FINAL AQUIFER TEST AND ANALYSIS REPORT FOR THE OCHOA MINE PROJECT

Lea County, New Mexico

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EXECUTIVE SUMMARY

To provide evidence of the sustainability of the proposed Intercontinental Potash Corp. (ICP) water supply for the Ochoa Mine Project, INTERA Incorporated (INTERA) staff conducted aquifer testing in July 2012 using two wells installed in the Capitan aquifer by ICP, near Jal, New Mexico. The test approach for the aquifer testing follows the procedures outlined in the *Final Aquifer Test and Groundwater Sampling Work Plan, Ochoa Mine Project, Lea County, New Mexico* (Work Plan) submitted to the U.S. Department of Interior Bureau of Land Management and the New Mexico Office of the State Engineer in October 2011 (INTERA, 2011). Water-level fluctuations within the Capitan aquifer before, during, and after aquifer testing were monitored in pumping well ICP-WS-02 (CP-1057) and monitoring well ICP-WS-01 (CP-1056). Aquifer hydraulic properties were estimated using standard aquifer test analysis methods.

Briefly, the results are as follows:

- The Capitan aquifer has a saturated thickness of approximately 1,000 feet (ft), and can provide substantial amounts of water.
- Drawdown was observed at the observation well located approximately 1,500 ft south of the pumping well within 2 minutes and 22 seconds of initiation of pumping. Total drawdown in the pumping well was 206.9 ft while pumping at 500 gallons per minute (gpm), and total drawdown in the observation well was 6.2 ft.
- The Capitan aquifer can sustain pumping rates of 500 gpm over long periods of time with minimal to moderate drawdown.
- The pressure response analysis revealed that the aquifer is likely a dual-permeability and/or multi-layered system with producing intervals of different pressures and permeabilities.
- Estimated aquifer transmissivity is approximately 7,000 ft^2/day, yielding an estimated horizontal hydraulic conductivity value of 7 ft/day.
- The estimated storativity value is $5x10^{-5}$.

TABLE OF CONTENTS

EXECUTIVE SUMMARY ..... **i**
LIST OF TABLES ..... **iii**
LIST OF FIGURES ..... **iii**
lIST OF APPENDICES ..... **iii**
LIST OF ACRONYMS ..... **iv**
1.0 INTRODUCTION **1**
1.1 Geology 1
1.2 Test Approach 2
2.0 WELL INSTALLATION, DEVELOPMENT, AND MONITORING **4**
3.0 AQUIFER TEST PROCEDURE **6**
3.1 Set-Up 6
3.2 Step-Drawdown Test 7
3.3 Seven-Day Constant Rate Test 8
3.4 Water Quality Measurements 8
4.0 ANALYSIS OF RESPONSES **9**
4.1 Step-Drawdown Test Response 9
4.2 Seven-Day Constant Rate Test Response 9
4.3 Diagnostic Plots of the Seven-Day Constant Rate Test 10
5.0 INTERPRETATION OF RESULTS **14**
5.1 ICP-WS-01 14
5.2 ICP-WS-02 15
5.3 Interpretation Summary 16
6.0 WATER QUALITY RESULTS **18**
7.0 CONCLUSIONS **19**
8.0 REFERENCES **20**

LIST OF TABLES

Table 1 Exploration Well Specifications
Table 2 Submitted Analytical Parameters and Analysis Methods for Aqueous Samples Collected from Groundwater Monitoring Wells in the Capitan Aquifer
Table 3 Specific Capacity and Transmissivity Estimates from Step-Drawdown Testing
Table 4 ICP-WS-02 Recovery After the Seven-Day Constant Rate Test
Table 5 Hydraulic Parameter Estimates from Analysis of the Seven-Day Pumping and Recovery Periods
Table 6 Concentrations of Select Parameters

LIST OF FIGURES

Figure 1 Location of Proposed Ochoa Project
Figure 2 Locations of ICP-WS-01 and ICP-WS-02
Figure 3 Well Location Close Up
Figure 4 Capitan Reef Cross Section
Figure 5 ICP-WS-01 Well Diagram
Figure 6 ICP-WS-02 Well Diagram
Figure 7 Background Water Level Monitoring
Figure 8 Development of ICP-WS-01
Figure 9 Development of ICP-WS-02
Figure 10 Wellhead Layout for Aquifer Testing
Figure 11 Step-Drawdown Test Water Levels
Figure 12 Step-Drawdown Test Specific-Capacity Estimates from ICP-WS-02
Figure 13 Seven-Day Constant Rate Test Water Levels
Figure 14 Seven-Day Constant Rate Test ICP-WS-02, Pressure Data Processing
Figure 15 Characteristic Pressure Plots for a Single-Porosity Flow System
Figure 16 Characteristic Pressure Plots for a Dual-Porosity Flow System
Figure 17 Pressure Plots for ICP-WS-02, Seven-Day Constant Rate Test
Figure 18 Pressure Plots for ICP-WS-02, Recovery Period
Figure 19 Pressure Plots for ICP-WS-01, Seven-Day Constant Rate Test
Figure 20 Pressure Plots for ICP-WS-01, Recovery Period
Figure 21 ICP-WS-01, Papadopulos-Cooper Solution Method, Seven-Day Constant Rate Test
Figure 22 ICP-WS-01, Moench Solution Method, Seven-Day Constant Rate Test
Figure 23 ICP-WS-01, Gringarten-Ramey Solution Method, Seven-Day Constant Rate Test
Figure 24 ICP-WS-02, Papadopulos-Cooper Solution Method, Seven-Day Constant Rate Test
Figure 25 ICP-WS-02, Moench Solution Method, Seven-Day Constant Rate Test
Figure 26 ICP-WS-02, Gringarten-Ramey Solution Method, Seven-Day Constant Rate Test

LIST OF APPENDICES

Appendix A Aquifer Test Work Plan
Appendix B Laboratory Analysis

LIST OF ACRONYMS

bgs	below ground surface
DAS	data acquisition system
ft	feet *or* foot
gpm	gallons per minute
ICP	Intercontinental Potash Corp (USA)
INTERA	INTERA Incorporated
kva	kilovolt-ampere
mg/L	milligrams per liter
psi	pound-force per square inch
SOP	sulfate of potash
TDS	total dissolved solids
VFD	variable flow drive
Work Plan	Final Aquifer Test and Groundwater Sampling Work Plan, Ochoa Mine Project, Lea County, New Mexico

1.0 INTRODUCTION

Intercontinental Potash Corp (USA) (ICP) is proposing to construct and operate the Ochoa Project, which will consist of an underground polyhalite mine and related surface facilities. The Ochoa Project will be located about 60 miles east of Carlsbad, New Mexico, and approximately 20 miles northwest of Jal, New Mexico (Figure 1). Polyhalite from the Ochoa Project would be used to produce sulfate of potash (SOP). SOP is a non-chloride-based potash fertilizer that is used in the fruit, vegetable, tobacco, and horticultural industries, and for agriculture in saline and dry soils and soils in which a variety of crops are cultivated.

The Ochoa Project requires water to be pumped at a rate of approximately 4,000 gallons per minute (gpm) to supply water for both ore processing and the plant facilities building. Of the total water supply required for the Ochoa Project, approximately 99 percent will be used for ore processing and less than 1 percent will be treated to drinking water standards and provided to the plant facilities building. This water requirement will be met by developing brackish groundwater resources from the Permian-age Capitan aquifer. Despite the long history of groundwater withdrawals from the Capitan aquifer for secondary oil recovery projects, municipal water use, and irrigated agriculture, little was known in the area of interest about the hydraulic properties of the Capitan aquifer or well performance for wells drilled into this unit prior to this study. Parameters such as transmissivity, hydraulic conductivity, specific storage, and well specific capacity are all important for predicting impacts of new or existing pumping on water levels, pumping yields, and the extent of impact.

In support of this aquifer test, ICP drilled two exploratory groundwater wells in Section 02, Township 24 South, Range 35 East in Lea County, New Mexico (Figure 2). The wells, ICP-WS-01 and ICP-WS-02, were drilled approximately 5,380 feet (ft) below ground surface (bgs) into the Capitan aquifer in early 2012. Well ICP-WS-01 is located approximately 1,500 ft south of ICP-WS-02 (Figure 3). Both wells are owned and will be operated by ICP. In July 2012, a step drawdown test and a seven-day aquifer test were conducted by INTERA Incorporated (INTERA) on behalf of ICP to ascertain the sustainability of the proposed water supply for the Ochoa Mine Project. This report discusses the results of the aquifer testing, including estimates of the aquifer hydraulic parameters and information regarding the water quality of the Capitan aquifer.

1.1 Geology

The groundwater resource target is the Permian-age Capitan aquifer. The Capitan aquifer forms a portion of what is known as the Capitan margin or the Capitan reef complex (Harris, 2009). The wells were completed near the basin-ward portion of the Capitan aquifer (Figure 1) and across the same interval of the Capitan aquifer (Table 1).

The depth to the top of the Capitan aquifer and its thickness vary depending on location. For example, in a cross section based on oil well geophysical logs, the depth to the top of the Capitan aquifer varies between 3,755 ft bgs (Lea State "GB" No. 1) and 3,940 ft bgs (Federal Davidson No. 1) or 4,730 ft bgs, as interpreted by Harris (2009) (Figure 4). Figure 4 presents a geologic cross section showing the reef depth and thickness, as well as the lateral stratigraphic changes from limestone to dolomite within time-equivalent intervals. The depth to the top of the Capitan aquifer at ICP-WS-01 is 4,351 ft bgs and 4,341 ft bgs at ICP-WS-02. The thickness of the Capitan aquifer also varies, from nearly 1,400 ft near its basin-ward edge to just over 600 ft on the outer shelf edge as interpreted by Harris (2009). This change in thickness takes place over a horizontal distance of approximately 8 miles and is the result of the natural reef development, with the thickest portion near the basin (to the west) and the thinnest part near the shelf (to the east). The thickness of the Capitan aquifer at the ICP wells is approximately 1,030 ft.

Rocks of the Seven Rivers and the Yates Formations (within the Artesia Group overlying the Capitan Reef Formation), as interpreted by Harris, have been interpreted by others (Hiss, 1973, TWDB, 2009) as part of the Capitan aquifer, although the physical and hydrogeologic properties of these formations and the Capitan Formation may be substantially different.

1.2 Test Approach

The test approach for the aquifer testing follows the procedures outlined in the *Final Aquifer Test and Groundwater Sampling Work Plan, Ochoa Mine Project, Lea County, New Mexico* (Work Plan) included as Appendix A (INTERA, 2011). As outlined in the Work Plan, background groundwater monitoring was conducted on pumping well ICP-WS-02 and observation well ICP-WS-01 prior to conducting the aquifer tests. The step-drawdown test and a seven-day constant rate aquifer test were designed and completed during July 2012 to determine the aquifer hydraulic properties of the Capitan aquifer.

An In-Situ Level Troll 700 instrument was used to record water levels in ICP-WS-01 for 25 days prior to the start of the aquifer testing. Background monitoring was also conducted on ICP-WS-01 for 117 days prior to development. An In-Situ Level Troll 700 instrument was also used to record water levels in ICP-WS-02 for 26 days prior to the start of the aquifer testing. The background monitoring is essential because it allows the analyst to interpret the difference between water level changes due to the applied stress of the aquifer test versus changes associated with barometric pressure or regional trends.

Following completion of the background monitoring, the two-part aquifer test was completed. First, the step-drawdown test was used to provide data to estimate the specific capacity for ICP-WS-02 and to determine the pumping rate for the subsequent constant rate test. Second, using the

rate selected from the step-drawdown test results, a seven-day constant rate test was completed to provide estimates of transmissivity, hydraulic conductivity, and storage.

2.0 WELL INSTALLATION, DEVELOPMENT, AND MONITORING

Two wells, ICP-WS-01 and ICP-WS-02, were drilled in early 2012 by United Drilling for ICP. The wells are located within the southern 1/2 of Section 02, Township 24 South, Range 35 East on New Mexico State Trust Land approximately 12 miles northwest of Jal, New Mexico (Figure 2). Well ICP-WS-01 was drilled in February 2012 and was completed with on open-hole configuration through the Capitan aquifer from 4,384 to 5,381 ft bgs (Figure 5). ICP-WS-01 was drilled with fresh water through the Capitan aquifer with significant volumes of water lost to the Capitan aquifer due to loss of return circulation. To maintain circulation, ICP-WS-02 was drilled using fresh water with high-pressure entrained air. Well ICP-WS-02 was drilled in May and June of 2012 and was completed as an open-hole configuration within the Capitan aquifer from 4,396 to 5,375 ft bgs (Figure 6). Well construction information and other characteristics for both wells are summarized in Table 1.

After each well was drilled, background monitoring of water levels began as detailed in the Work Plan (INTERA, 2011). The water levels were evaluated using down-hole pressure transducers as well as manual water level measurements. Background monitoring in ICP-WS-01, the observation well, was conducted over a 115-day period, from February 18 to June 11, 2012 (Figure 7).

Both ICP-WS-01 and ICP-WS-02 were developed after drilling was completed in June using airlifting techniques. A pressure gage was installed in each of the wells during development to determine when good hydraulic communication between the aquifer and the wellbore was achieved. Based on an understanding of the hydraulic properties of the aquifer, good hydraulic communication between the wellbore and the aquifer was anticipated to display a quick, sharp rebound of water levels for the first 90 percent of recovery after pumping and then much slower rebound for the remaining 10 percent of recovery.

Development of ICP-WS-01 was conducted after the drilling and development of ICP-WS-02. Figure 8 shows the three-stage development process that was used to develop ICP-WS-01. Good hydraulic communication with the formation in ICP-WS-01 was established after 21 hours and 5 minutes of airlifting, after the third development stage (Figure 8). The recovery during the first two “shut-in” periods shown on Figure 8 display a more gradual rise of water levels compared to the third “shut-in” period, which shows a quick rise in water levels and then a flattening out of the recovery. Figure 8 also shows the impact of airlifting in ICP-WS-01 on ICP-WS-02 in the blue line at the top of the graph. Good hydraulic communication between the ICP-WS-02 wellbore and the aquifer was verified after 2 hours and 23 minutes of airlifting (Figure 9). The water levels rose 90 percent within the first 30 minutes of recovery during the “shut-in” period (Figure 9).

After development, background water levels were monitored again in ICP-WS-01 during a 25-day period from June 14 to July 8, 2012 (Figure 7). The water level in ICP-WS-01 prior to development was 681.2 ft bgs, and after development, the water level was 720.18 ft bgs. After development in June, water levels again had an initial quick recovery, and then continued to rise at a rate of approximately 0.25 ft/day (Figure 7).

Background monitoring in ICP-WS-02, the pumping well, was conducted during a 25-day period from June 11 to July 6, 2012. The water level in ICP-WS-02 was 709.25 ft bgs on June 11 after completing drilling and development. The water level in ICP-WS-02 rose approximately 0.5 ft during the 25-day background monitoring period. The water level in ICP-WS-02 had a similar, though not as steep, slow upward trend during the background monitoring as the water level in ICP-WS-01 (Figure 7). After development in June, water levels had an initial quick recovery (Figure 9), and then continued to rise at a rate of approximately 0.10 ft/day. Before the seven-day constant rate test, the water level was manually measured prior to placing the pump in ICP-WS-02 at 708.8 ft bgs.

3.0 AQUIFER TEST PROCEDURE

The aquifer test procedures followed the process described in the approved Work Plan (INTERA, 2011) that is included as Appendix A. This aquifer test consisted of a setup and pre-test period, a 6-hour step drawdown test and recovery period, a 7-day constant rate test, and a 21-day recovery period. INTERA lead the aquifer testing and selected Hydro Resources to provide the specialized pumping equipment and HydroResolutions to provide support for data acquisition and monitoring during the aquifer testing.

3.1 Set-Up

Set-up activities for testing commenced on July 5, 2012. INTERA hydrogeologists were on-site to direct set-up activities and installation of transducers in each well. Details regarding the set-up and test activities completed for the pumping and observation wells are provided below.

Pumping Well ICP-WS-02: Wellhead preparation activities completed on July 8, 2012, by HydroResolutions and Hydro Resources included installing the pump and drop pipes in ICP-WS-02 and connecting the wellhead to the flow meters. The pump installed in the well was a Centrilift 4500-4GCS-6P submersible pump with 26 stages. The pump was installed so that the pump intake was at 1,494 ft bgs and the bottom of the motor was at 1,534 ft bgs. Two in-line flow meters were installed to measure the rate of discharge from the well: a 7500 Series Badger meter set to pace the motor speed on the pump through a variable flow drive (VFD), and to provide backup, a Promag Endress & Hauser electromagnetic flow meter with a data logger set to record flow rates at 5-minute intervals during testing (Figure 10). The Badger Meter was set up first in line on the discharge piping and was used to modulate flow through a 520 kilovolt-ampere (kva) step-up transformer VFD. The VFD then controlled the power being supplied to the pump motor to maintain a constant flow rate. The electromagnetic Endress & Hauser meter was attached to the outer wall of the discharge pipe downstream from the first meter.

An In-Situ Level Troll 700 pressure transducer was set in ICP-WS-02 above the pump intake at 1,219.9 ft bgs. The transducer was placed in the well inside a 1.25-inch PVC drop pipe to provide protection for the instrument and was connected to a custom data acquisition system (DAS) to allow real-time data analysis and control of the instrument. The depth to water was measured periodically using a Geotech/Keck hand-held water-level sounder. The wellhead discharge piping was attached to 6-inch flexible hose that was then attached to 927 ft of 8-inch SDR11 high-density polyethylene pipe. The discharge pipe directed the water into a 6.9-million-gallon aquifer test storage pond that had been built for the test.

Following completion of the system configuration, a shake-down period was conducted during which the instrumentation and discharge piping were tested by pumping ICP-WS-02 for

approximately 90 minutes at approximately 400 to 650 gpm. Pumping commenced at 15:35 and ceased at 17:06 on July 8, 2012.

Observation Well ICP-WS-01: On July 8, 2012, prior to the shake-down period in ICP-WS-02, an In-Situ Level Troll 700 pressure transducer was set at 878.75 ft bgs within ICP-WS-01. Water level measured on July 8, 2012, using a hand-held water-level sounder, was 715 ft bgs.

All pressure transducers were set to internally record water levels whenever the pressure at depth changed by more than 0.1 pound force per square inch (psi), or whenever a maximum of one minute had passed since the last measurement. In addition, both pressure transducers were electronically connected to the customized DAS which allowed for more or less frequent recording of the data to a secondary data file for real-time graphing of test responses.

INTERA made attempts to access additional observation wells to monitor during the seven-day constant rate test, as defined in the Work Plan (INTERA, 2011). An abandoned oil and gas well that was converted to a groundwater monitoring well in 1967 was identified for monitoring groundwater levels in the Capitan aquifer. The Federal Davidson Unit No. 1 well (CP-424) is currently owned by the United States Geological Survey and is located on private land approximately 4 miles southeast of the pumping well. On July 11, 2012, INTERA accompanied the private land owner to the Federal Davidson Unit No. 1 well and found the well to be dry to 1,000 ft, the maximum length of the electric sounding tape. In addition, shallow groundwater wells in the area were identified for monitoring during the test. However, due to private property access issues, access could not be obtained to any of the shallow wells in the area around the pumping well.

3.2 Step-Drawdown Test

Following set-up, a step-drawdown test was performed on the pumping well. The purpose of the test was to determine the specific capacity of the wellbore and the optimal flow rate at which the pump and aquifer would perform efficiently over the duration of the seven-day constant rate test. The test consisted of pumping the well for a few hours at a number of increasingly higher pumping rates. Each constant rate interval constitutes a “step.” Once drawdown leveled out at each “step,” the pumping rate was increased to the rate for the next “step.” After the final step had been completed, the pump was shut off and the recovery was monitored in each well until near equilibrium (pre-test water level) had been established. Starting at 7:40 on July 9, 2012, well ICP-WS-02 was pumped for a minimum period of approximately two hours for each of the three steps at approximately 400, 500, and 685 gpm. Water levels were recorded in the pumping and observation wells via the pressure transducers and periodically with the hand-held water-level sounder. The water level in the pumping well recovered to 100 percent of its pre-test level before starting the seven-day constant rate test.

3.3 Seven-Day Constant Rate Test

The seven-day constant rate test began at 19:28 on July 10, 2012, at a pumping rate of 500 gpm. The pumping phase was terminated at 19:30 on July 17, 2012. Recovery-phase data for the pumping well were collected for 24 days until August 10, 2012, when the water level had recovered to greater than 90 percent of the drawdown. A significant amount of gas was present in the water flowing through the well head configuration, causing variability in the flow recordings on both of the in-line flow meters. However, after increasing back pressure, the amount of variability (< 5 percent) was consistent throughout the test, and thus it was assumed that the flow rate from the formation was consistent. As a check on the absolute magnitude of the flow rate, a 21,000-gallon tank was used to verify the pumping rate by routing the discharge to the tank to measure the volumetric inflow over a specified period of time. This method confirmed a flow rate of 500 gpm.

3.4 Water Quality Measurements

Groundwater samples were collected from the pumping well, ICP-WS-02, three times during the step-drawdown and seven-day constant rate tests. The first sample was collected on July 9, 2012, during the step-drawdown test; the second sample was collected on July 12, 2012, the second day of the constant rate test; and the third sample was collected on July 16, 2012, the sixth day of the constant rate test. A duplicate sample was collected on July 16, 2012. See Table 2 for a list of analytical parameters and methods for the groundwater samples collected.

Select water quality parameters (temperature, conductivity, total dissolved solids [TDS], pH, specific gravity, and free chlorine) were measured in the field. The YSI 556 water-quality meter and a flow-through cell were used to measure temperature, conductivity, TDS, and pH throughout the test. Specific gravity was measured daily using a hydrometer, and free chlorine was measured periodically using a test strip.

4.0 ANALYSIS OF RESPONSES

The data obtained during the step-drawdown test, the seven-day constant rate test, and the recovery phases of the tests were evaluated using diagnostic plots as well as various well solution analyses. Drawdown and recovery responses were observed in both the pumping well (ICP-WS-02) and the observation well (ICP-WS-01) during the step-drawdown test and recovery as well as during the seven-day constant rate test. Additional data analysis was conducted using diagnostic plots of the pressure responses to determine the hydrogeologic flow periods.

4.1 Step-Drawdown Test Response

The step-drawdown test conducted in ICP-WS-02 was analyzed to determine the specific capacity of the well as a function of pumping rate. The specific capacity is the ratio of an applied constant flow rate to the measured water-level drawdown resulting from the constant flow rate at a specified time. Three steps were conducted at flow rates of 400, 500, and 685 gpm with drawdown of 93.3, 148.9, and 233.3 ft, respectively, measured after approximately two hours (Figure 11). Gas being released from the water caused variable flow meter recordings during the step test. The variability was decreased by adding back-pressure on the wellhead configuration, and the variability was relatively small during the constant rate test (< 5 percent). As discussed above in Section 3.3, one volumetric tank test was conducted to verify the accuracy of the flow meter readings.

The water level in the pumping well recovered very quickly upon cessation of pumping during the step test (Figure 11). Rapid rebound was observed on several occasions upon cessation of pumping in ICP-WS-02. The water level in the pumping well returned to 100 percent of the pre-test level within one hour (Figure 11). The specific capacity values calculated from the step-drawdown test for steps 1, 2, and 3 were 4.3, 3.4, and 2.9 gpm/ft, respectively (Table 3). As expected, the specific capacity decreases with an increase in the flow rate. A plot of specific capacity versus flow rate is presented in Figure 12 along with a linear-regression fit to the data points. Using Cooper and Jacob's (1946) straight line approximation to the Theis solution (e.g., Appendix 16.D in Driscoll, 1986), the specific capacity values were used to estimate the transmissivity at ICP-WS-02 resulting in values of approximately 1146, 898, and 785 ft^2/day (Table 3).

4.2 Seven-Day Constant Rate Test Response

During the seven-day constant rate pumping test, 93 percent of the drawdown in ICP-WS-02 was observed within the first 24 hours of pumping (Figure 13). Maximum drawdown in the pumping well was 206.9 ft. Drawdown in ICP-WS-02 began to approach stabilization after approximately four days of pumping (Figure 13). Drawdown was observed in the observation well, ICP-WS-01,

2 minutes and 22 seconds after the pump was turned on (Figure 13). The observation well reached a maximum drawdown of 6.2 ft.

Recovery in the pumping well occurred very quickly after the pump was turned off (Figure 13). Water levels in ICP-WS-02 rose approximately 148 ft in the first minute of recovery and another 14 ft in the second minute of recovery (Figure 13). Table 4 summarizes the first 90 minutes of recovery in the pumping well, ICP-WS-02. The pressure transducers were removed from the wells 24 days after the recovery started, by which time ICP-WS-02 water levels had recovered to 94 percent of the pre-test water levels (Figure 13).

Recovery in ICP-WS-01 was much slower than in ICP-WS-02 (Figure 13). After approximately 27 minutes, water levels in ICP-WS-01 recovered 1 ft. Water levels in ICP-WS-01 recovered to 169 percent of pre-test water levels when the pressure transducer was removed from the well (Figure 13).

The noisy transducer pressure recorded in ICP-WS-02 during the pumping period (Figure 14) was assumed to be a result of the gas coming out of solution from the formation water as the water was brought to the surface. The raw pressure data record was processed by smoothing and then reducing the number of data points to allow for a smoother pressure response and derivative calculation. Figure 14 shows a comparison of the raw (blue) and processed (red) data sets.

4.3 Diagnostic Plots of the Seven-Day Constant Rate Test

Cartesian data plots of the transducer pressure over time in wells ICP-WS-01 and ICP-WS-02 during the seven-day constant rate test and recovery periods were presented in Figure 13. As part of the data analysis, diagnostic semi-log pressure and pressure derivative plots were also developed to aid in the determination of the various hydrogeological flow periods observed in the measured pressure response during testing. These flow periods (wellbore storage, infinite-acting radial flow, dual-porosity transition, etc.) and the transition between these periods are observed based on characteristic behavior of the derivative plot (Horne, 1995). Once the characteristic behaviors and thus flow periods are identified, a better understanding of the hydrogeological conceptual model can be obtained and thus lead to the selection of an appropriate well-test solution method. Diagnostic plots for numerous flow regimes are presented in Horne (1995); however, only the characteristic behavior for single- and dual-porosity flow regimes will be reviewed in this text.

The characteristic behavior of the pressure response in a single-porosity flow system is presented in Figure 15. Figure 15a shows the semi-log diagnostic plot of pressure versus the logarithm of time. Figure 15b shows the log-log derivative diagnostic plot of change in pressure (top curve) and the derivative of the change in pressure (lower curve) over time. In Figure 15b, the two

curves are coincident and follow a unit slope which indicates a flow period within a radial-flow system that is dominated by water being removed from wellbore storage. When the pressure change curve deviates from the unit slope, the flow regime in the well begins the transition from wellbore storage dominated flow to formation dominated flow. This transition period includes the characteristic "hump" in the curve and lasts approximately 1.5 log cycles (Figure 15b). When the pressure derivative curve reaches an approximate asymptotic behavior, the flow response is based on infinite-acting radial flow within the formation. These flow periods and transitions for a radial-flow, single-porosity system are also observed in the semi-log plot in Figure 15a. The infinite-acting radial-flow period is indicated by the presence of a straight line on the semi-log pressure plot.

The characteristic behavior of the pressure response in a dual-porosity flow system is presented in Figure 16. This system assumes flow from a system of two different porosities (or permeabilities) such as a uniformly fractured system that can produce water from both the more permeable fractures and less permeable formation matrix. As shown in the log-log derivative plot (Figure 16b), the dual-porosity behavior is indicated by the presence of a minimum in the derivative curve. This minimum is shown to have occurred after the wellbore storage dominated period; however, sometimes this minimum can be obscured by the wellbore storage transition. If not obscured by wellbore storage effects, the pressure signal in the semi-log diagnostic plot will show a transition between two straight-line periods of equal slope (Figure 16a). These two straight-line periods both indicate infinite-acting radial-flow regimes.

Figure 17 shows the semi-log pressure versus time and the pressure derivative diagnostic plots for the measured pressure response in ICP-WS-02 during the seven-day pumping period (the red and black symbols indicate the change in pressure and the derivative of the pressure response over time, respectively). The early-time data show that the two curves overlie each other up to an elapsed time of 0.00045 day (40 seconds) with a unit slope (grey line). The characteristic unit slope at early time indicates that the pressure signal is dominated by wellbore storage effects. At an elapsed time of 0.00045 day (40 seconds), the two curves separate with the slope of the derivative plot turning negative and then approaching zero (horizontal) at an elapsed time of approximately 0.007 day (10 minutes). This transition period is indicated by the two vertical dashed lines in Figure 17b. The infinite-acting radial-flow period lasts until approximately 0.03 day (43 minutes). A change in the slope of the semi-log pressure plot (Figure 17a) during this time period may have been caused by a minor fluctuation in the flow rate due to the gas in the water. This also results in a slight offset in the pressure derivative curve (Figure 17b), but the overall slope is near horizontal during this period.

The time period from 0.03 day (43 minutes) to approximately 1.0 day shows a dip in the pressure derivative curve (Figure 17b). This dip is characteristic of a dual-porosity flow regime; however,

the corresponding expected response in the semi-log pressure plot (the transition between two parallel straight lines) (Horne, 1995) is not observed (Figure 17a). For durations greater than 1.0 day, the pressure derivative decreases (Figure 17b), while the semi-log pressure curve levels off (Figure 17a). This characteristic behavior indicates the presence of some type of pressure support boundary which is able to provide water at the same rate as the pumping rate resulting in no additional drawdown (e.g., leaky aquifer system). As seen from the ICP-WS-02 pumping period diagnostic plots, the portion of the aquifer tested by the seven-day pumping period is complicated with multiple flow regimes encountered, as would be expected for the Capitan aquifer.

Figure 18 presents the semi-log and pressure derivative diagnostic plots for the pressure response measured in ICP-WS-02 during the recovery period following termination of pumping. The semi-log plot (Figure 18a) shows a rapid stabilization of the recovery curve, and as a result, the derivative plot (Figure 18b) shows the characteristic behavior of a steadily decreasing derivative (Horne, 1995). Starting at 0.71 day (17 hours) into the recovery period, there is an increase in the slope on the semi-log plot, indicating an increase in the rate of water level rise. The pressure recovery curve appears to be approaching another stabilization period at a higher pressure. This behavior might indicate the presence of two separate producing intervals with different formation pressures: a high-permeability interval with lower pressure, and a low-permeability interval with higher pressure that becomes dominant at later times.

Figures 19 and 20 present the diagnostic plots for the ICP-WS-01 pressure response measured during the seven-day constant rate test and recovery period, respectively. Both of the derivative plots show similar behavior with a ¼ slope on the pressure derivative curve (gray line) during most of the first day. A ¼ slope is typically characteristic of a finite conductive fracture (Horne, 1995), though this slope would be seen on both the pressure response and pressure derivative curves. The ¼ slope is not seen on either of the pressure response curves. However, high-conductivity fractures communicating with the well bore yield a log-log straight line with a half-unit slope (Gringarten et al., 1974). Well bore storage effects show up as a unit slope at early times and may mask the half-slope due to the fractures. However, fractures intersecting wells can also produce unit slope response at early times. No initial log-log, half-unit-slope straight line will be observed except where the observation well intersects the same fracture or set of fractures as the pumping well (Gringarten, 1982). Well ICP-WS-02 exhibits a half-unit-slope straight line at early times. During the recovery period (Figure 20), a dip in the pressure data was observed at approximately 1.5 days (36 hours), followed by a slight change in the slope of the recovery curve. Following this, the water level in ICP-WS-01 continued to increase, resulting in transducer pressure readings greater than the initial starting pressure of approximately 88 psi.

Based on the review of the diagnostic plots, the characteristic behaviors observed are indicative of a dual-permeable and/or multi-layered conceptualization. This type of conceptual flow model provides the justification for the changes in pressure response over time. The diagnostic plots also showed no clear indication of the presence of a linear flow boundary. However, given the current understanding of the lateral boundaries of the Capitan aquifer relative to the location of the ICP wells, the analysis of the pressure responses will evaluate the potential for impact of the boundaries on the response. These analyses results are presented in Section 5.0.

