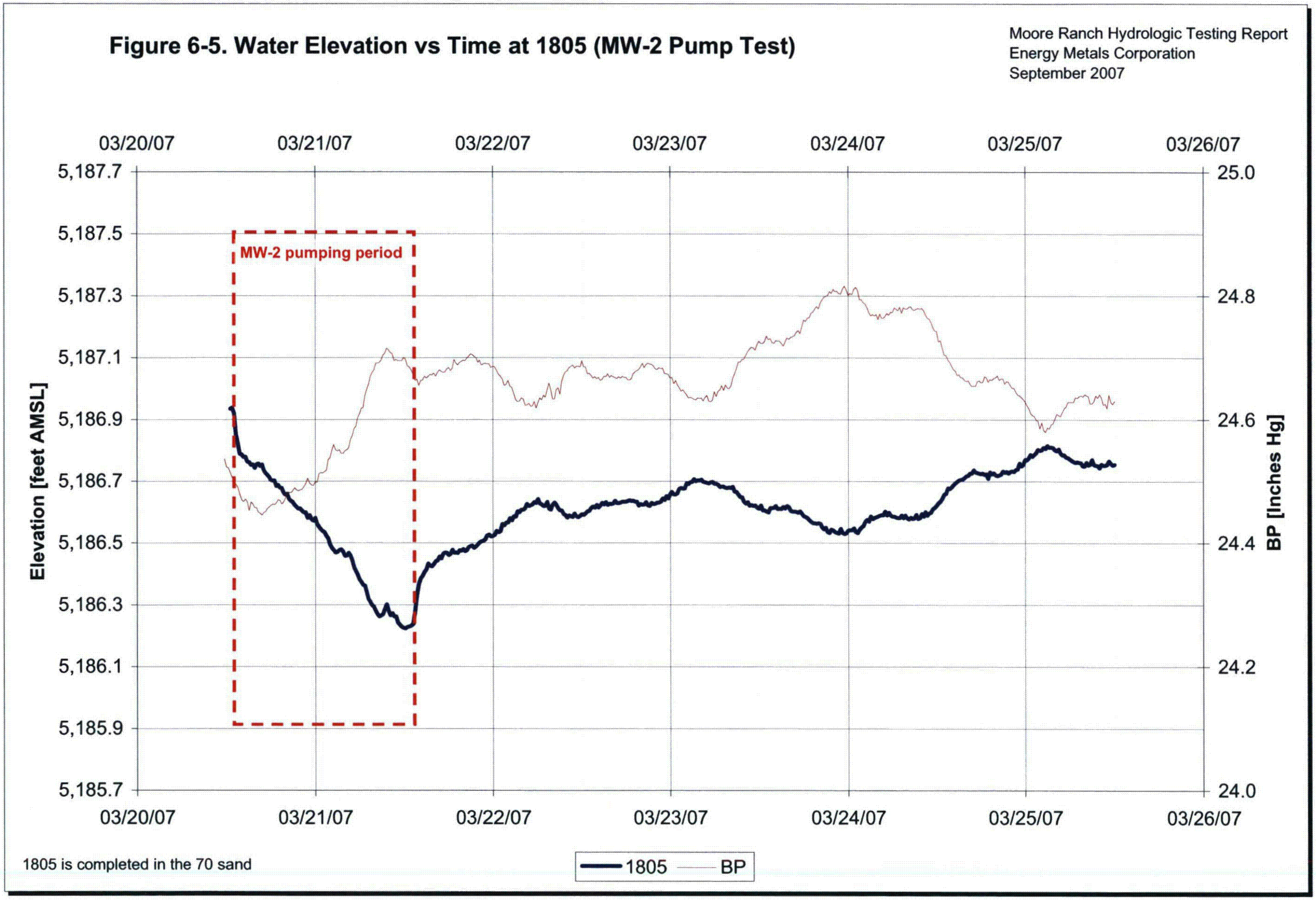
EMC MR PT Mastersheet - PW-1 with bkgrdrev070809.xls

Figure 6-3. Water Elevation vs Time at PW-1 (PW-1 Pump Test)





