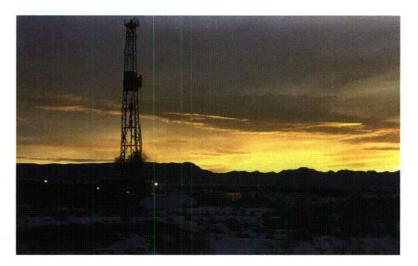


# MOORE RANCH 5-SPOT HYDROLOGIC TEST REPORT VOLUME I TEST DESIGN, RESULTS AND ANALYSIS





# MOORE RANCH PROJECT CAMPBELL COUNTY, WY

August 2008

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### Moore Ranch 5-Spot Hydrologic Test Report Volume I –Test Design, Results and Analysis

#### Introduction

Uranium One has submitted an application to the U.S. Nuclear Regulatory Commission (NRC) for a Source Materials License (SML) to conduct in-situ recovery (ISR) of uranium at the Moore Ranch Project in Wyoming (Energy Metals, Inc. 2007). The target ore zone is designated as the 70 Sand. Aquifer conditions within the 70 Sand transition from confined to unconfined toward the southern portion of the site. The NRC responded to the SML application with a request for additional information (RAI) regarding the impacts that unconfined conditions will have on operation of the ISR project during production and restoration phases. To collect data that could be used to respond to the RAI, Uranium One conducted a well pattern scale hydrologic test within an area of the project where unsaturated conditions exist in the ore zone aguifer. Petrotek Engineering Corporation (Petrotek) assisted with the design and operation of the test and performed the analysis and evaluation of the test data. Results of the test were used to develop and calibrate a numerical groundwater flow model. The numerical model will be used to further address NRC comments regarding operational issues specific to ISR of uranium within an unconfined aguifer system. Results of the test and modeling will also support Uranium One in planning and operation of the ISR project. Reporting of the test description, results, analysis and modeling is included in two volumes. This report is Volume I, which summarizes the pump test design, layout, results and analysis. Volume II describes the development of the numerical model and summarizes the results of numerical simulations used to address NRC comments. Additional modeling will be performed to address wellfield scale issues related to production and aquifer restoration.

#### **Purpose and Objectives**

The 5-Spot Hydrologic Test was designed and implemented to address key issues related to ISR of uranium reserves at the Moore Ranch Project. Objectives of the 5-Spot Hydrologic Test included the following:

- Evaluate, in detail, the site-specific hydraulics associated with unconfined flow during typical ISR operations.
- Characterize pattern-scale aquifer properties within the production zone.
- Collect data that supports selection of input parameters for the development of site-specific numerical models.
- Develop data suitable to address NRC (and internal) concerns regarding production and restoration of an unconfined aquifer system.



Data derived from the 5-Spot Hydrologic Test were used to develop a numerical model that is representative of site-specific conditions (including the unconfined nature of the production zone aquifer). The numerical model was validated through comparison with measured field data. The calibrated and validated model was then used to demonstrate impacts of an unconfined system on mine design, excursion control, and restoration operations. Discussion of the model development, calibration and simulations is presented in Volume II of this technical memorandum.

#### **Test Design and Layout**

A phased approach for the 5-Spot Hydrologic Test was developed to assess aquifer characteristics of the 70 Sand on a well pattern scale and to evaluate the hydraulics associated with unconfined flow during typical ISR operations. The phases of the 5-Spot Hydrologic Test are described below.

#### Installation of 5-Spot Well Pattern

The location selected for the 5-Spot Test was within an area of Wellfield 2 where the ore zone (the 70 Sand) is present under unconfined aquifer conditions [Figure 5ST (1)]. The test layout included installation of a single 5-spot pattern with a centrally located recovery well (PMW1) surrounded by four injection wells (IMW1 through IMW4). Spacing between the recovery well and each of the injection wells was 71.5 feet. Four additional monitoring wells were placed at distances of 10 (MW16), 30 (MW18), 40 (MW17) and 70 (MW19) feet from the recovery well. Monitor well UMW5 is screened within the underlying aquifer (the 68 Sand) and was also included as an observation well for the testing. The location of the wells is shown on Figure 5ST (2). Well data for the recovery, injection and observation wells are presented in Table 5ST (1). Well boring logs are included in Attachment 5ST(1).

#### Background Monitoring

Background monitoring was conducted before and in between each of the following phases of the test to determine if any antecedent trends were present that would require adjustment of the data. Background monitoring included water level measurements in all wells and barometric pressure monitoring.

#### Step Test

A step test was conducted to determine an extraction rate for the 5-Spot ExtractionTest that would adequately stress the aquifer but not result in premature termination of the test because of excessive dewatering of the aquifer at the extraction well.



#### Recovery Period

The recovery period following the step test was included to allow water levels in the 70 Sand aquifer to return to static or near static conditions prior to commencing the extraction test.

#### Extraction Test

The initial test was to include only extraction from a single recovery well. This phase was designed to allow for accurate assessment of aquifer characteristics (transmissivity, hydraulic conductivity and specific yield) within the area of the 5-Spot Hydrologic Test using documented, widely accepted analytical methods, (Theis, Cooper-Jacobs, Neuman etc.).

#### Recovery Period

The recovery period following the extraction test was included to allow water levels in the 70 Sand aquifer to return to static or near static conditions prior to commencing the extraction/injection test.

#### Extraction/Injection Test

This phase of the test included extraction from the recovery well and injection of the recovered water into the four injection wells. This phase was designed to evaluate the change in water levels within the 5-spot well pattern under hydraulic conditions that are typical of ISR operations. The second phase of the test was modified after startup to include variable rates of injection into the injection wells, as described in the section on Extraction/Injection test results

#### Geology and Hydrogeology of the Test Area

Figures 5ST (3) and (4) show the top and bottom elevation of the 70 Sand hydrostratigraphic unit. The map of the top elevation of the 70 Sand indicates a dip to the northwest of approximately 0.02 ft/ft. The map of the bottom elevation of the unit indicates a slight rise to the northwest, resulting in a thinning of the 70 Sand in that direction. The 70 Sand ranges from 85 to 95 feet thick within the 5-spot well pattern [(Figure 5ST (5)]. The 70 Sand is overlain by a 30 to 40 foot thick confining unit. Figure 5ST (6) shows the electric logs for the recovery well (PMW1) and indicates the location of the 70 Sand, the ore zone and the screen interval.

The potentiometric surface prior to the beginning of the 5-Spot Hydrologic Test is shown on Figure 5ST (7). The potentiometric surface has a hydraulic gradient of 0.0026 to 0.0036 ft/ft toward the north. In the area of the test, the water level within the 70 Sand is approximately 20 feet below the top of the stratigraphic interval. Each of the wells were screened across ore-bearing and saturated portions of the 70 Sand, with the exception of UMW5 which was screened within the underlying 68 Sand. The upper portion of the 70 Sand is unsaturated at each



of the well locations, verifying that the aquifer is unconfined. Figure 5ST (8) is a cross section in the 5-spot pattern that illustrates the unconfined nature of the 70 sand. The cross section is oriented from northeast to southwest through injection well IMW3, recovery well PMW1 and injection well IMW2. The saturated thickness of the 70 Sand at the wells ranges from 67 to 75 feet.

#### **Test Equipment and Instrumentation**

The test was conducted with a 1.5 HP Grundos electrical submersible pump in the recovery well (PMW1) powered by a portable diesel generator. The pump was set at a depth of 184 feet, approximately 4 feet above the bottom of the well screen and 31 feet above the bottom of the 70 Sand. The static water level in PMW1 prior to beginning the first phase of the testing was 142.3 feet below the top of casing, providing 41.7 feet of head above the pump.

Each of the recovery, injection and observation wells were outfitted with In-situ Level Troll transducers/data loggers. The pressure rating for the transducers was 30 psi for the recovery well and 15 psi for the injection and observation wells. The transducers were programmed to record depth to water at 10-minute intervals. Barometric pressure was monitored at the same frequency using a surface mounted Bara-Troll transducer.

For the Extraction Test, recovered water was discharged as surface flow approximately 500 feet from the recovery well (as allowed under temporary WDEQ permit). Flow was measured at the surface with two in-line totalizers.

During the Extraction/Injection Test, flow from the recovery well was routed to the injection wells through a manifold assembly with separate discharge lines for each injection well. An inline totalizer was installed in each discharge flow line.

Petrotek and Uranium One personnel installed the equipment prior to testing and verified the datalogger programming and equipment layout. Petrotek personnel assisted with the step test and initial startup of the extraction and recovery phases of the testing. Uranium One personnel provided daily downloads and transferred the data to Petrotek for review/QA/QC for the duration of the extraction and recovery tests.

#### **5-Spot Test Results**

#### **Background Monitoring and Step Test**

Background monitoring began in recovery well PMW1 on May 7, 2008 at 4:10 PM. Monitoring began on all of the remaining wells the following day just prior to startup of the step test.

The step test at PMW1 began on May 8 at 11:50 AM. The initial rate was 15.5 gpm for a period of 1 hour, followed by a rate of 19.6 gpm for 1 hour and 10



minutes and then 25.5 gpm for 1 hour [Figure 5ST (9)]. The maximum observed drawdown in the recovery well at the end of each step was 12.6, 16.6 and 21.1 feet, respectively. Based on the results of the step test, it was decided that a rate between 20 and 25 gpm would be sustainable for a long-term pump test.

Following the step test, background monitoring of water levels in all of the 5-Spot Hydrologic Test wells resumed until the beginning of the Extraction Test on May 12, 2008. Results of the background monitoring indicated no significant antecedent trends in water levels prior to the beginning of the Extraction Test [(Figure 5ST (10)].

#### **Extraction Test**

The Extraction Test began on May 12, 2008 at 10:40 AM. Recovery well PMW1 was the pumping well. The test was run for a period of 3 days, 10 hours and 52 minutes. The average rate during the test was 22.32 gpm, with minimal fluctuation during the test [Table 5ST(2)]. The test was terminated on May 16, 2008 at 9:32 AM.

The drawdown in the recovery well at the end of the test was 21.3 feet. The drawdown response of the recovery well is shown in Figure 5ST (10). Note that during the test, the water level dropped below the top of the well screen.

Drawdown was observed in the four injection wells (IMW1 through IMW4) and the four production zone monitoring wells (MW16 through MW19) during the Extraction Test. Maximum drawdown ranged from 6.9 feet at MW16 (the closest well to PMW1) to 3.7 feet at IMW4. The drawdown was similar at the four injection wells, ranging from 3.7 to 4.1 feet (IMW1) [Figure 5ST (11)]. The slightly greater drawdown at IMW1 can be attributed to the thinner saturated thickness at that well compared to the other locations. The relatively uniform drawdown at the injection wells, each located 71.5 feet from the extraction well, indicate a homogeneous, isotropic aquifer system, at least within the bounds of the 5-Spot Test. The water level response of the four injection wells during the Extraction test is shown on Figure 5ST (12). The response of the four monitor wells during the Extraction Test is shown on Figure 5ST (13). Based on the data from the Extraction Test, there does not appear to be a significant directional component to aquifer transmissivity. A hydrogeologic cross section that shows the water level response at the end of the Extraction Test is shown on Figure 5ST (14).

Barometric pressure was monitored prior to and throughout the Extraction Test. Barometric pressure began to rise just prior to the beginning of the Extraction Test and the increasing trend continued throughout the duration of the test. A barometric correction was applied to the water level data to evaluate if changes in barometric pressure during the test significantly impacted the results. The Manual Correction method was used to adjust the data based on barometric pressure fluctuations during the test. The Manual Correction method is described in detail in the Moore Ranch Hydrologic Testing Report (Petrotek 2007)



submitted as Appendix B of the Technical Report of the Application for Source Material License (EMC 2007). The Manual Correction method involves 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. The results of the correction indicate that barometric changes accounted for approximately 0.46 to 0.50 ft of the drawdown observed in the injection and monitor wells. The drawdown within the 5-Spot Test area at the end of the Extraction Test with barometrically corrected data is shown in Figure 5ST (15).

The response of the underlying monitor well (UMW5) is shown in Figure 5ST (16). There appears to be a slight increase in depth to water that corresponds with the start of the pump test. However when a barometric correction is applied to the data from UMW5, the overall trend is a decrease in depth to water during the period of the extraction test [Figure 5ST (17)]. The barometrically corrected data indicate that the response in UMW5 is unrelated to pumping activities.

Monitoring at each of the injection and monitor wells continued after the end of the Extraction Test to observe the recovery of water levels and to continue background monitor prior to the Extraction/Injection Test.

#### **Extraction Injection Test**

Startup of the Extraction/Injection test began on May 21, 2008 at 2:00 PM. The Extraction/Injection Test included extraction from the recovery well and injection of the extracted water into the injection wells. The flow extracted from the recovery well was divided equally between the four injection wells. However, the initial attempt of the test was aborted (at 3:14 PM) when it became apparent that the injection wells could not accept the discharge water at the designed rates (5 gpm per injection well). Water discharged into the injection wells filled up the casing and discharged onto the surface.

After review and evaluation of the data, Uranium One and PEC determined that the injection wells required additional development. A rig was mobilized to the site on May 30, 2008 and the wells were developed using airlifting. Development activities were completed by June 2, 2008

Slug tests were performed on the injection wells to evaluate the effectiveness of the development efforts. Slug tests were conducted on May 29, 2008, before development of the wells, and again on June 3, 2008, after development was completed. Figure 5ST (18) illustrates the results of the before and after response of those wells to the development. In most cases, the apparent hydraulic conductivity of the aquifer in the vicinity of the wells increased by an order of magnitude. The completion rig was unable to get below the top of the screen in IMW2 during airlifting activities. The response curves shows that IMW2 did not "clean up" as well as the other injection wells and this became more apparent during the Extraction/Injection tests as described below. A summary of



the hydraulic conductivity calculated from the before and after development slug tests is presented in Table 5ST (3). The

Following development and slug test activities, the Extraction/Injection Test was restarted on June 5, 2008 at 1:36 PM. The extraction rate was 20.0 gpm. The first stage of the test included equal distribution of the extracted water to the four injection wells (5 gpm each). On June 7, 2008 at 3:08 PM (2.06 days from the test startup), two of the wells (IMW1 and IMW2) were shut in and the flow was allocated to the remaining wells (IMW3 and IMW4) at a rate of 10 gpm each. This second stage continued until June 8, 2008 at 3:06 PM. At that time, well IMW4 was shut in, the pump rate at PMW1 was increased to 20.5 gpm and all of the extracted water was discharged into injection well IMW3. This phase of the Extraction/Injection test ended on June 9, 2008 at 1:04 PM.

Table 5ST (4) summarizes the results of the Extraction/Injection Test at the end of each stage. The response of the injection wells was relatively consistent with the exception of well IMW2. During the first stage of the test, water levels rose in all injection wells from 2 to 4 feet except at well IMW2 where the increase was over 26 feet. As previously noted, during development of IMW2, the rig was unable to airlift the well below the top of the well screen. A hydrogeologic crosssection shows the change in water level that occurred by the end of the first stage of the test and illustrates the anomalous rise in water level at IMW2 [Figure CR 5ST (19)). The second stage of the Extraction/Injection test resulted in a rise in water levels at IMW3 and IMW4 of over 9 feet [Figure 5ST (20)]. The final stage of the test resulted in a rise of nearly 15 feet at IMW3, which is similar to the decline in water levels at the extraction well [Figure (5ST (21)]. Figure 5ST (22) shows the response of the recovery well (PMW1) and injection wells IMW1 and IMW3 throughout the Extraction/Injection Test. The response of monitor wells MW16, MW17 and MW18 during the test is shown on Figure 5ST (23). Within one hour after the end of the test, water levels had returned to within one foot of pre-test levels, even at the extraction well (PMW1).

#### 5-Spot Test Analyses

#### **Analytical Methods**

The 5 Spot Extraction Test provided data suitable for detailed analysis of aquifer properties. Drawdown data collected from the recovery, injection and monitor wells were graphically analyzed to determine transmissivity and storativity/specific yield. The data collected from the test were analyzed using a variety of analytical methods including Theis (1935), Cooper-Jacob (1946), Neuman (1972) and Theis recovery (1935). Assumptions common to each of these methods, with the exception of confining conditions, which are not assumed for the Neuman method, are as follows

- > 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

These assumptions are reasonably satisfied, with the exception of confined conditions and fully penetrating wells. None of the recovery, injection or monitoring wells are fully penetrating.

The water table in an unconfined aquifer is equal to the elevation head. Transmissivity in an unconfined aquifer does not remain constant during a pump test. During a pump test, as the drawdown increases in a well, the available head in the well decreases, resulting in a decrease in transmissivity. In order to account for the decreased transmissivity during an aquifer test, a correction can be applied to the drawdown to approximate confined conditions. The correction proposed by Jacob (1944) is as follows:

$$s_{cor} = s - (s^2/2d)$$

where:

 $s_{cor}$  = corrected drawdown

s = measured drawdown

D = original saturated aquifer thickness

The Jacob correction allows for the use of the Theis, Cooper-Jacob, and Theis Recovery solutions for analysis of pumping test data for an unconfined aquifer (Waterloo Hydrogeologic Inc. 2002).

Because of the confirmed unconfined conditions present in the 70 Sand within the 5-Spot Hydrologic Test area, all drawdown data were corrected using the method described above for the Theis, Cooper-Jacob, and Theis Recovery solutions.

Also, as previously stated, barometric pressure changes influenced the response of the wells during the 5-Spot Hydrologic Test. Therefore, a barometric pressure correction was applied to all drawdown data prior to performing the analysis. The Manual Correction method, previously described, was applied to the data prior to analysis.

#### **Analytical Results**

The results of the analyses for the Extraction Test are summarized in Table 5ST (5). Curve matching plots for all of the 5-Spot Hydrologic Test wells for each of the methods used for analysis are included in Attachment 5ST(2). Results using the Theis method (corrected for unconfined conditions) provided the highest transmissivity values [ranging from 284 to 682 ft²/d (2,125 to 5,100 gpd/ft)],



followed by results from the Cooper Jacob method [from 440 to 510 ft²/d (3,290 to 3,850 gpd/ft)]. Results using the Theis recovery provided the lowest transmissivity values ranging from 180 to 253 ft²/d (1,350 to 1,890 gpd/ft).

Visual observation of the curve fitting for the different methods indicates that the Neuman (delayed yield, unconfined conditions) method provided the best fit to the data [with a range of 272 to 395 ft²/d (2,035 to 2,955 gpd/ft) and an average of 356 ft²/d (2,660 gpd/ft)]. Many of the drawdown responses from the wells in the Extraction Test showed reasonable early and late time fit to the standard Theis curve but poor correlation during the middle portion of the test. The rate of drawdown in most of the wells showed a flattening in the middle of the test that is interpreted as the delayed yield response characteristic of an unconfined aquifer system. Because of the unconfined nature of the 70 Sand in the vicinity of the test, the Neuman delayed yield analysis method is considered the most appropriate. Analytical results using the Neuman method were typically only 60 to 70 percent of the value determined using the standard Theis method. The average transmissivity value calculated from all of the wells and all of the methods was 405 ft²/d (3,030 gpd/ft).

Figure 5ST-24 is a comparison of transmissivity and hydraulic conductivity values calculated for each 5-Spot Hydrologic Test well using the different analytical solutions (Theis, Cooper-Jacobs, Neuman and Theis recovery). The variability in transmissivity between wells for a specific solution method is generally less than the variability exhibited between different analytical methods. As previously noted, the best visual fit to the analytical solution curves, is with the Neuman solution. Based on the results of the analyses, the transmissivity values calculated using Neuman are considered the most representative of site conditions.