5.0 INTERPRETATION OF RESULTS

The measured responses in both ICP-WS-01 and ICP-WS-02 during the seven-day pumping period and the subsequent recovery period were evaluated using the well-test analysis software AQTESOLV (HydroSOLVE, 2009). AQTESOLV, a commonly used, commercially available well test analysis software package, was used to determine estimates of the hydraulic properties of the Capitan aquifer and to evaluate the proposed conceptual flow models. The recorded transducer pressure data were processed to convert from pressure to water level above the transducer using the transducer placement depth and the average observed specific gravity of 1.040 (see Section 6.0). The head displacement (drawdown) was then calculated for the pumping and recovery periods for use in the analysis.

Three analytical well solutions were used in providing estimates of the transmissivity (T) and storativity (S) of the Capitan aquifer in the vicinity of the ICP wells. The three solutions assume different hydrogeological flow conceptual models and thus provide for a range of T and S estimates. The Papadopulos and Cooper (1967) solution assumes a homogenous, isotropic confined aquifer with wellbore storage accounted for within the wellbore. The Moench (1984) solution assumes a dual-porosity, dual-permeability flow model with an isotropic fractured aquifer with slab-type matrix blocks along with wellbore storage, and both wellbore and fracture skin effects are accounted for within the analysis. The Gringarten and Ramey (1974) solution assumes an anisotropic confined aquifer with a single, planar, uniform-flux horizontal fracture centered on the pumping well. In addition to these three solutions, the analyses were also conducted assuming a set of linear no-flow boundaries. Conceptually these boundaries run north and south and are located at a distance of 2 miles to the west and 20 miles to the east and approximate the lateral extent of the Capitan aquifer in the vicinity of the well locations (Figure 1). As was determined during the evaluation of the pressure response data, a single analytical solution did not closely fit both curves simultaneously. This indicates that the aquifer system is more complex than can be accounted for by the idealized solutions provided in AQTESOLV. As a result, the analysis was carried out on the pressure response curve for each well separately. A summary of the analysis results are listed in Table 5.

5.1 ICP-WS-01

Figure 21 shows the Papadopulos-Cooper fit to the ICP-WS-01 pumping and recovery phases. The recovery phase data for ICP-WS-01 were terminated after 1.5 days when the break in slope was observed (discussed in Section 4.3 in relation to Figure 20). The fit, assuming no linear boundary (Figure 21a), shows slower than observed drawdown over the first 0.1 day (2.4 hours), but a good fit to the remaining drawdown and recovery portions. The fitted T and S were 6,751 ft^2/day and $1.6x10^{-4}$, respectively. With the linear boundaries included, the fit to the early-

time data improved, but slightly worsened for the recovery phase data. The fitted T and S were 9,825 ft^2/day and $7.8x10^{-5}$, respectively. The inclusion of the boundary increased the T value by 50 percent and reduced the S by 50 percent in order to increase the amount of early-time drawdown.

Figure 22 presents the dual-porosity Moench fit to the ICP-WS-01 pressure response. Both of the fits with and without the linear boundary show a much improved fit to the overall data set, thus indicating that the conceptual flow model is most likely not a single-porosity system, but contains multiple flow regimes contributing to the pressure response. The Moench solution provides an estimate of the hydraulic conductivity for both the fracture (K) and the matrix (K'), as well as the specific storage (1/ft) for both the fracture (Ss) and the matrix (Ss'). Table 5 presents a summary of the estimated hydraulic parameters along with the calculation of the T and S based on the fracture K and Ss values assuming an aquifer thickness of 1,000 ft. The T estimates were 6,420 and 7,300 ft^2/day, and the S estimates were $3.30x10^{-5}$ and $2.43x10^{-5}$ for the no-boundary and boundary solutions, respectively. The overall fit to the drawdown and recovery data is slightly better for the no-boundary case (Figure 22a); however, there is no significant difference in the T and S estimates between the two cases.

Figure 23 presents the Gringarten-Ramey fit to the ICP-WS-01 pressure response. The conceptual flow model of a horizontal planar fracture that extends a distance away from the pumping well also shows a better fit to the overall pressure response than the single-porosity model presented in Figure 21. The Gringarten-Ramey solution provides estimates of the fracture hydraulic conductivity (Kr) and specific storage (Ss). These values were converted to T and S and listed in Table 5. The T estimates were 7,370 and 10,330 ft^2/day, and the S estimates were $5.41x10^{-5}$ and $6.09x10^{-5}$ for the no-boundary and boundary solutions, respectively. The overall fit to the recovery data is slightly better for the no-boundary case (Figure 23a), with a lower T than for the bounded case. However, there is no significant difference in the T and S estimates between the two boundary cases.

Based on the conceptual flow model discussion from the diagnostic plots, the Moench and Gringarten-Ramey solutions are more appropriate for the overall observed pressure response. For the analysis of the ICP-WS-01 pressure response, these two solution methods yielded small ranges of T from 6,420 to 10,330 ft^2/day and S from $2.43x10^{-5}$ to $6.09x10^{-5}$.

5.2 ICP-WS-02

Figure 24 shows the Papadopulos-Cooper fit to the ICP-WS-02 pressure response during both the pumping and recovery phases. The T and S estimates for both the no-boundary and boundary cases were the same, with a T of 773.9 ft^2/day and an S of $4.78x10^{-5}$. The main difference is the fit to the late-time portion of the pumping period for the no-boundary case (Figure 24a) resulted

in a better fit. The match to the recovery data is within reason for the early-time data, but after several days, the simulated recovery is greater than the observed.

Figure 25 presents the dual-porosity Moench fit to the ICP-WS-02 pressure response. Both the no-boundary and the boundary conceptualizations fit well from 0.1 day (2.4 hours) to the end of the pumping period. The T estimates were 743 and 439 ft^2/day, and the S estimates were $3.17x10^{-5}$ and $5.52x10^{-7}$ for the no-boundary and boundary solutions, respectively (Table 5). While the T value for the bounded fit is lower by a factor of two from the no-boundary case, the S value is lower by approximately two orders of magnitude. In addition, the fitted K and Ss values for the matrix (Table 5) increased significantly when the lateral boundaries were included. Thus, with the presence of the boundaries, it appears that a unique fit to the pressure response is not achievable with this number of fitting parameters. Thus, the no-boundary case should be considered to yield a more realistic set of hydraulic parameter estimates.

Figure 26 presents the Gringarten-Ramey fit to the ICP-WS-02 pressure response. The T estimates were 872 and 736 ft^2/day, and the S estimates were $3.21x10^{-5}$ and $4.07x10^{-5}$ for the no-boundary and boundary solutions, respectively. The overall fit to the pumping period early-time data is slightly better for the no-boundary case (Figure 26a). However, there is no significant difference in the T and S estimates between the two boundary cases.

The three different conceptual flow models fitted to the ICP-WS-02 pressure response data yielded similar quality fits for the pumping period and recovery period data sets. However, based on the conceptual flow model discussion from the diagnostic plots, the Moench and Gringarten-Ramey solutions are more appropriate. The estimates, not including the Moench solution with a lateral flow boundary included, yielded a range of T values from 743 to 872 ft^2/day, and S values from $3.17x10^{-5}$ to $4.07x10^{-5}$.

5.3 Interpretation Summary

The analysis of the observed ICP-WS-01 and ICP-WS-02 pressure responses to the seven-day pumping and recovery periods showed S values on the order of $1x10^{-5}$. As for T, the simulated fits to ICP-WS-01 data are on the order of 7,500 ft^2/day, while simulated fits to ICP-WS-02 are on the order of 800 ft^2/day. Thus, the T estimate at the pumping well is approximately one order of magnitude less than that for the observation well. As discussed previously, a reasonable simultaneous fit of both curves using any of the analytical solutions used was not successful. Attempts were made to evaluate various effects using the Moench solution including skin effects (head losses due to both well-bore and fracture skin), matrix hydraulic conductivity and specific storage, and the fracture or effective hydraulic conductivity and specific storage. Skin effects were not significant enough to strongly influence the results and provide for an improved simultaneous fit. This suggests that the well is not damaged and the formation is not plugged

along the well bore. The fast response and limited drawdown at the observation well, ICP-WS-01, strongly suggests a high-conductivity pathway between the two wells. It is possible that the fractures (or dissolution channels or cavernous zone within the aquifer) intersecting the pumping well are relatively smaller than in the vicinity of the observation well and this could, in part, explain the differences in responses. The Capitan Formation is known to be heterogenous, and dissolution channels and caverns have been reported previously in the Capitan Formation. In addition, a highly fractured zone was encountered within the Capitan Formation during drilling of ICP-WS-01.

The pressure response observed in the observation well, ICP-WS-01, was not subjected to the potential additional losses that are common to pumping wells due to the distance between the wells. Therefore, more weight should be placed on the estimated T and S from the observation well ICP-WS-01. Based on the analysis of drawdown and recovery at ICP-WS-01 for the seven-day aquifer test, a representative T of 7,000 ft^2/day and S of $5x10^{-5}$ is recommended.

6.0 WATER QUALITY RESULTS

The water quality of the Capitan aquifer was sampled three times throughout the step-drawdown and seven-day constant rate tests. The results of the laboratory analysis are summarized in Table 6. During aquifer testing, pH ranged from 6.9 to 7.06, and the specific gravity ranged from 1.038 to 1.044, measured at 60° Fahrenheit. The conductivity of the sampled water ranged from 114,000 to 127,000 microsiemens per centimeter. The Capitan aquifer water contains high concentrations of salts. Concentrations of some of the salts and parameters of concern are shown in Table 6. The laboratory reports for the collected groundwater samples are included in Appendix B.

Field parameters were also collected during the seven-day constant rate test using a YSI 556 meter. The pH measured in the field ranged from 7.03 to 5.55. The field-measured conductivity ranged from 87,885 to 99,045 milligrams per liter (mg/L). No free chlorine was detected via field measurements during the aquifer test. In addition, field measurements of specific gravity were collected using a hydrometer. The specific gravity field measurements ranged from 1.038 to 1.042, which corresponds with the laboratory measurements of 1.038 to 1.044 (Table 6).

7.0 CONCLUSIONS

The Capitan aquifer has a saturated thickness of approximately 1,000 ft, which is composed of heterogeneous layers. Based on specific-capacity and aquifer testing, the aquifer can sustain pumping rates of 500 gpm or greater for extended periods of time. Drawdown was observed at the observation well located south of the pumping well during the step-drawdown and seven-day constant rate tests. Water levels in the observation well, ICP-WS-01, decreased approximately 6 ft during the seven-day constant rate test and recovered 90 percent after 34 hours of recovery. During the seven-day constant rate test, the pumping-well (ICP-WS-02) water levels decreased approximately 206 ft, and drawdown stabilized after four days of pumping. The pumping well recovered 90 percent within three days and was 94 percent recovered after 24 days of recovery.

The pressure response analysis revealed characteristic behaviors indicative of a dual-permeability and/or multi-layered system. The aquifer appears to have producing intervals with differing pressures and permeabilities; for example, a low-permeability interval with higher pressure and a high-permeability interval with lower pressure. Aquifer transmissivity is estimated to be 7,000 ft^2/day, yielding an estimated horizontal hydraulic conductivity value of 7 ft/day, which is on the lower end of the expected range for karst limestone, but higher than the expected range for limestone and dolomite aquifers (Freeze and Cherry, 1979). The estimated storativity value is $5x10^{-5}$.

The water quality of the Capitan aquifer is characterized by elevated salinity. The TDS of the samples collected from the pumping well ranged from 61,200 to 69,900 mg/L, and contained high concentrations of calcium, chloride, magnesium, potassium, sodium, and sulfate.

8.0 REFERENCES

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TABLES

Table 1
Exploration Well Specifications

Specifications	ICP-WS-01	ICP-WS-02
Location Latitude	32º 14’ 25.827” N	32º 14’ 40.688” N
Location Longitude	103º 20’ 21.319” W	103º 20’ 21.079” W
Section Township Range	Township 24S, Range 35E, Section 2, SW, SE	Township 24S Range 35E, Section 2, SW, NE
Drilling Dates	January 20 – February 8, 2012	May 11 – June 9, 2012
Well Construction Completion Date	February 8, 2012	June 9, 2012
Total Depth, ft bgs	5,381	5,375
Casing depth, ft bgs	0 – 4,384	0 – 4,396
Open-hole depth interval, ft bgs	4,384 – 5,381	4,396 – 5,375
Producing Zone Length, ft	997	979
Depth to top of Capitan aquifer , ft bgs	4,351	4,341
Depth to water, below measuring point (measured July 8, 2012)	~ 715 ft bgs	~ 720 ft bgs

Notes:

gpm = gallons per minute
ft = feet
bgs = below ground surface

Table 2
Submitted Analytical Parameters and Analysis Methods for Aqueous Samples Collected from Groundwater Monitoring Wells in the Capitan Aquifer

Analytical Parameter	Analysis Method	Practical Quantitation Limit (mg/L unless noted)	Sample Holding Times
Anions			
Fluoride	SM4500F C	0.2	28 days
Bromide	SM4500Br	0.1	28 days
Chloride	SM4500CL B	4.0	28 days
Nitrogen, Nitrite (as N)	EPA Method 354.1	0.05	2 days
Nitrogen, Nitrate (as N)	EPA Method 353.3	0.1	2 days
Sulfate	EPA Method 375.4	10.0	28 days
Dissolved Metals (Filtered at 0.45 µm prior to preservation)			
Aluminum (Al)	EPA Method 200.7	0.02	6 months
Antimony (Sb)	EPA Method 200.8	0.001	6 months
Arsenic (As)	EPA Method 200.8	0.001	6 months
Barium (Ba)	EPA Method 200.8	0.002	6 months
Beryllium (Be)	EPA Method 200.8	0.002	6 months
Boron (B)	EPA Method 200.7	0.04	6 months
Cadmium (Cd)	EPA Method 200.8	0.002	6 months
Calcium (Ca)	EPA Method 200.7	1.0	6 months
Chromium (Cr)	EPA Method 200.8	0.006	6 months
Cobalt (Co)	EPA Method 200.8	0.006	6 months
Copper (Cu)	EPA Method 200.8	0.006	6 months
Iron (Fe)	EPA Method 200.7	0.02	6 months
Lead (Pb)	EPA Method 200.8	0.005	6 months
Magnesium (Mg)	EPA Method 200.7	1.0	6 months
Manganese (Mn)	EPA Method 200.8	0.002	6 months
Mercury (Hg)	EPA Method 245.1	0.0002	28 days
Molybdenum (Mo)	EPA Method 200.8	0.008	6 months
Nickel (Ni)	EPA Method 200.8	0.01	6 months
Total Phosphorus (P)	SM 4500PF or EPA Method 365.1	0.1	6 months
Potassium (K)	EPA Method 200.7	1.0	6 months
Selenium (Se)	EPA Method 200.8	0.001	6 months
Silicon (Si)	EPA Method 200.7	0.08	6 months
Silver (Ag)	EPA Method 200.8	0.005	6 months
Sodium (Na)	EPA Method 200.7	1.0	6 months
Strontium (Sr)	EPA Method 200.7	0.01	6 months
Thallium (Tl)	EPA Method 200.8	0.001	6 months
Tin (Sn)	EPA Method 200.7	0.01	6 months

Analytical Parameter	Analysis Method	Practical Quantitation Limit (mg/L unless noted)	Sample Holding Times
Uranium (U)	EPA Method 200.8	0.001	6 months
Vanadium (V)	EPA Method 200.8	0.05	6 months
Zinc (Zn)	EPA Method 200.8	0.01	6 months
Solids			
Total Dissolved Solids (TDS)	EPA 160.1	5.0	7 days
Alkalinity			
Alkalinity, total (as $CaCO_3$)	EPA 310.1	4.0	7 days
Carbonate	EPA 310.1	2.0	7 days
Bicarbonate	EPA 310.1	5.0	7 days
Radiochemistry*			
Gross Alpha Radioactivity	EPA Method 900.0	[-]	6 months
Isotopic Uranium (^{234}U, ^{235}U, ^{238}U)	HSL 300M	[-]	6 months
Dissolved Gases and Hydrocarbons			
Methane (CH_4)	RSK 175 or EPA Method 8015M	0.001	14 days
Diesel Range Organics (DRO)**	EPA Method 8015M	1.00	14 days
Gasoline Range Organics (GRO)	EPA Method 8015M	1.00	14 days
Other			
pH	EPA 150.1	0.1 pH Units	Upon receipt
Specific Conductance	EPA Method 120.1	1.0 µmhos/cm	28 days
Specific Gravity	SM 2710F	0.001	NA
Turbidity	EPA Method 180.1	0.5 NTU	48 hours
Total Organic Carbon	SM 5310B	2.0	14 days
Hydrogen Sulfide (H_2S)***	EPA Method 376.2	0.01	7 days
Dissolved Silica	EPA Method 200.7	2.1	6 months
Total Silica	EPA Method 200.7	2.1	6 months

Notes:

Practical Quantitation Limit = the minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence

*Sub-contracted to laboratory to be identified by INTERA/ICP

**DRO should be left on the chromatogram long enough to detect motor-oil range organics (MRO)

***Calculated from analysis of sulfide in water

[-] = Defined by sub-contracted laboratory running radiochemistry analyses

EPA = U.S. Environmental Protection Agency

NTU = natural turbidity unit

SM = Standard Method

µmhos/cm = micromhos per centimeter

Table 3
Specific Capacity and Transmissivity Estimates from Step-Drawdown Testing

Step	Flow Rate (gpm)	Water-Level Drawdown (ft)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/day)
1	400	93.3	4.3	**1146**
2	500	148.9	3.4	**898**
3	685	233.3	2.9	**785**

Notes:
gpm = gallons per minute
ft = feet

Table 4
ICP-WS-02 Recovery After the Seven-Day Constant Rate Test

Time	Depth to Water (feet below ground surface)
19:17	913.25
19:30	Pump Off
19:31	765
19:32	751
19:33	746
19:34	742.5
19:36	740
19:40	737
19:45	735.2
19:50	734.2
19:55	733.5
20:00	733.1
20:30	731.65
21:00	731.2

Table 5

Hydraulic Parameter Estimates from Analysis of the Seven-Day Pumping and Recovery Periods

Well	Solution	Boundary	T (ft^2/day)	S	K_matrix (ft/day)	Ss_matrix (1/ft)	K_fracture (ft/day)	Ss_fracture (1/ft)	Kz/Kr	Rf (ft)
ICP-01	Papadopulos-Cooper	No	6,751	1.58E-04	6.8	1.58E-07	NA	NA	NA	NA
	Papadopulos-Cooper	Yes	9,825	7.87E-05	9.8	7.87E-08	NA	NA	NA	NA
	Moench w/ slab blocks	No	6,420	3.30E-05	2.24E-07	1.44E-07	6.4	3.30E-08	NA	NA
	Moench w/ slab blocks	Yes	7,300	2.43E-05	2.42E-07	1.45E-07	7.3	2.43E-08	NA	NA
	Gringarten-Ramey w/ horz frac	No	7,370	5.41E-05	NA	NA	7.4	5.41E-08	1	3180.5
	Gringarten-Ramey w/ horz frac	Yes	10,330	6.09E-05	NA	NA	10.3	6.09E-08	1	2133.4
ICP-02	Papadopulos-Cooper	No	774	4.78E-05	0.77	4.78E-08	NA	NA	NA	NA
	Papadopulos-Cooper	Yes	774	4.78E-05	0.77	4.78E-08	NA	NA	NA	NA
	Moench w/ slab blocks	No	743	3.17E-05	4.12E-08	5.37E-08	0.74	3.17E-08	NA	NA
	Moench w/ slab blocks	Yes	439	5.52E-07	4.09E-07	4.59E-03	0.44	5.52E-10	NA	NA
	Gringarten-Ramey w/ horz frac	No	872	3.21E-05	NA	NA	0.87	3.21E-08	1	204.3
	Gringarten-Ramey w/ horz frac	Yes	736	4.07E-05	NA	NA	0.74	4.07E-08	1	243.3

Notes: T - transmissivity, S – storativity, K – hydraulic conductivity, Ss – specific storage, Kz/Kr – ratio of vertical to radial K, Rf – radial extent of planar fracture. Light-blue shaded boxes indicate parameters from solution method; non-shaded boxes indicate calculated values based on an aquifer thickness of 1,000 feet. NA – Not Applicable.

Table 6
Concentrations of Select Parameters

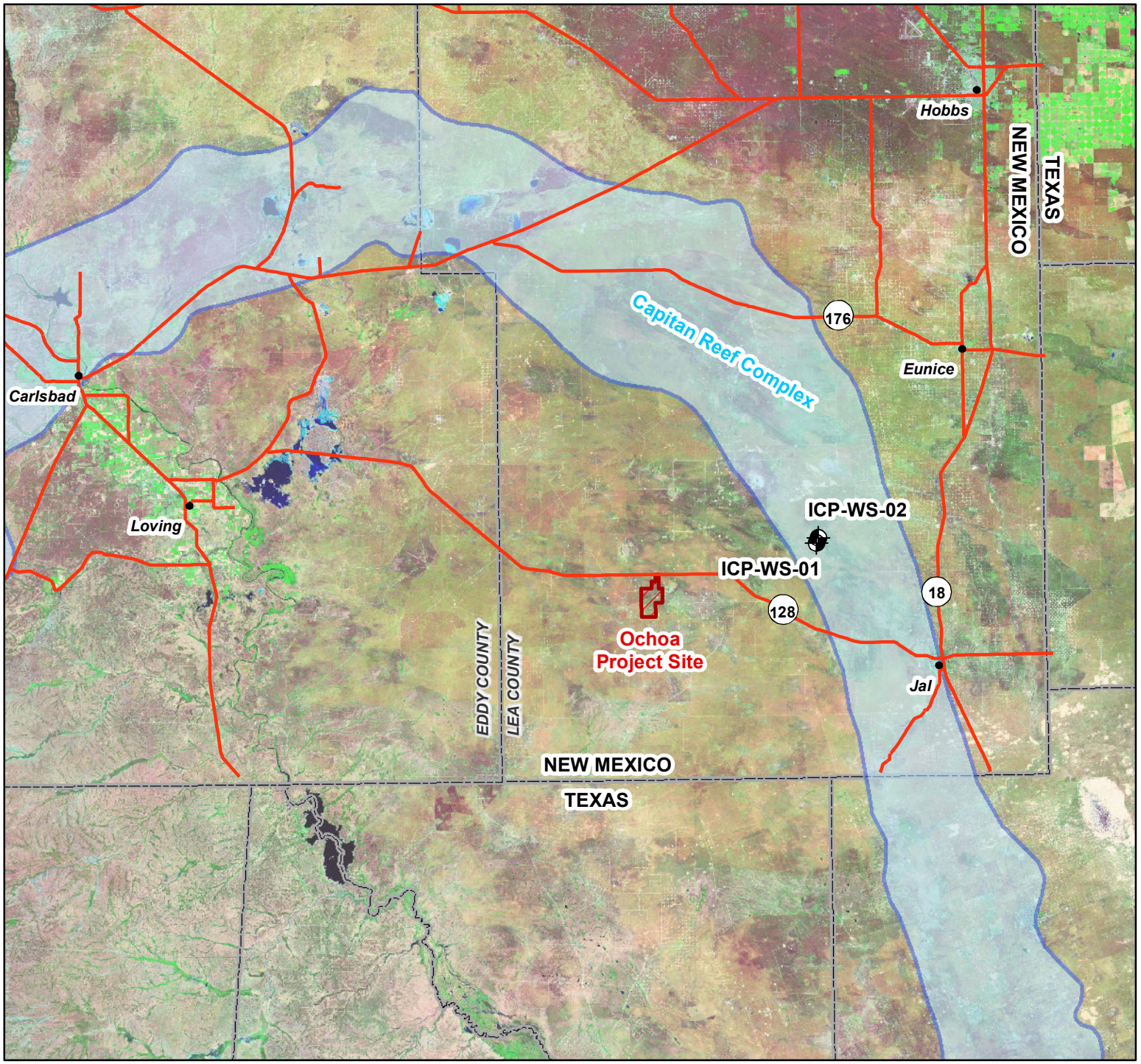
Sample Name	ICP-WS-02-1	ICP-WS-02-2	ICP-WS-02-3	ICP-WS-02-4
Collection Date	7/9/2012	7/12/2012	7/16/2012	7/16/2012
1-Chlorooctadecane (mg/L)	4.76	5.26	5.87	5.71
1-Chlorooctane (mg/L)	3.84	4.07	4.51	4.27
Adjusted Gross Alpha (pCi/L)	25.3 ± 4.3	29.5 ± 4.5	34.5 ± 4.3	26.1 ± 5.5
Alkalinity, Bicarbonate (mg/L)	264	371	239	332
Alkalinity, Carbonate (mg/L)	ND	ND	ND	ND
Alkalinity, Total (as $CaCO_3$) (mg/L)	216	304	196	272
Aluminum (mg/L)	0.717	0.808	0.912	0.814
Antimony (mg/L)	ND	ND	ND	ND
Arsenic (mg/L)	ND	ND	ND	ND
Barium (mg/L)	ND	ND	ND	ND
Beryllium (mg/L)	ND	ND	ND	ND
Boron (mg/L)	6.51	4.1	4.14	4.17
Bromide (mg/L)	ND	ND	ND	ND
Cadmium (mg/L)	ND	ND	ND	ND
Calcium (mg/L)	1380	1440	1450	1450
Chloride (mg/L)	32400	48000	40000	39600
Chromium (mg/L)	ND	ND	ND	ND
Cobalt (mg/L)	ND	ND	ND	ND
Conductivity (µS/cm)	114000	126000	126000	127000
Copper (mg/L)	0.301	0.29	0.327	0.36
DRO >C10-C28 (mg/L)	ND	ND	ND	ND
EXT DRO >C28-C35 (mg/L)	ND	ND	ND	ND
Fluoride (mg/L)	2.3	2.81	2.69	2.81
GRO C6-C210 (mg/l)	ND	ND	ND	ND
Gross Alpha (pCi/L)	28.0 ± 4.2	30.8 ± 4.5	35.8 ± 4.3	27.4 ± 5.5
Iron (mg/L)	19.7	7.01	1.11	1.22
Lead (mg/L)	ND	ND	ND	ND
Magnesium (mg/L)	617	641	649	655
Manganese (mg/L)	0.341	0.176	0.102	0.0969
Mercury (mg/L)	ND	ND	ND	ND
Methane (µg/L)	162	927	1660	921
Molybdenum (mg/L)	0.0504	ND	ND	ND
Nickel (mg/L)	0.0754	0.0516	0.0553	0.0569
Nitrate (as N) (mg/L)	ND	2.8	5.69	2.8
Nitrite (as N) (mg/L)	ND	ND	0.06	ND
pH	6.9	7.06	7.01	6.71

Sample Name	ICP-WS-02-1	ICP-WS-02-2	ICP-WS-02-3	ICP-WS-02-4
Collection Date	**7/9/2012**	**7/12/2012**	**7/16/2012**	**7/16/2012**
Phosphorus, Total (mg/L)	ND	ND	ND	ND
Potassium (mg/L)	670	701	666	683
Selenium (mg/L)	0.162	0.149	0.144	0.143
Silica (mg/L)	17	15.3	15.1	15.3
Silica, Total (mg/L)	13.4	16.1	16.1	18.3
Silicon (mg/L)	7.94	7.15	7.06	7.17
Silicon, Total (mg/L)	6.24	7.54	7.55	8.55
Silver (mg/L)	ND	ND	ND	ND
Sodium (mg/L)	19200	20600	21000	21000
Specific Gravity @ 60°F	1.038	1.043	1.043	1.044
Strontium (mg/L)	21.8	23.7	23.8	23.7
Sulfate (mg/L)	4860	6660	10200	7970
Sulfide, Total (mg/L)	0.052	28.6	77.6	83.6
Total Dissolved Solids (mg/L)	61200	68300	69100	69900
Thallium (mg/L)	ND	ND	ND	ND
Tin (mg/L)	9.84	ND	ND	ND
Total Organic Carbon (mg/L)	2.9	0.651	ND	ND
Total Uranium Activity (pCi/L)	2.7 ± 0.8	< 1.3	< 1.3	< 1.3
Total Uranium Content (µg/L)	3.9 ± 1.6	< 3	< 3	< 3
Turbidity (NTU)	1.67	11.2	ND	1.81
Uranium (mg/L)	ND	ND	ND	ND
Uranium 234 Activity (pCi/L)	1.4 ± 0.6	< 0.9	< 0.9	< 0.9
Uranium 234 Content (µg/L)	0.00022 ± 0.00009	< 0.00014	< 0.00014	< 0.00014
Uranium 235 Activity (pCi/L)	0.060 ± 0.004	< 0.007	< 0.007	< 0.007
Uranium 235 Content (µg/L)	0.028 ± 0.002	< 0.003	< 0.003	<0.003
Uranium 238 Activity (pCi/L)	1.3 ± 0.5	< 0.9	< 0.9	< 0.9
Uranium 238 Content (µg/L)	3.9 ± 1.6	< 3	< 3	< 3
Vanadium (mg/L)	ND	ND	ND	ND
Zinc (mg/L)	0.14	ND	ND	ND

Notes:

µg/L = micrograms per liter
mg/L = milligrams per liter
ND = non-detect
NTU = Nephelometric Turbidity Unites
pCi/L = picocuries per liter

FIGURES



N

10 5 0 10

Miles

Legend

- Water Well Location
- Ochoa Project Site
- Capitan Reef Complex (TWDB, 2009)

Figure 1
Location of Proposed Ochoa Project
ICP Water Development Project

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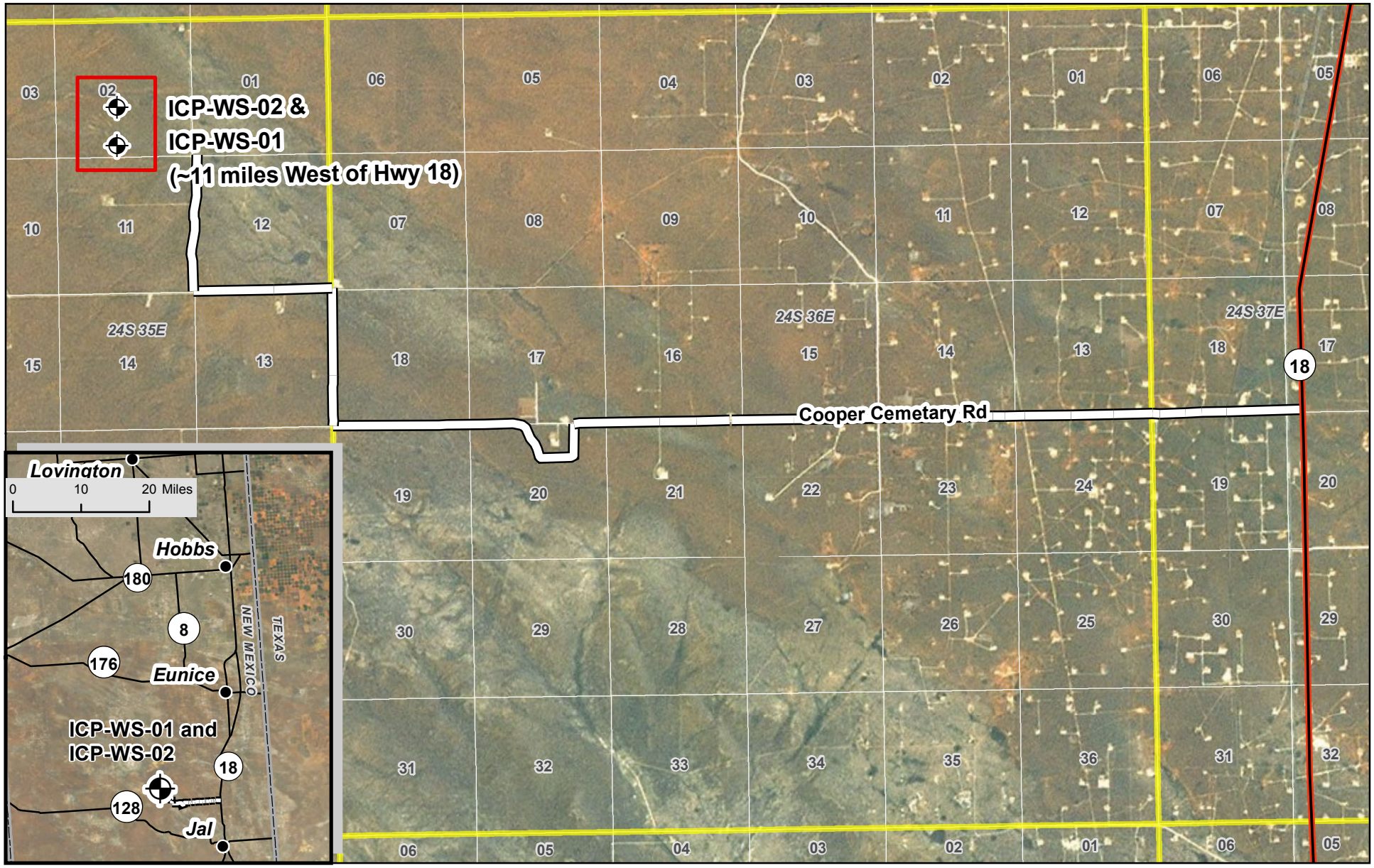