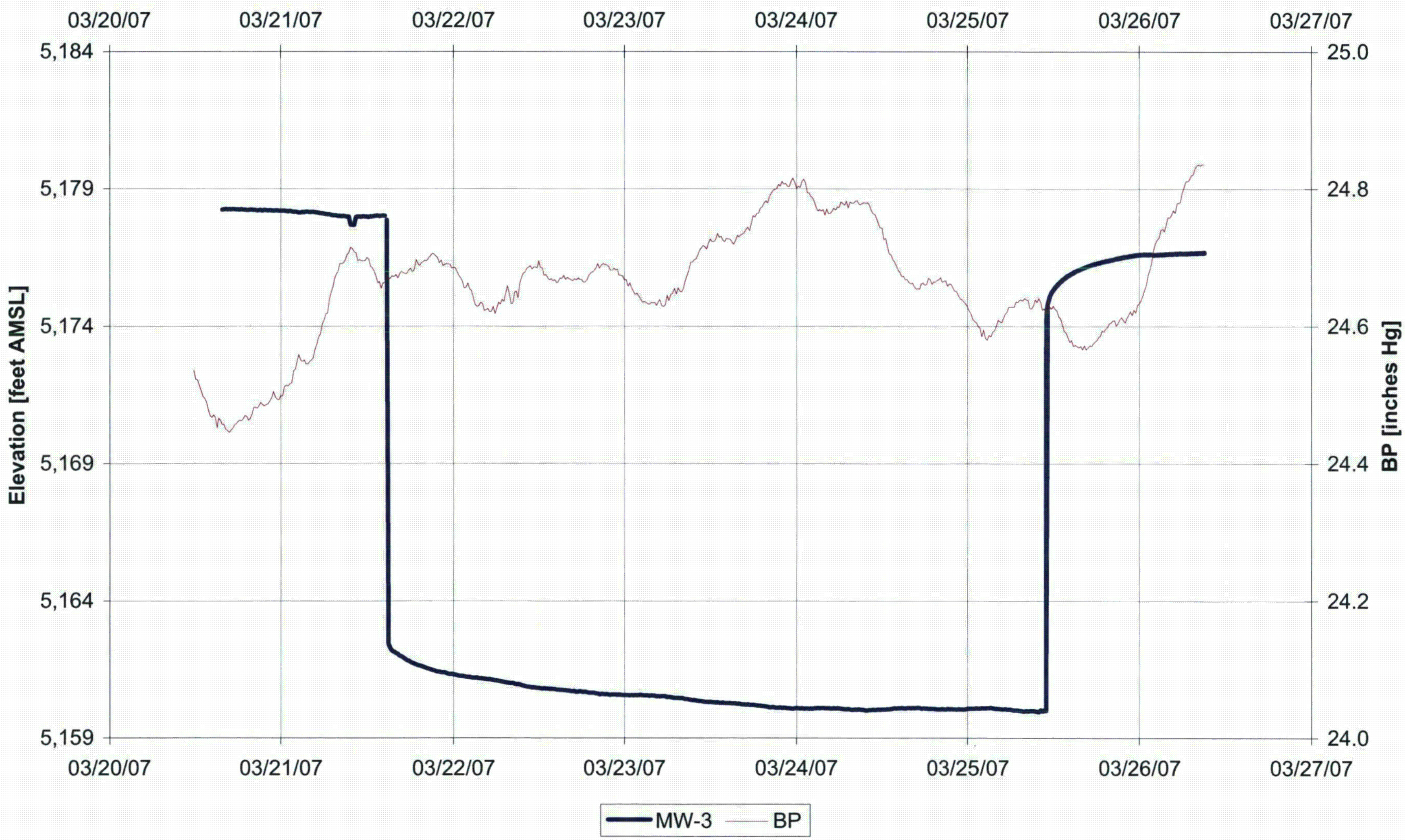
EMC MR PT Mastersheet - MW-2rev070809.xls