The hydraulic conductivity was determined by dividing the transmissivity by the saturated thickness of the aquifer. The saturated thickness within the 5-Spot Hydrologic Test area was approximately 72 feet. The hydraulic conductivity calculated from the average transmissivity from all analytical methods is 5.6 ft/d, with a range of 2.5 to 9.5 feet. The hydraulic conductivity calculated from the average transmissivity from the Neuman method is 5.0 ft/d.

Specific yield was calculated for the aquifer based on the Neuman solutions. The range of values was 0.011 to 0.039. Storativity was not calculated from the test results because of the unconfined nature of the aquifer

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 other than the barometric pressure corrections previously described.



#### **Discussion and Summary**

Uranium One and Petrotek conducted a hydrologic test to evaluate hydraulics associated with unconfined flow during typical ISR operations and to characterize pattern-scale aquifer properties within the production zone. A 5-Spot Hydrologic Test was designed to address NRC concerns regarding ISR operations in an unconfined aquifer system. A 5-spot well pattern was installed within an area of Wellfield 2 where unconfined conditions are prevalent. The 5-spot well pattern included a centrally located recovery well and four injection wells. Four additional production zone monitor wells and one underlying aquifer monitor well were also installed in the 5 Spot Hydrologic Test area.

The initial phase of the test included only extraction from the recovery well. Data from the Extraction Test allowed detailed analysis and characterization of production zone aquifer properties. The second phase of the test included injection of water extracted from the recovery well. Data from the Extraction/Injection Test provided information regarding response of the unconfined aquifer to anticipated ISR production rates for the Moore Ranch Uranium Project.

Results of the Extraction Test indicate that, within the 5-Spot Hydrogeologic Test area, the production zone aquifer is relatively homogeneous and isotropic. The Extraction Test was run for 4 days at a rate of 22.33 gpm. Drawdown in the recovery well at the end of the Extraction Test was 20.9 feet, approximately 29 percent of the available head (72 feet) in the aquifer. At a distance of 10 feet from the recovery well, drawdown was 6.4 feet, less than 10 percent of the available head in the production zone aquifer. Drawdown at the injection wells was between 3.1 and 3.7 feet.

Data from the Extraction test were analyzed using several solution methods including Theis, Cooper-Jacobs, Neuman and Theis Recovery. The variability in transmissivity determined using a single analytical solution was generally small. However, there was larger variability in transmissivity between different solution methods. The Neuman solution provided the best visual match to the data, as this method is specifically developed to evaluate unconfined aquifer conditions. The response in most of the 5-Spot Hydrologic Test wells during the Extraction test showed a period of flattening during the middle of the test, interpreted as the delayed yield typical of an unconfined aquifer. The overall range of transmissivity, using all of the analytical solutions was from 180 to 682 ft²/d. The range of transmissivity using only the Neuman method was from 272 to 395 ft²/d with an average of 356 ft²/d. Hydraulic conductivity values using all methods ranged from 2.5 to 9.5 ft/d, and from 4.5 to 5.7 ft/d for only the Neuman solution. Specific yield calculated using the Neuman method ranged from 0.011 to 0.039.



Results of the Extraction/Injection Test indicate that the production zone aquifer can sustain recovery and injection rates that are anticipated during production. A single injection was able to receive 20 gpm during the last stage of the test. Dewatering of the aquifer within a 5-Spot Pattern during typical ISR operating rates will generally be limited to a localized area around the recovery well. The rapid recovery to near pre test levels within an hour following termination of the test (which ran for a period of 4 days) indicates the aquifer has adequate transmissivity and areal extent to support ISR operations. Injection of lixiviant into the aquifer during production will prevent large scale dewatering of the 70 Sand. Similarly, reinjection of treated water during restoration activities will resaturate the upper portion of the 70 Sand in the vicinity of recovery wells that may be dewatered during production.

Results of the 5-Spot Hydrologic Test provided detailed site-specific aquifer characterization that will be utilized in the development, calibration and validation of a numerical model. The numerical model will used to simulate the hydraulic response of the aquifer during production and restoration operations. Discussion of the model development, calibration and simulation is presented in Volume II of this report.

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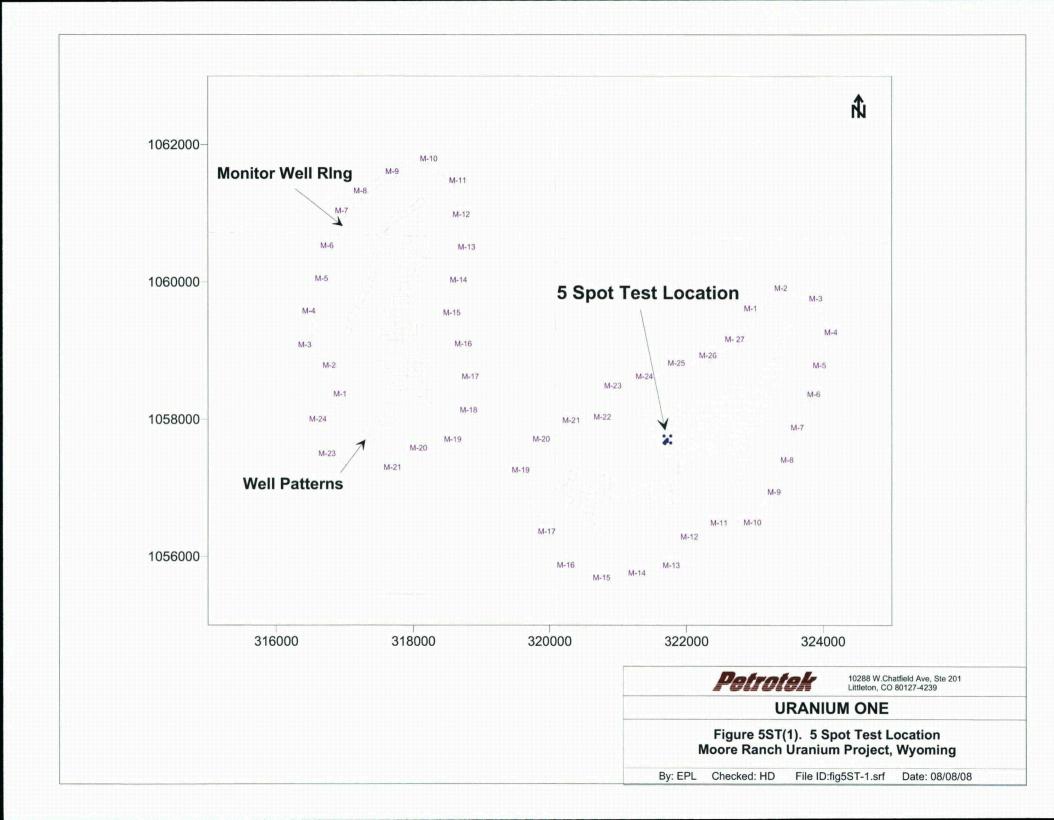
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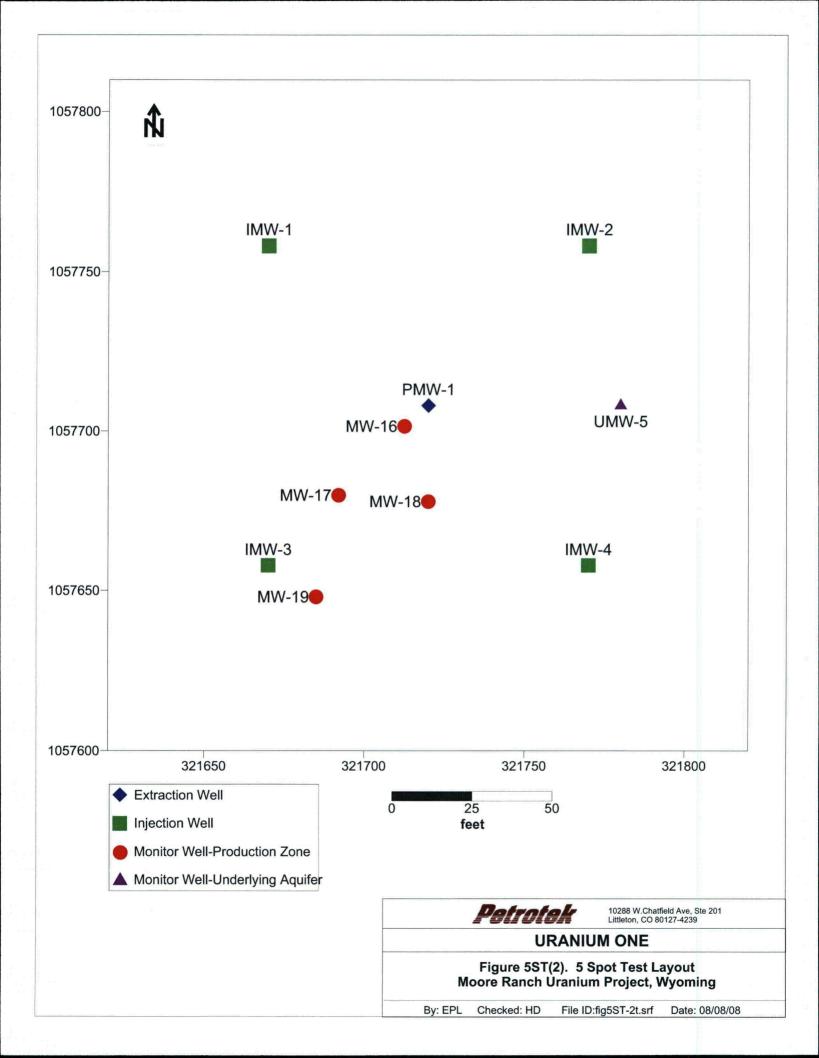
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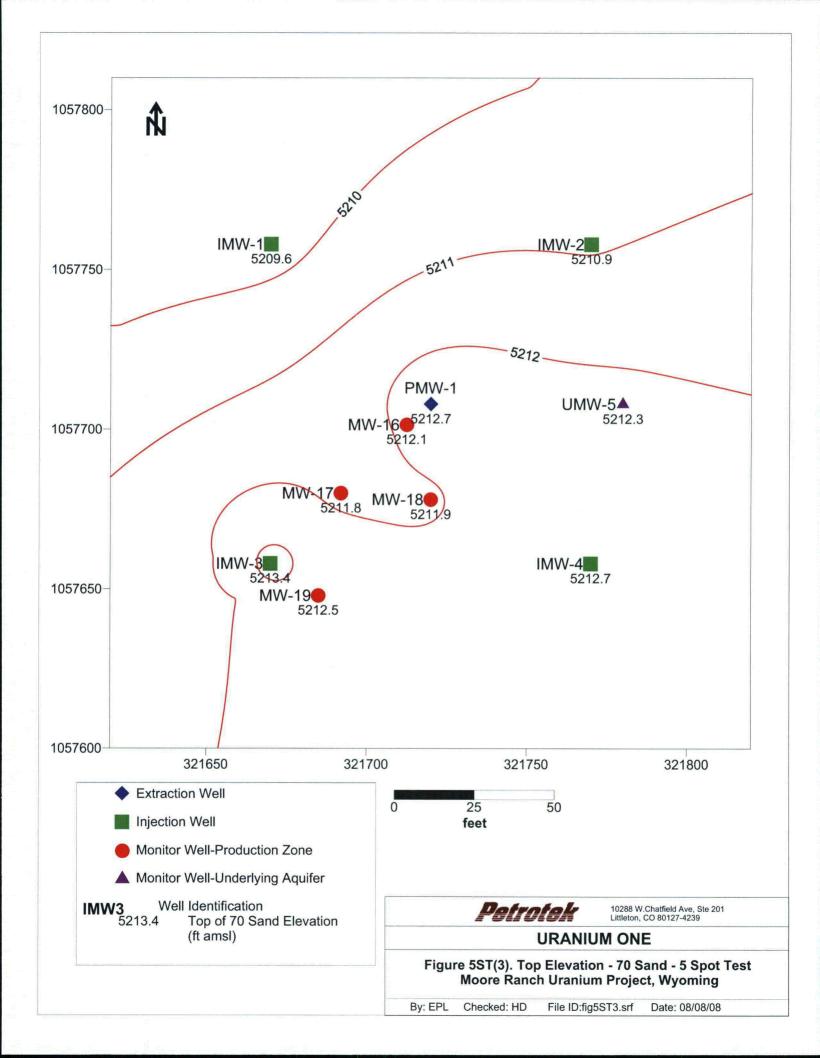
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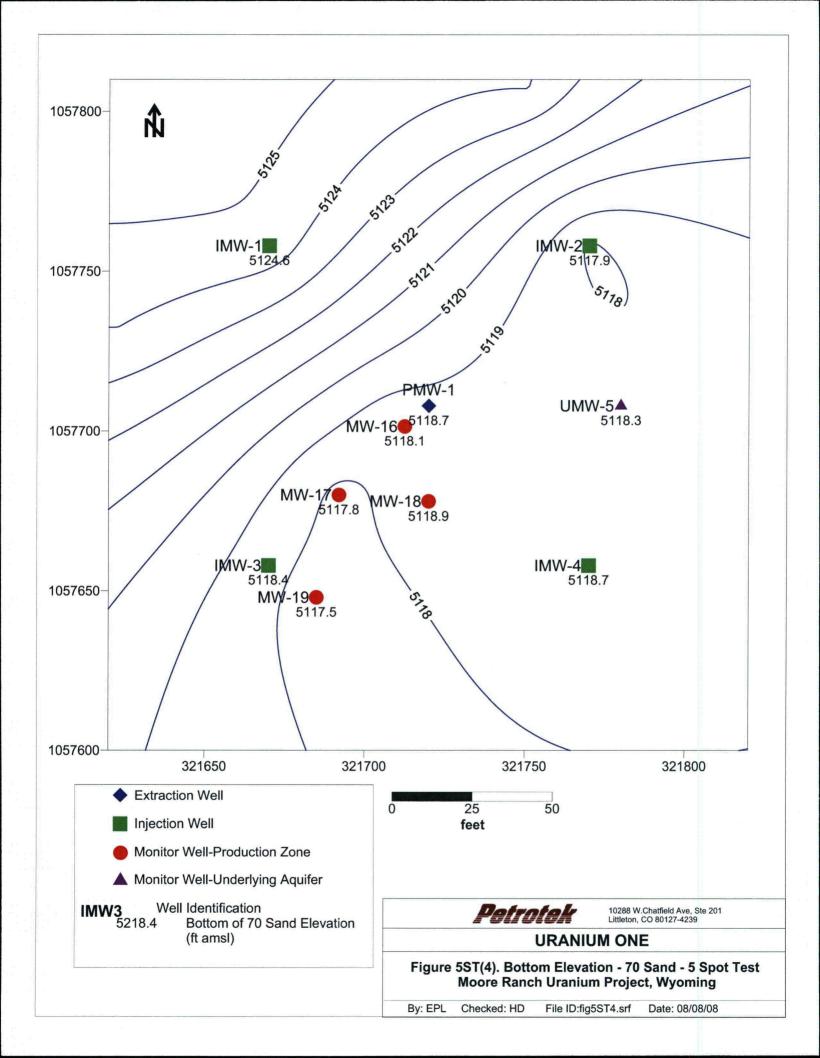
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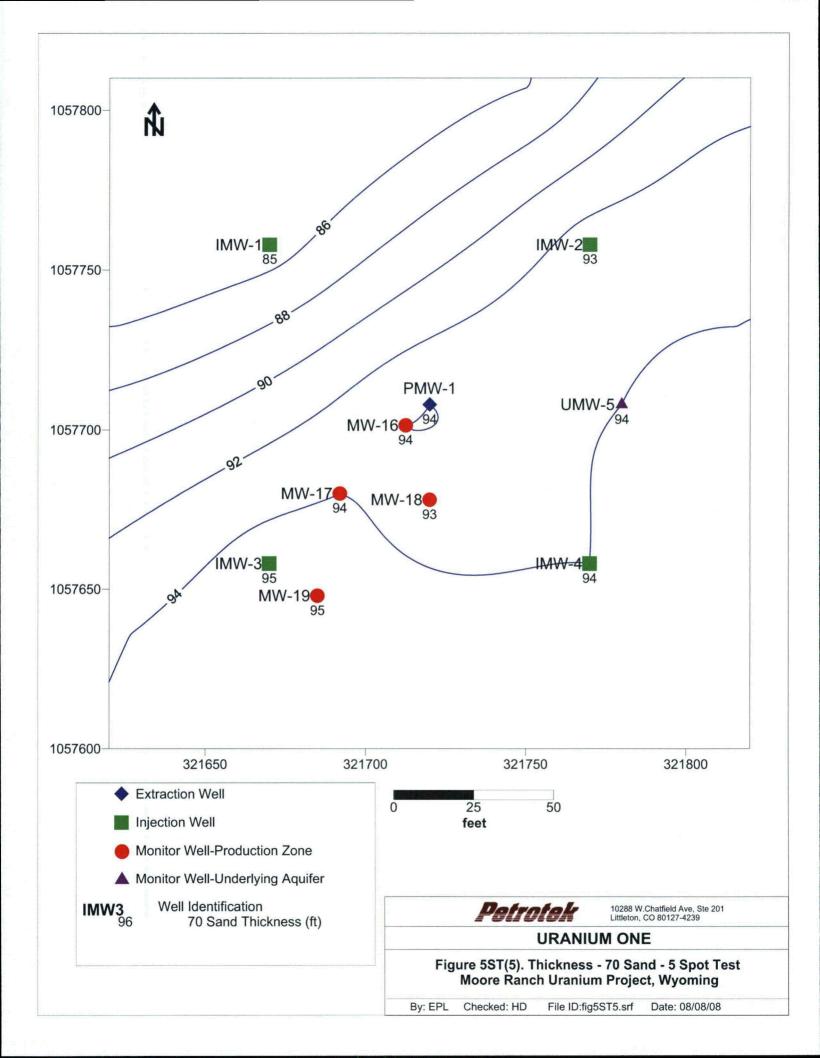