N

1 0.5 0 1

Miles

Legend

Water Well Location

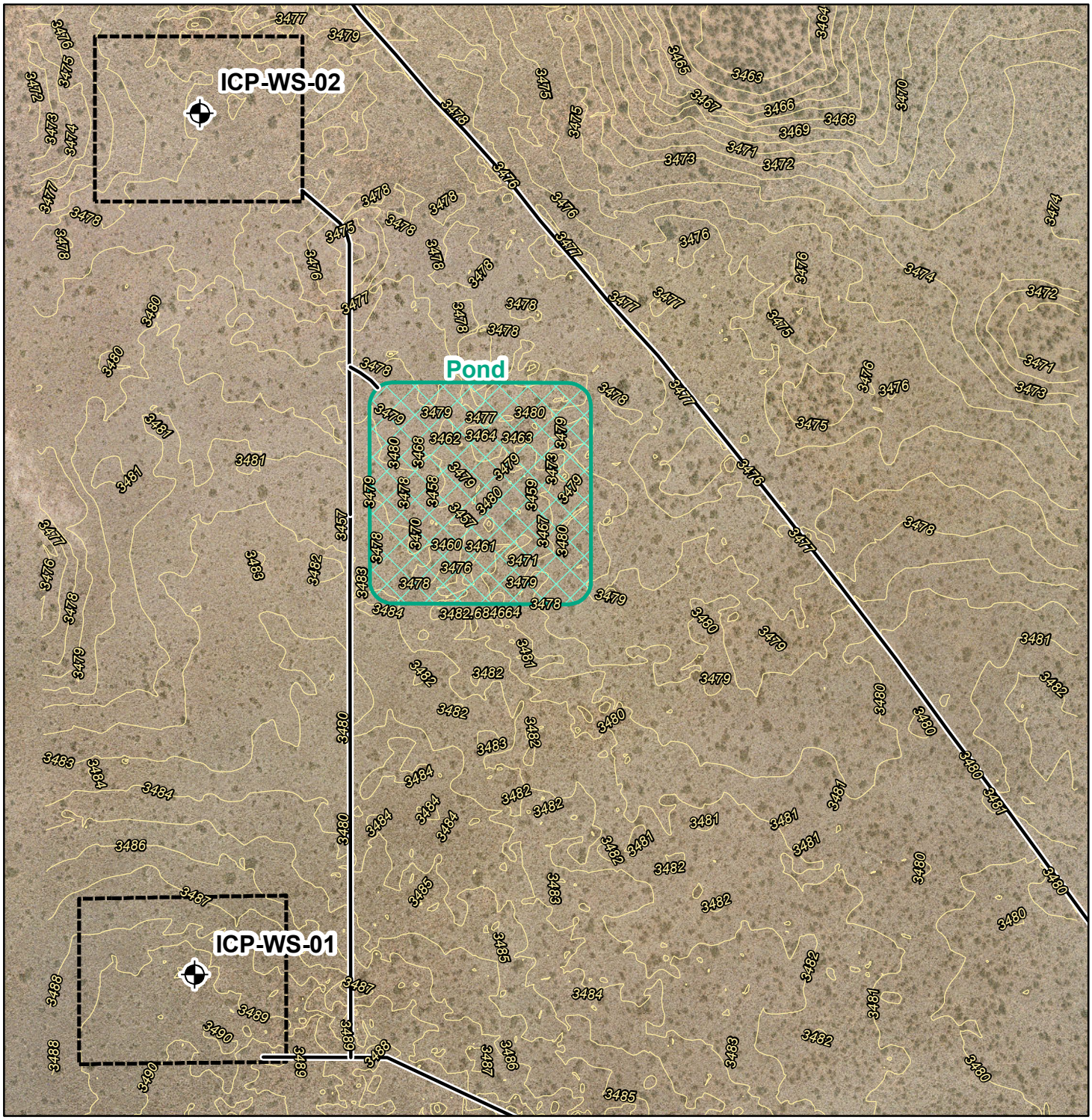
Access Road

Township Division

Section Division

Figure 2
Locations of ICP-WS-01 and ICP-WS-02
ICP Water Development Project

FILE: S:\Projects\ICP-001_Intercontinental_Potash\GIS\MapDocuments\AquiferTesting\Report\Fig02_Locs_ICPWS01-02.mxd 9/10/2012



N

250 125 0 250

Feet

Legend

- Water Well Location
- Road
- Drilling Site
- Well Test Holding Pond
- Elevation (ft amsl)

Figure 3
Well Location Close Up
ICP Water Development Project

INTERA

FILE: S:\Projects\ICP-001_Intercontinental_Potash\GIS\MapDocuments\AquiferTesting\Report\Fig03_ICPWS02_Loc.mxd 9/13/2012

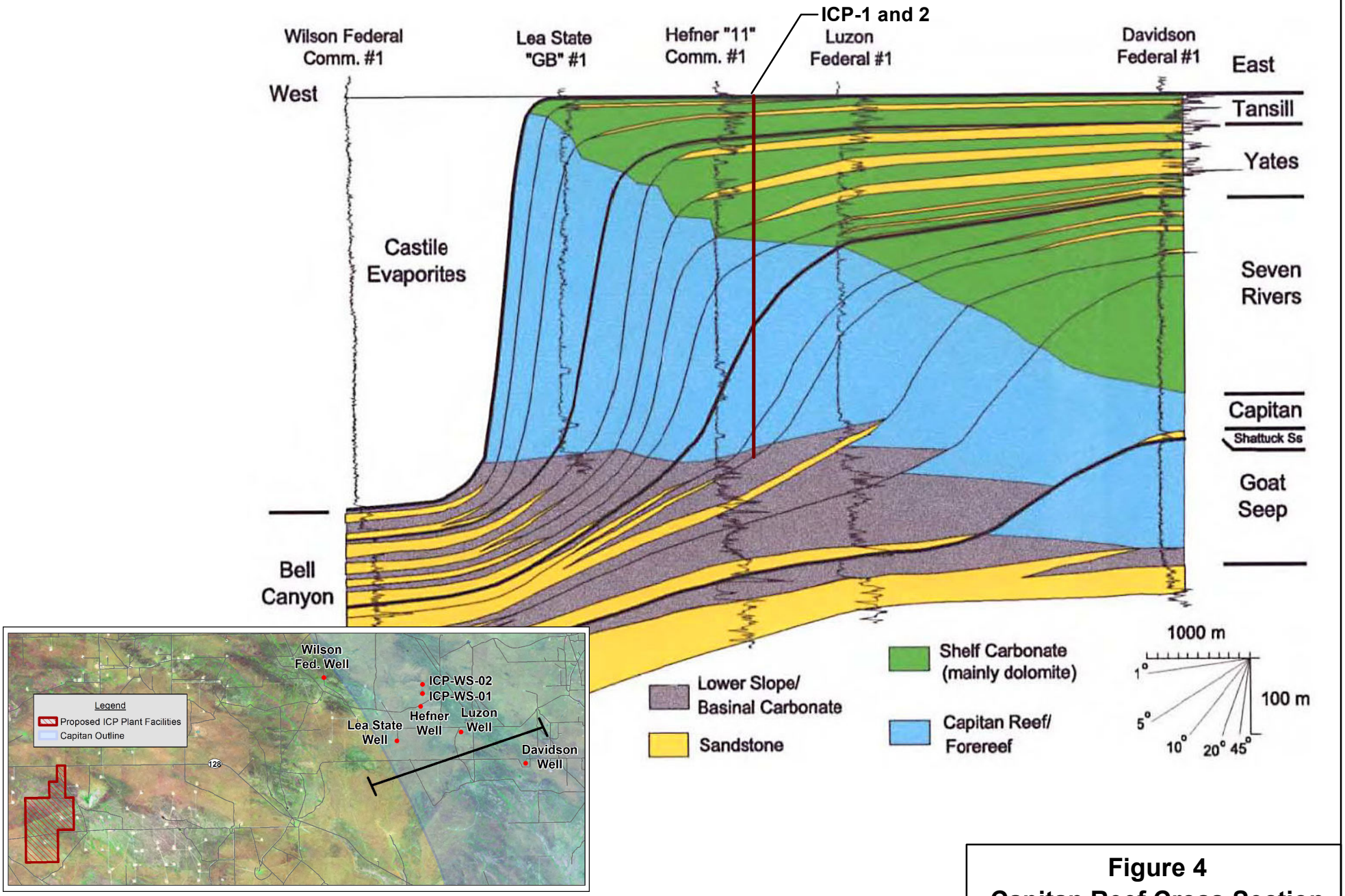
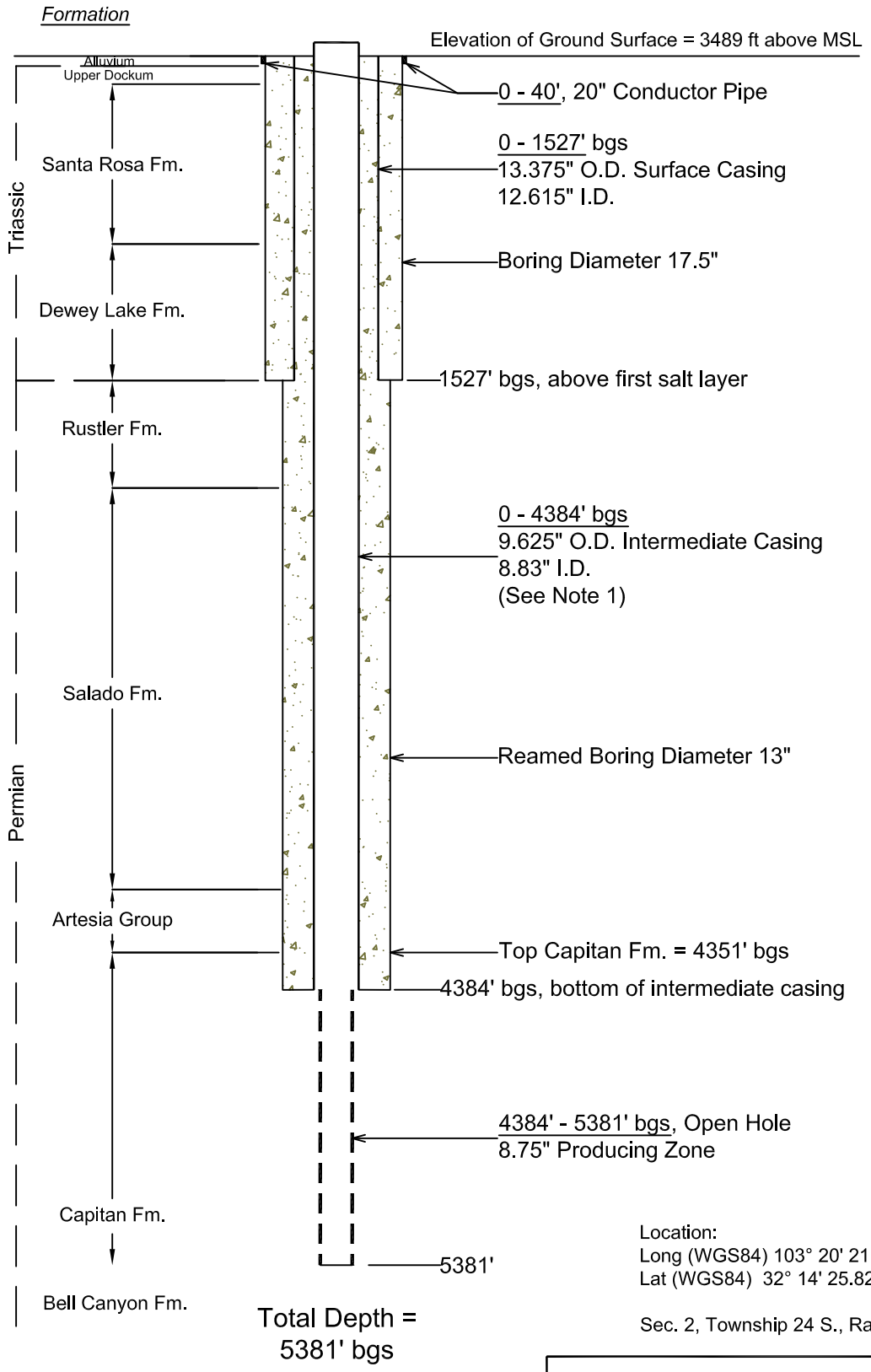


Figure 4
Capitan Reef Cross Section
ICP Water Development Project

INTERA

S:\Projects\ICP-001_Intercontinental_Potash\GIS\MapDocuments\AquiferTesting\Report\Fig04_CapitanReefXsec.mxd 9/13/2012



Location:
Long (WGS84) 103° 20' 21.319" W.
Lat (WGS84) 32° 14' 25.827" N.

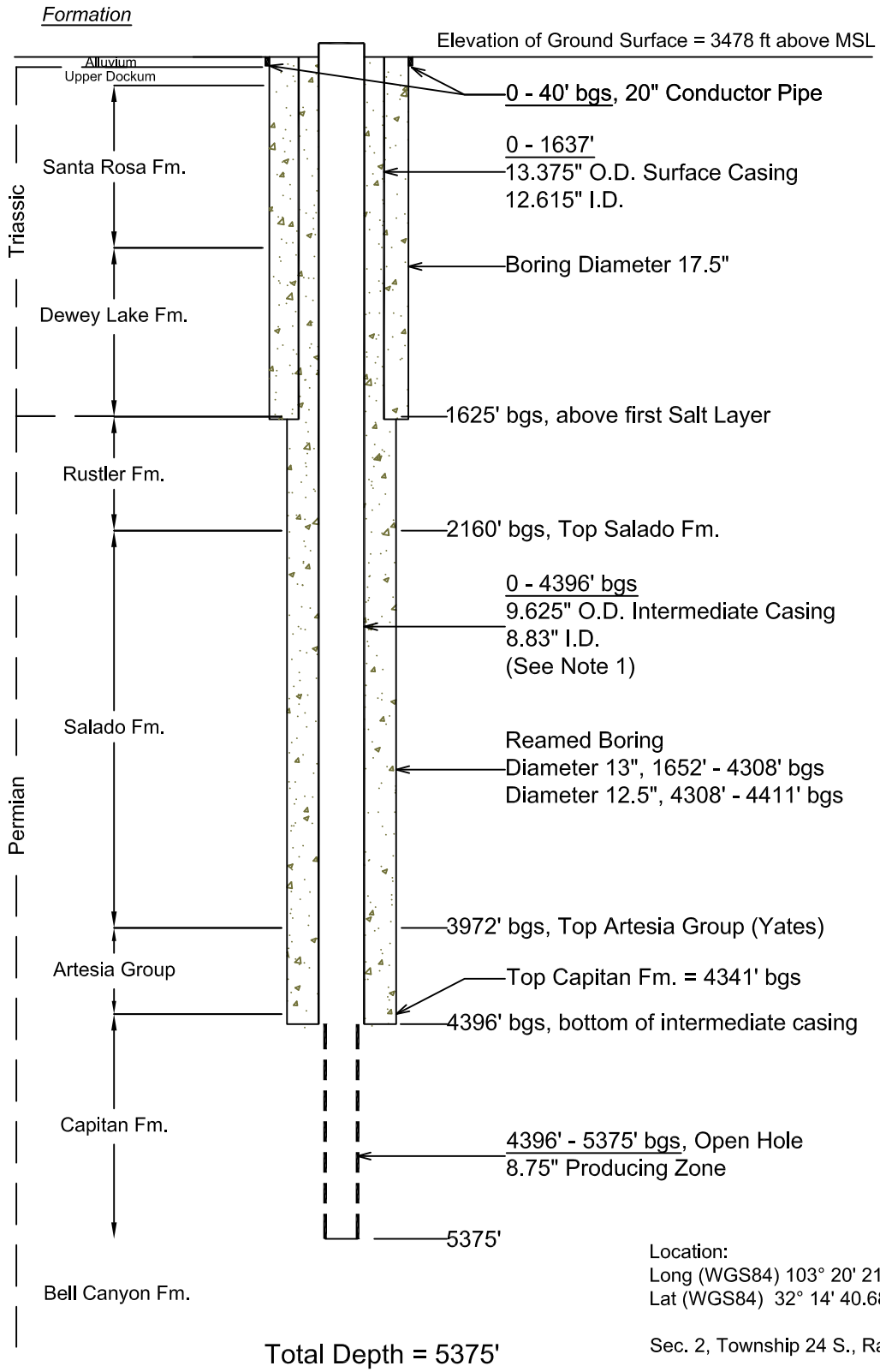
Sec. 2, Township 24 S., Range 35 E.

Notes:
1. 9.625" casing is flush threaded below depth of base of surface casing to create 3.375" annular space.
2. All depths are estimated, below ground surface (bgs).

Figure 5
ICP-WS-01
Well Diagram

ICP Water Development Project

S:\Projects\ICP-001_Intercontinental_Potash\GIS\Well_Schematics\AquiferTestReport\ICP-WS-01_ATR_Aug2012.dwg



Location:
Long (WGS84) 103° 20' 21.079" W.
Lat (WGS84) 32° 14' 40.688" N.

Sec. 2, Township 24 S., Range 35 E.

Notes:
1. 9.625" casing is flush threaded below depth of base of surface casing to create 3.375" annular space.
2. All depths are estimated, below ground surface (bgs).

Figure 6
ICP-WS-02
Well Diagram

ICP Water Development Project

S:\Projects\ICP-001_Intercontinental_Potash\GIS\Well_Schematics\AquiferTestReport\ICP-WS-02_ATR_AUG2012.dwg

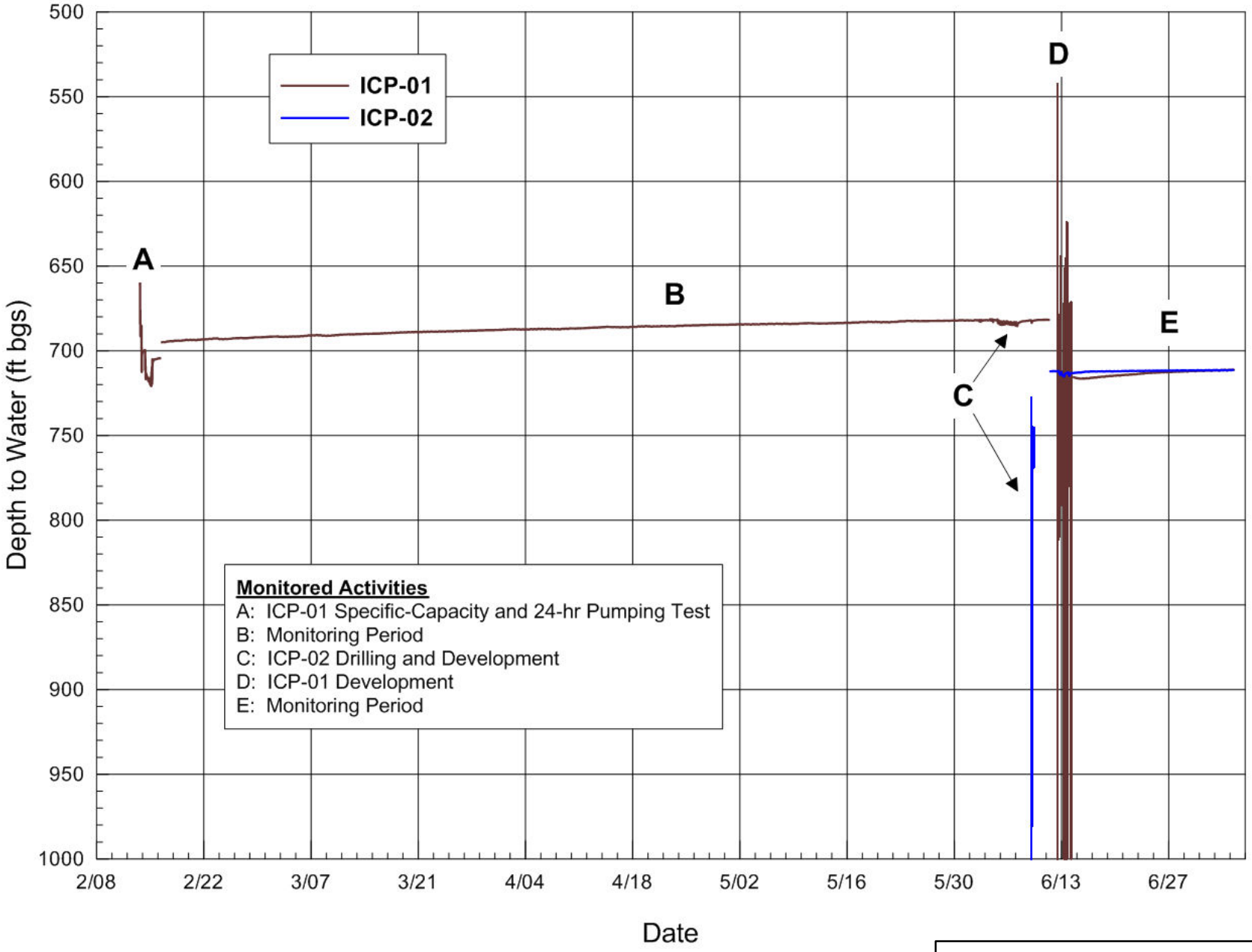


Figure 7
Background Water Level Monitoring
ICP Water Development Project

INTERA

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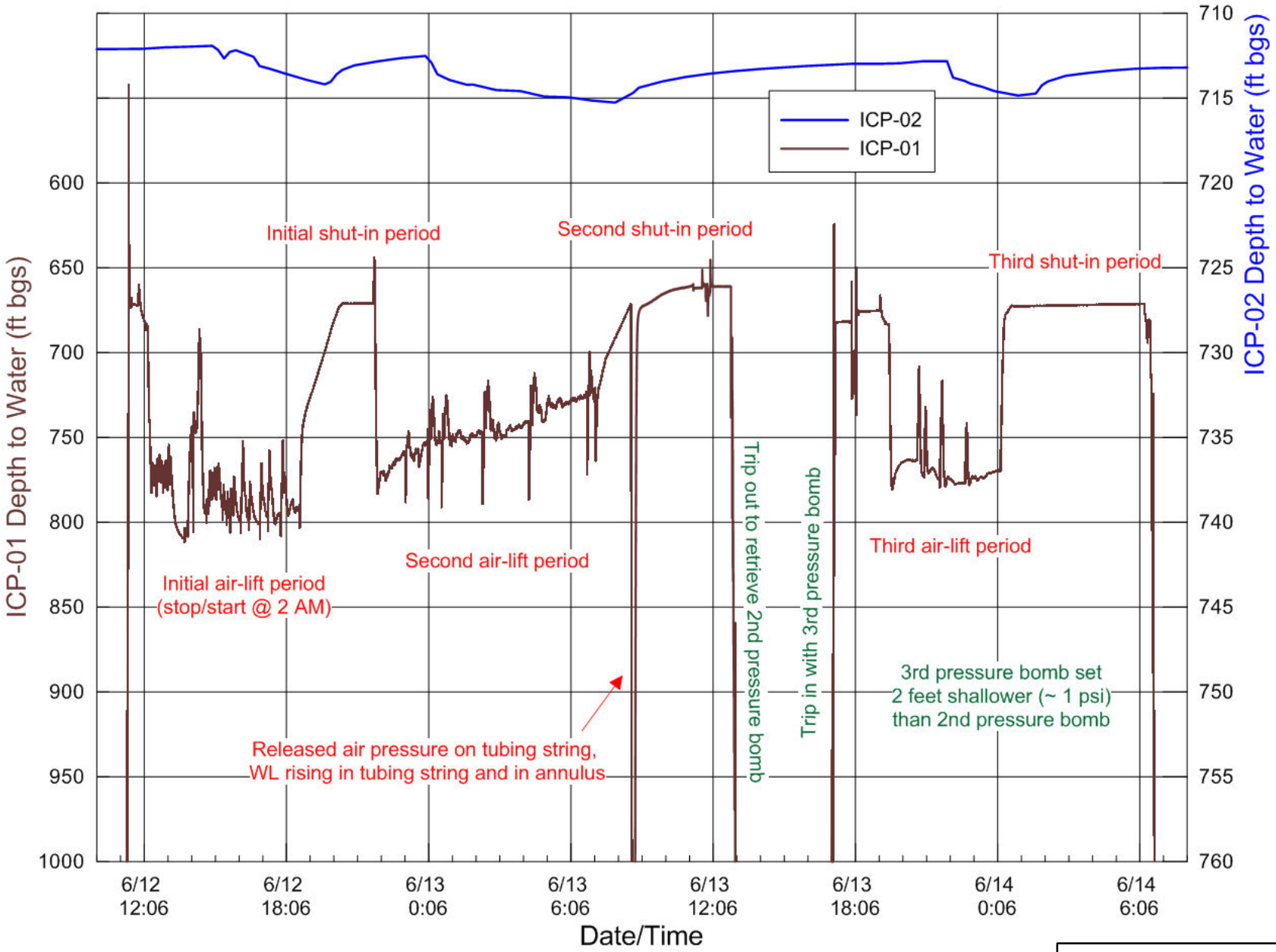

Figure 8
Development of ICP-WS-01
ICP Water Development Project

INTERA

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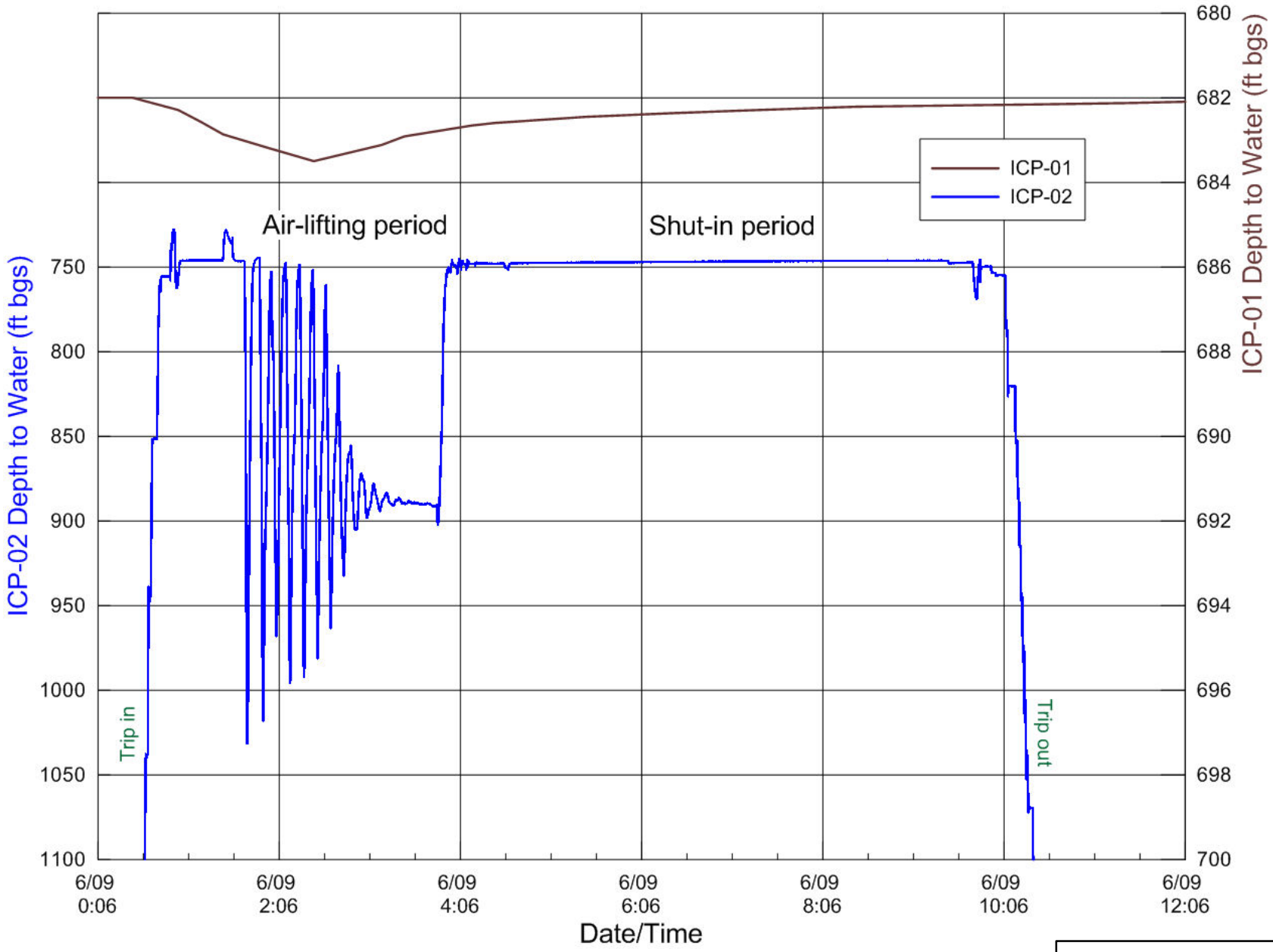
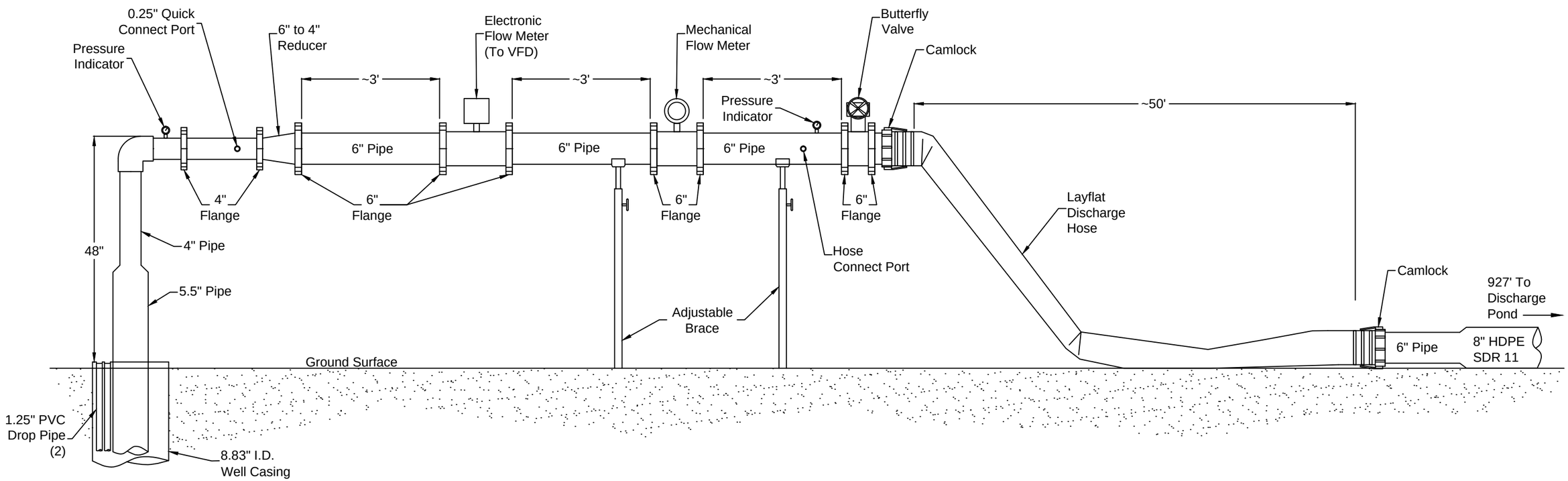