EMC MR PT Mastersheet - MW-2rev070809.xls

Moore Ranch Hydrologic Testing Report
Energy Metals Corporation
September 2007

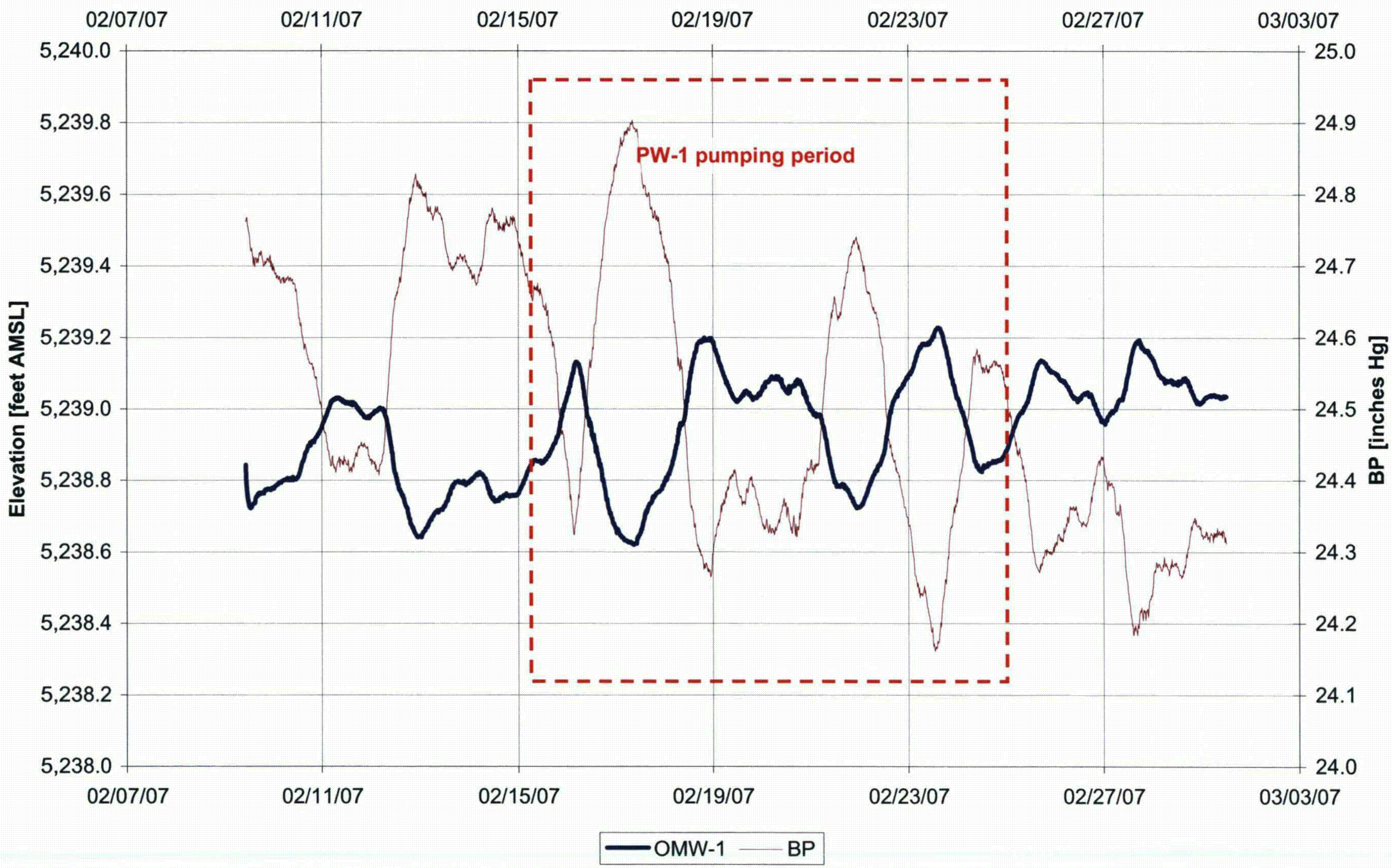
Figure 6-6. Water Elevation vs Time at MW-3 (MW-3 Pump Test)