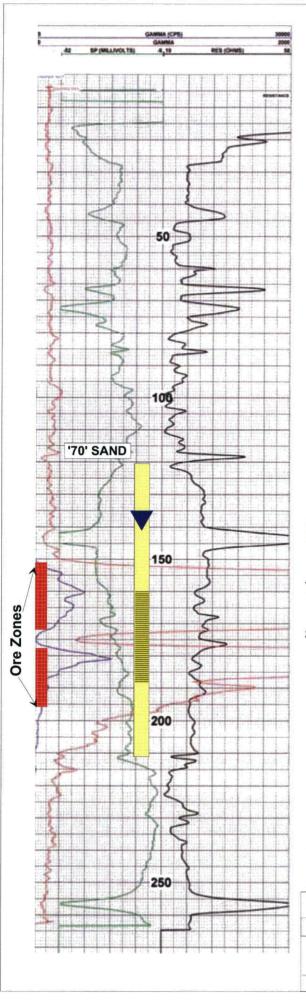












## Initial Depth to Water 142.4 feet on 5/7/08

70 Sand Interval 121' to 212' bgs

Screen Interval 160' to 188' bgs

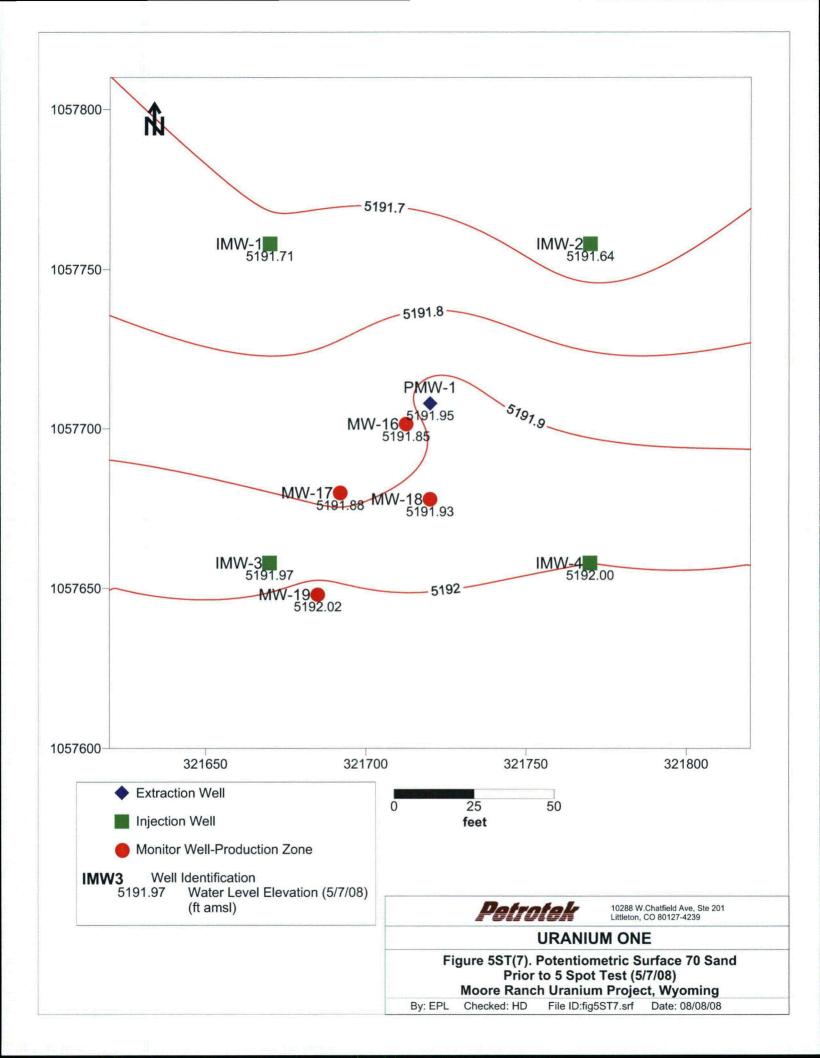


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#### **URANIUM ONE**

Figure 5ST(6). Recovery Well PMW1 -Electric Logs Moore Ranch Uranium Project, Wyoming

By: EPL Checked: HD File ID:fig5ST-6.srf Date: 08/08/08



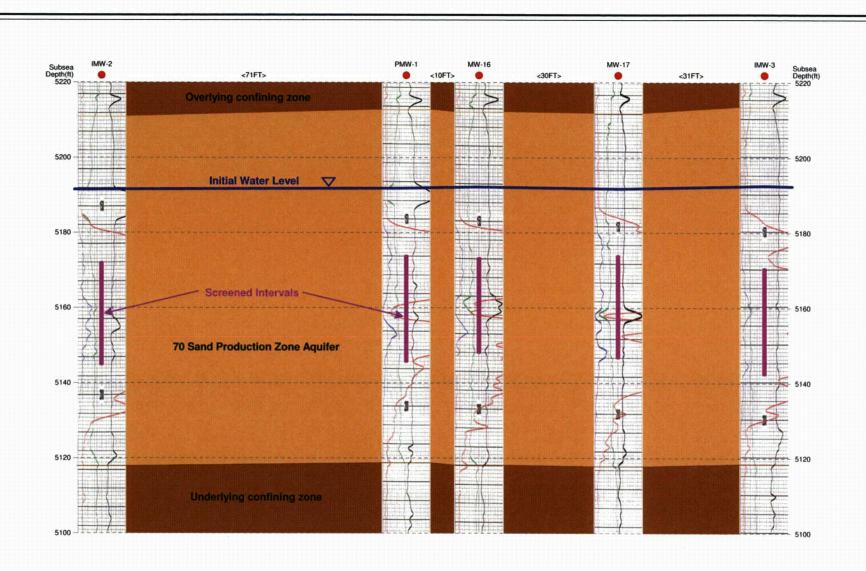




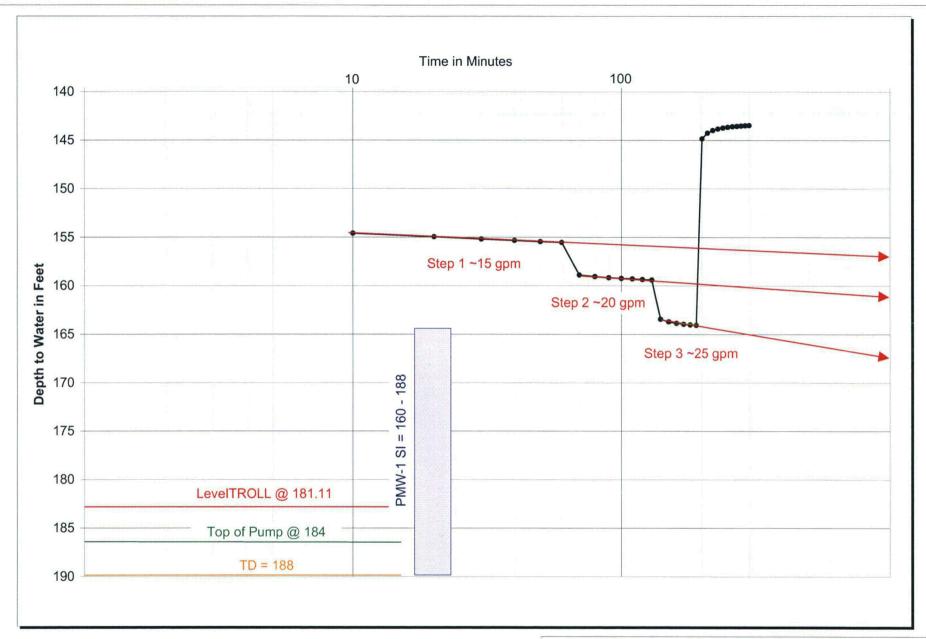
Figure 5ST(8)
Hydrogeologic Cross Section
5—Spot Test, Initial Conditions

Project: 312–16 Date: August 2008

File: 5ST(8).dwg By: KRS Checked: EPL



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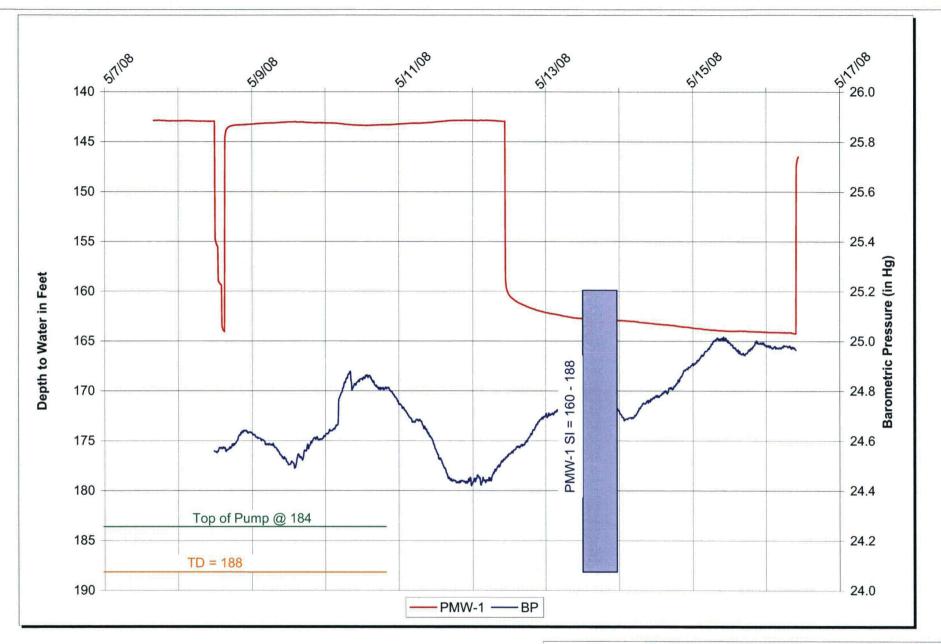
#### **URANIUM ONE**

Figure 5ST(9). Result of Step Test - PMW1 Moore Ranch Uranium Project, Wyoming

By: EPL Checked: HD

File ID:fig5ST-9.srf

Date: 08/08/08





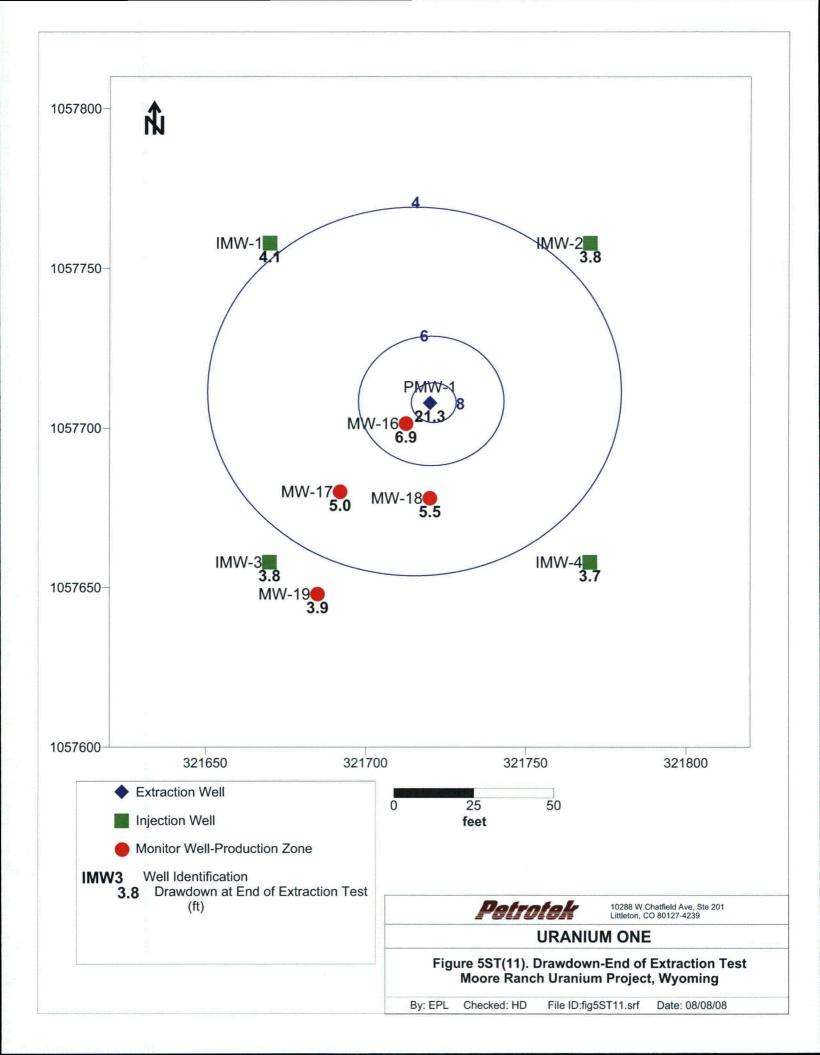
10288 W.Chatfield Ave, Ste 201 Littleton, CO 80127-4239

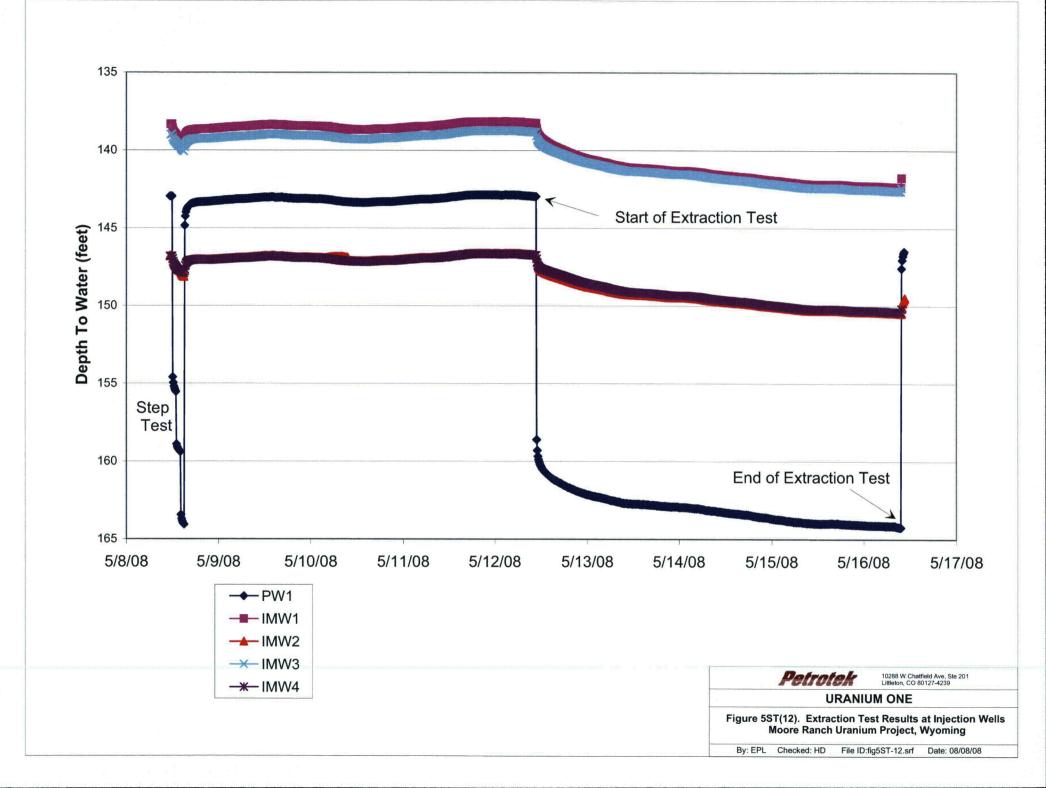
#### **URANIUM ONE**

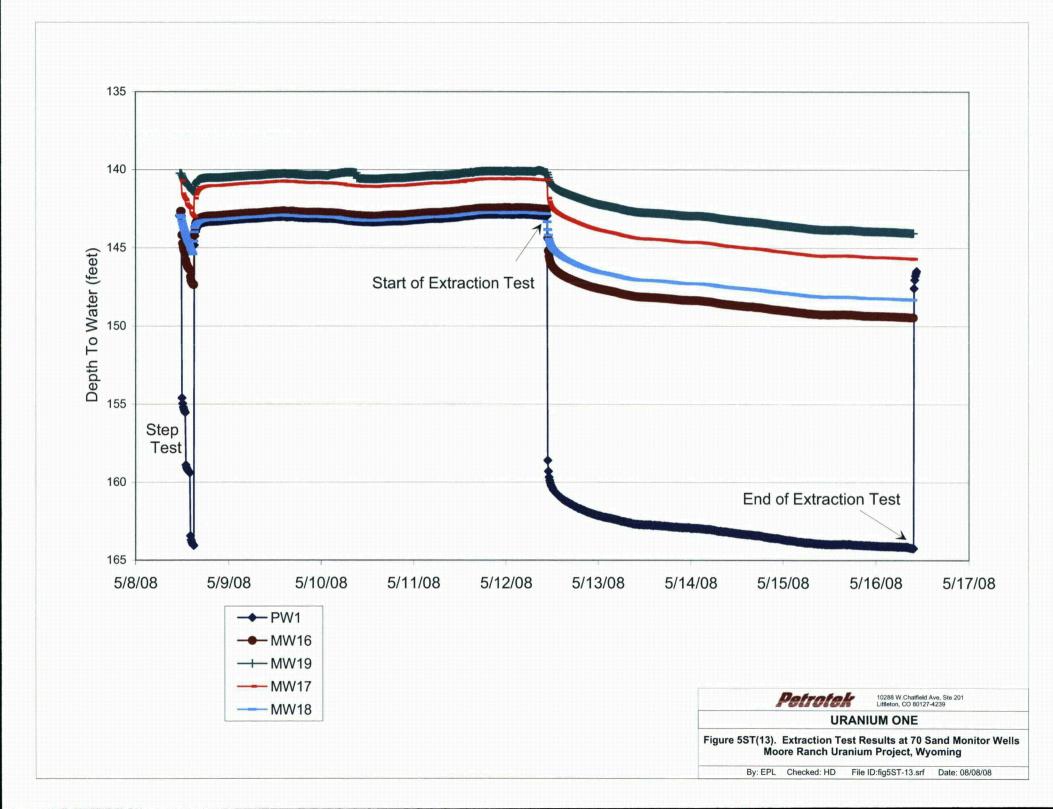
Figure 5ST(10). Extraction Test Response - PMW1 Moore Ranch Uranium Project, Wyoming