Figure 9
Development of ICP-WS-02
ICP Water Development Project



NOTES:

1. Pipe sizes and lengths may be modified based on field conditions and equipment needs.

2. Electronic flow meter is connected to the variable flow drive (VFD).

Figure 10
Wellhead Layout for Aquifer Testing

ICP Water Development Project

S:\Projects\ICP-001_Intercontinental_Potash\GIS\MapDocuments\AquiferTesting\Report\Fig10_Wellhead_layout_rev2.dwg

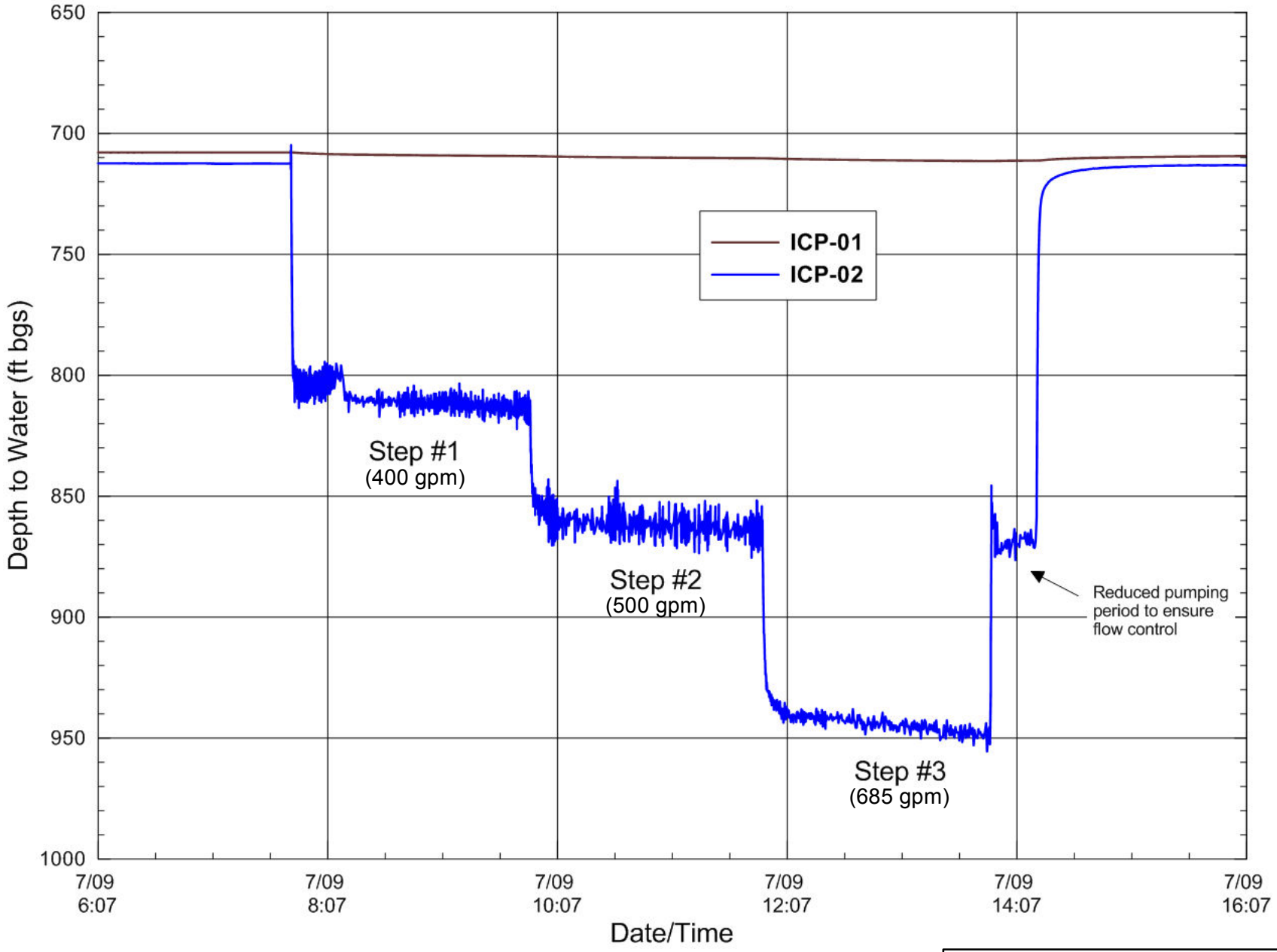


Figure 11
Step-Drawdown Test Water Levels
ICP Water Development Project

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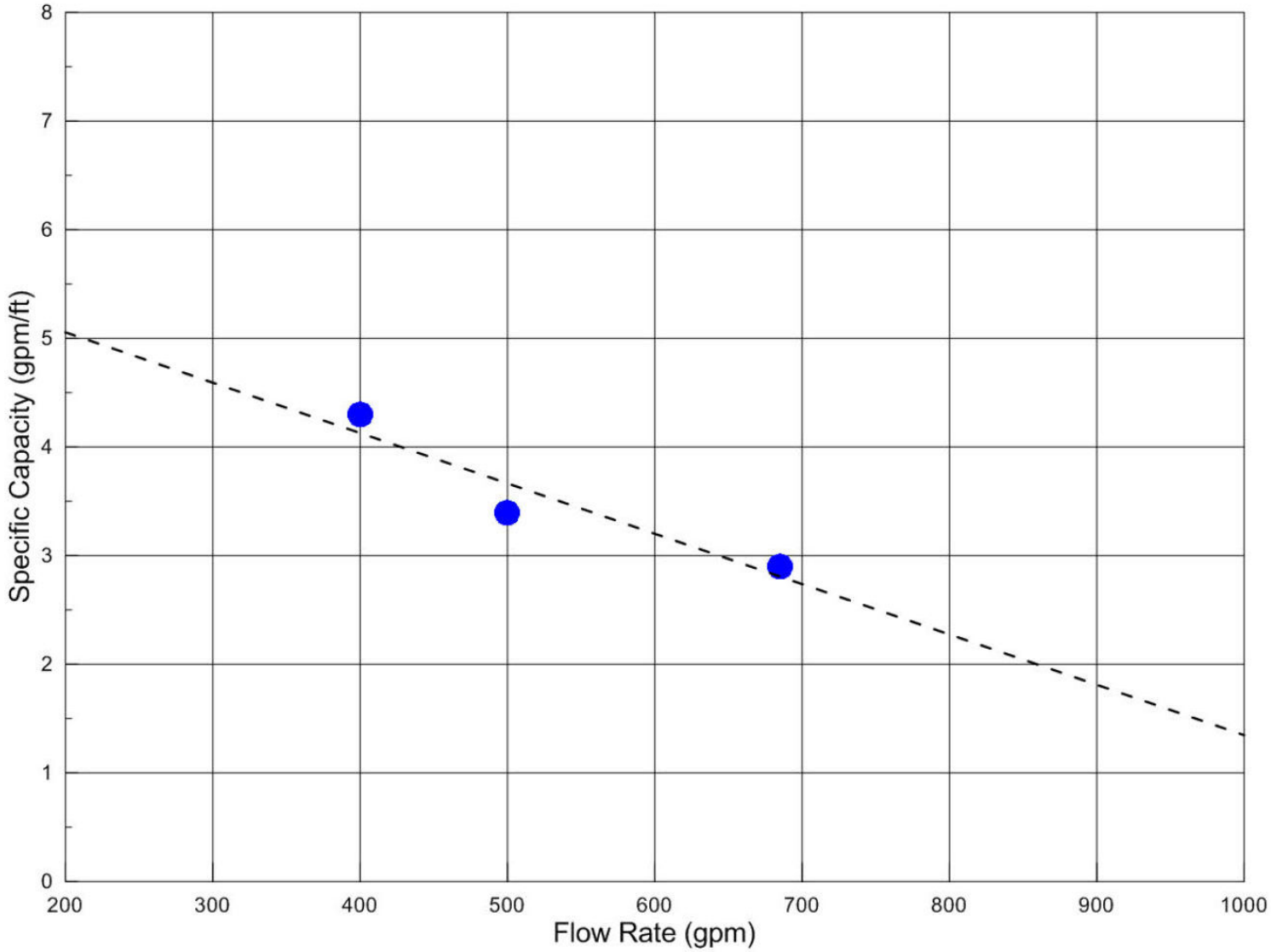

Figure 12
Step-Drawdown Test Specific-Capacity Estimates from ICP-WS-02
ICP Water Development Project

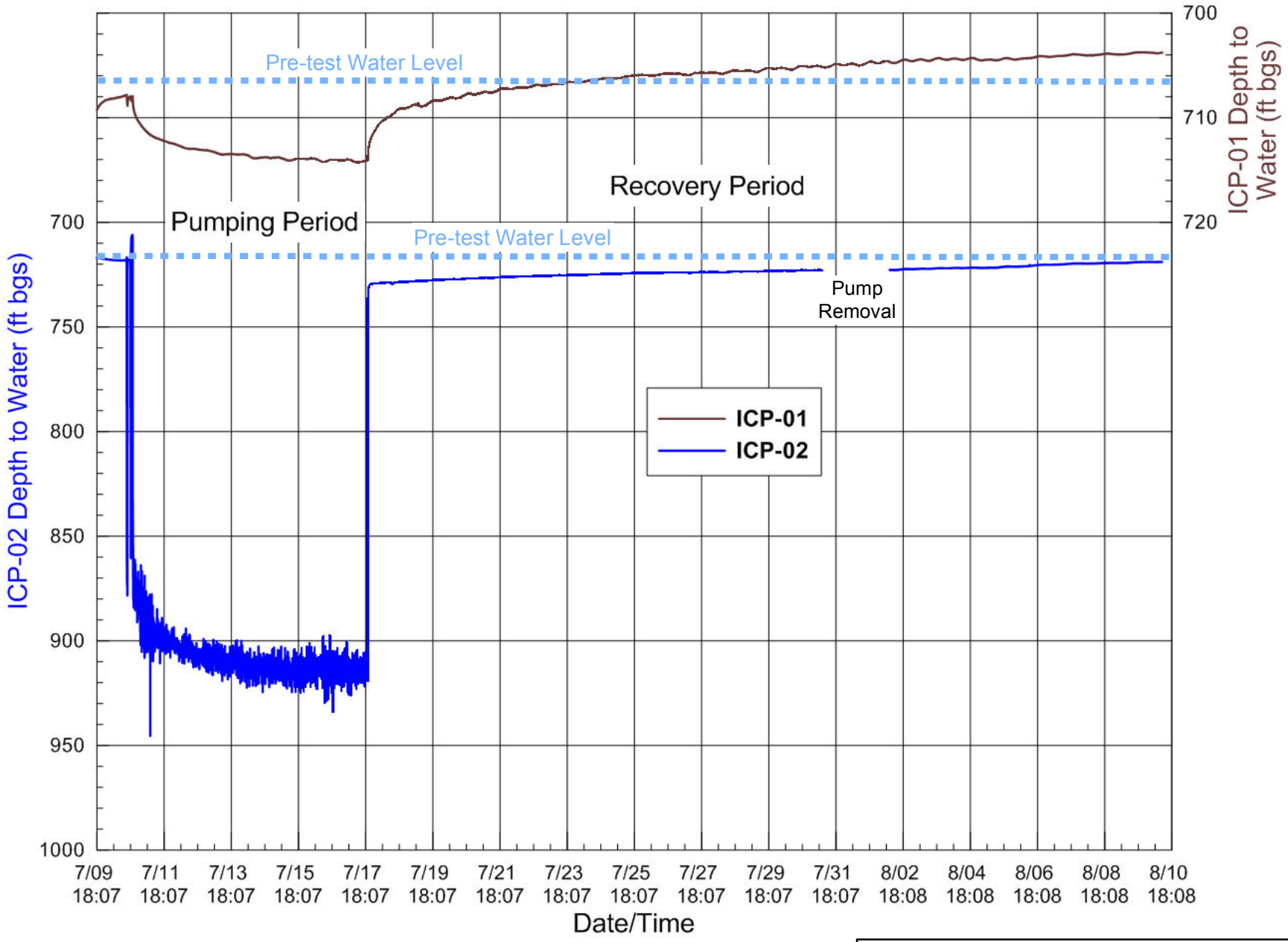

Figure 13
Seven-Day Constant Rate Test Water Levels
ICP Water Development Project

INTERA

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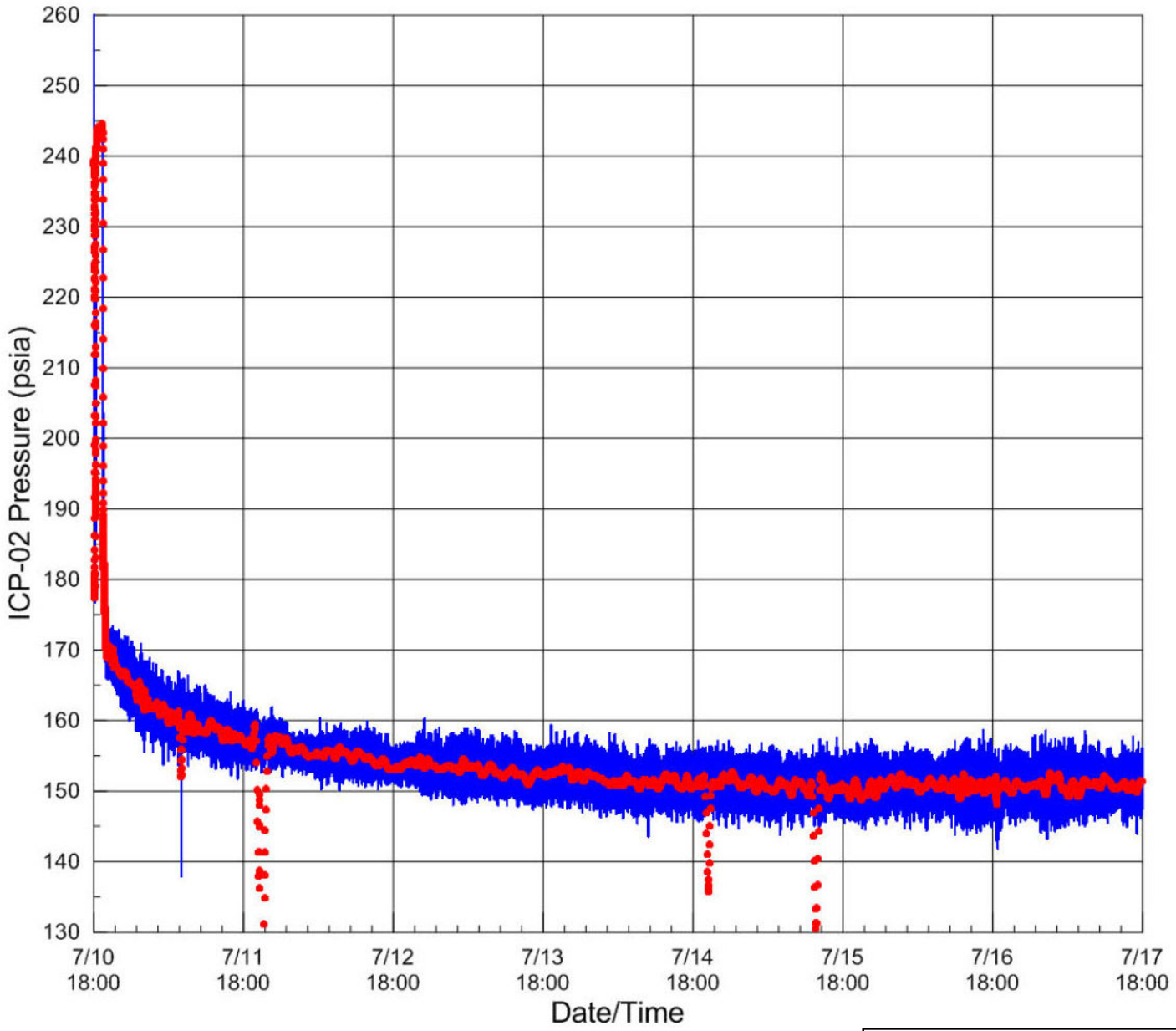

Figure 14
Seven-Day Constant RateTest ICP-WS-02, Pressure Data Processing
ICP Water Development Project

INTERA

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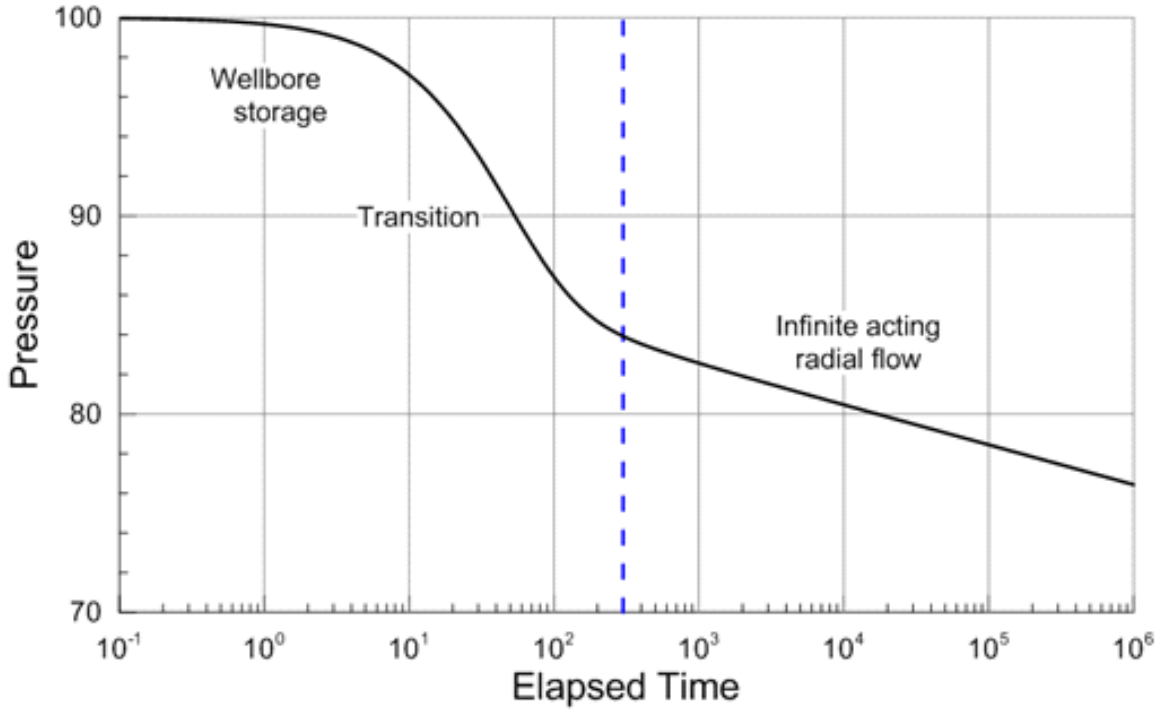

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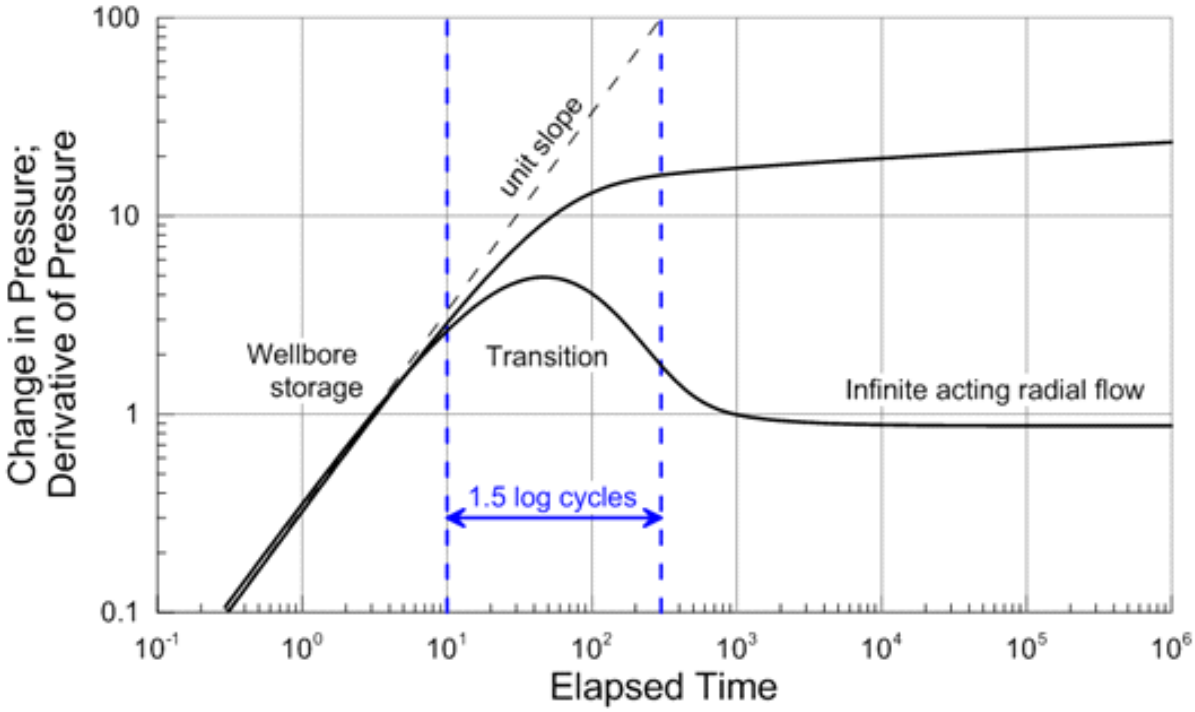

(b) Derivative

Figure 15
Characteristic Pressure Plot for a Single-Porosity Flow System
ICP Water Development Project

INTERA

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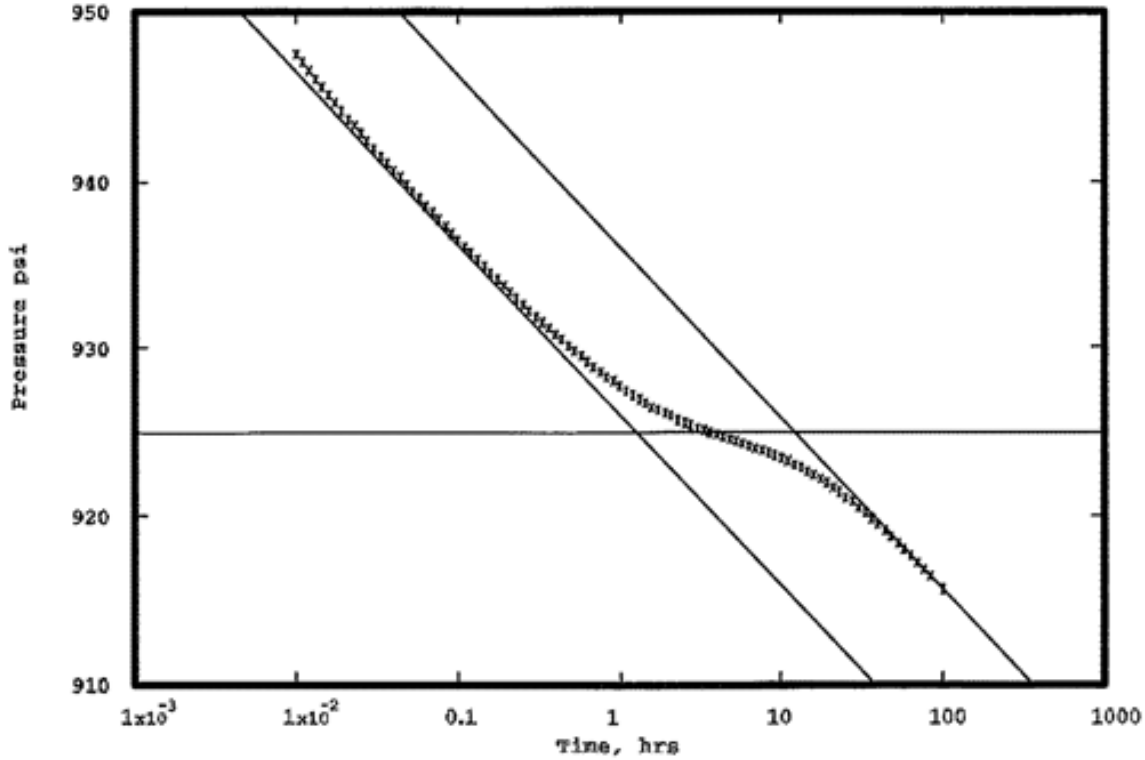

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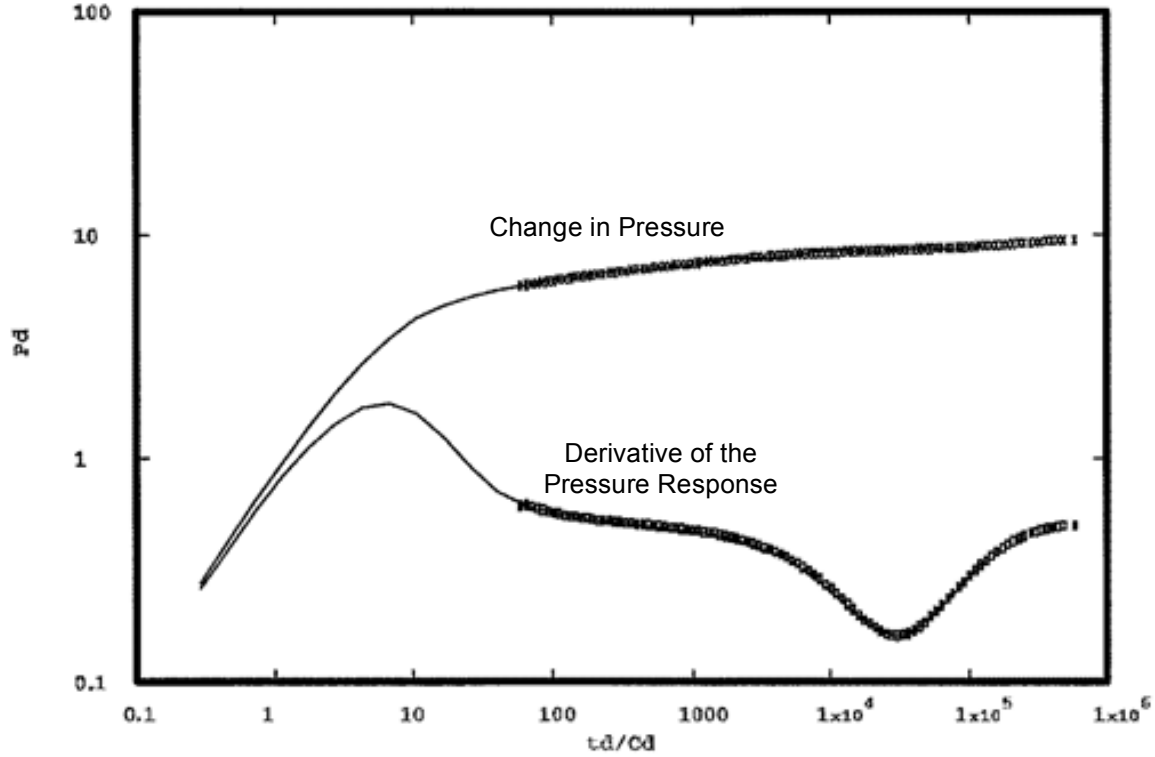
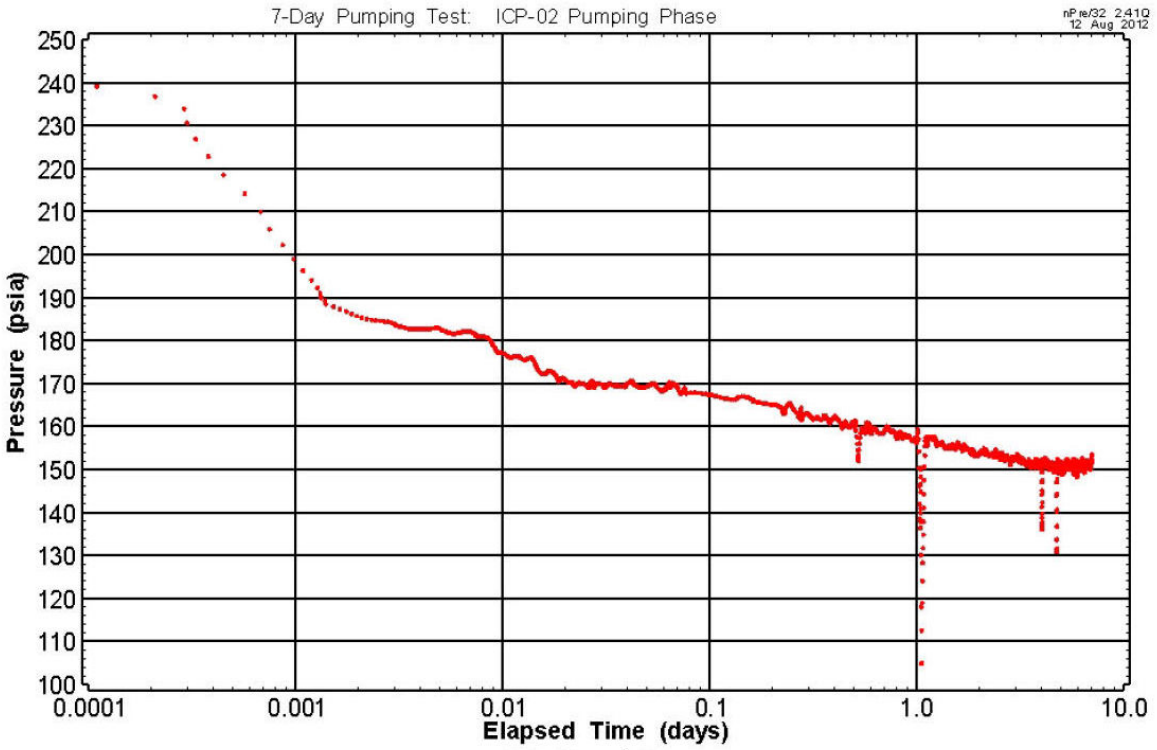


(b) Derivative

Figure 16
Characteristic Pressure Plots for a Dual-Porosity Flow System
ICP Water Development Project

Source: Horne, 1995



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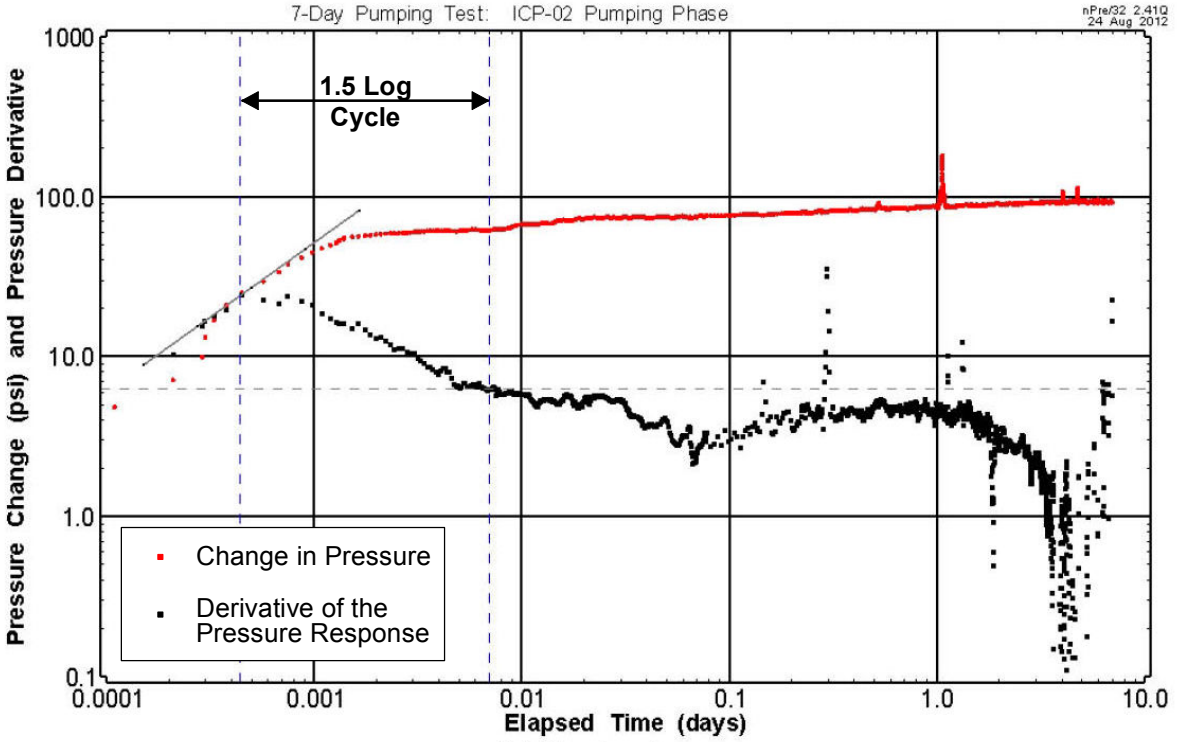