EMC MR PT Mastersheet - MW-3rev070809.xls

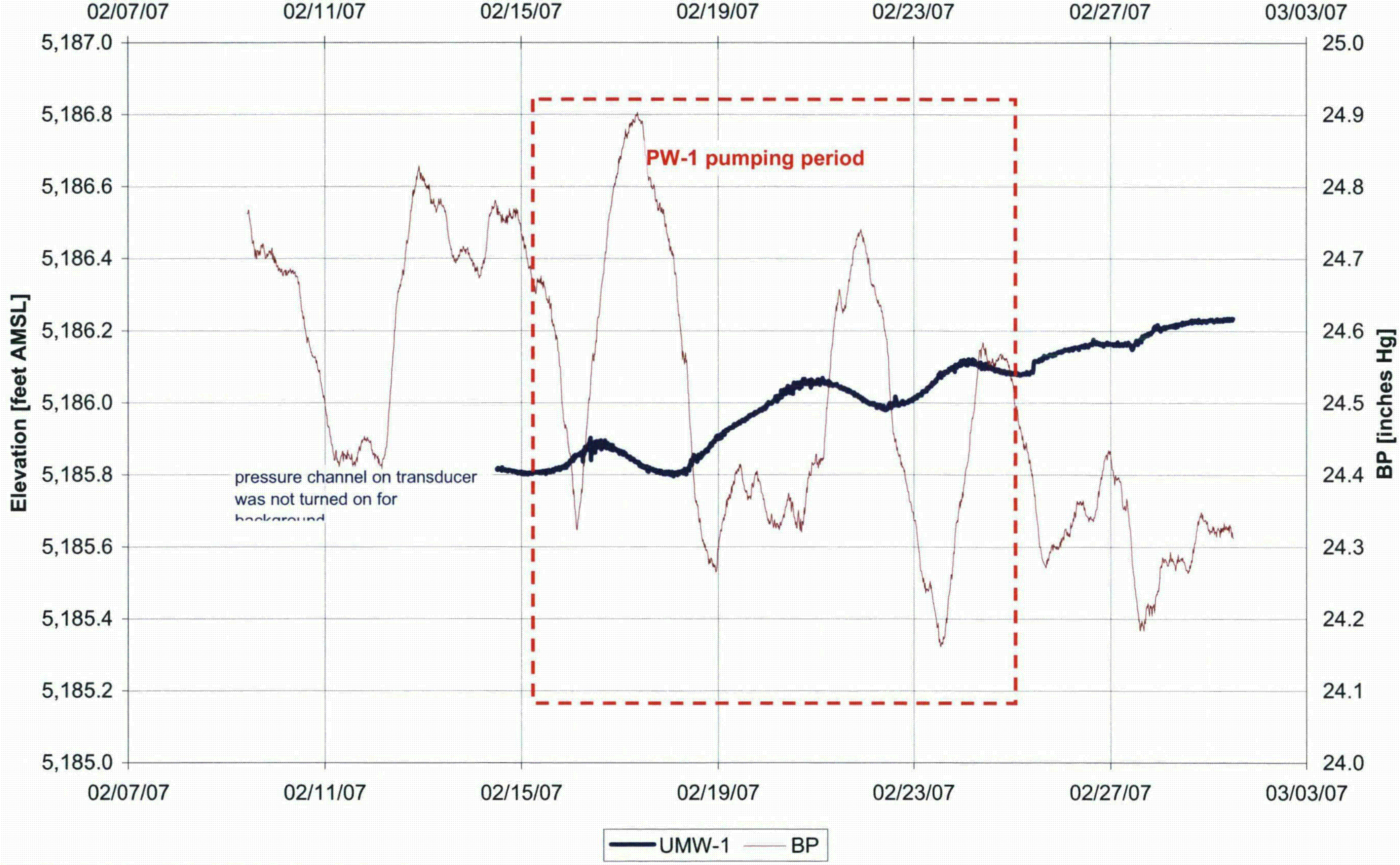
Figure 6-7. Water Elevation vs Time at OMW-1 (PW-1 Pump Test)