By: EPL Checked: HD

File ID:fig5ST-10.srf Date: 08/08/08







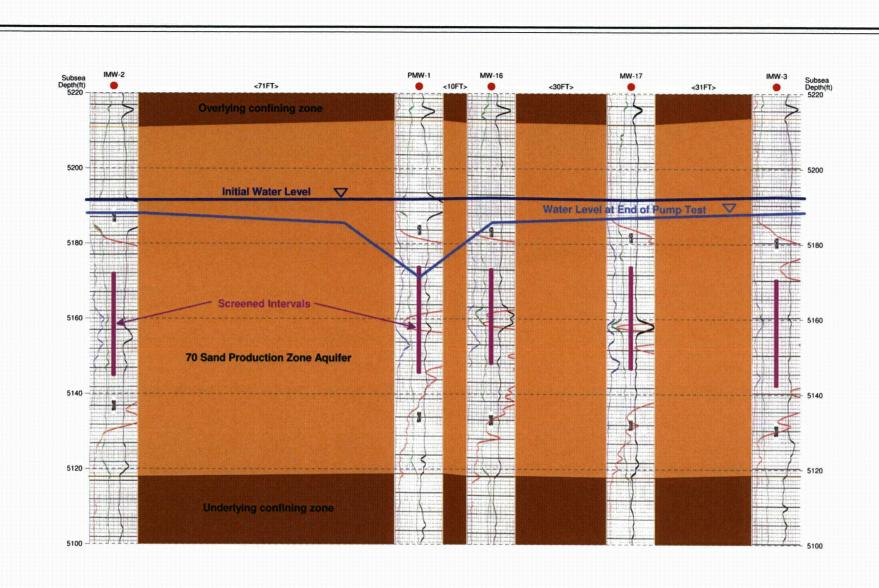


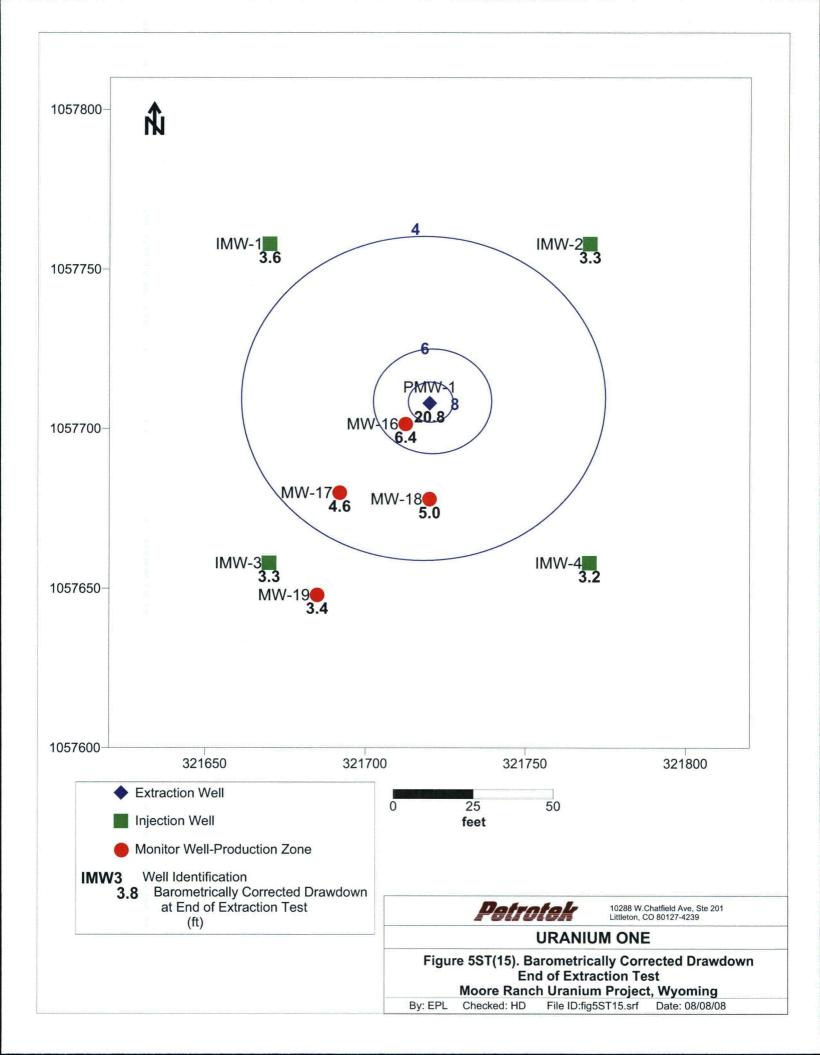


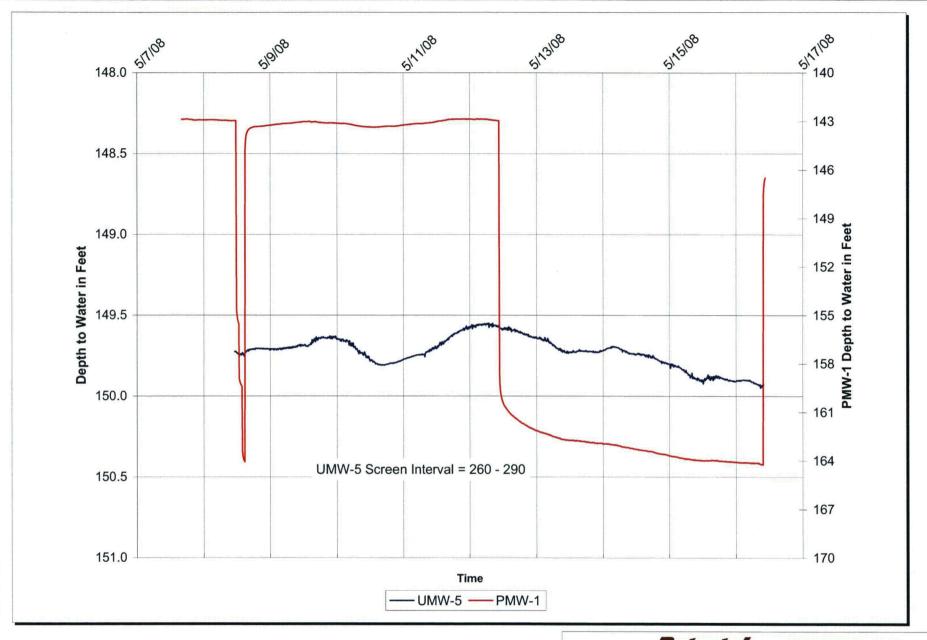
Figure 5ST(14)
Hydrogeologic Cross Section
End of Extraction Test

Project: 312-16 File: 5ST(14).dwg Date: August 2008 By: KRS | Checked: EPL



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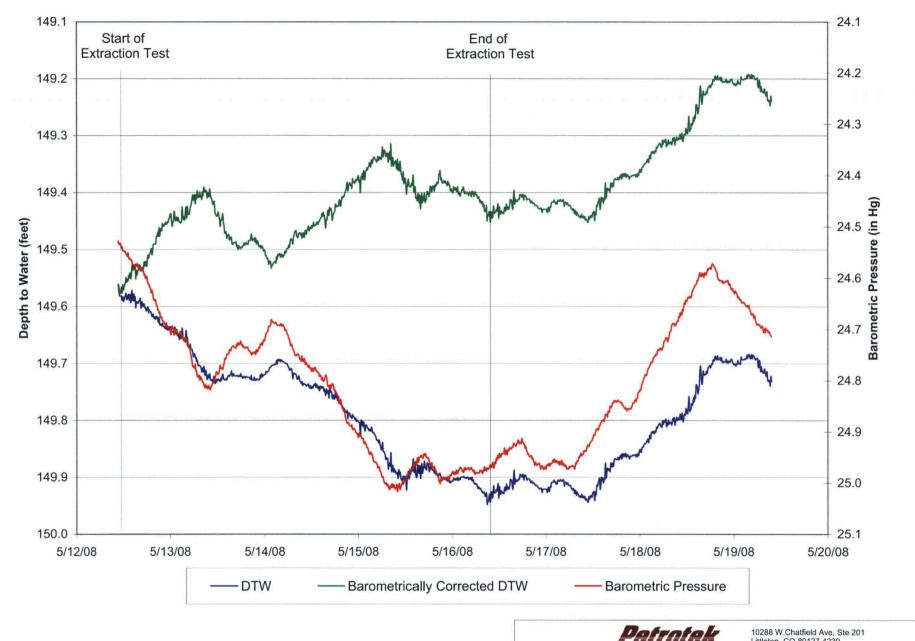
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#### **URANIUM ONE**

Figure 5ST(16). Extraction Test Response - UMW5 Moore Ranch Uranium Project, Wyoming

By: EPL Checked: HD

File ID:fig5ST-16.srf Date: 08/08/08





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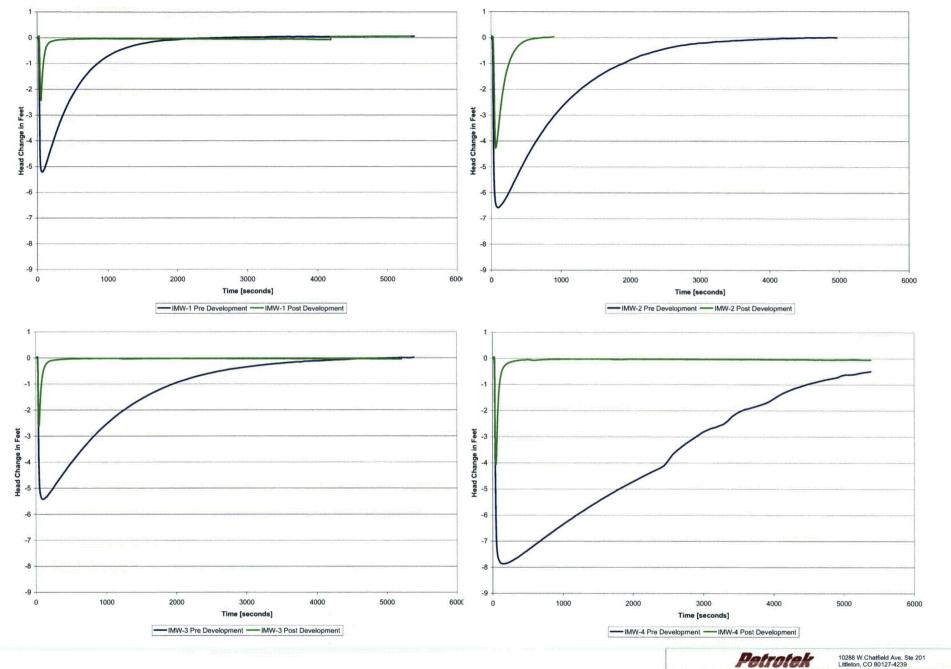
#### **URANIUM ONE**

Figure 5ST(17). Barometrically Corrected Depth to Water- UMW5 Moore Ranch Uranium Project, Wyoming

By: EPL Checked: HD

File ID:fig5ST-17.srf

Date: 08/08/08



#### **URANIUM ONE**

Figure 5ST(18). Pre and Post Development Slug Test Results Injection Wells Moore Ranch Uranium Project, Wyoming

By: EPL Checked: HD File ID:fig5ST-18.srf Date: 08/08/08

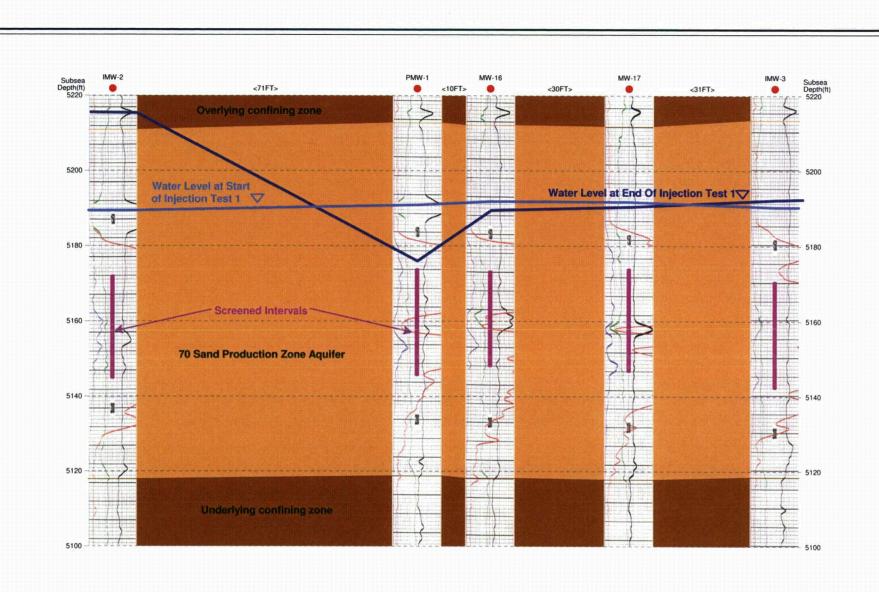




Figure 5ST(19)
Hydrogeologic Cross Section
First Stage, Extraction/Injection Test

Project: 312-16 File: 5ST(19).dwg Date: August 2008

By: KRS | Checked: EPL



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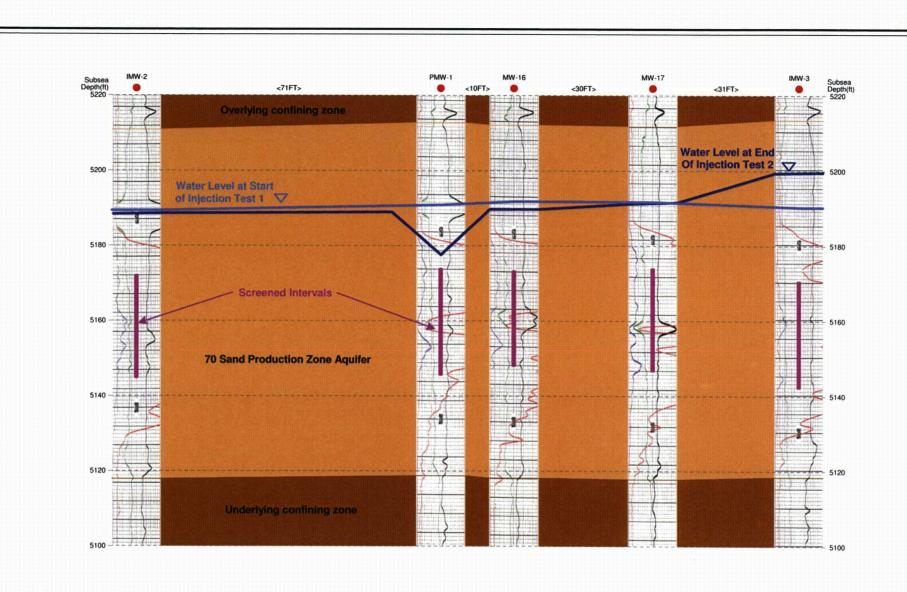




Figure 5ST(20)
Hydrogeologic Cross Section
Second Stage, Extraction/Injection Test

Project: 312-16 File: 5ST(20).dwg

Date: August 2008 By: KRS | Checked: EPL



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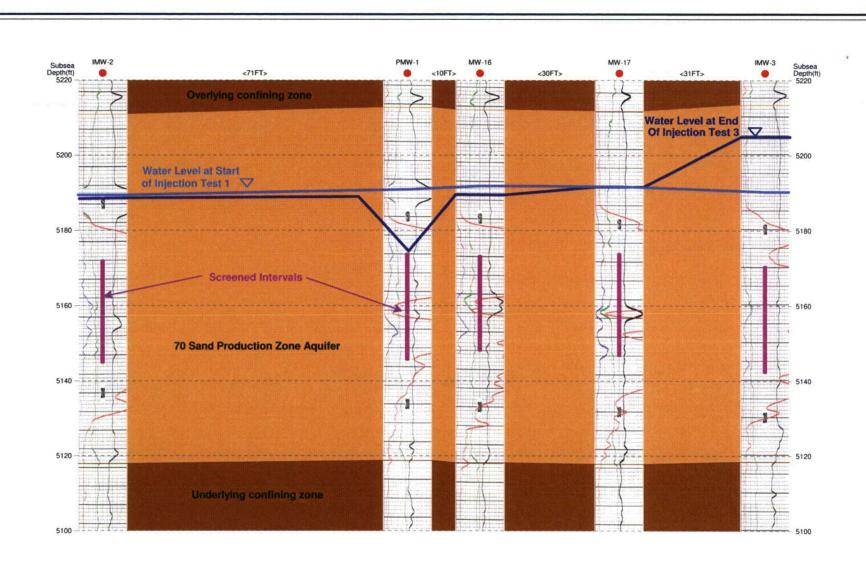




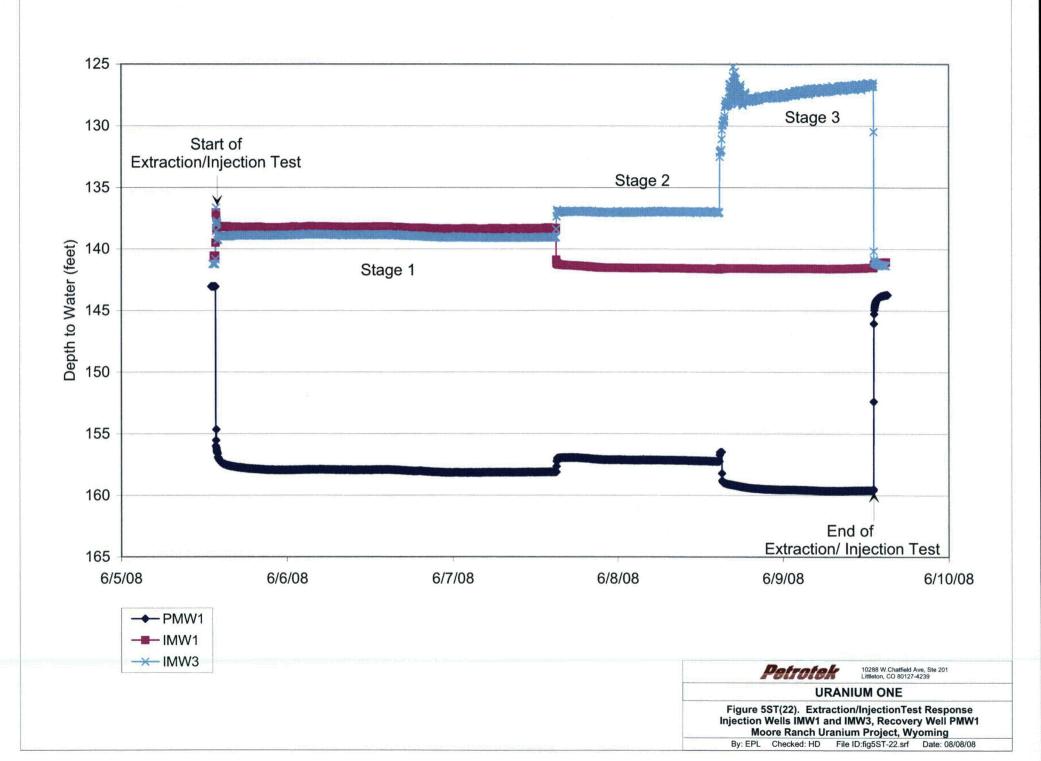
Figure 5ST(21)
Hydrogeologic Cross Section
Third Stage, Extraction/Injection Test

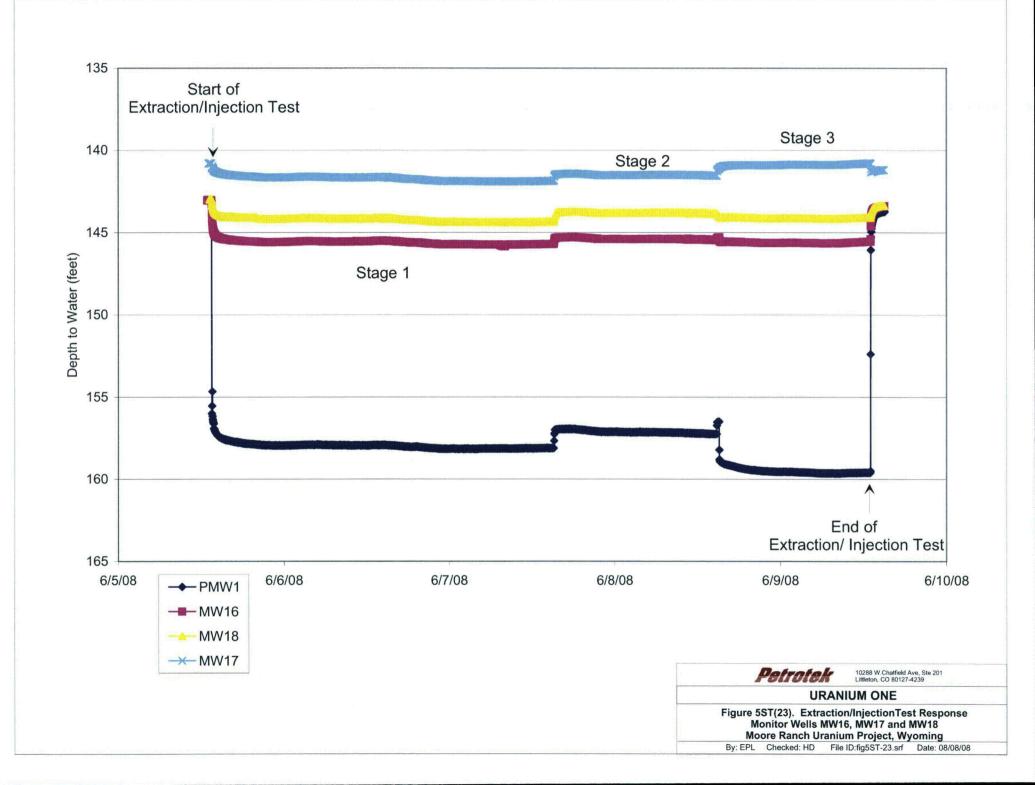
Project: 312-16 File: 5ST(21).dwg Date: August 2008