(b) Derivative

Figure 17
Pressure Plots for ICP-WS-02, Seven-Day Constant RateTest
ICP Water Development Project

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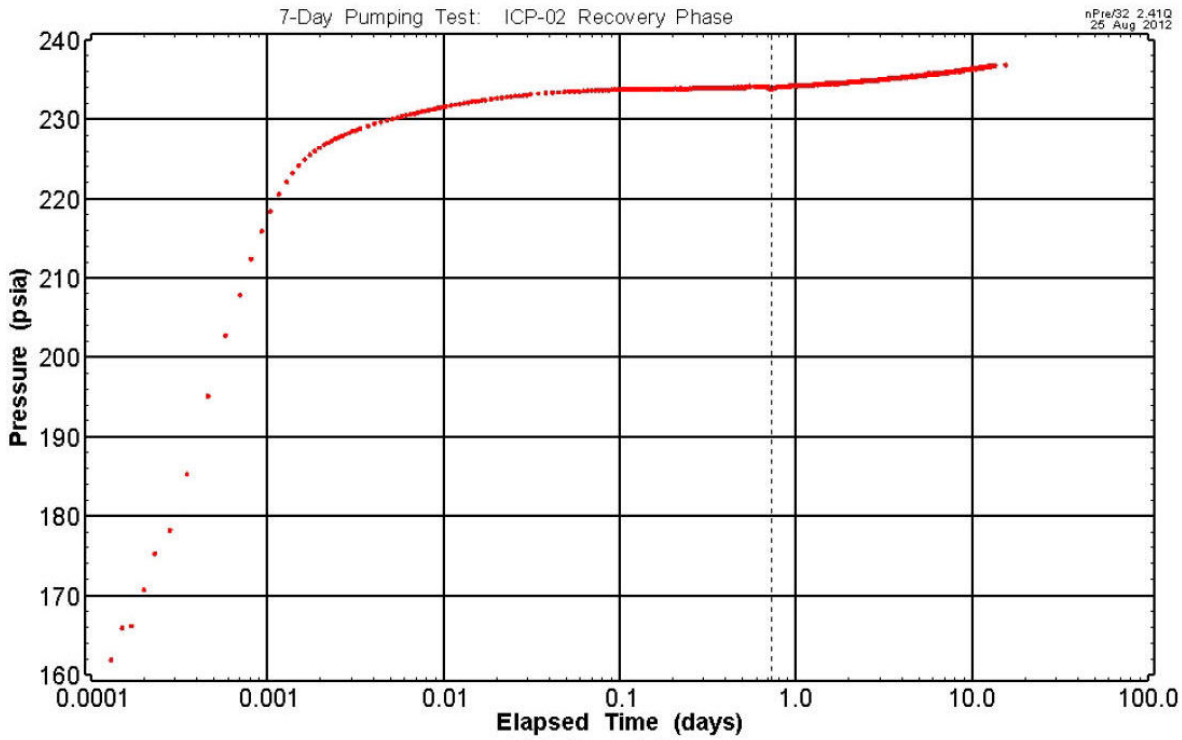

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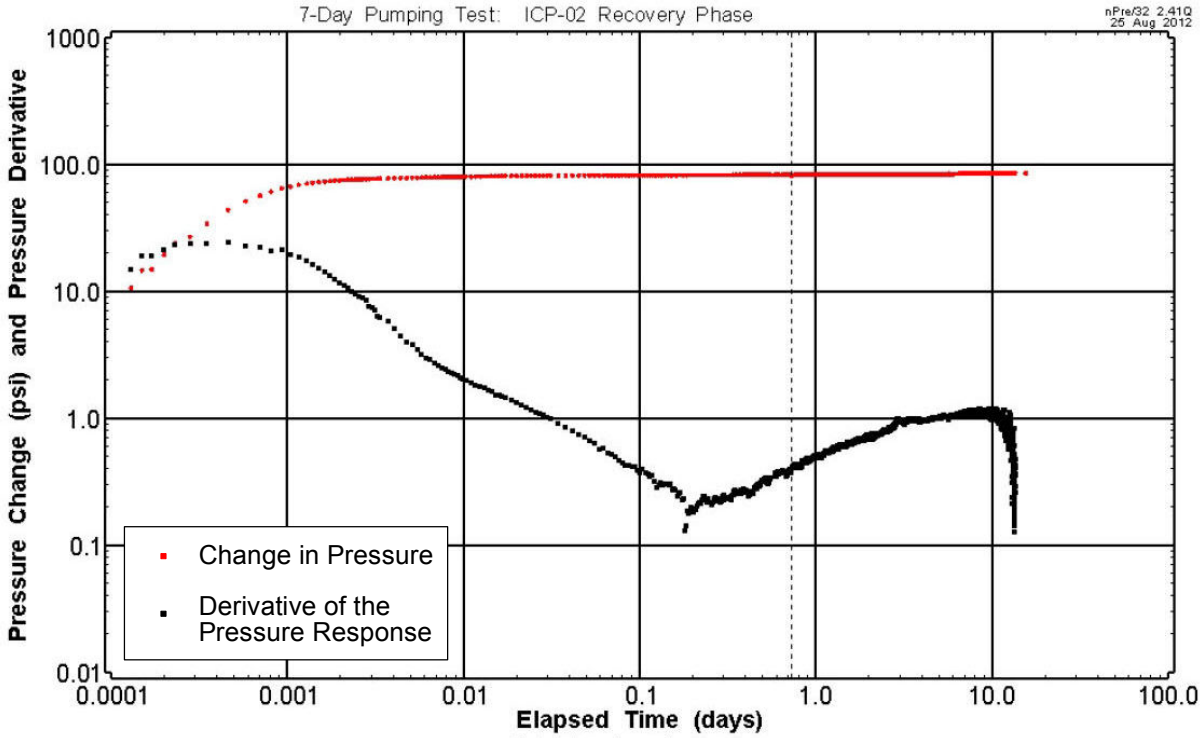
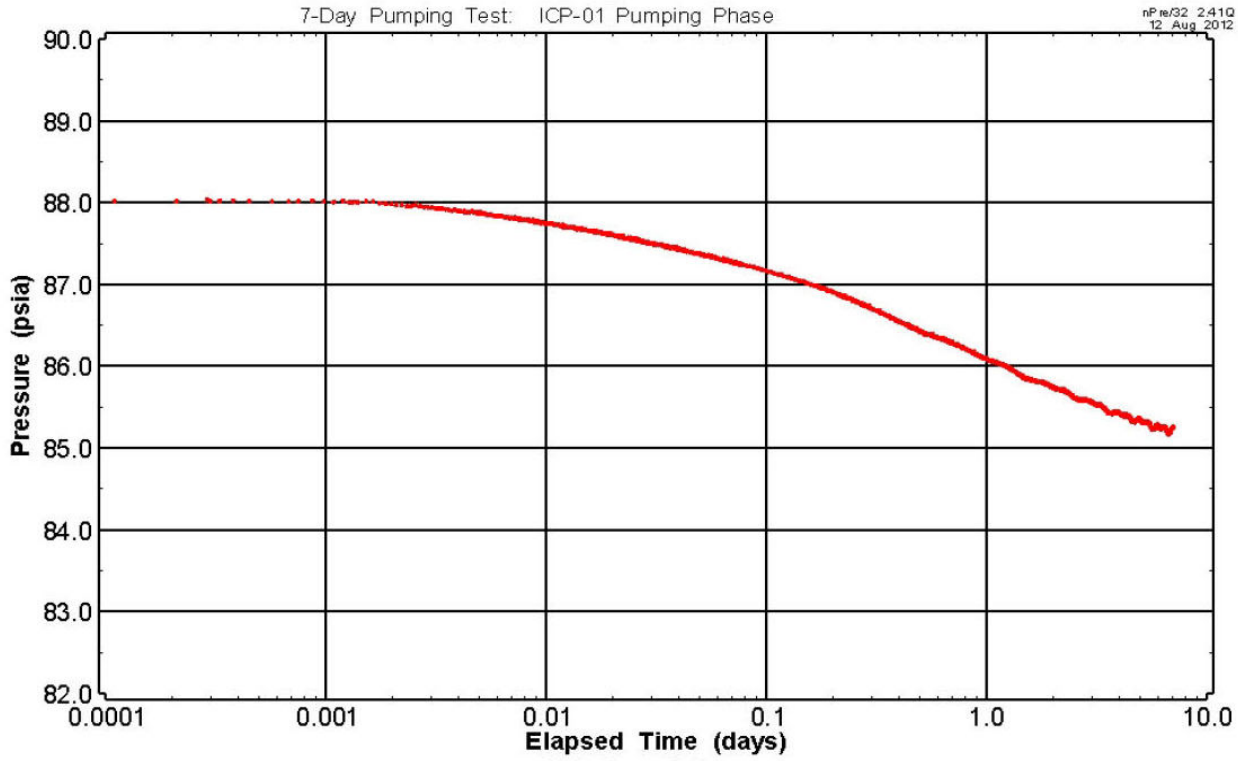


(b) Derivative

Figure 18
Pressure Plots for ICP-WS-02, Recovery Period
ICP Water Development Project

INTERA

FILE: S:\Projects\ICP-001_Intercontinental_Potash\GIS\MapDocuments\AquiferTesting\Report\Fig18_ICPWS02_pressure_recov.mxd 11/19/2012



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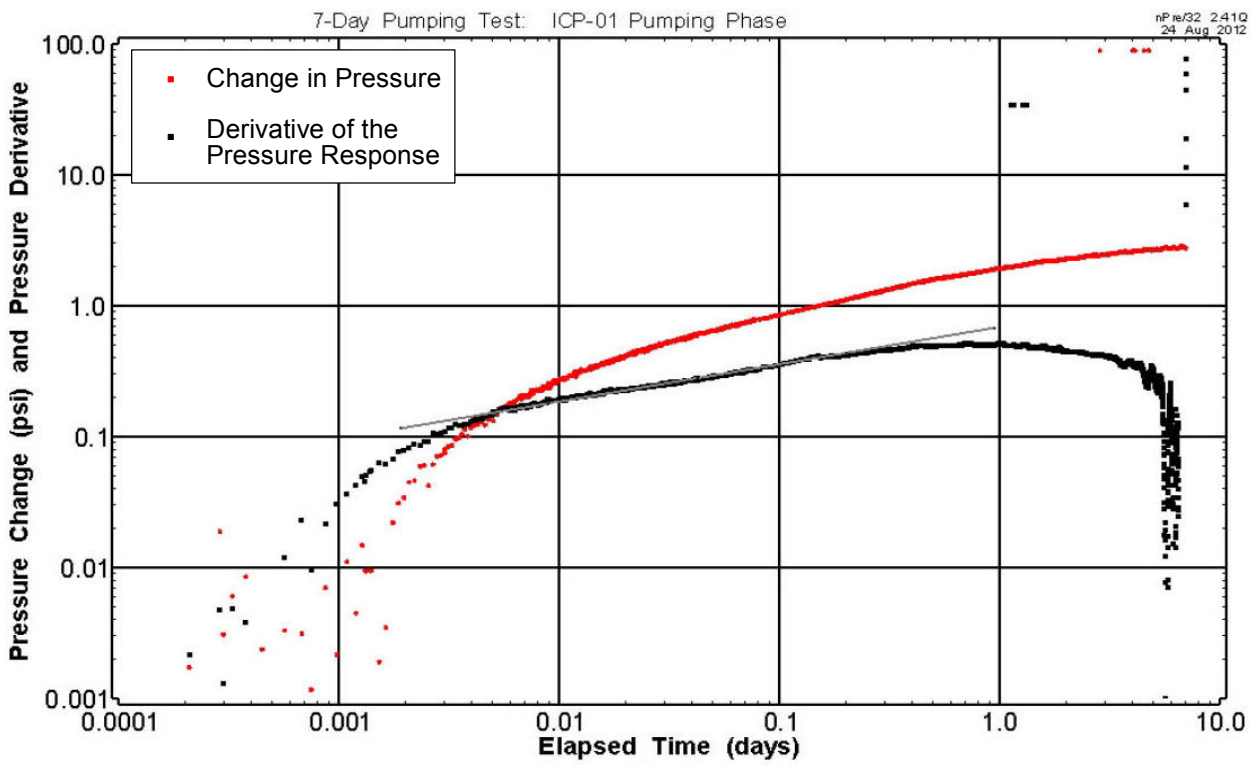
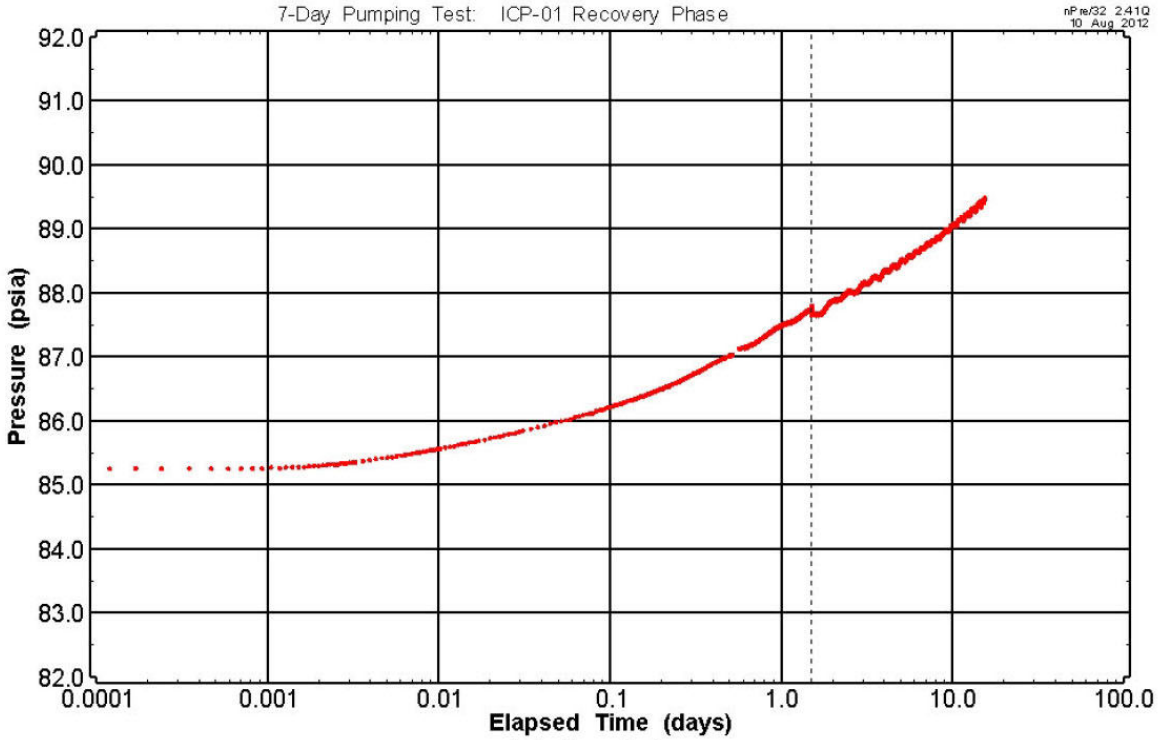


(b) Derivative

Figure 19
Pressure Plots for ICP-WS-01, Seven-Day Constant Rate Test
ICP Water Development Project



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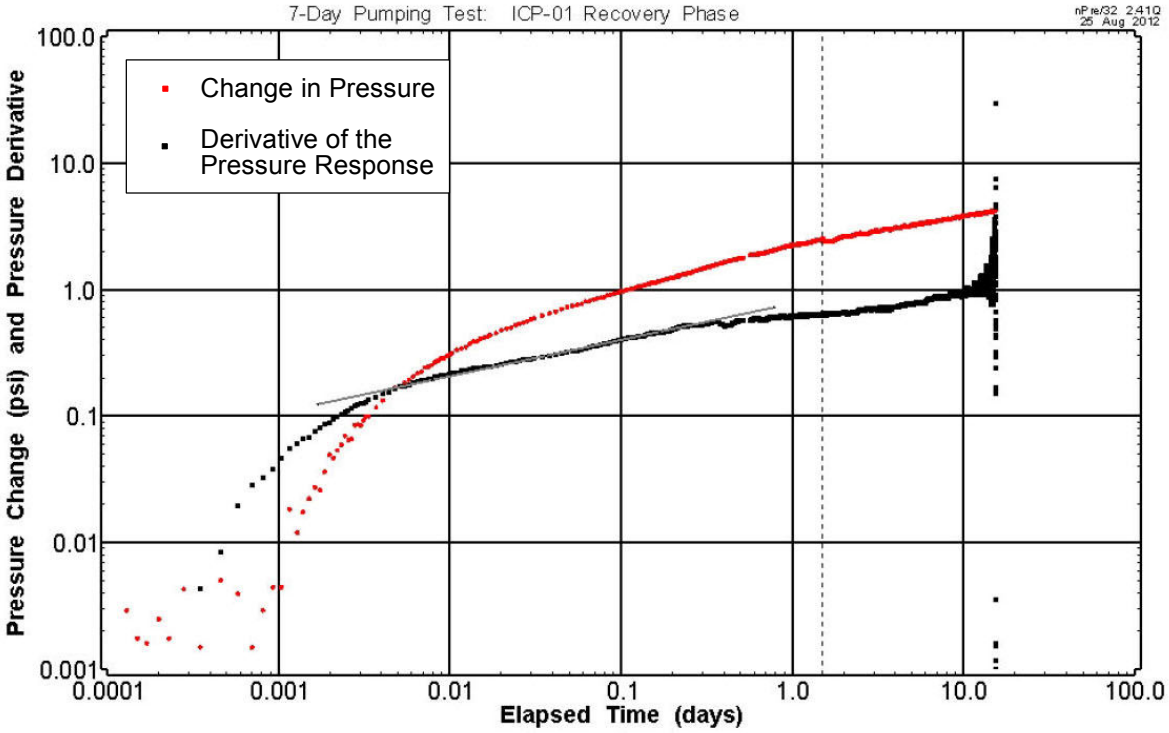
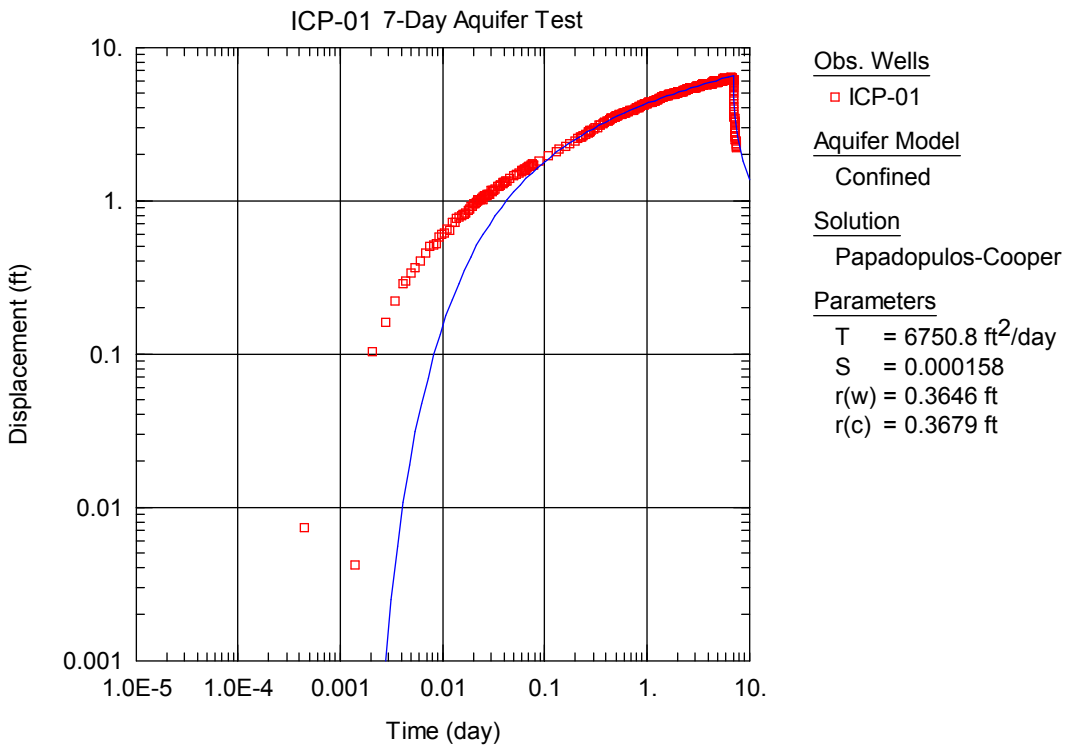
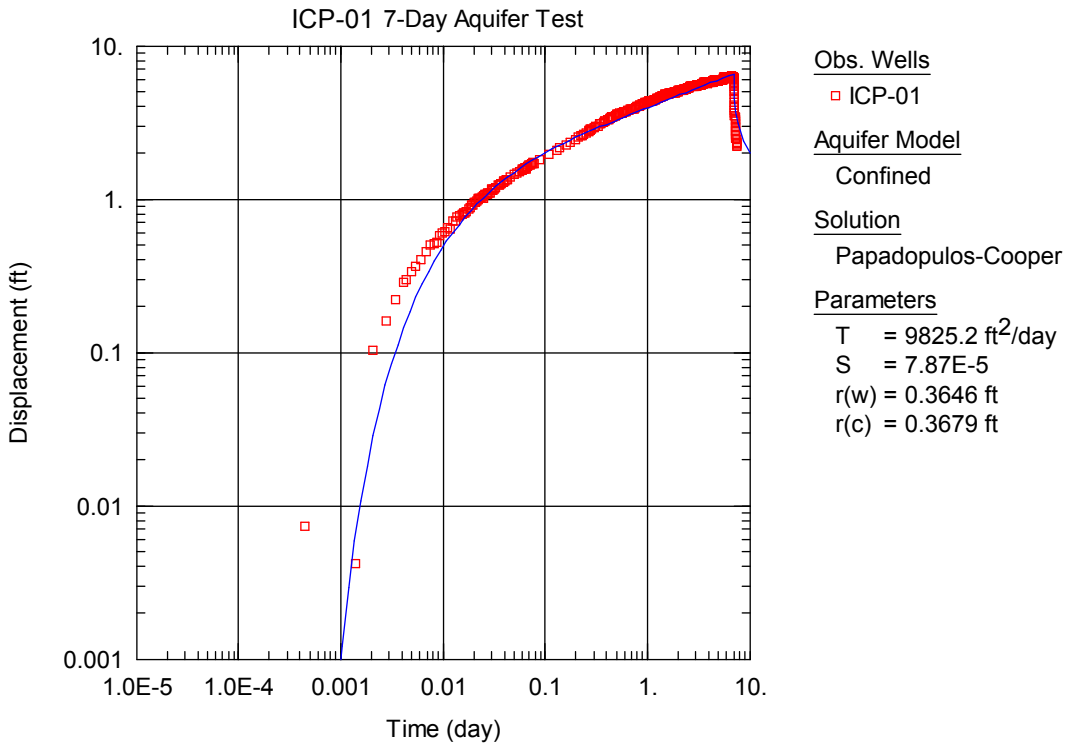


(b) Derivative

Figure 20
Pressure Plots for ICP-WS-01, Recovery Period
ICP Water Development Project

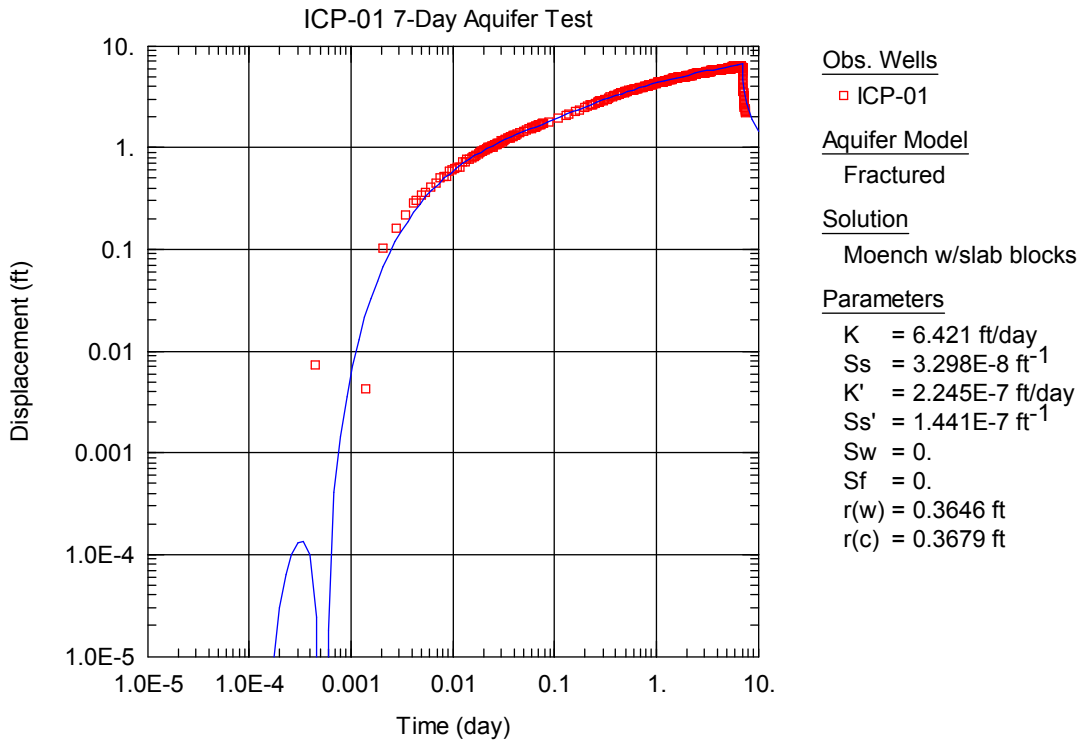


(a) Without Lateral Flow Boundaries

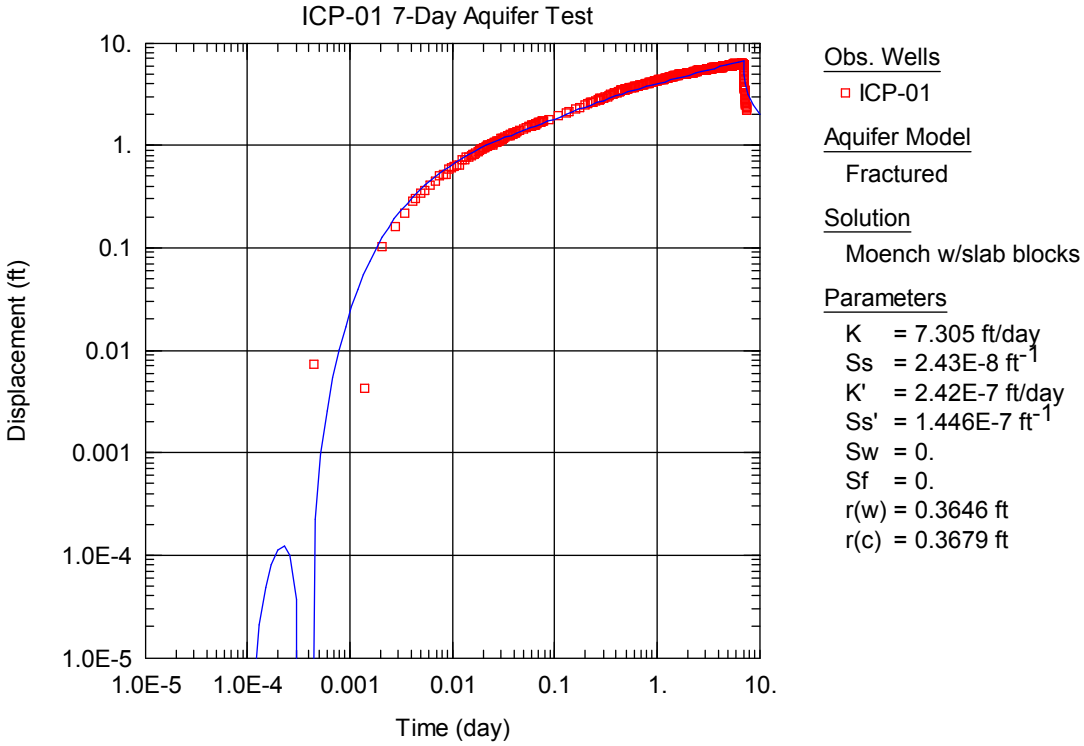


(b) With Lateral Flow Boundaries

Figure 21
ICP-WS-01, Papadopulos-Cooper Solution Method, Seven-Day Constant Rate Test
ICP Water Development Project