Moore Ranch Hydrologic Testing Report
Energy Metals Corporation
September 2007



Moore Ranch Hydrologic Testing Report
Energy Metals Corporation
September 2007

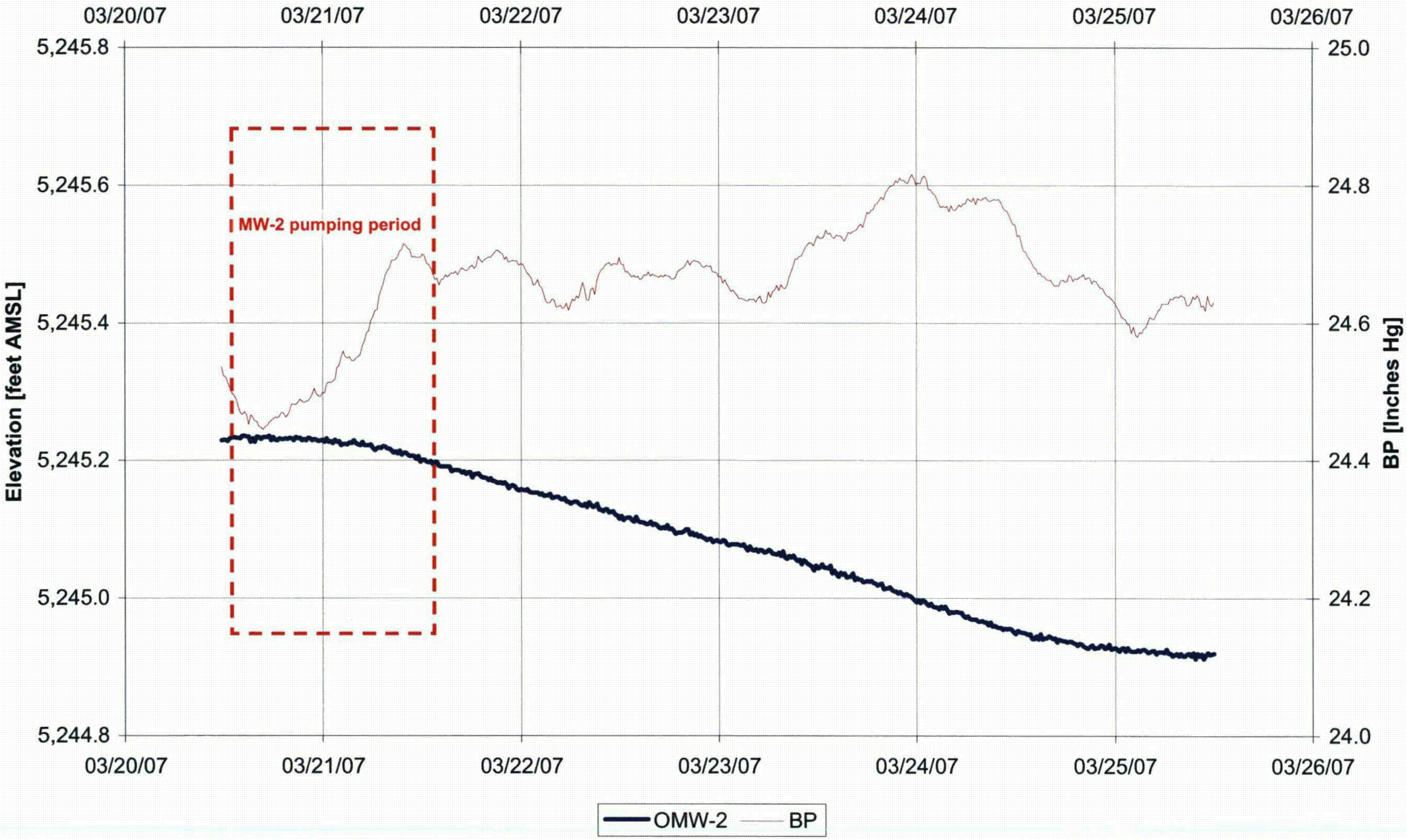
Figure 6-8. Water Elevation vs Time at UMW-1 (PW-1 Pump Test)