21).dwg By: KRS Checked: EPL



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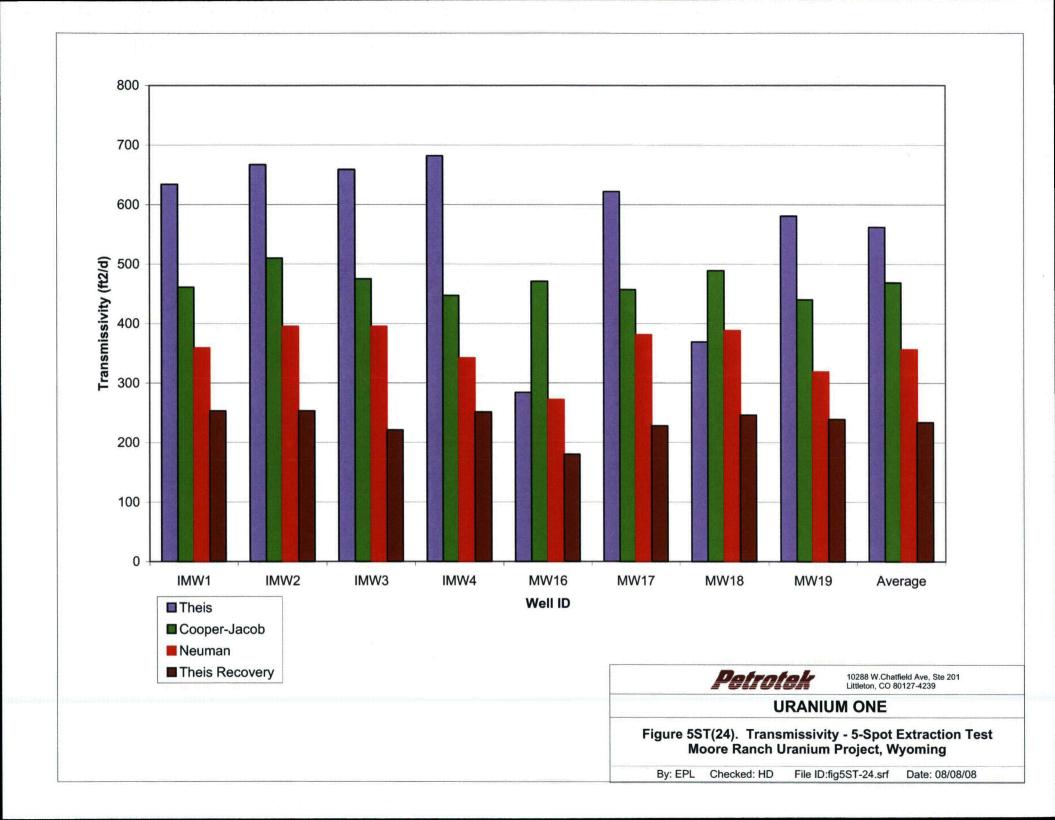


Table 5ST(1). Well Data, 5 Spot Hydrologic Test Recovery, Injection and Monitor Wells, Moore Ranch Uranium Project, Wyoming

Well ID	Northing	Easting	Completion Zone	Distance from Recovery Well	Ground Surface Elevation	Top of Casing Elevation	Total Depth	Top of Screen	Bottom of Screen	Screen Length	Depth to Top 70 Sand	Elevation Top 70 Sand	Depth to Bottom 70 Sand	Rottom	70 Sand Thickness	Depth to Top 68 Sand	Thickness Underlying Confining Unit	DTW 5/7/08	WL Elev
	(feet)	(feet)		(feet)	(ft amsl)	(ft amsl)	(ft bgs)	(ft bgs)	(ft bgs)	(feet)	(ft bgs)	(ft amsl)	(ft bgs)	(ft amsl)	(feet)	(ft bgs)	(feet)		
IMW-1	1057758.0	321670.0	70 Sand	70.7	5329.60	5330.05	260	160	190	30	120	5209.6	205	5124.6	85.0	221	16	138.34	5191.71
IMW-2	1057758.0	321770.0	70 Sand	70.7	5336.90	5338.43	260	165	192	27	126	5210.9	219	5117.9	93.0	239	20	146.79	5191.64
IMW-3	1057658.0	321670.0	70 Sand	70.7	5330.42	5330.99	260	160	188	28	117	5213.4	212	5118.4	95.0	232	20	139.02	5191.97
IMW-4	1057658.0	321770.0	70 Sand	70.7	5337.67	5338.83	260	160	183	23	125	5212.7	219	5118.7	94.0	239	20	146.83	5192.00
MW-16	1057701.5	321712.5	70 Sand	9.9	5333.13	5334.53	260	160	185	25	121	5212.1	215	5118.1	94.0	234	19	142.68	5191.85
MW-17	1057680.0	321692.0	70 Sand	39.6	5331.77	5332.60	260	158	185	27	120	5211.8	214	5117.8	94.0	233	19	140.72	5191.88
MW-18	1057678.0	321720.0	70 Sand	30.0	5333.88	5334.85	260	160	188	28	122	5211.9	215	5118.9	93.0	235	20	142.92	5191.93
MW-19	1057648.0	321685.0	70 Sand	69.5	5331.51	5332.28	260	157	185	28	119	5212.5	214	5117.5	95.0	232	18	140.26	5192.02
PMW-1	1057708.0	321720.0	70 Sand	0.0	5333.73	5334.32	260	160	188	28	121	5212.7	215	5118.7	94.0	236	21	142.37	5191.95
UMW-5	1057708.0	321780.0	68 Sand	60.0	5338.25	5340.08	290	260	290	30	126	5212.3	220	5118.3	94.0	240	20	149.72	5190.36

ft amsl - feet above mean sea level ft bgs - feet below ground surface

#### Extraction Rate at PMW1

			Time			Totalizer 1		Totalizer 2		
	DATE/TIME	Comments	Cumulative (min)	Increment (min)	Cumulative (gal)	Increment (gal)	Rate (gpm)	Cumulative (gal)	Increment (gal)	Rate (gpm)
-	5/8/08 12:50	Begin Step Test	0	0	0	0	0	0	0	( <b>gpiii</b> )
Se	5/8/08 13:50		60	60	929	929	15.48	935	935	15.58
ř	5/8/08 15:00		130	70	2296	1367	19.53	2312	1377	19.67
0	5/8/08 15:13		143	13	2624	328	25.23	2646	334	25.70
<b>e</b>	5/8/08 15:48		178	35	3518	894	25.54	3565	919	26.26
S	5/8/08 16:00	End Step Test	190	12	3817	299	24.92	3870	305	25.42

A	verage Rate
	(gpm)
	0.00
	15.53
	19.60
	25.47
	25.90
	25.17

	5/12/08 10:40	Begin Extraction Test	0	0	3817	0	0	3870	0	0	0.00
*	5/12/08 12:16		96	96	5897	2080	21.67	5979	2109	21.97	21.82
ě	5/13/08 9:00		1340	1244	32899	27002	21.71	33385	27406	22.03	21.87
- 1	5/13/08 11:34		1494	154	36305	3407	22.12	36792	3407	22.12	22.12
2	5/13/08 12:07		1527	33	37015	709	21.49	37530	738	22.37	21.93
Ĕ	5/14/08 13:38		3058	1531	69862	32848	21.46	70874	33343	21.78	21.62
2	5/14/08 14:50		3130	72	71406	1544	21.44	72458	1585	22.01	21.73
	5/15/08 9:53		4273	1143	95880	24474	21.41	97362	24904	21.79	21.60
×	5/15/08 10:22		4302	29	96572	691	23.83	98656	1294	44.62	34.23
ш	5/16/08 9:12		5672	1370	125761	29189	21.31	127731	29075	21.22	21.26
İ	5/16/08 9:32	End Extraction Test	5692	20	126126	365	18.25	128114	383	19.15	18.70
					Average Extracti	on Rate for Test	22.13			22.51	22.32

#### Drawdown at End of Extraction Test, 5-Spot Hydrologic Test Wells

Well ID	IMW-1	IMW-2	IMW-3	IMW-4	MW-16	MW-17	MW-18	MW-19	PMW-1
Initial DTW (ft)	138.34	146.79	139.02	146.83	142.68	140.72	142.92	140.26	142.37
Drawdown (ft)	4.09	3.78	3.79	3.66	6.92	5.03	5.50	3.88	21.29
Drawdown - BP Corrected (ft)	3.61	3.29	3.3	3.16	6.43	4.57	5.00	3.38	20.79

BP - barometric pressure

Table 5ST (3) Slug Test Results, Pre- and Post-Development of Injection Wells, 5 Spot Hydrologic Test, Moore Ranch Uranium Project, Wyoming

Filmond of the control of the control of the Amin's Hard the control of the Amin's Hard the Control of the Cont	Slug Test Results						
Well ID	Pre Development K	Post Development K					
	(ft/d)	(ft/d)					
IMW-1	0.42	4.71					
IMW-2	0.24	1.71					
IMW-3	0.19	5.29					
IMW-4	0.18	6.28					

K - hydraulic conductivity Analytical method - Hvorslev (1951)

Table 5ST (4) Extraction/Injection Test Rates and Results, 5 Spot Hydrologic Test, Moore Ranch Uranium Project

**Extraction/Injection Test Rate Summary** 

	1st St	tage	2nd S	tage	3rd S	tage
	Rate	Duration	Rate	Duration	Rate	Duration
Well ID	(gpm)	(days)	(gpm)	(days)	(gpm)	(days)
IMW-1	5.0	2.06	0.0	1.0	0.0	0.92
IMW-2	5.0	2.06	0.0	1.0	0.0	0.92
IMW-3	5.0	2.06	10.0	1.0	0.0	0.92
IMW-4	5.0	2.06	10.0	1.0	20.5	0.92
PW1	-20.0	2.06	-20.0	1.0	-20.5	0.92

Positive value indicates injection, negative value indicates extraction

**Extraction/Injection Test Well Response Summary** 

Well ID	DTW Start of Test	DTW End 1st Stage	Net Change 1st Stage	BP Corr 1st Stage (+0.08 ft)	DTW End 2nd Stage	Net Change 2nd Stage	BP corr 2nd Stage (+0.18 ft)	DTW End 3rd Stage	Net Change 3d Stage	BP corr 3rd Stage (+0.21 ft)
	(ft)									
IMW-1	140.57	138.28	2.29	2.37	141.60	-1.03	-0.85	141.54	-0.97	-0.76
IMW-2	148.95	123.01	25.94	26.02	149.75	-0.80	-0.62	150.03	-1.08	-0.87
IMW-3	141.24	139.05	2.19	2.27	131.94	9.30	9.48	126.54	14.70	14.91
IMW-4	149.02	145.31	3.71	3.79	139.91	9.11	9.29	149.53	-0.51	-0.30
MW-16*	143.00	140.36	2.64	2.72	140.74	2.26	2.44	140.51	2.49	2.70
MW-17	140.81	141.87	-1.06	-0.98	141.05	-0.24	-0.06	140.80	0.01	0.22
MW-18	142.96	144.35	-1.39	-1.31	143.99	-1.03	-0.85	144.08	-1.12	-0.91
MW-19	140.37	140.15	0.22	0.30	138.05	2.32	2.50	137.01	3.36	3.57
PW1	143.06	158.10	-15.04	-14.96	156.60	-13.54	-13.36	159.60	-16.54	-16.33

DTW - Depth to Water

BP Corr. - Barometric Pressure Correction

\* DTW in MW16 at start of test is estimated - all remaining values are relative to start value

Positive value indicates net rise in water level

Negative value indicates net decrease in water level

Table 5ST (5) Extraction Test Analytical Results, 5 Spot Hydrologic Test, Moore Ranch Uranium Project, Wyoming

	Th	eis	Coopei	r-Jacob	Theis R	ecovery		Neuman		Avera Meti	ge All nods
	Т	K	Т	K	Т	K	Т	K	Sy	T	K
Well ID	(ft <sup>2</sup> /d)	(ft/d)	(ft <sup>2</sup> /d)	(ft/d)	(ft <sup>2</sup> /d)	(ft/d)	(ft <sup>2</sup> /d)	(ft/d)		(ft <sup>2</sup> /d)	(ft/d)
IMW1	634	8.81	461	6.40	253	3.51	359	4.99	0.012	427	5.93
IMW2	667	9.26	510	7.08	253	3.51	395	5.49	0.014	456	6.34
IMW3	659	9.15	475	6.60	221	3.07	395	5.49	0.015	438	6.08
IMW4	682	9.47	447	6.21	251	3.49	342	4.75	0.027	431	5.98
MW16	284	3.94	471	6.54	180	2.50	272	3.78	0.015	302	4.19
MW17	622	8.64	457	6.35	228	3.17	381	5.29	0.011	422	5.86
MW18	369	5.13	489	6.79	246	3.42	388	5.39	0.039	373	5.18
MW19	581	8.07	440	6.11	239	3.32	319	4.43	0.024	395	5.48
PW1		-		-	237	3.29	2-2-	-		237	3.29
Average	562	7.81	469	6.51	234	3.25	356	4.95	0.020	405	5.63
Maximum	682	9.47	510	7.08	253	3.51	395	5.49	0.039		
Minimum	284	3.94	440	6.11	180	2.50	272	3.78	0.011		
Std dev	150.5	2.1	22.8	0.3	23.2	0.3	43.6	0.6	0.010	-	- 4

T - Transmissivity
K - Hydraulic Conductivity
Sy - Specific Yield



# **APPENDIX B2**

Moore Ranch 5-Spot Hydrologic Test Report Volume I Test Design, Rresults and Analysis

ATTACHMENTS:

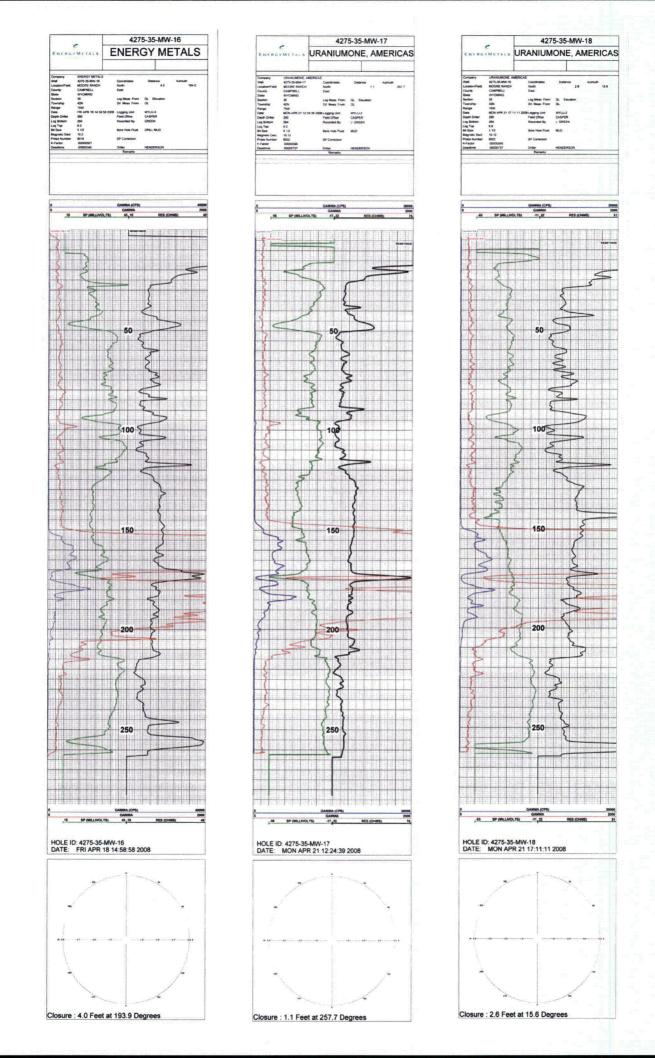
- (1) 5ST Well Logs
- (2) Analytical Solutions

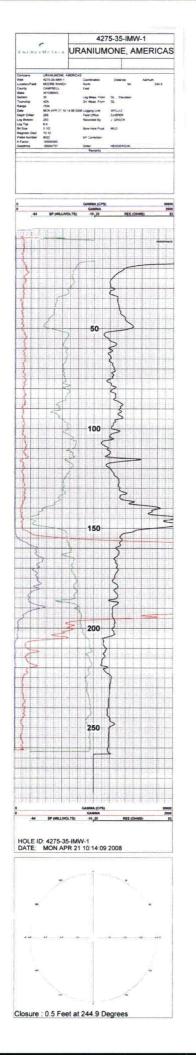


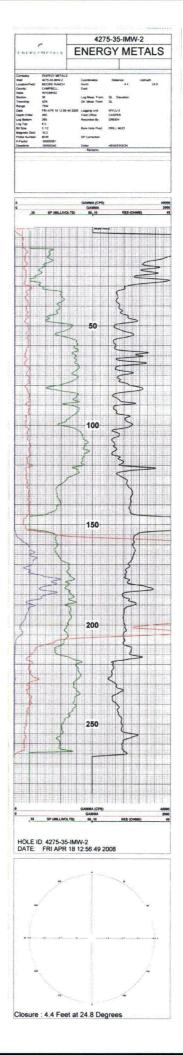
# **ENERGY METALS CORPORATION US**

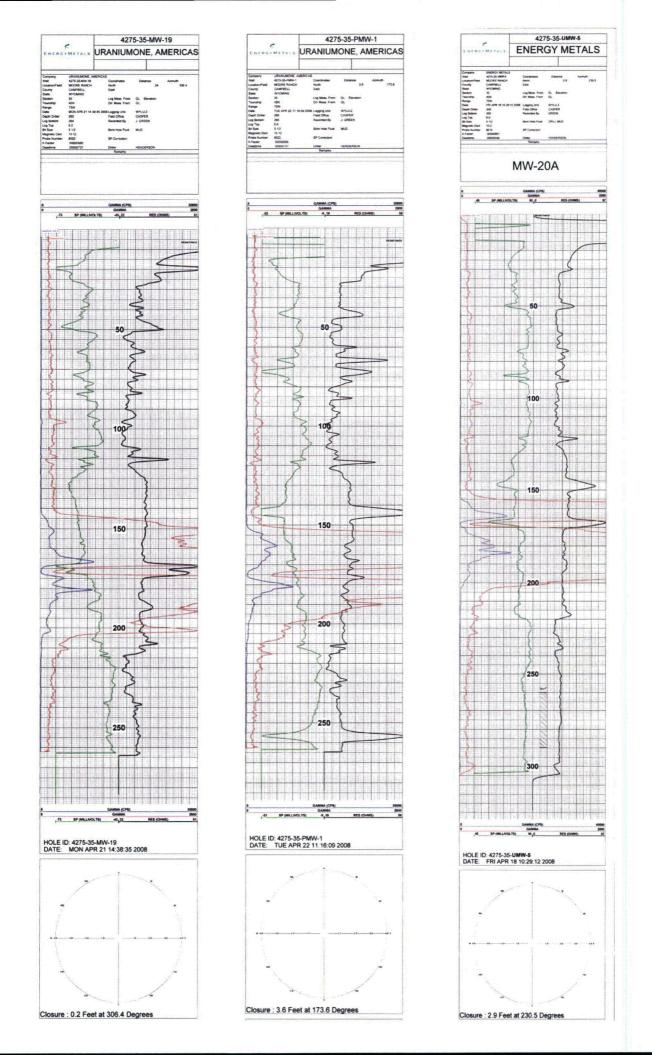
License Application, Technical Report Moore Ranch Uranium Project