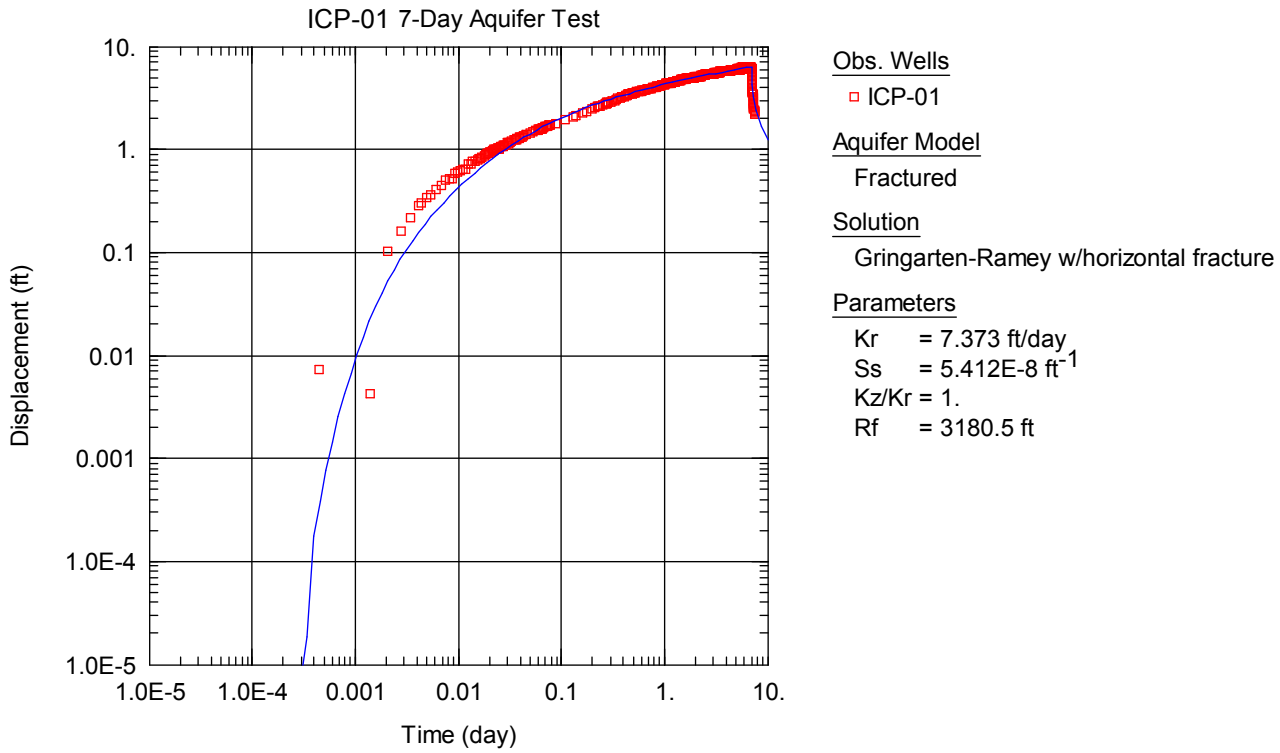


(a) Without Lateral Flow Boundaries

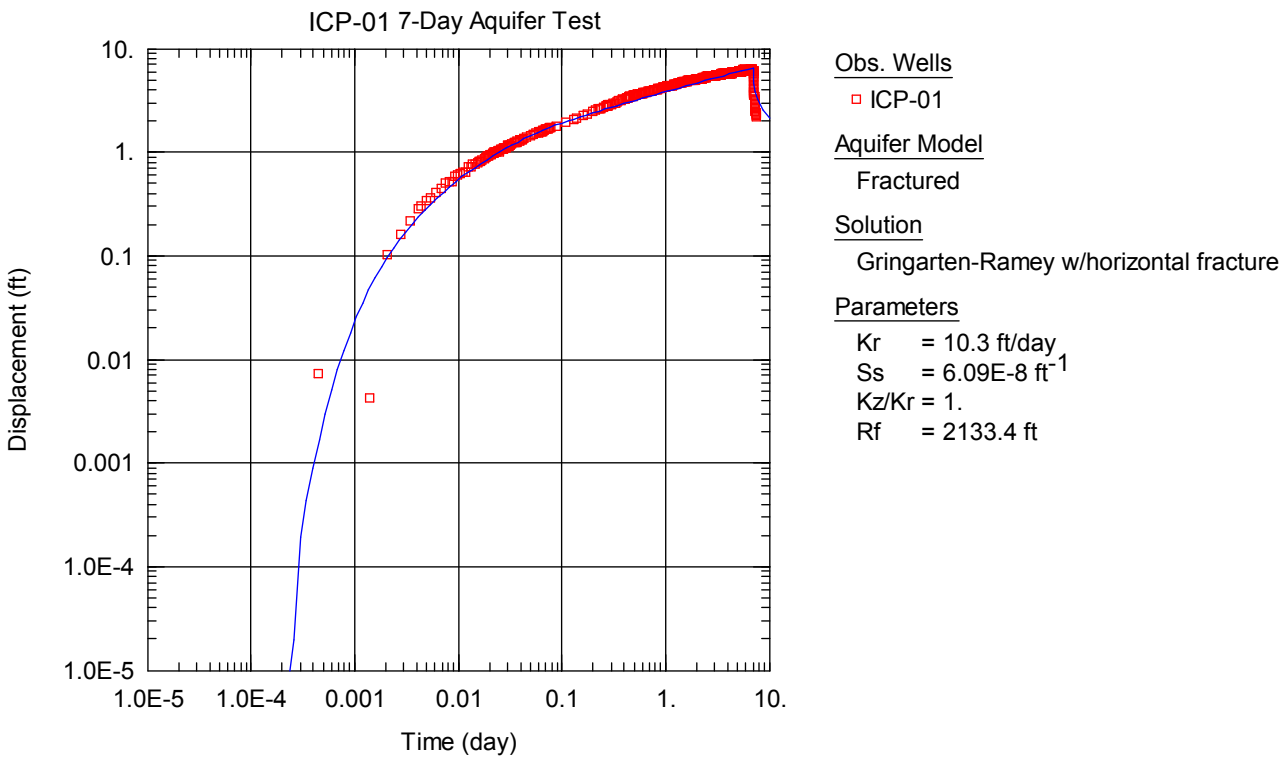


(b) With Lateral Flow Boundaries

Figure 22
ICP-WS-01, Moench Solution Method, Seven-Day Constant Rate Test
ICP Water Development Project

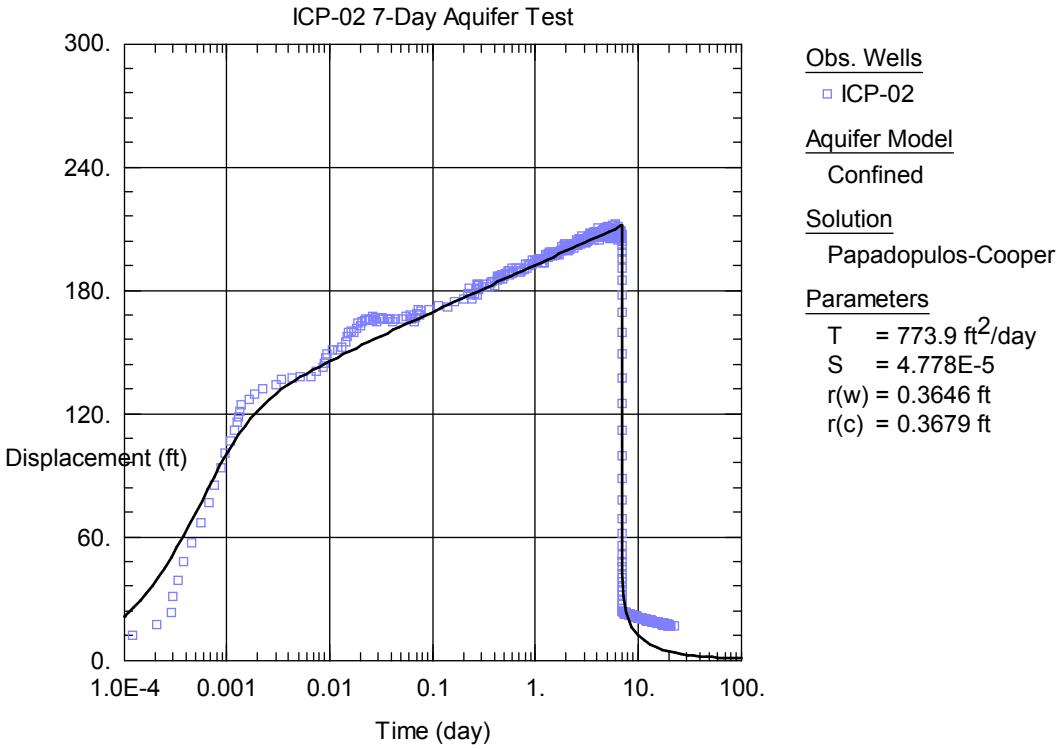


(a) Without Lateral Flow Boundaries

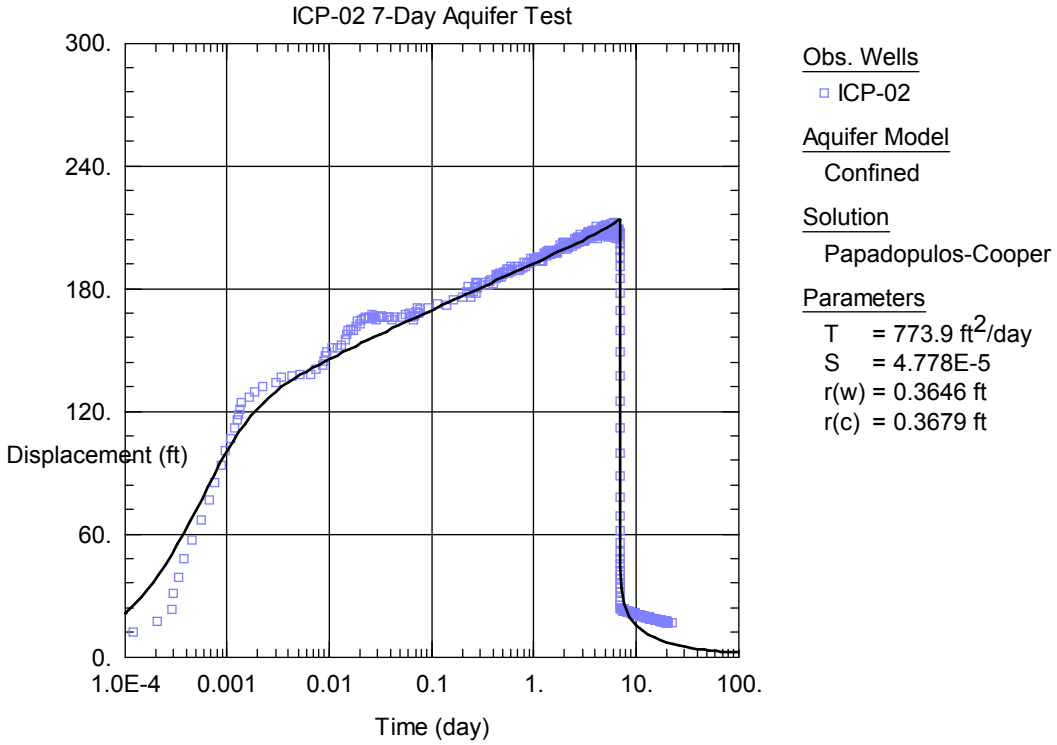


(b) With Lateral Flow Boundaries

Figure 23
ICP-WS-01, Gringarten-Ramey Solution Method, Seven-Day Constant Rate Test
ICP Water Development Project

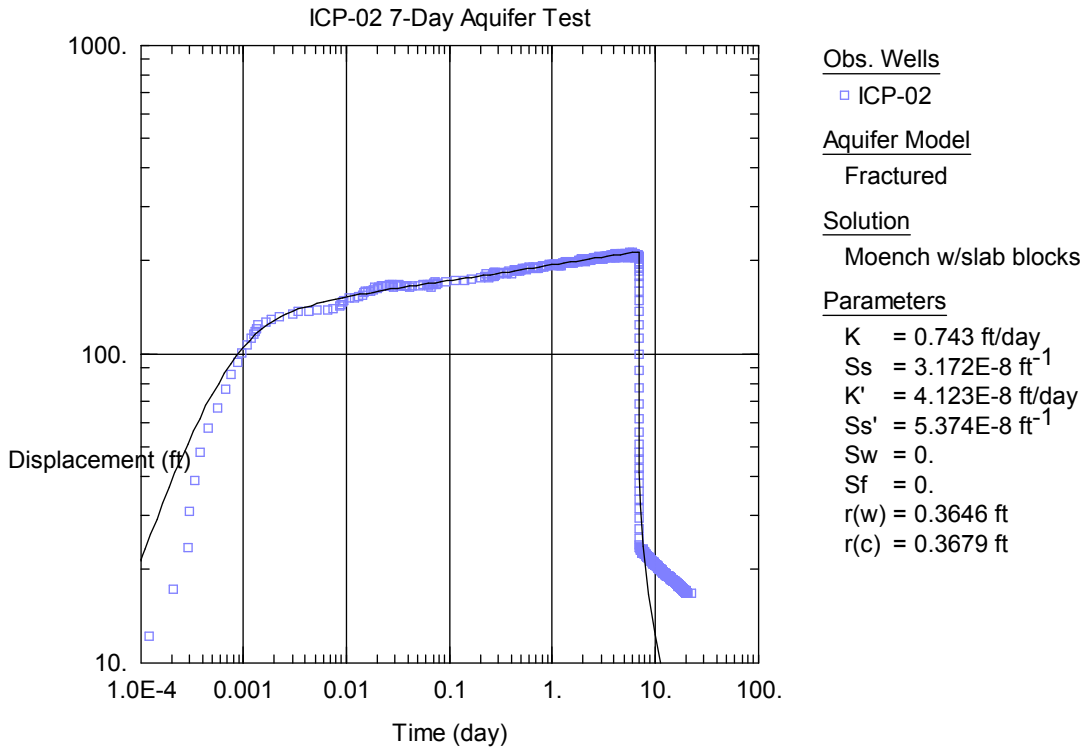


(a) Without Lateral Flow Boundaries

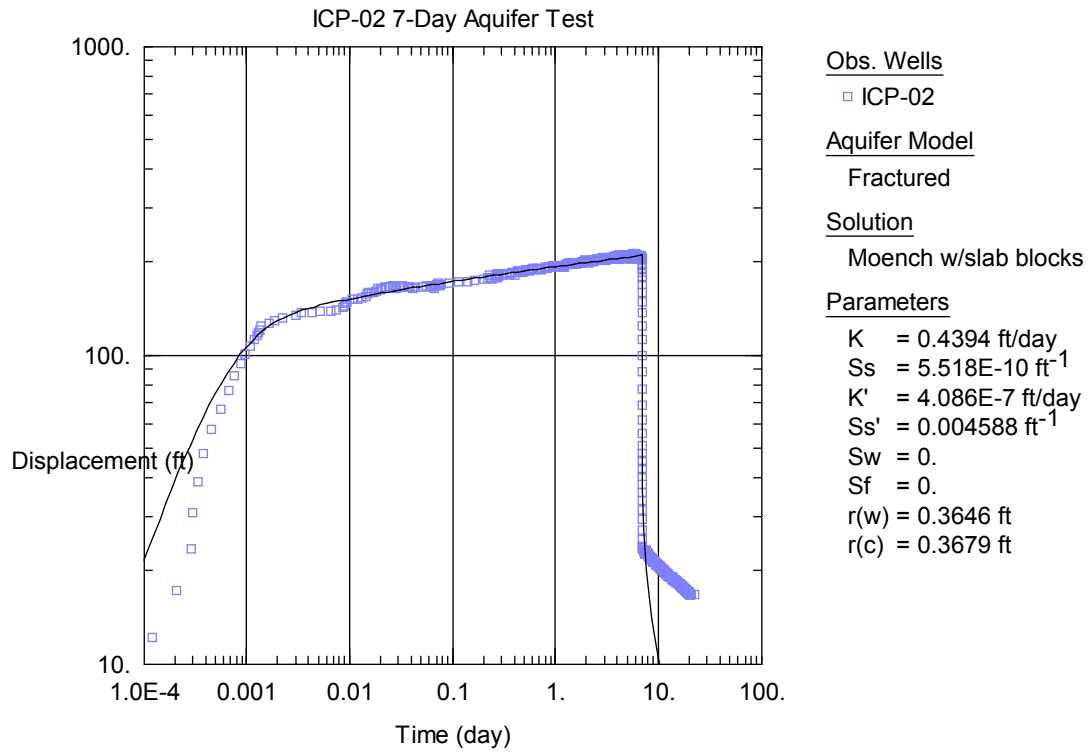


(b) With Lateral Flow Boundaries

Figure 24
ICP-WS-02, Papadopulos-Cooper Solution Method, Seven-Day Constant Rate Test
ICP Water Development Project

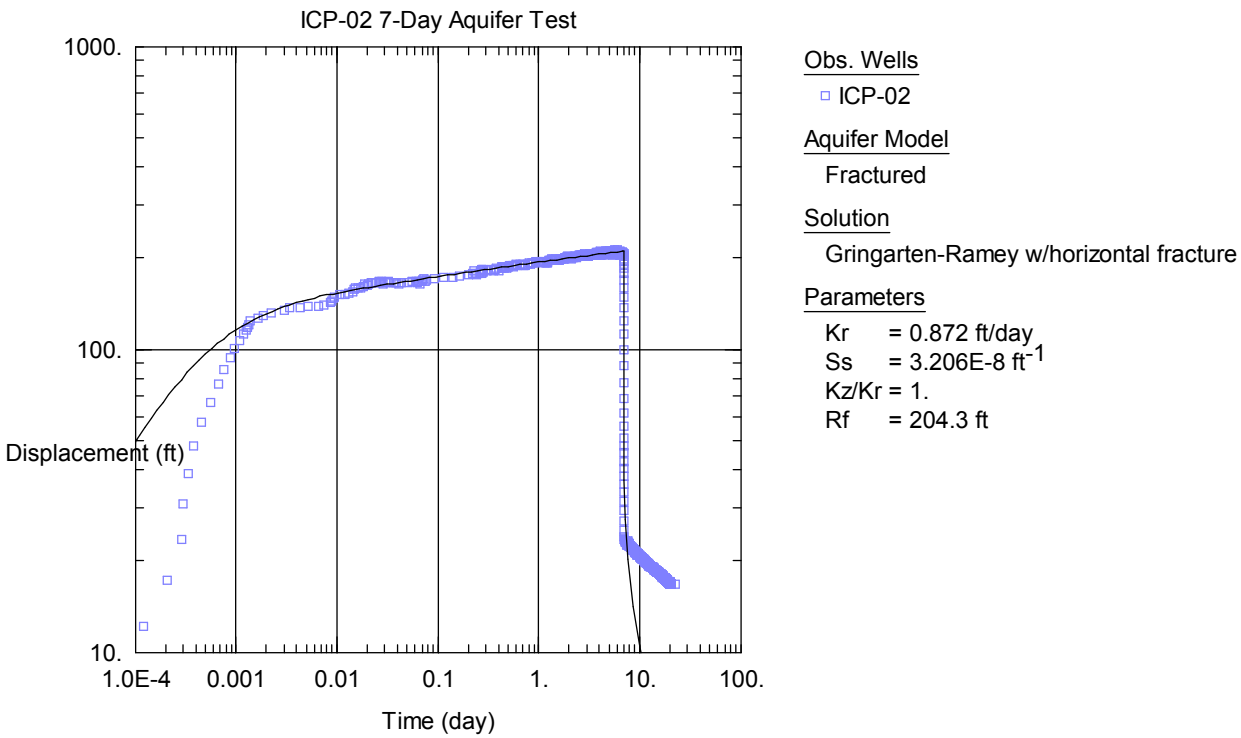


(a) Without Lateral Flow Boundaries

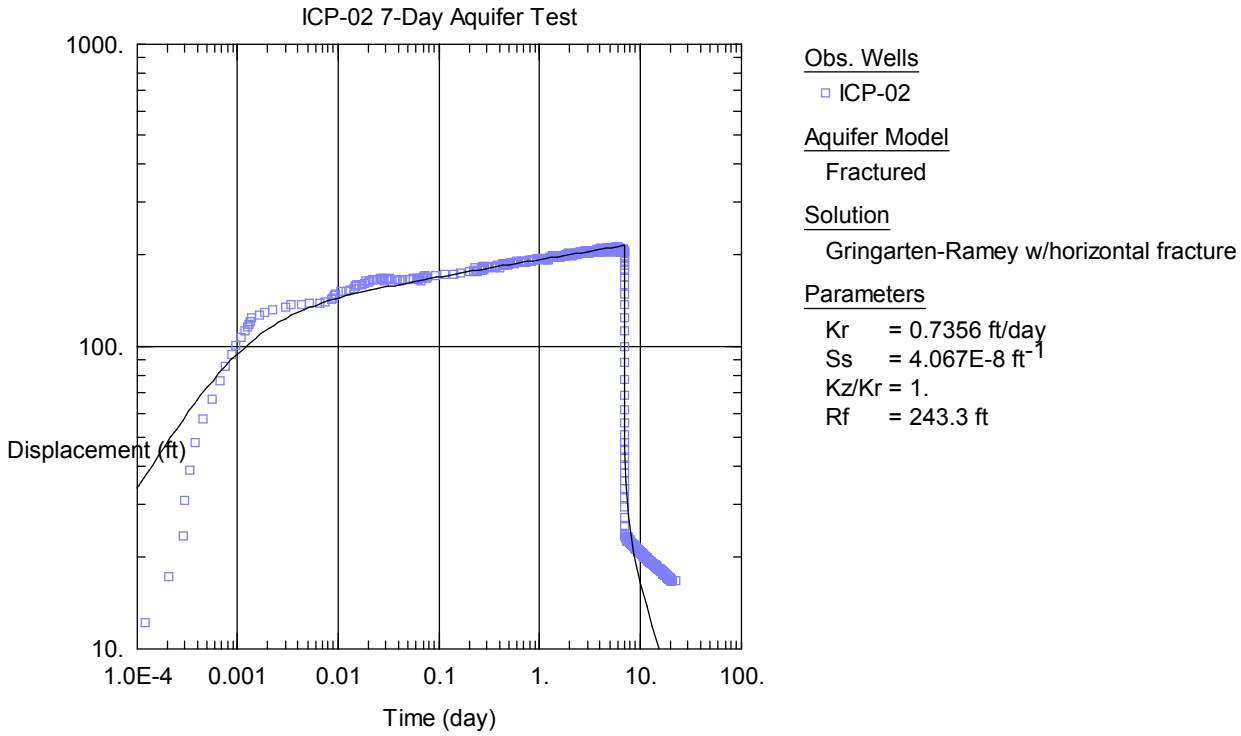


(b) With Lateral Flow Boundaries

Figure 25
ICP-WS-02, Moench Solution Method, Seven-Day Constant Rate Test
ICP Water Development Project



(a) Without Lateral Flow Boundaries



(b) With Lateral Flow Boundaries

Figure 26
ICP-WS-02, Gringarten-Ramey Solution Method, Seven-Day Constant Rate Test
ICP Water Development Project

APPENDIX A

Aquifer Test Work Plan

Final Aquifer Test and Groundwater Sampling Work Plan, Ochoa Mine Project, Lea County, New Mexico

Submitted To:

U.S. Department of Interior Bureau of Land Management
Carlsbad Field Office
620 E. Greene Street
Carlsbad, NM 88220

Prepared for:

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INTERA

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Suite 220
Albuquerque, NM 87110

October 14, 2011

TABLE OF CONTENTS

1.0 INTRODUCTION 1

1.1 Background 2

1.1.1 Geology 2

1.2 Well Drilling and Construction 3

1.3 Aquifer Testing Theory 4

1.3.1 Test Site Layout and Field Trailer 5

1.3.2 Water Discharge Management and Containment 5

1.3.3 Instrumentation in the Wells 6

1.4 Health and Safety and Site Security 7

2.0 DESCRIPTION OF TEST PROCEDURE 8

2.1 Task 1: Pre-Test Flow 8

2.2 Task 2: Pre-Test Background Data Logging 8

2.3 Task 3: Step Drawdown and Recovery and Specific Capacity Test 9

2.4 Task 4: Drawdown Test 11

2.5 Task 5: Recovery Period Approximately 21 Days (Three Times the Flow Period) 13

2.6 Task 6: Interpretation of Test Results and Report of Findings 13

3.0 TEST OPERATIONS 14

3.1 Data Collection and Record Keeping 14

3.1.1 Data Logger Data 14

3.2 Forms 15

3.3 Data Collection Schedule 16

4.0 GROUNDWATER SAMPLING 17

4.1 Sampling for Groundwater Quality 17

4.2 Field Methods for Groundwater Sampling 19

4.3 Field Calibration 20

5.0 REFERENCES 21

FIGURES

Figure 1 Conceptual Well Field
Figure 2 Capitan Reef Cross Section
Figure 3 Schematic Well Design, ICP-WS-01 and ICP-WS-02
Figure 4 Aquifer Test Site Layout
Figure 5 Proposed Surface Plumbing Diagram

TABLES

Table 1 Exploration Well Specifications
Table 2 Field Parameters
Table 3 Analytical Parameters and Analysis Methods for Aqueous Samples Collected from Aquifer Test Well ICP-WS-01

APPENDICES

Appendix A Field Forms
Appendix B Personnel Roles and Responsibilities and Contact List

1.0 INTRODUCTION

Intercontinental Potash Corp. (ICP), an American company, is proposing to construct and operate the Ochoa Project. The Ochoa Project is an underground polyhalite mine that would be located about 60 miles east of Carlsbad, New Mexico and less than 20 miles northwest of Jal, New Mexico. Polyhalite from the Ochoa Project would be used to produce sulfate of potash (SOP). SOP is a non-chloride-based potash fertilizer that is used in the fruit, vegetable, tobacco, potato, and horticultural industries, and for agriculture in saline and dry soils and soils in which a variety of crops are cultivated.

The Ochoa Project requires water for both ore processing and the plant facilities building. Water would be supplied by developing brackish groundwater in the Permian-age Capitan Formation. Of the total supply required for the Project, approximately 73 percent of the total supply would be used for ore processing and 27 percent of the total supply would be treated to drinking water standards and provided to the plant facilities building.

This aquifer test and groundwater sampling work plan (Work Plan) describes the field methods for conducting a constant rate drawdown and recovery test and sampling groundwater from two proposed wells that would produce water from the Capitan Formation, ICP-WS-01 and ICP-WS-02 (Figure 1). The well name label "WS" denotes that the well is for water supply. Each well would be installed, owned and operated by ICP. The purpose of the aquifer test and groundwater sampling is to determine aquifer properties of the water-bearing Capitan Formation. Despite the long a history of groundwater withdrawals from the Capitan Formation for secondary oil recovery projects, municipal water use, and irrigated agriculture, little is known in the area of interest about its hydraulic properties such as transmissivity, hydraulic conductivity, storativity, specific storage, and specific yield, all of which are critical or useful for assessing potential impacts from proposed pumping associated with the Ochoa Project on water levels, pumping yields, and on other water rights holders. The data generated from this test will be used in support of the Hydrologic Impact Assessment described in the Bureau of Land Management Environmental Impact Statement, the notice of intent filed with the New Mexico Office of the State Engineer to pump the water, and the feasibility study prepared for the project.

This Work Plan covers the aquifer test equipment and methods, followed by the groundwater sampling procedures. This Work Plan assumes that ICP-WS-01 will be drilled and preliminary testing will confirm the necessity and benefit of installing the second well, ICP-WS-02. ICP-WS-02 will be drilled and completed in a location such that combined drawdown from the two wells is acceptable over the life of the wells, which is assumed to be fifty years. The distance between the wells has been estimated at 2,000 ft based on preliminary drawdown calculations. ICP-WS-01 is the flowing or pumping well and ICP-WS-02 is the observation well. This Work

Plan defines the test program for the first two wells but may apply to any additional testing in the event that other wells are installed in the wellfield.

The basic well testing program will consist of the following tasks:

- Conduct a pre-test flow to test pump, instrumentation, and plumbing.
- Conduct background water level monitoring for at least 7 days.
- Conduct a step drawdown test to measure the specific capacity of ICP-WS-01 (sustainable flow rate per foot of drawdown) and determine a sustainable flow rate for the primary test. Based on results of this step drawdown and specific capacity test, ICP will decide to drill or not to install the second well, ICP-WS-02.
- Assuming the second well is installed and using the two wells, conduct a seven-day (168 hour) drawdown and 21-day (or until 90% recovery) recovery test, recording the change in water level or pressure response throughout the drawdown and recovery periods.
- Direct the test flow water to a lined pond located on site near the pumping well.
- Analyze the drawdown and recovery data to estimate hydrogeologic parameters of hydraulic conductivity, transmissivity, specific capacity, and storativity.
- Evaluate the long-term well behavior based on the initial test results to determine if reservoir stimulation, such as acidizing or fracturing, would be necessary or beneficial.

Each of these subtasks is described in more detail below.

1.1 Background

1.1.1 Geology

The groundwater resource target is the Permian-age Capitan Formation (Capitan). The Capitan forms a portion of what is known as the Capitan margin or the Capitan reef complex (Harris, 2009). The exact well locations are yet to be determined, but they are expected to be located in the area identified on Figure 1. The first well, ICP-WS-01, will be completed in the Capitan and will serve initially as a test well but, if successful, also as a production well. The well will be located in proximity to another well, ICP-WS-02 (the observation well for the aquifer test and also a production well) completed in the same zone (the Capitan Formation) so that during aquifer testing, measurable drawdown will occur in the observation well.

The depth to the top of the Capitan Formation and its thickness vary depending on location. For example, in a cross section based on oil well geophysical logs, the depth to the top of the Capitan Formation varies between 3755 ft (Lea State “GB” No. 1) and 3940 ft (Federal Davison No. 1) or 4730, as interpreted by Harris (2009), while the thickness of the Capitan Formation varies

from nearly 1400 ft near its western edge to just over 600 ft on the eastern edge as interpreted by Harris (2009). This change in thickness takes place over a horizontal distance of approximately eight miles and is the result of the natural reef development, with the thickest portion near the basin (to the west) and the thinnest part near the shelf (to the east). Rocks of the Seven Rivers and the Yates Formations (within the Artesia Group) as interpreted by Harris, have been interpreted by others (Hiss, 1973, Standen et al., 2009) as part of the Capitan Formation, although the physical and hydrogeologic properties of these formations and the Capitan Formation may be substantially different. A geologic cross section showing the reef depth and thickness, as well as the lateral stratigraphic changes from limestone to dolomite within time-equivalent intervals is presented in Figure 2.

1.2 Well Drilling and Construction

Access to the wells, which are to be located on New Mexico State Trust land, will be via county roads and secondary gravel roads that are used in the oil and gas fields near the wells. Table 1 summarizes the drilling and construction information for the two exploratory groundwater wells and provides general groundwater chemistry of the producing zones. It is the intention of ICP to use these exploratory wells as groundwater supply wells for the mine, should results of the test be favorable. Figure 3 is a schematic of the well construction. As-built well specifications are presented in Table 1 (to be filled in after wells are drilled).

Table 1
Exploration Well Specifications

Specifications	ICP-WS-01	ICP-WS-02	Comments
Location Latitude	32 14 44.404 N	TBD	Subject to NM OSE permit approval
Location Longitude	103 20 39.950 W	TBD	Subject to NM OSE permit approval
Section Township Range	Township 24S, Range 35E, Section 2, SW, NW	Township 24S Range 35E, Section 2, SW, SW	
Drilling Dates			To be determined
Well Construction Completion Date			To be determined
Total Depth, ft bgs	5600	5600	Estimate based on Hefner 11 Comm. 1 geophysical log, includes 100 ft additional depth for geophysical logging tools and sump
Producing Zone Length, ft	1175	1175	Estimate

Specifications	ICP-WS-01	ICP-WS-02	Comments
Capitan Formation depth interval	4325 - 5500	4325-5500	Estimate based on Hefner 11 Comm. 1 geophysical log
Depth to water, below measuring point			To be determined
Flow Rate, gpm			To be determined
Water Temperature at Surface, degrees Fahrenheit			To be determined

gpm = gallons per minute
ft = foot/feet
bgs = below ground surface

1.3 Aquifer Testing Theory

Well tests are performed to provide an estimate of hydraulic properties of a formation, identify changes in the hydraulic properties, and to identify aquifer boundaries. A number of well testing techniques exist including slug or pulse tests, constant pressure tests and constant rate tests. For all types of testing the estimated hydraulic properties will be an average of the properties within the tested volume of the formation. Slug and pulse tests will only provide estimates of the properties immediately around the test well. Single well constant pressure and constant rate tests can test a greater extent of the formation, and may indicate the presence of boundaries and other heterogeneities. In general, a constant rate test with one or more observation wells will provide the best estimate of the hydraulic properties and can test the greatest extent of the formation. The actual extent of the formation that is tested depends on the formation properties and the duration of the test.

In a constant rate test, water is produced from the test well (or pumping well) at a constant rate and the pressure response is recorded in the test well and in any observation wells. The pressure response in the test well will be determined by the formation properties, and the properties of the well itself. The response in the observation well will depend on the pressure response of the formation at the test well and the properties of the formation in the vicinity of the test and observation wells.

The pressure response of the test and observation wells can be analyzed by fitting the data to a specific theoretical response or by using a numerical simulator to match the data, but numerical simulators allow more flexibility. In either case, assumptions must be made about the flow regime in the formation. The flow regime can be evaluated by comparing the pressure response to known theoretical responses for different conditions. The pressure derivative diagnostic plot is particularly useful for this purpose because it accentuates the visible changes in the slope of the plotted curve, allowing for the diagnostic interpretation.

The primary analysis tool for this test will be an analytical model software package such as Aqtesolve (Hydrosolve, 2011).

1.3.1 Test Site Layout and Field Trailer

The well site will have been cleared and leveled for the drilling operation and must be maintained as a safe, even ground surface for access and work during the aquifer test. The layout of the wellhead pad and supporting equipment is presented in Figure 4.

The area directly around the wellhead will be covered with a layer of crushed rock to provide a clear, open, and mud-free work area for reading pressure gauges, adjusting flow, and collecting water samples from the well-head assembly. The data logger instrumentation panel will be housed in a below-ground metal vault with a locking lid, large enough for a person to access during set-up of the data logger and electronic flow meter system.