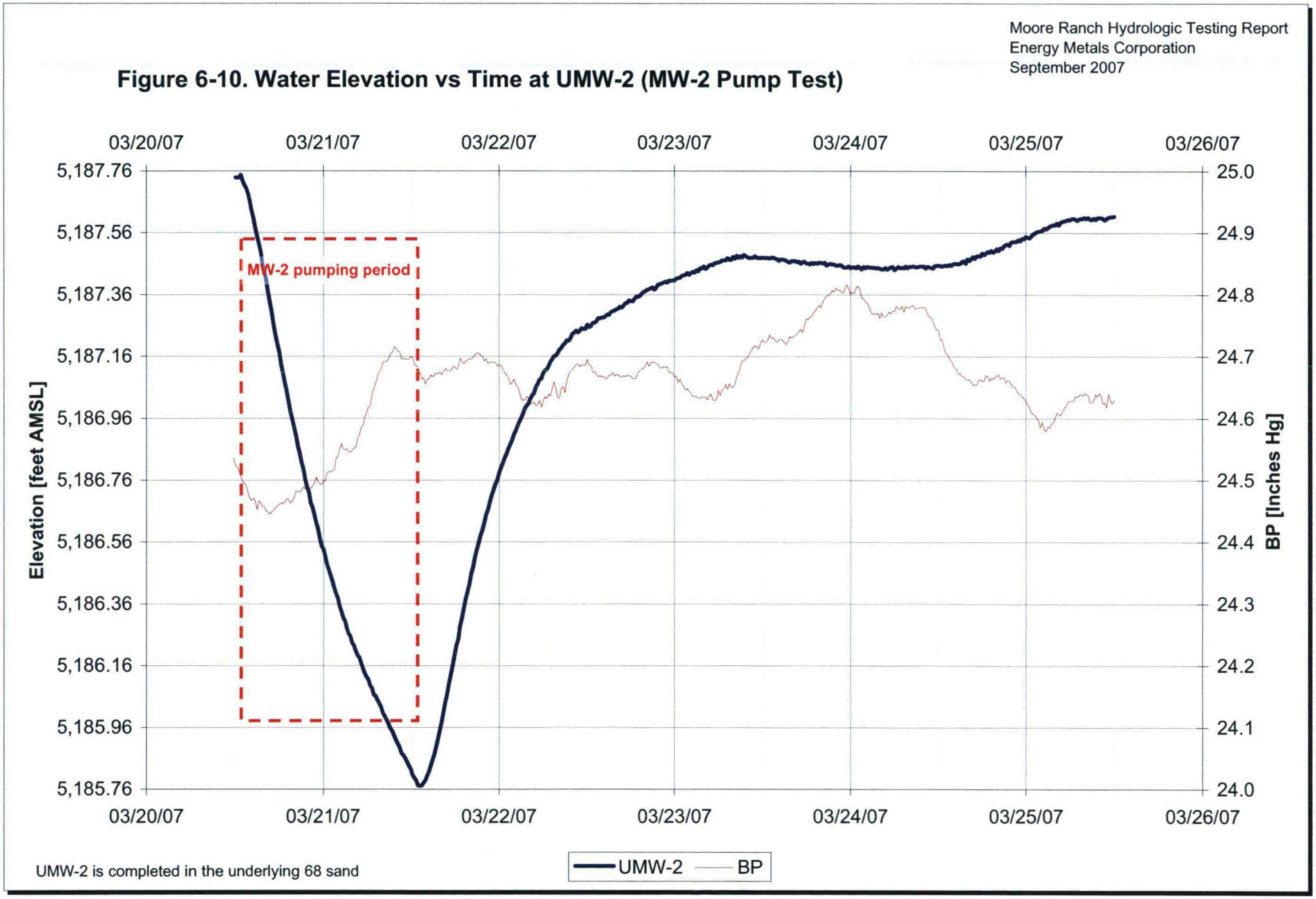


EMC MR PT Mastersheet - PW-1 with bkgrdrev070809.xls

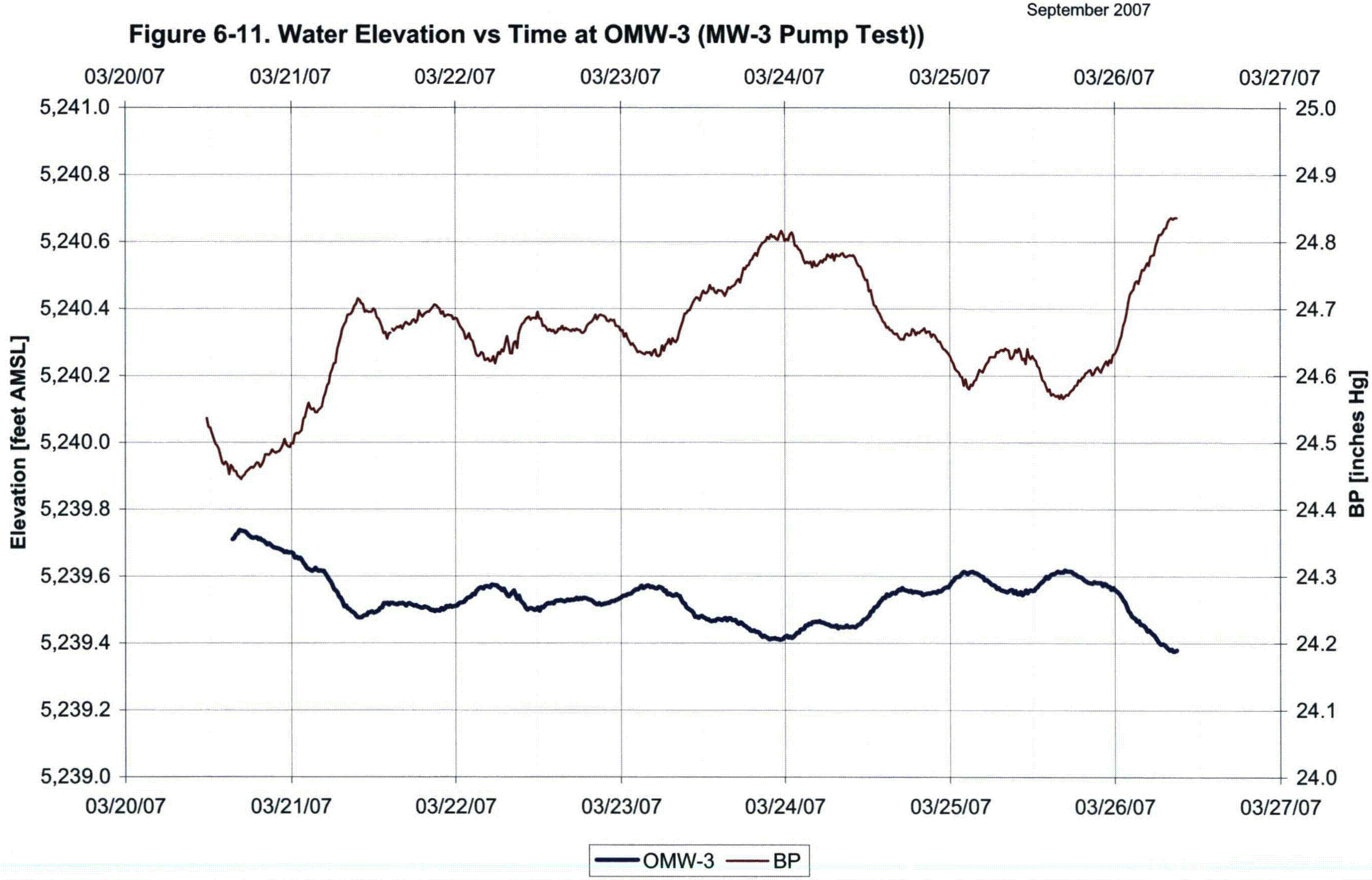
Moore Ranch Hydrologic Testing Report
Energy Metals Corporation
September 2007

Figure 6-9. Water Elevation vs Time at OMW-2 (MW-2 Pump Test)