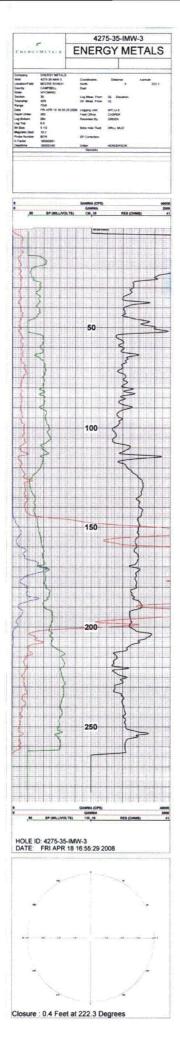
ATTACHMENTS: (1) 5ST Well Logs



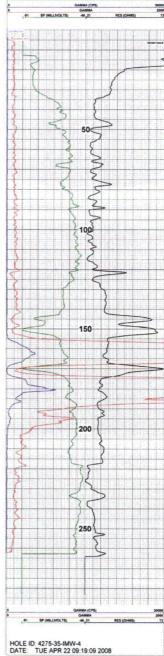


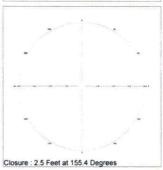














# ATTACHMENTS:

(2) 5ST Analytical Solutions



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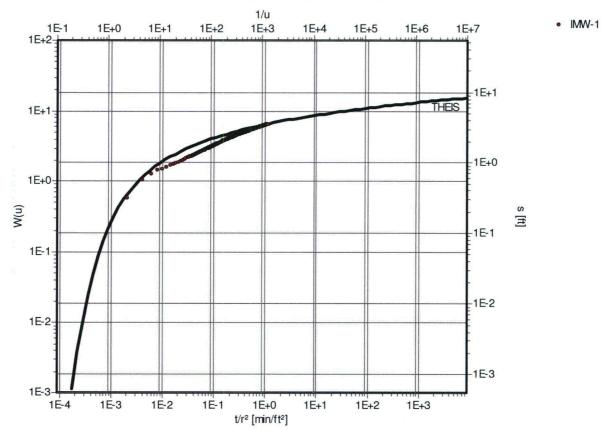
# **Pumping Test Analysis Report**

Project: 5 Spot Test- Moore Ranch

Number:

Client: Uranium One, Americas

# 5 Spot Pump Test Barometric Correction [Theis]



Pumping Test:

5 Spot Extraction Test BP Corrected

Analysis Method:

Theis

Analysis Results:

Transmissivity:

6.34E+2 [ft²/d]

Conductivity:

8.80E+0 [ft/d]

Test parameters:

Pumping Well:

PMW-1

Aquifer Thickness:

72 [ft]

Casing radius:

0.17 [ft]

**Unconfined Aquifer** 

Screen length:

28 [ft]

Boring radius:

0.33 [ft]

Discharge Rate:

22.32 [U.S. gal/min]

Comments:

Evaluated by:

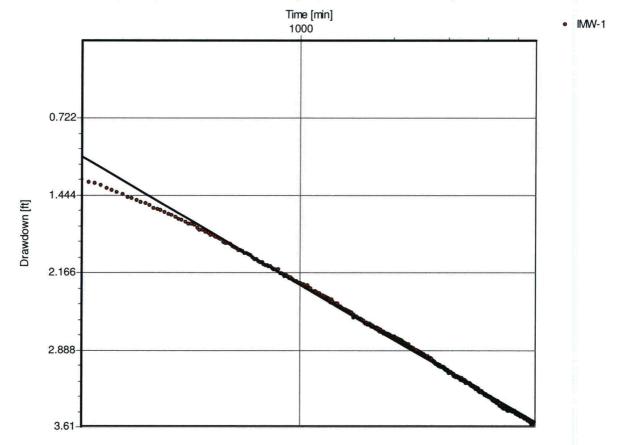
EPL

Evaluation Date:

5/28/2008







**Pumping Test:** 

**5 Spot Extraction Test BP Corrected** 

**Analysis Method:** 

Cooper-Jacob Time-Drawdown

**Analysis Results:** 

Transmissivity:

4.61E+2 [ft2/d]

Conductivity:

6.41E+0 [ft/d]

Test parameters:

Pumping Well:

PMW-1

Aquifer Thickness:

72 [ft]

Casing radius:

0.17 [ft]

Confined Aquifer

Screen length:

28 [ft]

Boring radius:

0.33 [ft]

Discharge Rate:

22.32 [U.S. gal/min]

#### Comments:

Evaluated by:

EDI

**Evaluation Date:** 



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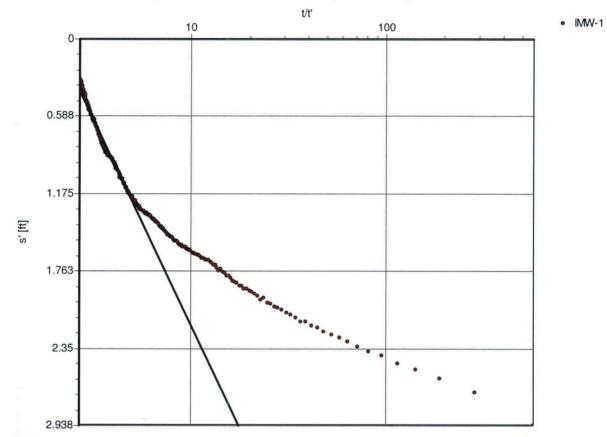
**Pumping Test Analysis Report** 

Project: 5 Spot Test- Moore Ranch

Number:

Client: Uranium One, Americas

### 5 Spot Pump Test Barometric Correction [Theis Recovery]



Pumping Test:

5 Spot Extraction Test BP Corrected

**Analysis Method:** 

**Theis Recovery** 

Analysis Results:

Transmissivity:

2.53E+2 [ft²/d]

Conductivity:

3.51E+0 [ft/d]

Test parameters:

Pumping Well:

PMW-1

Aquifer Thickness:

72 [ft]

Casing radius:

0.17 [ft]

**Unconfined Aquifer** 

Screen length:

28 [ft]

Boring radius:

0.33 [ft]

Discharge Rate:

22.32 [U.S. gal/min]

**Pumping Time** 

5700 [min]

Comments:

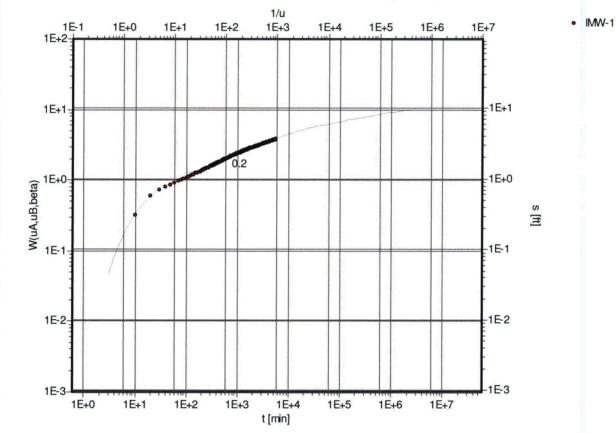
Evaluated by:

EPL

Evaluation Date:







Pumping Test:

**5 Spot Extraction Test BP Corrected** 

**Analysis Method:** 

Neuman

Analysis Results:	Transmissivity:	3.59E+2 [ft²/d]	Conductivity:	4.99E+0 [ft/d]
	Storativity:	1.20E-3	Specific Yield:	1.20E-2
Test parameters:	Pumping Well:	PMW-1	Aquifer Thickness:	72 [ft]
	Casing radius:	0.17 [ft]	Beta:	0.2
	Screen length:	28 [ft]		
	Boring radius:	0.33 [ft]		
	Discharge Rate:	22.32 [U.S. gal/min]		
	LOG(Sy/S):	1		

## Comments:

Evaluated by:

**EPL** 

**Evaluation Date:** 



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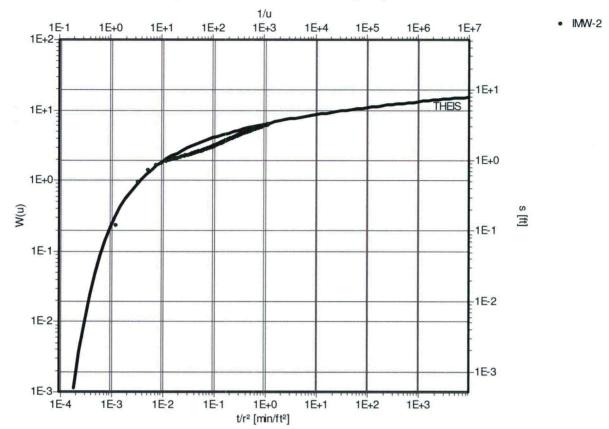
**Pumping Test Analysis Report** 

Project: 5 Spot Test- Moore Ranch

Number:

Client: Uranium One, Americas

### 5 Spot Pump Test Barometric Correction [Theis]



**Pumping Test:** 

5 Spot Extraction Test BP Corrected

Analysis Method:

Theis

**Analysis Results:** 

Transmissivity:

6.67E+2 [ft2/d]

Conductivity:

9.26E+0 [ft/d]

Test parameters:

Pumping Well:

PMW-1

Aquifer Thickness:

72 [ft]

Casing radius:

0.17 [ft]

**Unconfined Aquifer** 

Screen length:

28 [ft]

Boring radius:

0.33 [ft]

Discharge Rate:

22.32 [U.S. gal/min]

Comments:

Evaluated by:

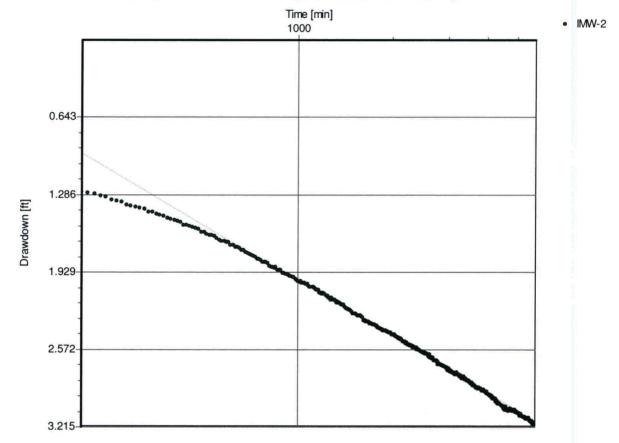
EPL

**Evaluation Date:** 

5/28/2008







Pumping Test:

5 Spot Extraction Test BP Corrected

**Analysis Method:** 

Cooper-Jacob Time-Drawdown

**Analysis Results:** 

Transmissivity:

5.10E+2 [ft²/d]

Conductivity:

7.08E+0 [ft/d]

Test parameters:

Pumping Well:

PMW-1

Aquifer Thickness:

72 [ft]

Casing radius:

0.17 [ft]

**Unconfined Aquifer** 

Screen length:

28 [ft]

Boring radius:

0.33 [ft]

Discharge Rate:

22.32 [U.S. gal/min]

Comments:

Evaluated by:

EPL

**Evaluation Date:** 



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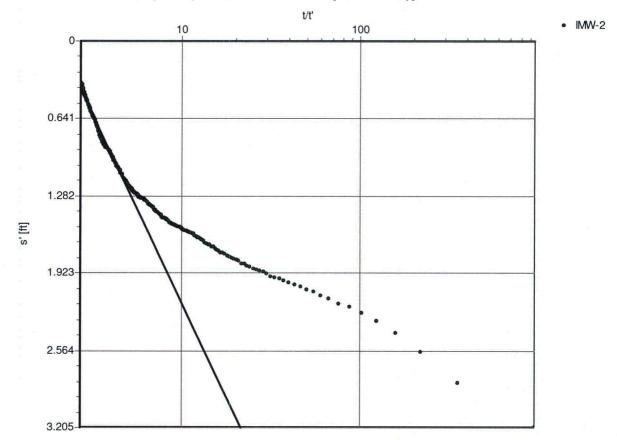
**Pumping Test Analysis Report** 

Project: 5 Spot Test- Moore Ranch

Number:

Client: Uranium One, Americas

### 5 Spot Pump Test Barometric Correction [Theis Recovery]



Pumping Test:

**5 Spot Extraction Test BP Corrected** 

Analysis Method:

**Theis Recovery** 

**Analysis Results:** 

Transmissivity:

2.53E+2 [ft<sup>2</sup>/d]

Conductivity:

3.51E+0 [ft/d]

Test parameters:

Pumping Well:

PMW-1

Aquifer Thickness:

72 [ft]

Casing radius:

0.17 [ft]

**Unconfined Aquifer** 

Screen length:

28 [ft]

Boring radius:

0.33 [ft]

Discharge Rate:

22.32 [U.S. gal/min]

**Pumping Time** 

5700 [min]

#### Comments:

Evaluated by:

EPL

Evaluation Date:



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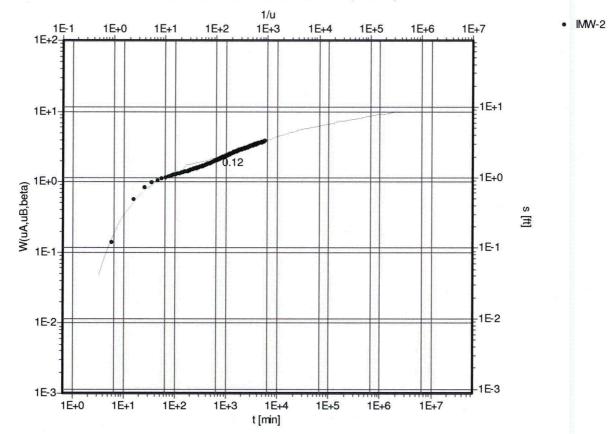
## **Pumping Test Analysis Report**

Project: 5 Spot Test- Moore Ranch

Number:

Client: Uranium One, Americas

#### 5 Spot Pump Test Barometric Correction [Neuman]



**Pumping Test:** 

**5 Spot Extraction Test BP Corrected** 

Analysis Method:

Neuman

Analysis Results: Transmissivity:

3.95E+2 [ft2/d]

Conductivity:

5.49E+0 [ft/d]

Storativity:

1.43E-3

Specific Yield:

1.43E-2

Test parameters:

Pumping Well:

PMW-1

Aquifer Thickness:

72 [ft]

Casing radius:

0.17 [ft]

Beta:

0.12

Screen length:

28 [ft]

Boring radius:

0.33 [ft]

Discharge Rate:

22.32 [U.S. gal/min]

LOG(Sy/S):

1

Comments:

Evaluated by:

EPL

**Evaluation Date:** 



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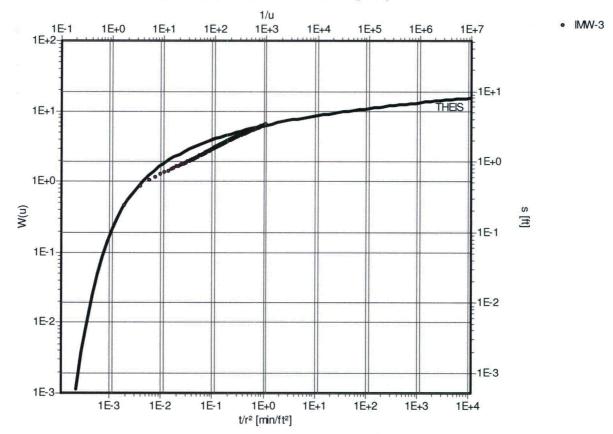
**Pumping Test Analysis Report** 

Project: 5 Spot Test- Moore Ranch

Number:

Client: Uranium One, Americas

#### 5 Spot Pump Test Barometric Correction [Theis]



Pumping Test:

**5 Spot Extraction Test BP Corrected** 

**Analysis Method:** 

Theis

**Analysis Results:** 

Transmissivity:

6.59E+2 [ft2/d]

Conductivity:

9.15E+0 [ft/d]

Storativity:

2.08E-3

Test parameters:

Pumping Well:

PMW-1

Aquifer Thickness:

72 [ft]

Casing radius:

0.17 [ft]

Confined Aquifer

Screen length:

28 [ft]

Boring radius:

0.33 [ft]

Discharge Rate:

22.32 [U.S. gal/min]

Comments:

Evaluated by:

EPL

Evaluation Date:

5/28/2008



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Pumping Test Analysis Report

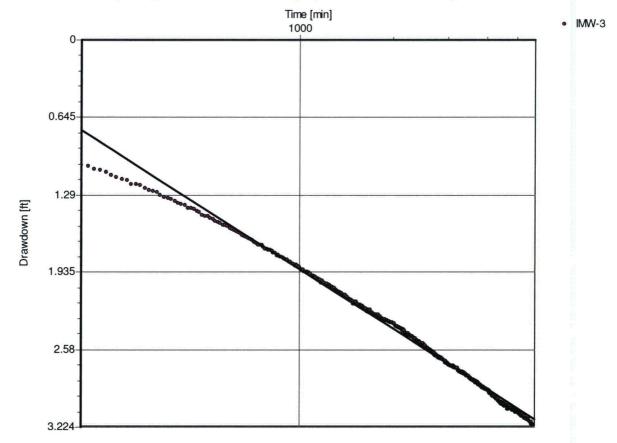
Project: 5 Spot Test- Moore Ranch

Number:

Uranium One, Americas



Client:



Pumping Test:

**5 Spot Extraction Test BP Corrected** 

**Analysis Method:** 

Cooper-Jacob Time-Drawdown

**Analysis Results:** 

Transmissivity:

4.75E+2 [ft²/d]

Conductivity:

6.59E+0 [ft/d]

Test parameters:

Pumping Well:

PMW-1

Aquifer Thickness:

72 [ft]

Casing radius:

0.17 [ft]

**Unconfined Aquifer** 

Screen length:

28 [ft]

Boring radius:

0.33 [ft]

Discharge Rate:

22.32 [U.S. gal/min]

Comments:

Evaluated by:

EPL

**Evaluation Date:** 



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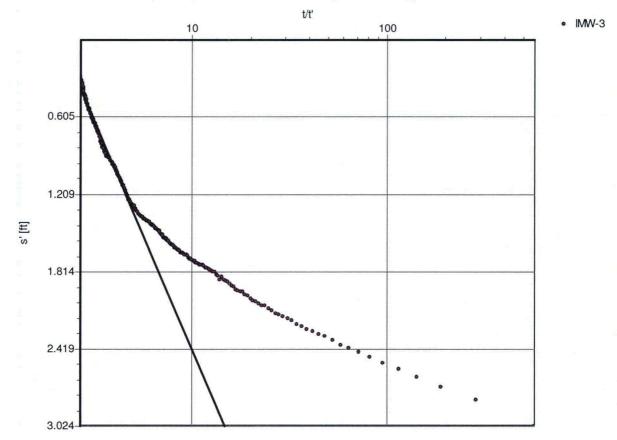
**Pumping Test Analysis Report** 

Project: 5 Spot Test- Moore Ranch

Number:

Client: Uranium One, Americas

### 5 Spot Pump Test Barometric Correction [Theis Recovery]



Pumping Test:

5 Spot Extraction Test BP Corrected

**Analysis Method:** 

**Theis Recovery** 

**Analysis Results:** 

Transmissivity:

2.21E+2 [ft²/d]

Conductivity:

3.06E+0 [ft/d]

Test parameters:

Pumping Well:

PMW-1

Aquifer Thickness:

72 [ft]

Casing radius:

0.17 [ft]

**Unconfined Aquifer** 

Screen length:

28 [ft]

Boring radius:

0.33 [ft]

Discharge Rate:

22.32 [U.S. gal/min]

**Pumping Time** 

5700 [min]

#### Comments:

Evaluated by:

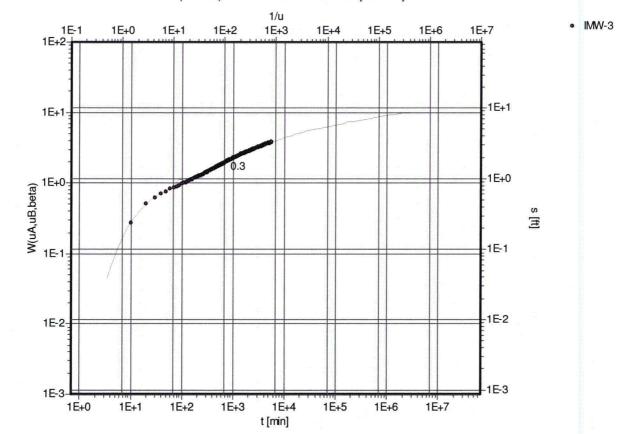
EPL

Evaluation Date:



### 5 Spot Pump Test Barometric Correction [Neuman]

Client:



Pumping Test:

**5 Spot Extraction Test BP Corrected** 

**Analysis Method:** 

Neuman

Analysis Results:	Transmissivity:	3.95E+2 [ft²/d]	Conductivity:	5.48E+0 [ft/d]	
	Storativity:	1.49E-3	Specific Yield:	1.49E-2	
Test parameters:	Pumping Well:	PMW-1	Aquifer Thickness:	72 [ft]	

Casing radius:

0.17 [ft]

Beta:

0.3

Screen length:

Boring radius:

28 [ft]

0.33 [ft]

Discharge Rate:

22.32 [U.S. gal/min]

LOG(Sy/S):

1

#### Comments:

Evaluated by:

**Evaluation Date:** 



Pumping Test Analysis Report

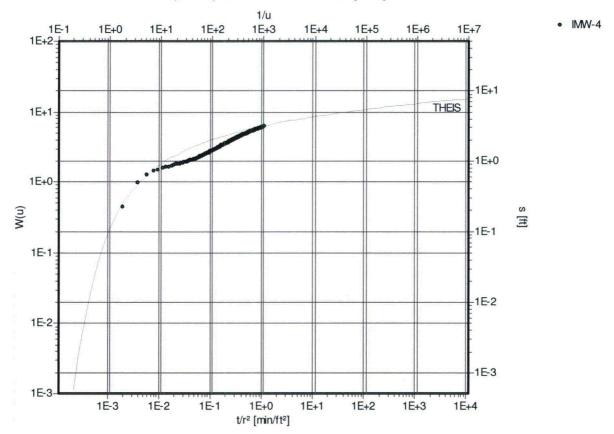
Project: 5 Spot Test- Moore Ranch

Number:

Uranium One, Americas

#### 5 Spot Pump Test Barometric Correction [Theis]

Client:



Pumping Test:

5 Spot Extraction Test BP Corrected

Analysis Method:

**Theis** 

**Analysis Results:** 

Transmissivity:

6.82E+2 [ft2/d]

Conductivity:

9.48E+0 [ft/d]

Test parameters:

Pumping Well:

PMW-1

Aquifer Thickness:

72 [ft]

Casing radius:

0.17 [ft]

**Unconfined Aquifer** 

Screen length:

28 [ft]

Boring radius:

0.33 [ft]

Discharge Rate:

22.32 [U.S. gal/min]

Comments:

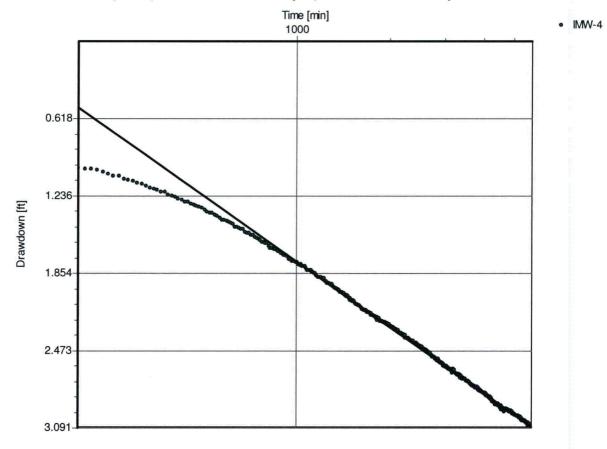
Evaluated by:

EPL

Evaluation Date:



5 Spot Pump Test Barometric Correction [Cooper-Jacob Time-Draw down]



Pumping Test:

**5 Spot Extraction Test BP Corrected** 

**Analysis Method:** 

Cooper-Jacob Time-Drawdown

**Analysis Results:** 

Transmissivity:

4.47E+2 [ft²/d]

Conductivity:

6.21E+0 [ft/d]

Test parameters:

Pumping Well:

PMW-1

Aquifer Thickness:

72 [ft]

Casing radius:

0.17 [ft]

**Unconfined Aquifer** 

Screen length:

28 [ft]

Boring radius:

0.33 [ft]

Discharge Rate:

22.32 [U.S. gal/min]

Comments:

Evaluated by:

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**Evaluation Date:** 



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Project:

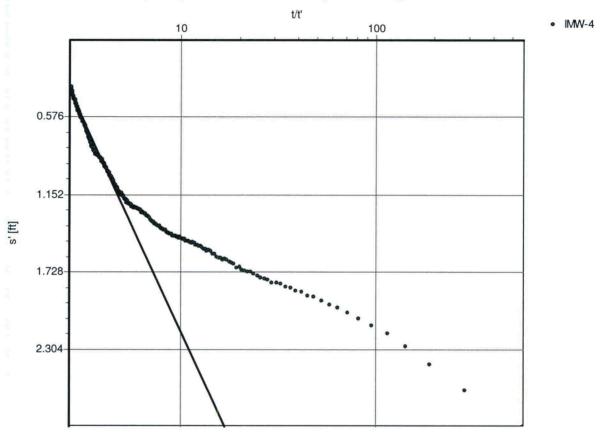
5 Spot Test- Moore Ranch

**Pumping Test Analysis Report** 

Number: Client:

Uranium One, Americas

5 Spot Pump Test Barometric Correction [Theis Recovery]



Pumping Test:

5 Spot Extraction Test BP Corrected

**Analysis Method:** 

**Theis Recovery** 

**Analysis Results:** 

Transmissivity:

2.51E+2 [ft²/d]

Conductivity:

3.49E+0 [ft/d]

Test parameters:

Pumping Well:

PMW-1

Aquifer Thickness:

72 [ft]

Casing radius:

0.17 [ft]

**Unconfined Aquifer** 

Screen length:

28 [ft]

Boring radius:

0.33 [ft]

Discharge Rate:

22.32 [U.S. gal/min]

**Pumping Time** 

5700 [min]

Comments:

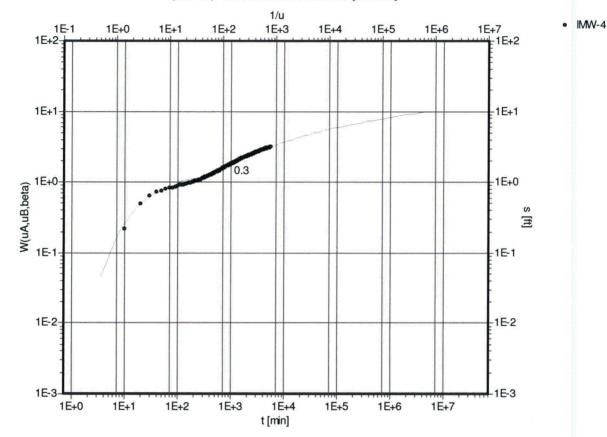
Evaluated by:

EPL

**Evaluation Date:** 



5 Spot Pump Test Barometric Correction [Neuman]



**Pumping Test:** 

**5 Spot Extraction Test BP Corrected** 

Analysis Method:

Neuman

Anal	<b>VSIS</b>	Results:

Transmissivity:

3.42E+2 [ft2/d]

Conductivity:

4.75E+0 [ft/d]

Storativity:

1.33E-3

Specific Yield:

2.66E-2

Test parameters:

Pumping Well:

PMW-1

Aquifer Thickness:

72 [ft]

Casing radius:

0.17 [ft]

Beta:

0.3

Screen length:

28 [ft]

Boring radius:

0.33 [ft]

Discharge Rate:

22.32 [U.S. gal/min]

LOG(Sy/S):

1.3

# Comments:

Evaluated by:

EPL

**Evaluation Date:** 

5/28/2008



Pumping Test Analysis Report

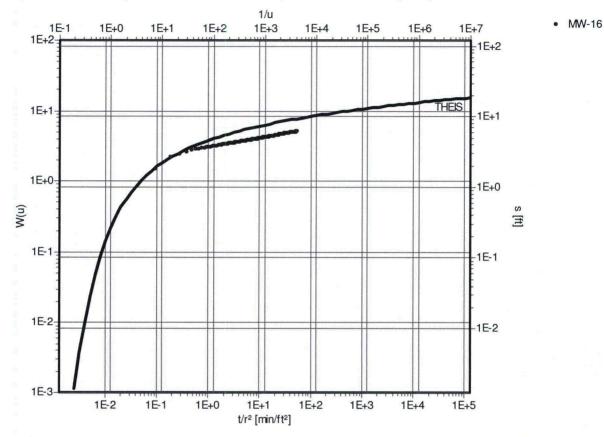
Project: 5 Spot Test- Moore Ranch

Number:

Uranium One, Americas

#### 5 Spot Extraction Test-Barometrically Corrected Draw down [Theis]

Client:



Pumping Test:

**5 Spot Extraction Test BP Corrected** 

Analysis Method: Theis

Analysis Results:

Transmissivity:

2.84E+2 [ft²/d]

Conductivity:

3.95E+0 [ft/d]

Test parameters:

Pumping Well:

PMW-1

Aquifer Thickness:

72 [ft]

Casing radius:

0.17 [ft]

**Unconfined Aquifer** 

Screen length:

28 [ft]

Boring radius:

0.33 [ft]

Discharge Rate:

22.32 [U.S. gal/min]

Comments:

Evaluated by:

EPL

Evaluation Date:

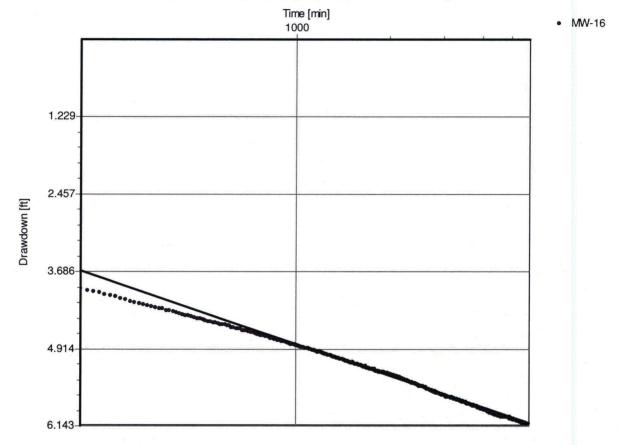


Project: 5 Spot Test-Moore Ranch

Number:

Client: Uranium One, Americas

5 Spot Pump Test Barometric Correction [Cooper-Jacob Time-Draw dow n]



Pumping Test:

**5 Spot Extraction Test BP Corrected** 

**Analysis Method:** 

Cooper-Jacob Time-Drawdown

**Analysis Results:** 

Transmissivity:

4.71E+2 [ft2/d]

Conductivity:

6.54E+0 [ft/d]

Test parameters:

Pumping Well:

PMW-1

Aquifer Thickness:

72 [ft]

Casing radius:

0.17 [ft]

**Unconfined Aquifer** 

Screen length:

28 [ft]

Boring radius:

0.33 [ft]

Discharge Rate:

22.32 [U.S. gal/min]

Comments:

Evaluated by:

EPL

**Evaluation Date:** 



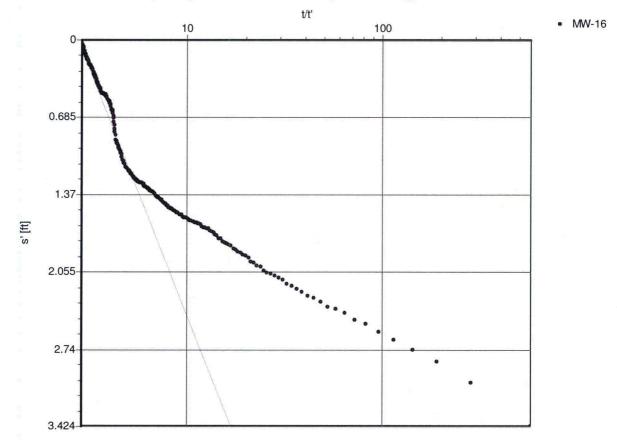
**Pumping Test Analysis Report** 

Project: 5 Spot Test- Moore Ranch

Number:

Client: Uranium One, Americas

### 5 Spot Pump Test Barometric Correction [Theis Recovery]



Pumping Test:

**5 Spot Extraction Test BP Corrected** 

**Analysis Method:** 

**Theis Recovery** 

**Analysis Results:** 

Transmissivity:

1.80E+2 [ft²/d]

Conductivity:

2.50E+0 [ft/d]

Test parameters:

Pumping Well:

PMW-1

Aquifer Thickness:

72 [ft]

Casing radius:

0.17 [ft]

**Unconfined Aquifer** 

Screen length:

28 [ft]

Boring radius:

0.33 [ft]

Discharge Rate:

22.32 [U.S. gal/min]

**Pumping Time** 

5700 [min]

#### Comments:

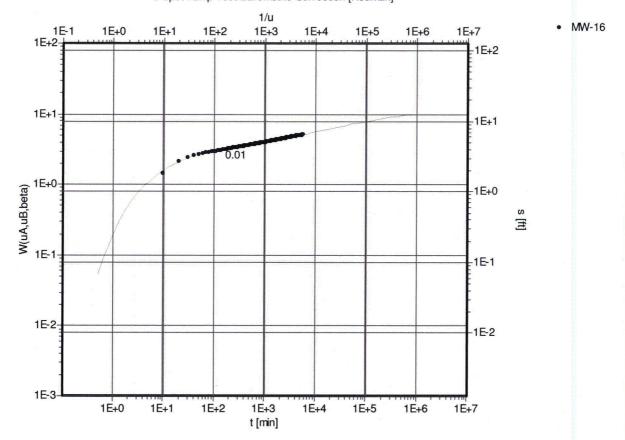
Evaluated by:

**EPL** 

**Evaluation Date:** 



# 5 Spot Pump Test Barometric Correction [Neuman]



**Pumping Test:** 

**5 Spot Extraction Test BP Corrected** 

**Analysis Method:** 

Neuman

Analysis Results:	Transmissivity:	2.72E+2 [ft²/d]	Conductivity:	3.77E+0 [ft/d]
	Storativity:	7.33E-3	Specific Yield:	1.46E-1
Test parameters:	Pumping Well:	PMW-1	Aquifer Thickness:	72 [ft]
	Casing radius:	0.17 [ft]	Beta:	0.01
	Screen length:	28 [ft]		
	Boring radius:	0.33 [ft]		
	Discharge Rate:	22.32 [U.S. gal/min]		
	LOG(Sy/S):	1.3		

### Comments:

Evaluated by:

EPL

**Evaluation Date:** 

5/28/2008



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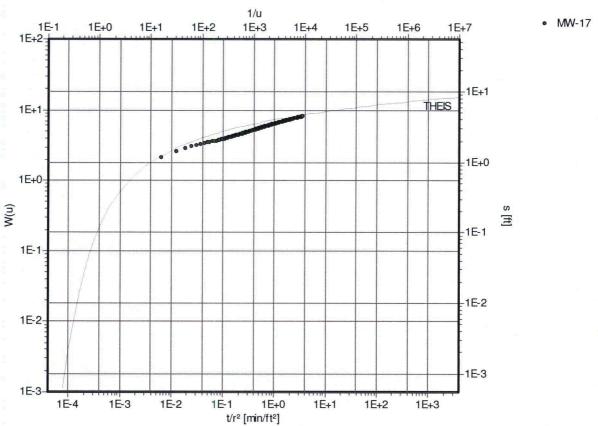
## **Pumping Test Analysis Report**

Project: 5 Spot Test- Moore Ranch

Number:

Client: Uranium One, Americas





**Pumping Test:** 

**5 Spot Extraction Test BP Corrected** 

**Analysis Method:** Theis

**Analysis Results:** 

Transmissivity:

6.22E+2 [ft2/d]

Conductivity:

8.64E+0 [ft/d]

Test parameters:

Pumping Well:

PMW-1

Aquifer Thickness:

72 [ft]

Casing radius:

0.17 [ft]

**Unconfined Aquifer** 

Screen length:

28 [ft]

Boring radius:

0.33 [ft]

Discharge Rate:

22.32 [U.S. gal/min]

Comments:

Evaluated by:

EPL

**Evaluation Date:** 



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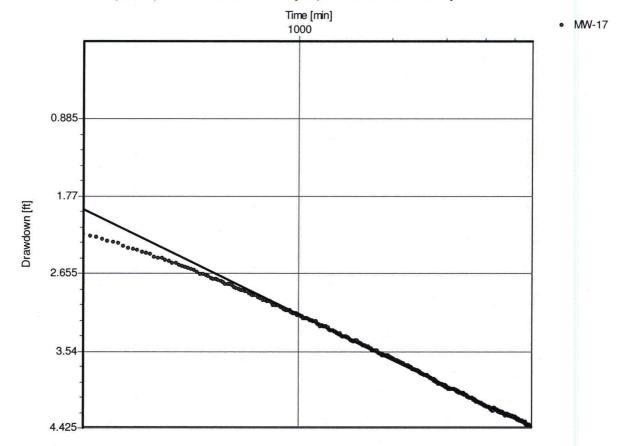
**Pumping Test Analysis Report** 

Project: 5 Spot Test- Moore Ranch

Number:

Client: Uranium One, Americas





Pumping Test:

5 Spot Extraction Test BP Corrected

**Analysis Method:** 

Cooper-Jacob Time-Drawdown

**Analysis Results:** 

Transmissivity:

4.57E+2 [ft²/d]

Conductivity:

6.35E+0 [ft/d]

Test parameters:

Pumping Well:

PMW-1

Aquifer Thickness:

72 [ft]

Casing radius:

0.17 [ft]

**Unconfined Aquifer** 

Screen length:

28 [ft]

Boring radius:

0.33 [ft]

Discharge Rate:

22.32 [U.S. gal/min]

#### Comments:

Evaluated by:

EDI

**Evaluation Date:** 



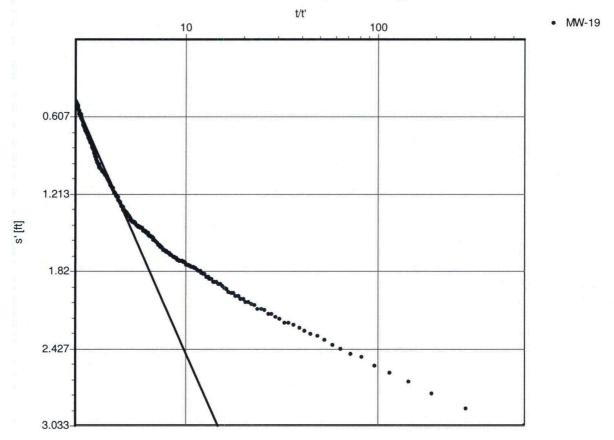
**Pumping Test Analysis Report** 

Project: 5 Spot Test- Moore Ranch

Number:

Client: Uranium One, Americas

# 5 Spot Pump Test Barometric Correction [Theis Recovery]



Pumping Test:

5 Spot Extraction Test BP Corrected

**Analysis Method:** 

**Theis Recovery** 

**Analysis Results:** 

Transmissivity:

2.28E+2 [ft²/d]

Conductivity:

3.17E+0 [ft/d]

Test parameters:

Pumping Well:

PMW-1

Aquifer Thickness:

72 [ft]

Casing radius:

0.17 [ft]

**Unconfined Aquifer** 

Screen length:

28 [ft]

Boring radius:

0.33 [ft]

Discharge Rate:

22.32 [U.S. gal/min]

**Pumping Time** 

5700 [min]

### Comments:

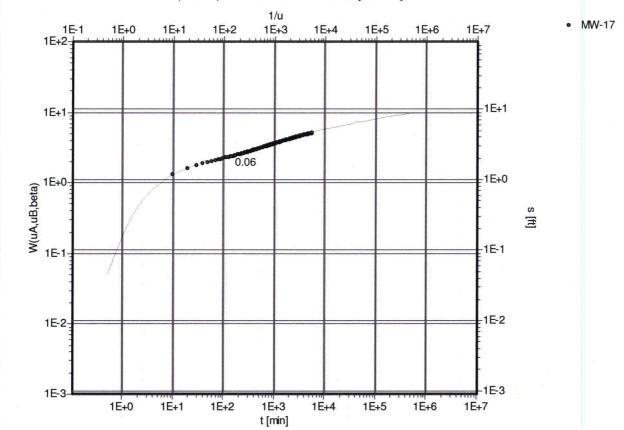
Evaluated by:

EPL

Evaluation Date:



# 5 Spot Pump Test Barometric Correction [Neuman]



Pumping Test:

**5 Spot Extraction Test BP Corrected** 

**Analysis Method:** 

Neuman

LOG(Sy/S):

Analysis Results:	Transmissivity:	3.81E+2 [ft²/d]	Conductivity:	5.29E+0 [ft/d]
	Storativity:	6.95E-4	Specific Yield:	1.10E-2
Test parameters:	Pumping Well:	PMW-1	Aquifer Thickness:	72 [ft]
	Casing radius:	0.17 [ft]	Beta:	0.06
	Screen length:	28 [ft]		
	Boring radius:	0.33 [ft]		
	Discharge Rate:	22.32 [U.S. gal/min]		

1.2

# Comments:

Evaluated by:

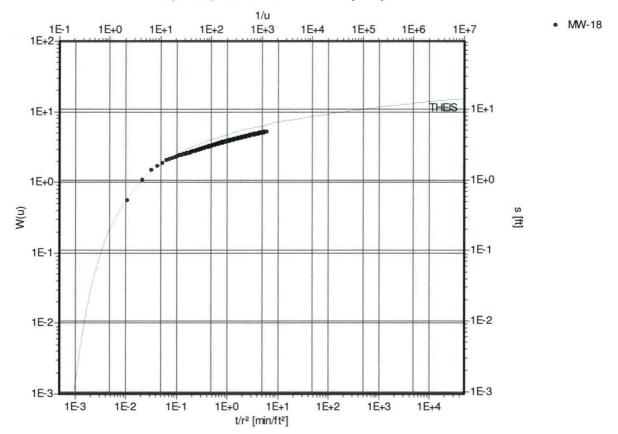
EPL

**Evaluation Date:** 

5/28/2008



### 5 Spot Pump Test Barometric Correction [Theis]



Pumping Test:

5 Spot Extraction Test BP Corrected

Analysis Method: Th

**Theis** 

**Analysis Results:** 

Transmissivity:

3.69E+2 [ft2/d]

Conductivity:

5.13E+0 [ft/d]

Test parameters:

Pumping Well:

PMW-1

Aquifer Thickness:

72 [ft]

Casing radius:

0.17 [ft]

**Unconfined Aquifer** 

Screen length:

28 [ft]

Boring radius:

0.33 [ft]

Discharge Rate:

22.32 [U.S. gal/min]

Comments:

Evaluated by:

EPL

**Evaluation Date:** 



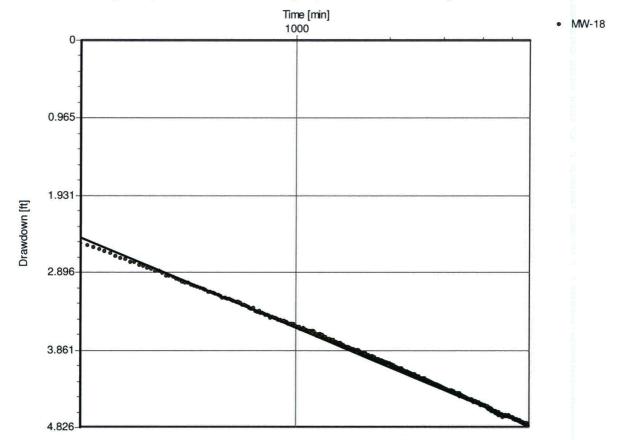
**Pumping Test Analysis Report** 

Project: 5 Spot Test- Moore Ranch

Number:

Client: Uranium One, Americas





**Pumping Test:** 

5 Spot Extraction Test BP Corrected

**Analysis Method:** 

Cooper-Jacob Time-Drawdown

**Analysis Results:** 

Transmissivity:

4.89E+2 [ft²/d]

Conductivity:

6.79E+0 [ft/d]

Test parameters:

Pumping Well:

PMW-1

Aquifer Thickness:

72 [ft]

Casing radius:

0.17 [ft]

**Unconfined Aquifer** 

Screen length:

28 [ft]

Boring radius:

0.33 [ft]

Discharge Rate:

22.32 [U.S. gal/min]

# Comments:

Evaluated by:

FPI

**Evaluation Date:** 



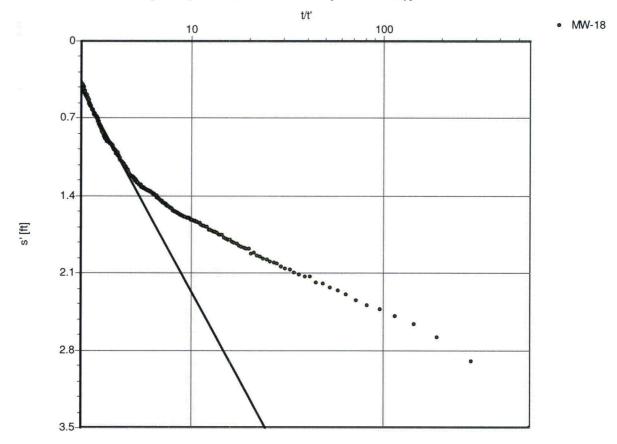
### **Pumping Test Analysis Report**

Project: 5 Spot Test- Moore Ranch

Number:

Client: Uranium One, Americas

## 5 Spot Pump Test Barometric Correction [Theis Recovery]



Pumping Test:

**5 Spot Extraction Test BP Corrected** 

**Analysis Method:** 

**Theis Recovery** 

**Analysis Results:** 

Transmissivity:

2.46E+2 [ft²/d]

Conductivity:

3.41E+0 [ft/d]

Test parameters:

Pumping Well:

PMW-1

Aquifer Thickness:

72 [ft]

Casing radius:

0.17 [ft]

**Unconfined Aquifer** 

Screen length:

28 [ft]

Boring radius:

0.33 [ft]

Discharge Rate:

22.32 [U.S. gal/min]

**Pumping Time** 

5700 [min]

# Comments:

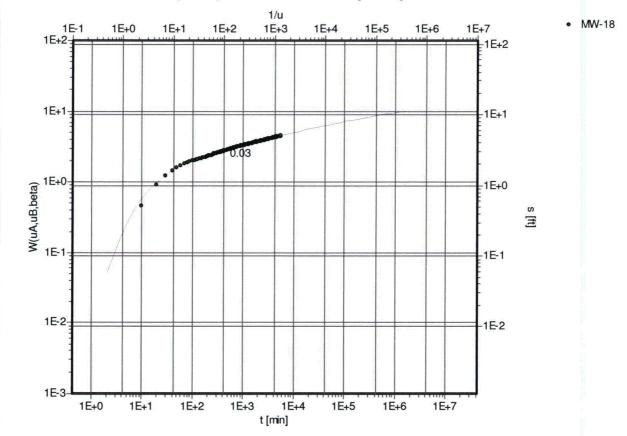
Evaluated by:

**EPL** 

Evaluation Date:



# 5 Spot Pump Test Barometric Correction [Neuman]



**Pumping Test:** 

**5 Spot Extraction Test BP Corrected** 

**Analysis Method:** 

Neuman

Analysis Results:	Transmissivity: Storativity:	3.05E+2 [ft²/d] 3.88E-3	Conductivity: Specific Yield:	4.23E+0 [ft/d] 3.88E-2
Test parameters:	Pumping Well:	PMW-1	Aquifer Thickness:	72 [ft]
	Casing radius:	0.17 [ft]	Beta:	0.03
	Screen length:	28 [ft]		
	Boring radius:	0.33 [ft]		
	Discharge Rate:	22.32 [U.S. gal/min]		
	LOG(Sy/S):	1		

# Comments:

Evaluated by:

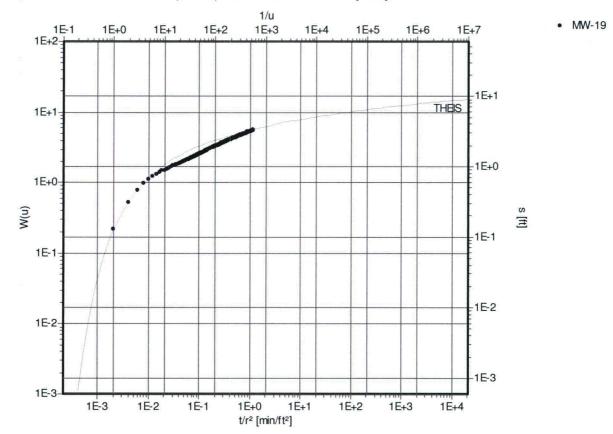
EPL

**Evaluation Date:** 

5/28/2008



# 5 Spot Pump Test Barometric Correction [Theis]



**Pumping Test:** 

5 Spot Extraction Test BP Corrected

Analysis Method: Theis

Analysis Results: T

Transmissivity:

5.81E+2 [ft<sup>2</sup>/d]

Conductivity:

8.06E+0 [ft/d]

Test parameters:

Pumping Well:

PMW-1

Aquifer Thickness:

72 [ft]

Casing radius:

0.17 [ft]

**Unconfined Aquifer** 

Screen length:

28 [ft]

Boring radius:

0.33 [ft]

Discharge Rate:

22.32 [U.S. gal/min]

Comments:

Evaluated by:

**EPL** 

Evaluation Date:



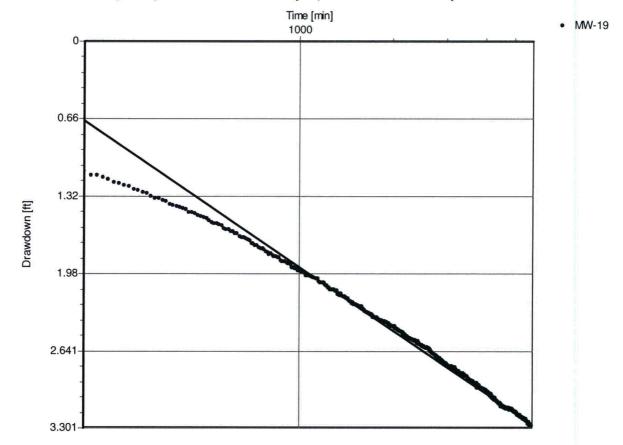
**Pumping Test Analysis Report** 

Project: 5 Spot Test- Moore Ranch

Number:

Client: Uranium One, Americas





**Pumping Test:** 

5 Spot Extraction Test BP Corrected

**Analysis Method:** 

Cooper-Jacob Time-Drawdown

**Analysis Results:** 

Transmissivity:

4.40E+2 [ft2/d]

Conductivity:

6.11E+0 [ft/d]

Test parameters:

Pumping Well:

PMW-1

Aquifer Thickness:

72 [ft]

Casing radius:

0.17 [ft]

**Unconfined Aquifer** 

Screen length:

28 [ft]

Boring radius:

0.33 [ft]

Discharge Rate:

22.32 [U.S. gal/min]

Comments:

Evaluated by:

EPL

**Evaluation Date:** 



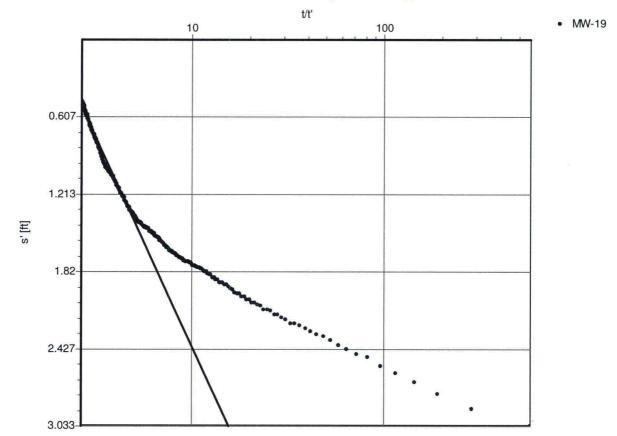
**Pumping Test Analysis Report** 

Project: 5 Spot Test- Moore Ranch

Number:

Client: Uranium One, Americas

## 5 Spot Pump Test Barometric Correction [Theis Recovery]



Pumping Test:

5 Spot Extraction Test BP Corrected

**Analysis Method:** 

**Theis Recovery** 

**Analysis Results:** 

Transmissivity:

2.39E+2 [ft²/d]

Conductivity:

3.33E+0 [ft/d]

Test parameters:

Pumping Well:

PMW-1

Aquifer Thickness:

72 [ft]

Casing radius:

0.17 [ft]

**Unconfined Aquifer** 

Screen length:

28 [ft]

Boring radius:

0.33 [ft]

Discharge Rate:

22.32 [U.S. gal/min]

**Pumping Time** 

5700 [min]

### Comments:

Evaluated by:

EPL

**Evaluation Date:** 



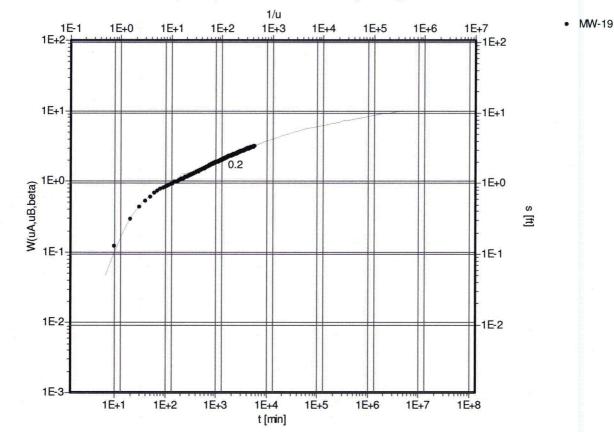
**Pumping Test Analysis Report** 

Project: 5 Spot Test- Moore Ranch

Number:

Client: Uranium One, Americas

## 5 Spot Pump Test Barometric Correction [Neuman]



Pumping Test:

**5 Spot Extraction Test BP Corrected** 

Analysis Method:

Neuman

Analysis Results: Transmissivity:

3.19E+2 [ft2/d]

Conductivity:

4.43E+0 [ft/d]

Storativity:

2.39E-3

Specific Yield:

2.39E-2

Test parameters:

Pumping Well:

PMW-1

Aquifer Thickness:

72 [ft]

Casing radius:

0.17 [ft]

Beta:

0.2

Screen length:

28 [ft]

Boring radius:

0.33 [ft]

Discharge Rate:

22.32 [U.S. gal/min]

LOG(Sy/S):

1

# Comments:

Evaluated by:

EPL

**Evaluation Date:** 

5/28/2008



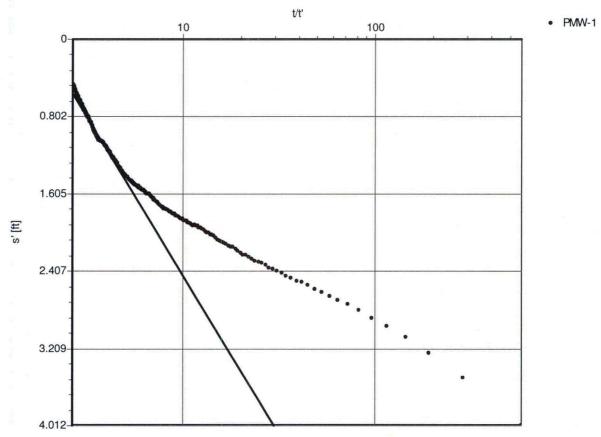
**Pumping Test Analysis Report** 

Project: 5 Spot Test- Moore Ranch

Number:

Client: Uranium One, Americas





Pumping Test:

5 Spot Extraction Test BP Corrected

**Analysis Method:** 

**Theis Recovery** 

**Analysis Results:** 

Transmissivity:

2.37E+2 [ft²/d]

Conductivity:

3.30E+0 [ft/d]

Test parameters:

Pumping Well:

PMW-1

Aquifer Thickness:

72 [ft]

Casing radius:

0.17 [ft]

**Unconfined Aquifer** 

Screen length:

28 [ft]

Boring radius:

0.33 [ft]

Discharge Rate:

22.32 [U.S. gal/min]

**Pumping Time** 

5700 [min]

### Comments:

Evaluated by:

EPL

Evaluation Date:



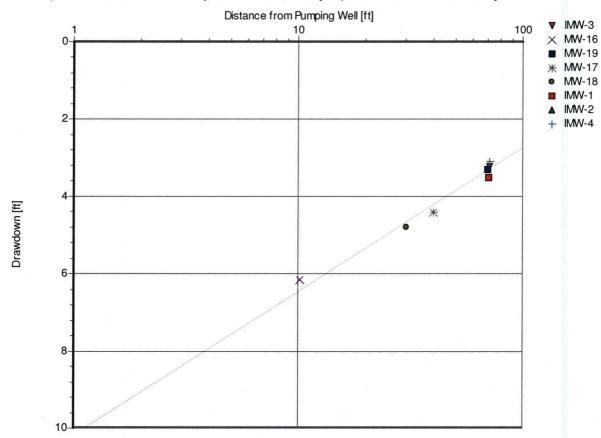
Pumping Test Analysis Report

Project: 5 Spot Test- Moore Ranch

Number:

Client: Uranium One, Americas

### 5 Spot ExtractionTest-Barometrically Corrected Draw down[Cooper-Jacob Distance-Draw down]



Pumping Test:

**5 Spot Extraction Test BP Corrected** 

**Analysis Method:** 

Cooper-Jacob Distance-Drawdown

**Analysis Results:** 

Transmissivity:

4.22E+2 [ft²/d]

Conductivity:

5.87E+0 [ft/d]

Test parameters:

Pumping Well:

PMW-1

Aquifer Thickness:

72 [ft]

Casing radius:

0.17 [ft]

**Unconfined Aquifer** 

Screen length:

28 [ft]

Boring radius:

0.33 [ft]

Discharge Rate:

22.32 [U.S. gal/min]

Calculation Time:

5700 [min]

### Comments:

Evaluated by:

**Evaluation Date:**