An on-site field trailer will be provided for use during the aquifer test. A buried communication line will be connected from the instrument vault to the field trailer for real-time monitoring and downloading of the test data. Lighting will be provided around the well head during the night shift. The trailer will have power for lighting, computers, and temperature control provided by a dedicated generator and fuel tank located outside the trailer. The entire well site will be fenced with a 6-foot high chain link fence and gate with combination padlock.

1.3.2 Water Discharge Management and Containment

The estimated volume of water that will be produced during the step drawdown test and the seven-day test is approximately 6.1 million gallons or approximately 19 acre feet, assuming a test flow rate of 600 gpm. Based on total dissolved solids (TDS) concentrations reported by Hiss (1971), it is expected that the water produced during the test will be in the order of 10,000 ppm TDS. This TDS is further supported by water samples from the Jal Water System wells (producing from the Capitan Formation) 1 through 7 which have an average TDS of 10,090 mg/L. It is unlikely that the water produced during the aquifer test can be discharged to ground surface because New Mexico Environment Department (NMED) regulations define protectable groundwater as having a TDS concentration of less than 10,000 ppm TDS and applying groundwater with greater concentrations of TDS could have an adverse effect on shallow groundwater resources. The option to dispose of the water in an injection well was evaluated but was logistically prohibitive due to the number of trucks that would be needed to transport the water to a disposal facility near Jal, NM in order to keep pace with the design flow rate. Such an arrangement would make the aquifer test dependent on a trucking and disposal operation, which could put the success of the test at risk. INTERA is currently in discussions with the NMED to obtain a Temporary Discharge Permit to discharge the water to an engineered containment

reservoir to be constructed near ICP-WS-01. The reservoir would hold the water until it is evaporated.

1.3.3 Instrumentation in the Wells

For the purposes of this Work Plan, ICP-WS-01 is the "pumping well." It will be outfitted with an electric submersible pump capable of producing up to approximately 600 gpm. The depth to water in this well will be measured with an electronic water level measuring device and the pump and test instrumentation will be installed with respect to this measured water level. The pump depth will be initially set approximately 500 ft below the water elevation and adjusted according to the drawdown observed during the pre-test flow period. This pump will be positioned below the depth of maximum expected drawdown during the aquifer test. The pump will require power supplied by a generator and diesel fuel. The generator, fuel, and other mechanical systems will be supplied by a subcontractor. The pump operations, including maintaining the constant flow rate during the test, will be operated and maintained by INTERA. This well will be equipped with two, 2-inch diameter outlets at the wellhead, each controlled with a gate valve. The two outlets will be plumbed to a four-inch-diameter pipe equipped with a gas trap and gas release valve, a series of in-line pressure gauges, two flow meters, and two flow control gate valves. A plumbing and instrumentation diagram is presented in Figure 5. Flow downstream from the valve then splits through a tee fitting to two 2 5/8-inch inside diameter poly (HDPE) pipes that conducts the flow to the water storage reservoir near ICP-WS-01. The gate valve and the flow control valve controls the flow rate through the poly pipe.

ICP-WS-01 will be instrumented with a GeoKon vibrating wire piezometer, or equivalent, to measure pressure and temperature at approximately 50 ft above the level of the pump. During the test, the pressure and temperature will be recorded by a data logger programmed to take a reading whenever the pressure changes by more than 0.1 psi, or at a maximum specified interval of ten minutes. The pressure transducer will be installed in a down-hole drop-pipe set below the pump, with the depth to be determined based on well behavior as described above. The drop pipe acts as a stilling well to protect the data logger and transducer from pumping noise, resulting in more consistent data. A barometer will also be placed in the instrument vault near the well head to measure atmospheric pressure at the surface. All of the depths for down-well equipment identified in this work plan may be adjusted according to actual field measurements of water level and drawdown as measured during the pre-test flow period. A 50-watt solar panel may be used to feed the battery supporting the data logger and transducer. Note that if the well is flowing artesian to the surface, the tubing will be filled with brine to overcome artesian head in the tubing.

In addition to the measurements recorded by data loggers, pressure gauges will be installed to monitor the pressure at the wellhead and across the other valves in the line. The surface piping is

instrumented with a transducer to measure pressure at the wellhead and a totalizing flow meter with an electronic signal output to the data logger. A second flow meter is a mechanical flow meter used as a backup, positioned in line downstream of the electronic flow meter.

The pressure in ICP-WS-02 will be recorded by a logging transducer identical to the one in ICP-WS-01 installed at a depth to be determined by preliminary calculations of the expected drawdown in the observation well. The data logger will be supported by a battery fed by a solar panel.

A sampling port and valve are located in the wellhead surface piping to collect water quality parameters and water samples. The water quality parameters pH, electrical conductivity, oxidation and reduction potential, and dissolved oxygen will be collected using a flow-through cell and water samples for laboratory analysis will be collected three times during the flow test period. The analytical suite is presented in Section 4 of this Work Plan and the water sampling will take place once prior to the start of the test, once after approximately three days, and once approximately six days after the start of the test. Note that the water may need to be cooled to a maximum of 100 degrees Fahrenheit before measurement of parameters to prevent damage to the parameter measurement probes. The cooling procedure is described in more detail in Section 4 of this Work Plan.

1.4 Health and Safety and Site Security

A project-specific Health and Safety Plan (HASP) will be prepared for this project for INTERA personnel and will be provided under separate cover. A copy of the HASP will be kept in the on-site office for reference. Anyone who visits the site is required to obtain a safety briefing from the project manager or site safety manager. A first aid kit, blood-borne pathogen kit, eye wash kit, and fire extinguisher will be available in the field trailer.

Cellular phone coverage is intermittent to non-existent on the site. A map to the nearest hospital is included in the HASP. Locations ICP-WS-01 and ICP-WS-02 will each be surrounded by a fence for security and the gate should be locked after dark and/or, when no one is on site.

2.0 DESCRIPTION OF TEST PROCEDURE

The test will consist of six tasks: 1) pre-test flow and pre-test recovery, 2) pre-test background monitoring, 3) step drawdown test with specific capacity test and recovery, 4) primary test flow, 5) primary test recovery and 6) interpretation of results. Each phase is essential to the overall success of the test and the quality of the analysis. Data quality assurance is essential for all test tasks. These tasks are described as follows:

2.1 Task 1: Pre-Test Flow

The objective of this task is to test all of the equipment in the system, including the plumbing, flow control valve, pressure gauges, flow meters, sampling ports, and water delivery system to the water storage reservoir. This task allows INTERA to examine the data recorded by the data logger and graph the data to determine the quality of the flow control valve operation.

The pre-test flow task procedure is as follows:

Step 1: Measure the depth to water from the top of casing for the pumping and observation wells, program and install the transducers, and correlate water column height reported by the transducer to water level elevation and depth. All flow rates and depth-to-water measurements and their time of observation must be recorded on a data sheet or in the field book.

Step 2: Start pumping the well at 100 gpm and continue pumping at that rate for up to three days, if necessary to evaluate all test systems. Stop flow to adjust equipment as needed. Check electronic flow meter and manual flow meter to confirm correlation of flow rates.

Step 3: Confirm data logger measurements by measuring depth to water with hand held measuring device hourly during this pre-test flow.

2.2 Task 2: Pre-Test Background Data Logging

This test phase consists of collecting water level data (pressure data) from the down-hole data logger over a period of approximately two weeks to develop an understanding of natural groundwater level fluctuations. This is an essential part of the test because it will allow the analyst to interpret the difference between water level changes due to the applied stress of the aquifer test versus changes associated with other causes such as changes in barometric pressure. The data logger will be programmed to record all measurements whenever the pressure at depth changes by more than 0.1 psi, or whenever a maximum fixed time passes since the last measurement (10 minutes).

The procedure for this task is as follows:

Step 1: Set data logger to record as described above.

Step 2: Download data once per day and check pressure changes.

Step 3: Review data from background monitoring to evaluate natural water level fluctuations.

2.3 Task 3: Step Drawdown and Recovery and Specific Capacity Test

The objectives of this task are to (1) confirm that the well can provide enough water for the intended use and that drilling the second well (ICP-WS-02) is warranted and necessary, (2) estimate the specific capacity of the well and allow preliminary calculation of expected drawdown over the life of the well for a given production rate, and (3) provide the data needed to select the flow rate for the seven-day aquifer test.

A step drawdown test consists of pumping the aquifer for relatively short time intervals at a number of increasing pumping rates. Each interval – constant pumping rate pair constitute a "step". Each interval should be of sufficient duration so that the drawdown in the pumping well levels out, i.e., the time rate of change of drawdown is small. Once drawdown has stabilized, the pumping rate can be increased to the rate for the next "step". After the final step has been completed, the pump is shut off and the recovery monitored in each well until equilibrium has been established.

The duration of each step will be the time necessary to show that drawdown has stabilized. Three steps are anticipated: 50 gpm, 100 gpm, and 150 gpm. INTERA staff will choose the rate for the next step by considering the amount of available drawdown remaining in the pumping well once drawdown has stabilized. The duration of the steps will be estimated after the initial flow period and stabilization at 50 gpm.

Both flow rate and water levels will be observed and recorded during the step drawdown test. The flow rate will be recorded visually from the electronic and mechanical flow meters every half hour on the well operation data form. The data logger will be programmed to record the water level based on the rate of drawdown in the well. For example, when the water level is changing rapidly, the measurements will be recorded at a high frequency, whereas when the water level is changing slowly, the measurements are less frequent. The data logger will be programmed to record a measurement when the pressure changes by 0.1 psi or every 10 minutes.

The procedures for the step drawdown and recovery test are as follow:

Step 1: Measure the depth to water from the top of casing for the pumping and observation well, program and install the transducers, and correlate water column height reported

by the transducer to water level elevation and depth. All flow rates and their time of observation must be recorded on a data sheet or in the field book.

Step 2: Start pumping at 50 gpm in accord with the start of the most rapid measurement frequency for the pumping well transducer. Measure and record the flow rate every half hour during each step. Check that drawdown does not exceed total available drawdown in the pumping well based on transducer and hand-held depth measurements.

Step 3: Once drawdown in the pumping well has stabilized (is increasing very slowly), move on to the next step.

Step 4: Repeat the actions in Steps 3 and 4 above for the remaining test "steps". Once drawdown has stabilized for the last step (highest pumping rate), shut off the pump.

The length of each step depends on the time needed for drawdown to level out. The constant rate test can begin once water levels have recovered to within 5 percent of the baseline value.

Based on well response from these tests, the amount of drawdown in ICP-WS-01 can be observed and the expected drawdown in the second well (the observation well) can be estimated for any given distance between the two wells. Based on the data gathered from this test, the location of ICP-WS-02 can be selected such that measurable drawdown is expected during the seven day test and such that future production from both wells will not cause excessive drawdown interference in the two wells.

The decision criteria for whether or not to drill the second well will be based on a specific capacity test that will be conducted as soon as possible after completion of the first well. This test and the related decision process are described below:

1. Drill and complete ICP-WS-01 including site preparation, rig mobilization, drilling, geophysical logging, casing, cementing, well completion, and well development.
2. Install data logger, transducer, electric submersible pump in the well and the electronic data logging flow meter at the well head and plan for water discharge and storage during specific capacity test.
3. Test ICP-WS-01 for specific capacity (feet of drawdown to reach nominal stabilization at given flow rate), at 100 gpm for 24 hours. This is a standard specific capacity time frame according to common water well testing practice and Driscoll (1986).

4. Evaluate the specific capacity test data and predict long-term drawdown at expected full capacity production (600 gpm) in ICP-WS-01 and in a potential second well (ICP-WS-02).
5. Based on these results and in consultation with ICP, decide to drill or not to drill the second well. Criteria would be the following:
    - Drill the second well: Specific capacity test and related calculations show sufficient water available to produce the required water volume with manageable long-term drawdown with respect to production pumping equipment and costs.
    - Not drill the second well: Tests show sufficient water from a single well to meet production requirements; tests show less water than expected due to various factors such as low porosity and permeability, lack of sufficient well development, need for formation stimulation (acidizing, fracturing, etc.) or other unknown factors.
6. If approved, the second well would be drilled as soon as possible and then the seven-day drawdown and recovery test would be completed, with ICP-WS-02 as the observation well.

2.4 Task 4: Drawdown Test

The objectives of this test are (1) estimate the transmissivity at ICP-WS-01 and between ICP-WS-01 and the observation well, (2) estimate the storage properties between ICP-WS-01 and the observation well, and (3) demonstrate whether flow is dominated by fracture or pore networks.

By pumping at a constant rate that is sufficiently high to cause drawdown in monitoring wells while not exceeding total available drawdown in the pumping well, the constant rate test can achieve its objectives. The pumping phase is estimated to require 7 days, but the duration may need to be extended until measurable drawdown is observed at the monitoring wells.

Measurements of flow rate and water level are to be made using the same methods adopted for the step drawdown test. It is critical to monitor the pump rate for any changes. The rate should be measured frequently and the rate and time of observation must be recorded on a data sheet or in the field book.

The pumping rate will be determined by INTERA's Senior Hydrogeologist from the step drawdown test, but is expected to fall between 500 and 600 gpm. The chosen rate must not allow drawdown in the well to fall below total available drawdown, i.e., at no time should drawdown leave less than 50 ft of water above the top of the pump. INTERA's Senior Hydrogeologist will

select the final pump rate based on a preliminary analysis of the step drawdown test data and the availability of test pumping equipment to provide the desired flow rate. Adjustments to the pumping rate can be made by INTERA field staff as necessary to ensure a useful amount of drawdown for the data analysis, while preventing a complete drawdown of the water column that might place the pump at risk of running dry. The new pumping rate and the time that it started must be recorded.

The seven (7)-day drawdown test period will be staffed full time by INTERA personnel. The staffing will take place in three shifts, as follows: Day Shift: 7:00 AM to 4:00 PM; Evening Shift: 3:00 PM to 12:00 AM; Late Night Shift: 11:00 PM to 8:00 AM. The reason for this level of effort is to ensure the constant rate of discharge from the wellhead and that all monitoring systems are operating properly. There will be a one-hour overlap in the shifts to allow staff to discuss test conditions with each other at the start of each shift and there will be approximately one hour of travel time at the beginning and end of each shift, assuming the field crew is staying in Hobbs, NM. During each shift, the flow rate will be checked no less frequently than every two hours, and adjusted, if necessary.

The procedure for completing this test is as follows:

Step 1: Measure the depth-to-water from the top of casing for the pumping and monitoring wells, program the transducers, and correlate water column height reported by the transducer to water level elevation and depth.

Step 2: Start pumping at the selected rate. Record the flow rate every half hour for the first four hours and at maximum of two-hour intervals thereafter. Verify that the flow rate is as constant as possible and adjust flow rate as needed. Check that drawdown does not exceed total available drawdown in the pumping well. Hand measure water levels at ICP-WS-02 at least once per shift.

Transducer data should be downloaded to the field laptop as frequently as possible, at least twice per day, and the data saved to a third device (e.g., CD, flash memory, e-mailed to another computer, etc.) Confirm data logger measurements by measuring depth to water periodically with the hand-held water level indicator. All transducer data should be e-mailed the INTERA Albuquerque office (rsengebush@intera.com) by 8 AM for review.

Step 3: A decision must be made by INTERA's Senior Hydrogeologist in consultation with INTERA field staff as the pumping phase nears seven (7) days. If significant drawdown is observed in the observation well by the end of seven (7) days of pumping and that drawdown stabilized (as for the step test), then the pump can be

shut down and the recovery phase can begin. Otherwise, the pumping phase must be extended until drawdown is observed in the observation well. Monitoring of flow rates and water levels should continue as before.

2.5 Task 5: Recovery Period Approximately 21 Days (Three Times the Flow Period)

This task consists of traveling to the site (approximately) every two days to download the data loggers. Although this is an important part of the test, the test data analysis from the drawdown portion of the test will begin and run concurrently with the recovery period. The recovery period of 21 days was established to ensure full recovery is achieved. If full recovery to 90 percent or greater of the original water level is achieved prior to 21 days, then the recovery portion of the test will be complete.

2.6 Task 6: Interpretation of Test Results and Report of Findings

The data obtained from the drawdown and recovery phases of the tests will be evaluated using AQTESOLVE (HydroSOLVE, 2011), a commonly-used, commercially available well test analysis software package. This analysis will provide estimates of the hydraulic properties such as hydraulic conductivity, transmissivity, and storage coefficient, describe the aquifer type, and well bore storage. A well test report upon completion of the testing will include the following:

- Test procedure summary
- Field notes
- Data and analyses
- Conclusions

3.0 TEST OPERATIONS

3.1 Data Collection and Record Keeping

3.1.1 Data Logger Data

A Campbell Scientific CR800 data logger, or a functionally equivalent data logger, placed at the surface in the instrument vault, will be used to record the data measured by the down-hole instruments in ICP-WS-01 and the observation well ICP-WS-02.

The data logger will be programmed to record all measurements whenever the pressure at depth changes by more than 0.1 psi, or whenever a maximum fixed time passes since the last measurement (10 minutes). The maximum fixed time between measurements will vary throughout test and will be determined by the aquifer test leader. For example, the data collection interval will be shorter during the first few hours of the test when the water level is changing rapidly and longer during the recovery period when the water level is changing slowly.

- **Meta data files –** A meta data file will be used that contains the following information for each instrument:
    - Measurement ID
    - Type of measurement
    - Location of measurement
    - Manufacturer of instrument
    - Model of instrument
    - Serial number of instrument
    - Calibration coefficient
    - Engineering units
- **Data files –** Each data file archived will be given a unique name consisting of the logger name followed by the year, julian day, hour, and minute of the beginning of the data. Each data file archived will have a file header containing the name of the logger, the date and time of the first data point, the date and time of the last data point and the number of data lines. The data will be written in columns with the first column being the time. Each of the subsequent columns will have a column header containing the measurement ID.
- **Downloading –** Data from each of the data loggers will be downloaded at the end of every shift during the active flow portion of the test. Each download will be recorded on an electronic data backup log.

- **Data quality assurance –** After downloading, the data will be checked visually to ensure that it covers the time since the previous download. A quick plot will be made of the data from each instrument and checked visually to make sure that it is continuous, falls within the expected output range for the instrument and has no anomalous behavior.
- **Data archiving –** Once a day during the active flow portion of the test the data collected that day, including transcriptions of forms, will be backed up to external hard drive. Each downloaded file will be recorded and assigned a unique serial number.

3.2 Forms

Forms and notebooks will be used to record information that is not collected automatically by one of the data acquisition systems. All forms will have a unique name including a revision number. Information from paper forms will be transcribed into electronic format at least daily.

When a form is initiated the date, time, the form name, and the name of the person initiating the form will be entered into the form log, and the next available form serial number will be assigned to the form. When the form is completed the date, time and the name of the person completing the form will be entered in the form log. Completed paper forms will be filed in the completed forms binder and copies of the completed forms will be made on a regular basis. Electronic forms will be backed up on a regular basis whether they are completed or not.

The following are some of the key forms that will be used; examples of these forms are contained in the appendix. Additional forms may be created as needed.

- **Operations Data Form (paper)** – The operations data form will be used to record information pertaining to the operations of the test and will include data taken from electronic instruments, data taken from manual gauges, and documentation of system inspections. In addition to collecting information this form will serve as documentation that the operator is monitoring vital systems. The Operations data form will contain the time of the record, the down hole pressure and temperature (data logger), flow rate (data logger), wellhead pressure (gauge), discharge pressure (gauge), wellhead inspection (visual), discharge system inspection (visual), the initial of the person recording the information, and the initials of the person that transcribes the information. A copy of this form is provided in Appendix A.
- **Observation Well Operations Data Form (paper)** – This form documents the data download from the observation well, which will take place at the observation well at the end of each shift during the test. A copy of this form is provided in Appendix A.
- **Water Sampling Field Form (paper)** – This form will be used to record the measurement of water quality parameters such as temperature, pH, electrical

conductivity, dissolved oxygen, oxidation/reduction potential, and other measurements as needed. A copy of this form is provided in Appendix A.

Field Notebooks – Field notebooks will be used to record information, such as important events and narrative descriptions, for which there are no forms. Every entry in a notebook will contain the date and time that the entry is made, the initials of the person making the entry, and the initials of the person that transcribes the information. The field notebook will be used to record the time and description of all field activities and events and will remain on the site for use by the staff, as staff changes between shifts.

3.3 Data Collection Schedule

The schedule on which data is collected will vary throughout the test. In general, data will need to be collected most frequently at the beginning of the active flow portion of the test and least frequently at the end of the passive recovery period. The actual collection schedule will be determined by the project manager or designee based on a review of the data and consultation with the lead analyst. Below are some guidelines for frequency of data collection.

- Operations data – As defined in each task.
- Data logger download – Every shift during the active flow portion of the test and every two days during the recovery portion of the test.
- Water chemistry data – During each of the three water sampling events.

4.0 GROUNDWATER SAMPLING

4.1 Sampling for Groundwater Quality

Groundwater sampling will take place from ICP-WS-01 three times during the 7-day aquifer test. The first sampling event will take place during the pretest flow period before the start of the primary test, the second sampling event after approximately two days, and the third approximately six days after the start of the main flow period, or approximately one day prior to the end of the test. Sampling protocol is based on the U.S. Geological Survey National Field Manual for the Collection of Water-Quality Data, F.D. Wilde and D. B. Radtke, editors, April 2000 (USGS, 2000).

The samples will be analyzed for shown in the tables below. Table 2 lists the field parameters to be measured in the flow-through cell. Table 3 presents the analyte, analytical method, and practical quantitation limits.

Table 2
Field Parameters

Table 6.0–1. Stabilization criteria for recording field measurements
[±, plus or minus value shown; °C, degrees Celsius; ≤, less than or equal to value shown; µS/cm, microsiemens per centimeter at 25°C; >, greater than value shown; unit, standard pH unit; mg/L, milligram per liter; NTU, nephelometric turbidity unit]

Standard direct field measurement[1]	Stabilization criteria for measurements (variability should be within the value shown)
Temperature:	
Thermistor thermometer	± 0.2°C
Liquid-in-glass thermometer	± 0.5°C
Conductivity:	
when ≤ 100 µS/cm	± 5 percent
when > 100 µS/cm	± 3 percent
pH:	
Meter displays to 0.01	± 0.1 unit
Dissolved oxygen:	
Amperometric method	± 0.3 mg/L
Turbidity:	
Turbidimetric method, in NTU	± 10 percent

[1]Eh is not considered to be a routine or direct field measurement (see NFM 6.5). Alkalinity and acid neutralizing capacity require a titration procedure and, thus, are not direct measurements.

Table from USGS, http://water.usgs.gov/owq/FieldManual/

Table 3

Analytical Parameters and Analysis Methods for Aqueous Samples Collected from Groundwater Monitoring Wells in the Capitan Limestone.

Analytical Parameter	Analysis Method	Practical Quantitation Limit (mg/L unless noted)	Sample Holding Times
Anions			
Fluoride	EPA Method 300.0	0.1	28 days
Bromide	EPA Method 300.0	0.1	28 days
Chloride	EPA Method 300.0	0.5	28 days
Nitrogen, Nitrite (as N)	EPA Method 300.0	0.1	2 days
Nitrogen, Nitrate (as N)	EPA Method 300.0	0.1	2 days
Sulfate	EPA Method 300.0	0.5	28 days
Dissolved Metals (Filtered at 0.45 µm prior to preservation)			
Aluminum (Al)	EPA Method 200.7	0.02	6 months
Antimony (Sb)	EPA Method 200.8	0.001	6 months
Arsenic (As)	EPA Method 200.8	0.001	6 months
Barium (Ba)	EPA Method 200.7	0.002	6 months
Beryllium (Be)	EPA Method 200.7	0.002	6 months
Boron (B)	EPA Method 200.7	0.04	6 months
Cadmium (Cd)	EPA Method 200.7	0.002	6 months
Calcium (Ca)	EPA Method 200.7	1.0	6 months
Chromium (Cr)	EPA Method 200.7	0.006	6 months
Cobalt (Co)	EPA Method 200.7	0.006	6 months
Copper (Cu)	EPA Method 200.7	0.006	6 months
Iron (Fe)	EPA Method 200.7	0.02	6 months
Lead (Pb)	EPA Method 200.7	0.005	6 months
Magnesium (Mg)	EPA Method 200.7	1.0	6 months
Manganese (Mn)	EPA Method 200.7	0.002	6 months
Mercury (Hg)	EPA Method 245.1	0.0002	28 days
Molybdenum (Mo)	EPA Method 200.7	0.008	6 months
Nickel (Ni)	EPA Method 200.7	0.01	6 months
Total Phosphorus (P)	SM 4500PF or EPA Method 365.1	0.01	6 months
Potassium (K)	EPA Method 200.7	1.0	6 months
Selenium (Se)	EPA Method 200.8	0.001	6 months

Analytical Parameter	Analysis Method	Practical Quantitation Limit (mg/L unless noted)	Sample Holding Times
Silicon (Si)	EPA Method 200.7	0.08	6 months
Silver (Ag)	EPA Method 200.7	0.005	6 months
Sodium (Na)	EPA Method 200.7	1.0	6 months
Strontium (Sr)	EPA Method 200.7	0.01	6 months
Thallium (Tl)	EPA Method 200.8	0.001	6 months
Tin (Sn)	EPA Method 200.7	0.01	6 months
Uranium (U)	EPA Method 200.8	0.001	6 months
Vanadium (V)	EPA Method 200.7	0.05	6 months
Zinc (Zn)	EPA Method 200.7	0.01	6 months
Solids			
Total Dissolved Solids (TDS)	SM 2540 C modified	20	7 days
Alkalinity			
Alkalinity, total (as $CaCO_3$)	SM 2320B	20	7 days
Carbonate	SM 2320B	20	7 days
Bicarbonate	SM 2320B	20	7 days
Radiochemistry*			
Gross Alpha Radioactivity	EPA Method 900.0	[-]	6 months
Isotopic Uranium (^{234}U, ^{235}U, ^{238}U)	HSL 300M	[-]	6 months
Dissolved Gases And Hydrocarbons			
Methane (CH_4)	RSK 175 or EPA Method 8015M	0.001	14 days
Diesel Range Organics (DRO)***	EPA Method 8015B	0.5	7 days
Gasoline Range Organics (GRO)	EPA Method 8015B	0.05	14 days
Other			
pH	SM 4500 H+B	12.45	Upon receipt
Specific Conductance	EPA Method 120.1	0.01 µmhos/cm	28 days

Notes: Practical Quantitation Limit = the minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence
SM = Standard Method
EPA = U.S. Environmental Protection Agency
*Sub-contracted to laboratory to be identified by INTERA/ICP
***DRO should be left on the chromatogram long enough to detect motor-oil range organics (MRO)
[-] = Defined by sub-contracted laboratory running radiochemistry analyses
ASTM = American Society for Testing and Materials

4.2 Field Methods for Groundwater Sampling

The following field equipment and instruments will be required for the groundwater sampling:

- Portable temperature, pH, conductivity, dissolved oxygen, oxidation/reduction potential meter (YSI 556 meter and flow-through cell)
- Water sampling field forms (Appendix A)
- Laboratory-prepared sample containers
- Sampling coolers with ice for sample storage
- Coolers with ice for cooling the water entering the flow-through cell
- Chain-of-custody documents

4.3 Field Calibration

Step 1: Calibrate the instrument to be used for field measurements or document rental facility calibration. Calibrate at actual water temperature, if below 100 degrees Fahrenheit (F) or after cooling if above 100 degrees F (see Step 2).

Step 2: Measure field parameters in flow-through cell: Measure water temperature to be sure temperature is below 100 degrees F using a thermometer separate from thermometer in flow-through cell probe. If water is above 100 degrees F, run water through a "cooling tube" created by running the water discharge tubing through a ice water bath, prior to water entry into the cell. Measure and record parameters on field forms, return the water to the reserve pit at the well location. If water is not cooled sufficiently by running 50 feet of tubing through the ice water bath, then obtain a sample in a separate container, let cool, and pour into the flow through cell to measure parameters. Note procedure on field form.

Step 3: Open the valve on the discharge line to fill the sample containers. The samples will be collected for "total" analysis, (unfiltered). Use a 0.45 micron filter provided by the analytical laboratory to obtain the "dissolved" (filtered) sample.

Label with laboratory-prepared labels and store sample containers on ice in a cooler. The sampling events from ICP-WS-01 will be identified as ICP-WS-01-1, ICP-WS-01-2, and ICP-WS-01-3

Fill out chain-of-custody forms and deliver to Hall Environmental Laboratory (HEAL) in Albuquerque.

5.0 REFERENCES

Driscoll, 1989, Groundwater and Wells, Second Edition, Johnson Filtration Systems, St. Paul, Minnesota, 1089 p.

HydroSOLVE, 2011, AQTESOLVE for Windows Professional, version v 4.50.002 HydroSOLVE Inc., Reston, VA.

Harris, Paul M. (Mitch), 2009, The Capitan Margin of the Guadalupe Mountains, a Field Trip Guide, Reprint of Harris, Paul M. (Mitch), 2004, The Capitan margin of the Guadalupe Mountains – A field trip guide: AAPG Hedberg Conference – Carbonate Reservoir Characterization and Simulation: From Facies to Flow Units, March 14 – 18, El Paso, Texas, 43 p. and Appendices (96 p.).

Hiss, W.L., 1973. Capitan Aquifer Observation-Well Network Carlsbad to Jal, New Mexico. New Mexico State Engineer Technical Report 38.

Standen, A., Finch, S., Williams, R., Lee-Brand, B., and Kirby, P., 2009, Capitan Reef Complex Structure and Stratigraphy, Consultant's Report Prepared for the Texas Water Development Board, Contract Number 0804830794, 71 p.