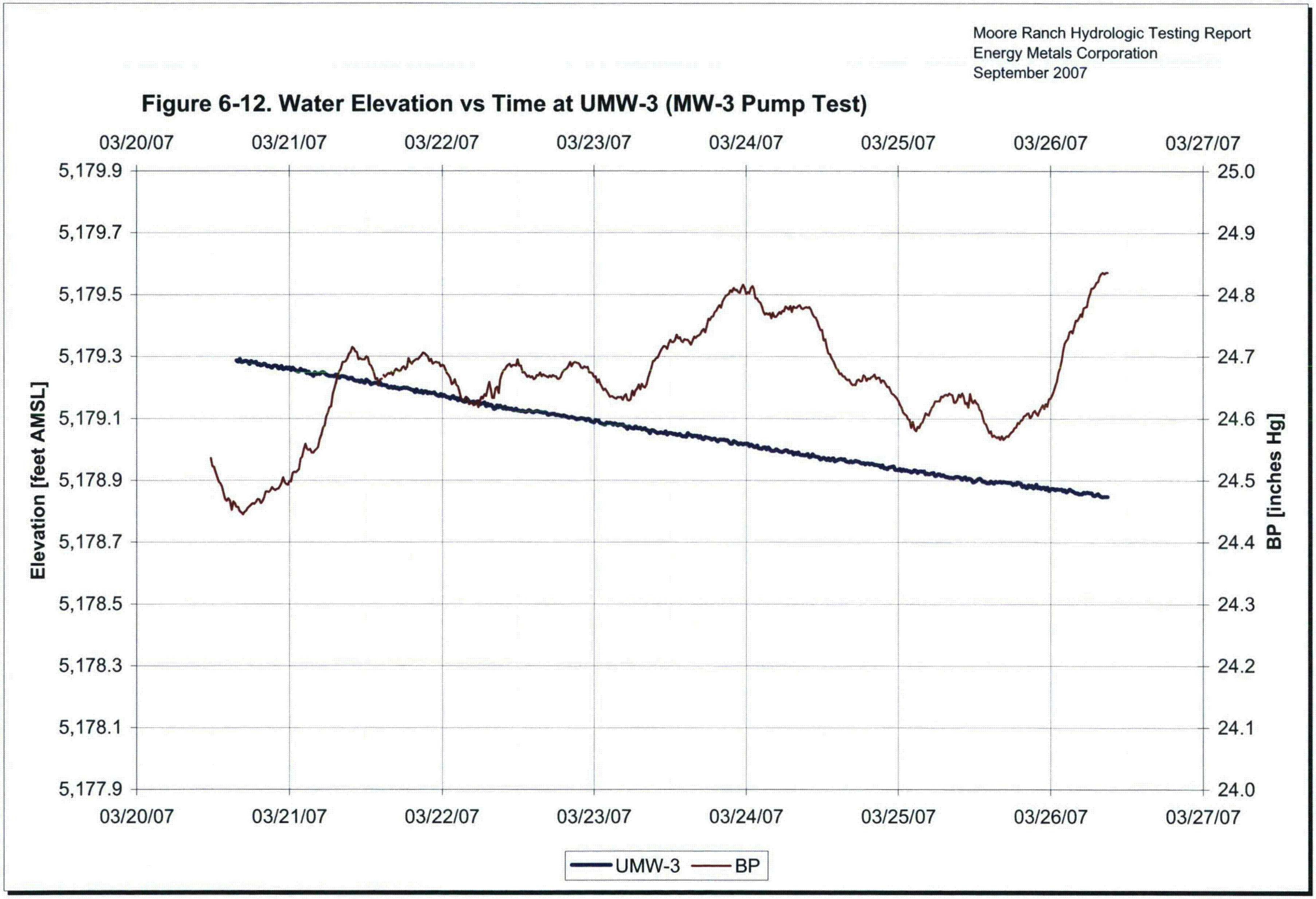



Moore Ranch Hydrologic Testing Report
Energy Metals Corporation
September 2007
Figure 6-10. Water Elevation vs Time at UMW-2 (MW-2 Pump Test)
03/20/07
03/21/07
03/22/07
03/23/07
03/24/07
03/25/07
03/26/07
5,187.76
5,187.56
5,187.36
5,187.16
5,186.96
5,186.76
5,186.56
5,186.36
5,186.16
5,185.96
5,185.76
25.0
24.9
24.8
24.7
24.6
24.5
24.4
24.3
24.2
24.1
24.0
Elevation [feet AMSL]
BP [Inches Hg]
MW-2 pumping period
UMW-2 is completed in the underlying 68 sand
UMW-2
BP

Moore Ranch Hydrologic Testing Report
Energy Metals Corporation
September 2007



EMC MR PT Mastersheet - MW-3rev070809.xls



Moore Ranch Hydrologic Testing Report
Energy Metals Corporation
September 2007
Figure 6-12. Water Elevation vs Time at UMW-3 (MW-3 Pump Test)
03/20/07
03/21/07
03/22/07
03/23/07
03/24/07
03/25/07
03/26/07
03/27/07
5,179.9
5,179.7
5,179.5
5,179.3
5,179.1
5,178.9
5,178.7
5,178.5
5,178.3
5,178.1
5,177.9
Elevation [feet AMSL]
25.0
24.9
24.8
24.7
24.6
24.5
24.4
24.3
24.2
24.1
24.0
BP [inches Hg]
UMW-3
BP

APPENDIX A

Moore Ranch Hydrologic Testing Report – 2007 Pump Tests Revised 2009

Completion Reports