US Geological Survey, National Field Manual for the Collection of Water-Quality Data, http://water.usgs.gov/owq/FieldManual/

FIGURES

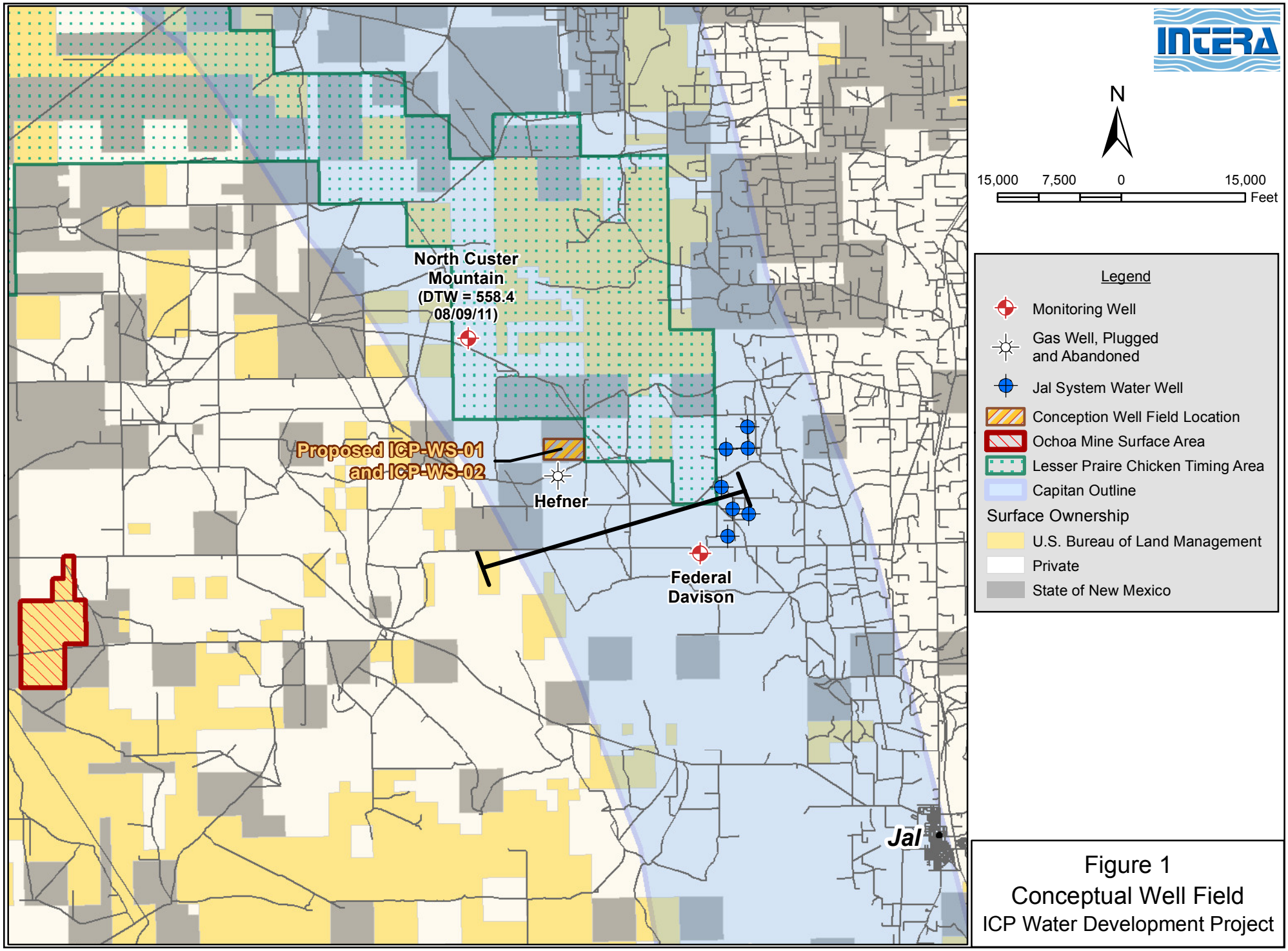
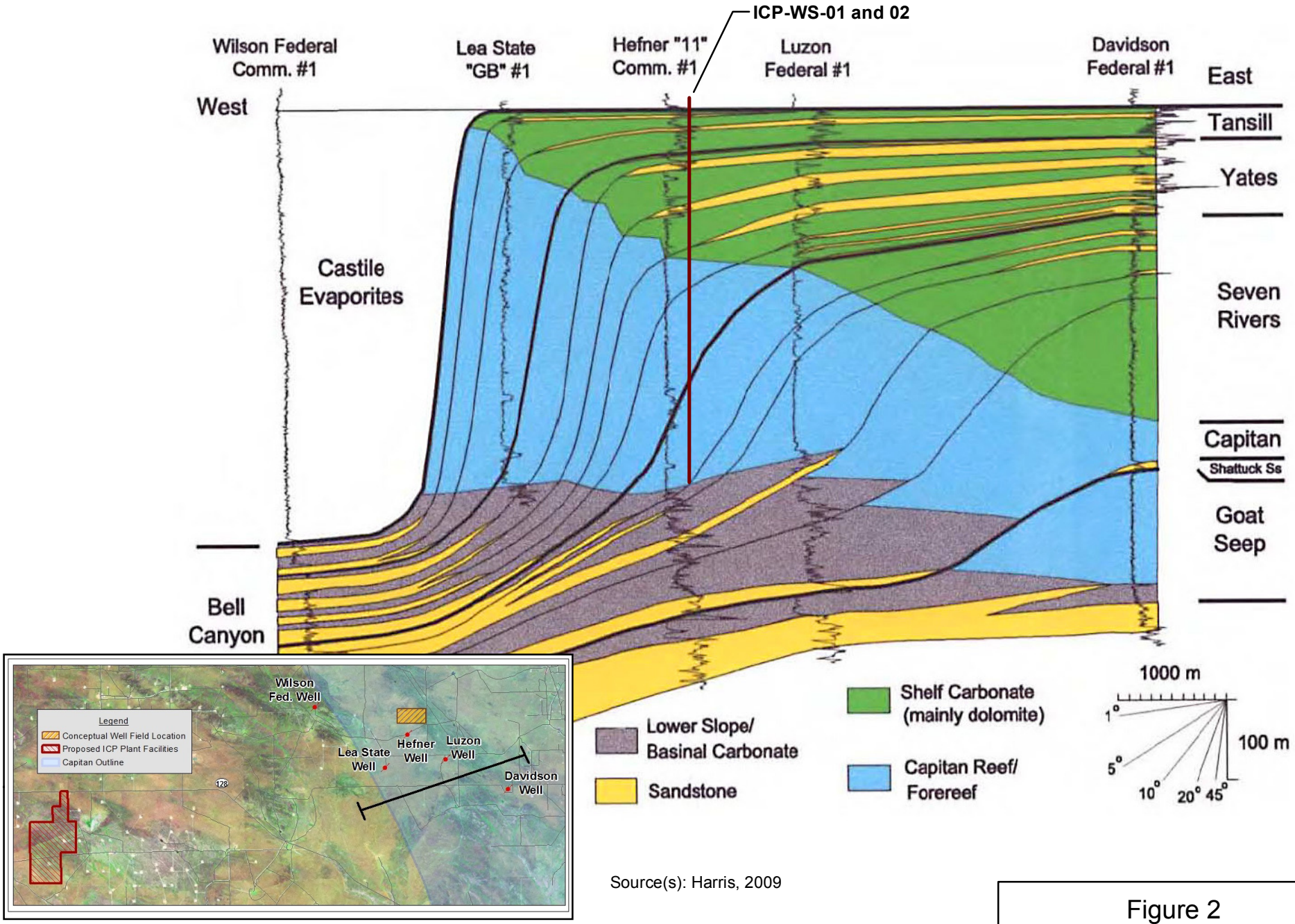


Figure 1
Conceptual Well Field
ICP Water Development Project

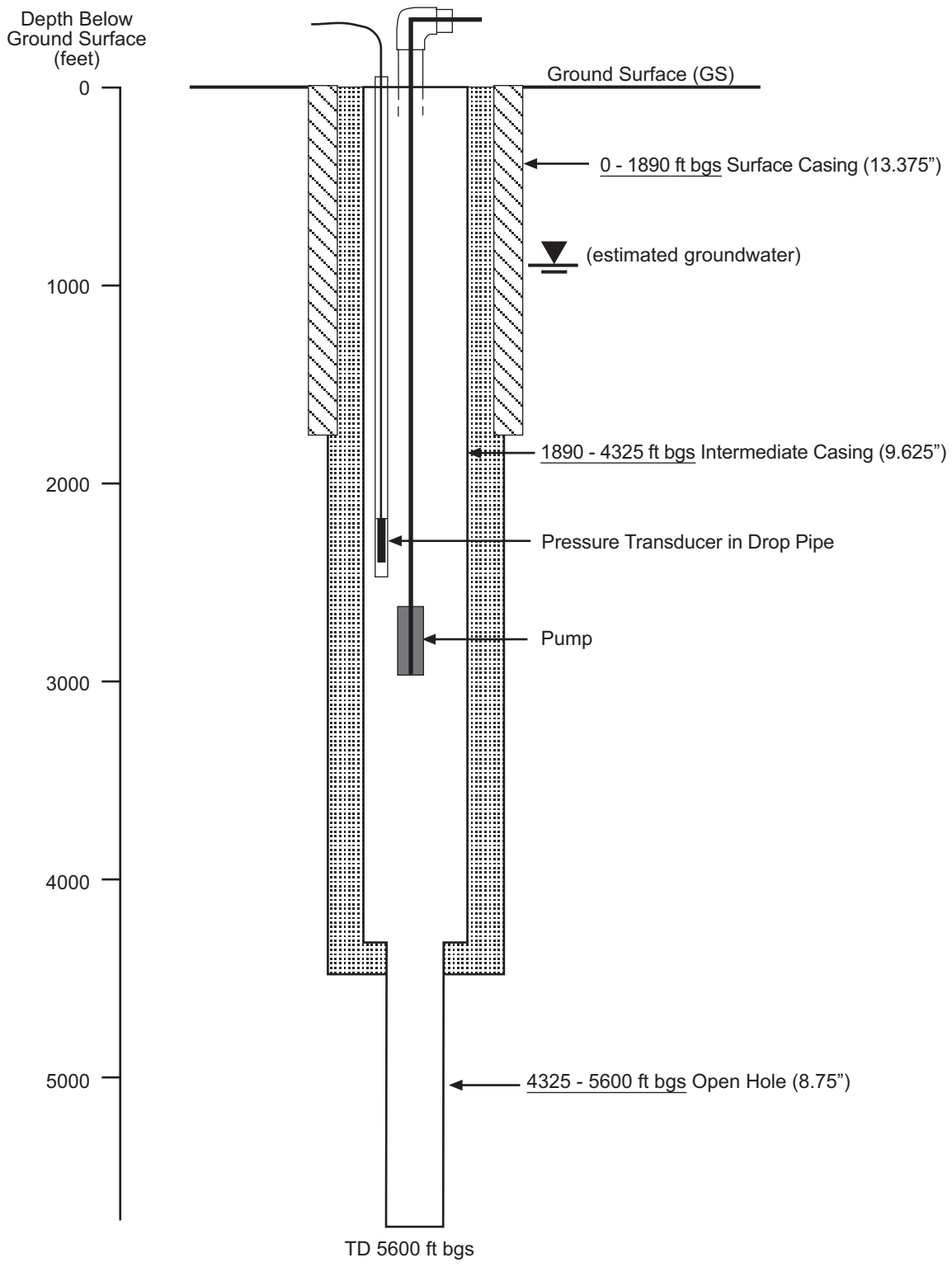
S:\Projects\ICP-001_Intercontinental_Potash\GIS\MapDocuments\AquiferTesting\WorkPlan201107\Figure1_conceptualWellField.mxd



Source(s): Harris, 2009

Figure 2
Capitan Reef Cross Section
ICP Water Development Project

S:\Projects\ICP-001_Intercontinental_Potash\GIS\MapDocuments\AquiferTesting\WorkPlan201107\Figure2_capitanReefXsec.mxd



Note: All depths are estimated

Figure 3
Schematic Well Design
ICP-WS-01 and ICP-WS-02
ICP Water Development Project

S:\Projects\ICP-001_Intercontinental_Potash\GIS\MapDocuments\AquiferTesting\WorkPlan201107\Figure3_ICPwellDesign.fh10

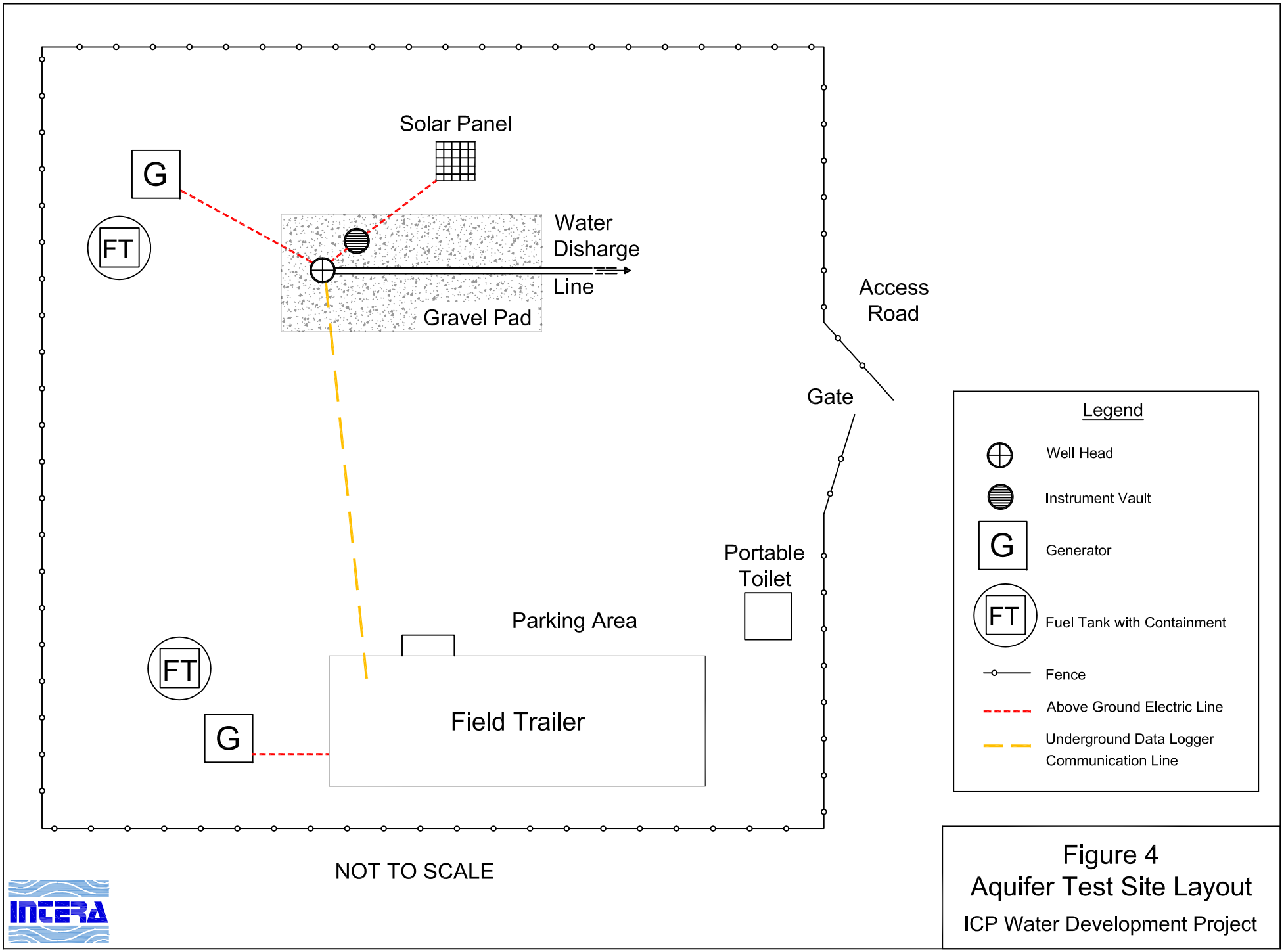
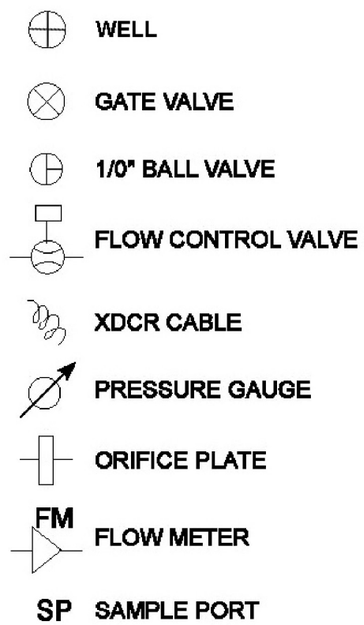
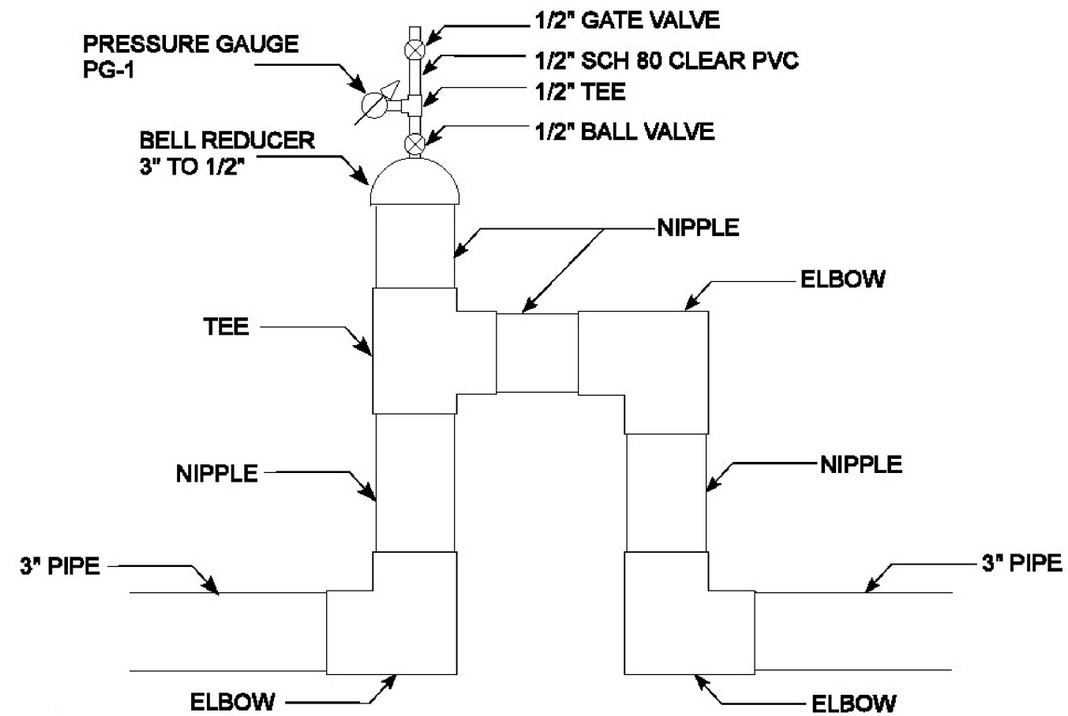


Figure 4
Aquifer Test Site Layout
ICP Water Development Project

S:\Projects\ICP-001_Intercontinental_Potash\GIS\MapDocuments\AquiferTesting\WorkPlan201107/Figure4_siteLayout.dwg





GAS TRAP DETAIL

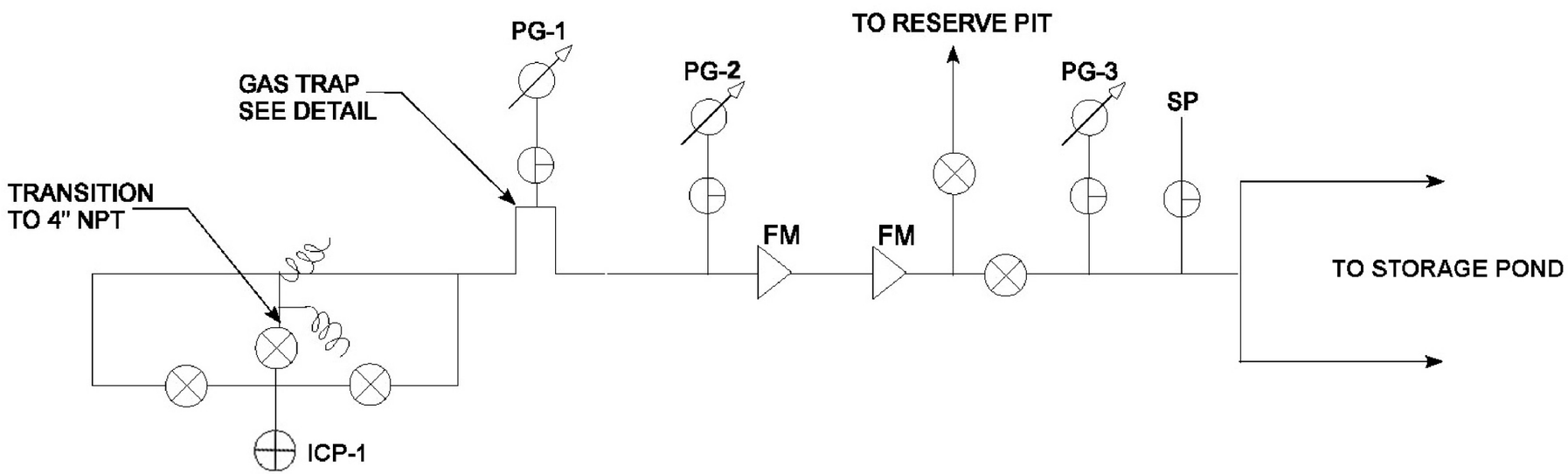


Figure 5
Proposed Surface Plumbing Diagram
ICP Water Development Project

S:\Projects\ICP-001_Intercontinental_Potash\GIS\MapDocuments\AquiferTesting\WorkPlan201107\Figure5_plumbingDiagram.mxd

APPENDIX A

Field Forms

Well Operations Data Form

Serial _____ Well ID _____

When Started _____ Started by _____

When Completed _____ Competed by _____

Date Time		by	W _PRES_DH	W _TEMP_DH	W _FLOW	INS	PG1
PG2	PG3	PG4	FG1 - Total	FG2 - Total	Time (flow)	Trans by	Date
Date Time		by	W _PRES_DH	W _TEMP_DH	W _FLOW	INS	PG1
PG2	PG3	PG4	FG1 - Total	FG2 - Total	Time (flow)	Trans by	Date
Date Time		by	W _PRES_DH	W _TEMP_DH	W _FLOW	INS	PG1
PG2	PG3	PG4	FG1 - Total	FG2 - Total	Time (flow)	Trans by	Date
Date Time		by	W _PRES_DH	W _TEMP_DH	W _FLOW	INS	PG1
PG2	PG3	PG4	FG1 - Total	FG2 - Total	Time (flow)	Trans by	Date
Date Time		by	W _PRES_DH	W _TEMP_DH	W _FLOW	INS	PG1
PG2	PG3	PG4	FG1 - Total	FG2 - Total	Time (flow)	Trans by	Date
Date Time		by	W _PRES_DH	W _TEMP_DH	W _FLOW	INS	PG1
PG2	PG3	PG4	FG1 - Total	FG2 - Total	Time (flow)	Trans by	Date
Date Time		by	W _PRES_DH	W _TEMP_DH	W _FLOW	INS	PG1
PG2	PG3	PG4	FG1 - Total	FG2 - Total	Time (flow)	Trans by	Date

Well ____ Operations Data Form

Serial _____

When Started _____ Started By _____

When Completed _____ Completed By _____

		Upper Gauge	Lower Gauge
Date	**Time**		**psi**

Data

Uploaded from Well ____			
Date	**Time**	**Total Points**	
Data Copied to Well ____ Computer			
Date	**Time**	**File Size**	**# of Lines**
Data Backed Up onto External Hard Drive			
Date	**Time**	**Filename**	

Visual Inspection of Water Storage

Water Storage

WATER PURGING AND SAMPLING DATA FORM

PROJECT NAME:_____ SAMPLE LOCATION NO. OR BORING/WELL NO.: _____

PROJECT NO.:_____ TECHNICAL CREW: _____

DATE:_____ FORM COMPLETED BY:_____

SAMPLING METHOD:_____

WELL CASING DIAMETER:_____ INITIAL WATER LEVEL (BMP) (FT):_____ @ TIME_____

BORING (SANDPACK) DIAMETER:_____ TOTAL DEPTH OF WELL (BMP) (FT) _____ @ TIME_____

LENGTH OF WATER COLUMN (FT) _____

WELL CASING VOLUME (GAL): _____ WELL VOLUME (ANNULUS) (GAL): _____

$$V_{WC} = \frac{\pi D^2 h}{4} \qquad V_{FP} = \left[\frac{\pi D^2 h}{4} - V_{WC}\right](n) \qquad V_{WC} = \frac{\pi D^2 h}{4}$$

WELL VOLUME TO BE REMOVED (GAL): NUMBER OF CASING/WELL VOLUMES: _____TARGET VOLUME_____

TIME ELAPSED FROM FINAL DEVELOPMENT/PURGING:_____ PUMPING RATES/SAMPLING:_____

SAMPLING DEPTH INTERVAL (BLS) (FT):_____ SAMPLE COLLECTION PERIOD: START:_____ FINISH:_____

WATER QUALITY INSTRUMENTS

DATE/TIME	INSTRUMENT	SERIAL NO.	CALIBRATION PERFORMED	TECH	COMMENTS

WATER QUALITY READINGS DURING PURGING

DATE/TIME	TOTAL WATER PURGED (gal)	TEMP ☐ °C ☐ °F	CONDUCTIVITY (µS/cm)	pH	TECH	COMMENTS (COLOR/ODOR)

COMMENTS:_____

_____

_____

_____

APPENDIX B

Personnel Roles and Responsibilities and Contact List

ICP Water Development Project
Roles and Responsibilities

Name	Entity	Project Role	Office Phone	Cellular Phone	Email
Randy Foote	ICP	Chief Operations Officer	(505) 994-0221	(505) 414-1057	rfoote@icpotash.com
Tom McGuire	ICP	Director of Technical Services	(575) 942-2799	(575) 725-8451	tmcguire@icpotash.com
Rudy Milligan	ICP	Filed Logistics Coordinator	(575) 942-2799	(575) 302-0648	rmilligan@icpotash.com
Peter Castiglia	INTERA, Inc.	Project Manager	(505) 246-1600	(505) 280-2889	pcastiglia@intera.com
Robert Sengebush, P.G.	INTERA, Inc.	Task Manager	(505) 246-1600	(505) 235-3271	rsengebush@intera.com
Lee Dalton	INTERA, Inc.	Field Geologist	(505) 246-1600	(505) 228-8201	ldalton@intera.com
TBD	INTERA, Inc.	Field Geologist	(505) 246-1600	TBD	TBD
Phelps White	Primero Operating Co.	Drilling Consultant	(575) 626-7660	(575) 626-7660	pwiv@zianet.com

APPENDIX B

Laboratory Analysis

QUALITY ASSURANCE REVIEW FORM
LABORATORY ANALYTICAL RESULTS

Project No.	INTCP.C001 Work Order 9, Task 1 (Aquifer Test)
Client Name:	Intercontinental Potash Corp. (USA)
Project Name:	Ochoa Mine Project
Laboratory Name:	Cardinal Laboratories

Laboratory Order No.:	**NA**	**Well No. or Name:**	**ICP-WS-01**
Laboratory ID No.:	**H201564-01**	**Collection Date:**	**07/09/2012**
Client Sample ID(s):	**ICP-WS-02-1**	**Sample Time:**	**09:40**

Analytical Parameters requested By INTERA for sample(s) are defined by unique ID Code for COC: *INTCP.C001.WO9T1*. Check the boxes that apply to each question below:

Analytical Parameter	Analysis Method	Was the Parameter Analyzed (Y/N)?	Comments
Anions			
Fluoride	SM4500F C	Y	
Bromide	SM4500Br	Y	
Chloride	SM4500CL B	Y	
Nitrogen, Nitrite (as N)	EPA Method 354.1	Y	
Nitrogen, Nitrate (as N)	EPA Method 353.3	Y	
Sulfate	EPA Method 375.4	Y	
Dissolved Metals (Filtered at 0.45 µm prior to preservation)			
Aluminum (Al)	EPA Method 200.7	Y	
Antimony (Sb)	EPA Method 200.8	Y	
Arsenic (As)	EPA Method 200.8	Y	
Barium (Ba)	EPA Method 200.8	Y	
Beryllium (Be)	EPA Method 200.8	Y	
Boron (B)	EPA Method 200.7	Y	
Cadmium (Cd)	EPA Method 200.8	Y	

Analytical Parameter	Analysis Method	Was the Parameter Analyzed (Y/N)?	Comments
Calcium (Ca)	EPA Method 200.7	Y	
Chromium (Cr)	EPA Method 200.8	Y	
Cobalt (Co)	EPA Method 200.8	Y	
Copper (Cu)	EPA Method 200.8	Y	
Iron (Fe)	EPA Method 200.7	Y	
Lead (Pb)	EPA Method 200.8	Y	
Magnesium (Mg)	EPA Method 200.7	Y	
Manganese (Mn)	EPA Method 200.8	Y	
Mercury (Hg)	EPA Method 245.1	Y	
Molybdenum (Mo)	EPA Method 200.8	Y	
Nickel (Ni)	EPA Method 200.8	Y	
Total Phosphorus (P)	SM 4500PF or EPA Method 365.1	Y	Used method 365.3
Potassium (K)	EPA Method 200.7	Y	
Selenium (Se)	EPA Method 200.8	Y	
Silicon (Si)	EPA Method 200.7	Y	
Silver (Ag)	EPA Method 200.8	Y	
Sodium (Na)	EPA Method 200.7	Y	
Strontium (Sr)	EPA Method 200.7	Y	
Thallium (Tl)	EPA Method 200.8	Y	
Tin (Sn)	EPA Method 200.7	Y	
Uranium (U)	EPA Method 200.8	Y	
Vanadium (V)	EPA Method 200.8	Y	
Zinc (Zn)	EPA Method 200.8	Y	
Solids			
Total Dissolved Solids (TDS)	EPA 160.1	Y	
Alkalinity			
Alkalinity, total (as $CaCO_3$)	EPA 310.1	Y	Used method 310.1.M
Carbonate	EPA 310.1	Y	Used method 310.1.M
Bicarbonate	EPA 310.1	Y	Used method 310.1.M
Radiochemistry*			
Gross Alpha Radioactivity	EPA Method 900.0	Y	Used method 600/00-02

Analytical Parameter	Analysis Method	Was the Parameter Analyzed (Y/N)?	Comments
Isotopic Uranium (^{234}U, ^{235}U, ^{238}U)	HSL 300M	Y	Used method ASTM D26239
Dissolved Gases And Hydrocarbons			
Methane (CH_4)	RSK 175 or EPA Method 8015M	Y	
Diesel Range Organics (DRO)***	EPA Method 8015 M	Y	
Gasoline Range Organics (GRO)	EPA Method 8015 M	Y	
Other			
pH	EPA 150.1	Y	
Specific Conductance	EPA Method 120.1	Y	
Specific Gravity	SM 2710F	Y	
Turbidity	EPA Method 180.1	Y	
Total Organic Carbon	SM 5310B	Y	
Hydrogen Sulfide (H_2S)^	EPA Method 376.2	Y	Total sulfide reported. Use pH to determine presence as H_2S.
Dissolved Silica	EPA Method 200.7	Y	Calculated
Total Silica	EPA Method 200.7	Y	Calculated

Notes: Practical Quantitation Limit = the minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence;

SM = Standard Method;

EPA = U.S. Environmental Protection Agency;

*Sub-contracted to laboratory to be identified by INTERA/ICP;

^Calculated from analysis of sulfide in water;

***DRO should be left on the chromatogram long enough to detect motor-oil range organics (MRO)

NTU = natural turbidity unit;

ASTM = American Society for Testing and Materials

I hereby affirm that I have completed a review of the analytical results as reported by the laboratory indicated above and confirm that, to the best of my knowledge, that all analytical results requested have been received.

Annelia Tinklenberg

__ _____8/24/12_____

Signature Date

Annelia Tinklenberg

Name Printed

SAMPLE NO. ICP-WS-02-1

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

August 23, 2012

PETER CASTIGLIA

INTERA, INC.

6000 UPTOWN BLVD, NE SUITE 220

ALBUQUERQUE, NM 87110

RE: OCHOA MINE PROJECT

Enclosed are the results of analyses for samples received by the laboratory on 07/10/12 9:17.

Cardinal Laboratories is accredited through Texas NELAP under certificate number T104704398-11-3. Accreditation applies to drinking water, non-potable water and solid and chemical materials. All accredited analytes are denoted by an asterisk (*). For a complete list on accredited analytes and matrices visit the TCEQ website at www.tceq.texas.gov/field/qa/lab_accred_certif.html.

Cardinal Laboratories is accreditated through the State of Colorado Department of Public Health and Environment for:

Method EPA 552.2	Haloacetic Acids (HAA-5)
Method EPA 524.2	Total Trihalomethanes (TTHM)
Method EPA 524.4	Regulated VOCs (V1, V2, V3)

Accreditation applies to public drinking water matrices.

This report meets NELAP requirements and is made up of a cover page, analytical results, and a copy of the original chain-of-custody. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Celey D. Keene

Celey D. Keene

Lab Director/Quality Manager

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:34

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
ICP - WS - 02-1	H201564-01	Water	09-Jul-12 09:40	10-Jul-12 09:17

Cardinal Laboratories

*=Accredited Analyte

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Celey D. Keene, Lab Director/Quality Manager

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PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:34

ICP - WS - 02-1

H201564-01 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Notes
			Cardinal Laboratories						
Radionuclides									**SUB-RS**
Gross Alpha	**28.0 ± 4.2**	0.0	pCi/L	1	2080612	CK	23-Jul-12	600/00-02	
Adjusted Gross Alpha	**25.3 ± 4.3**	0.0	pCi/L	1	2080612	CK	23-Jul-12	600/00-02	
Uranium 234 Activity	**1.4 ± 0.6**	0.0	pCi/L	1	2080613	CK	17-Jul-12	ASTM D6239	
Uranium 235 Activity	**0.060 ± 0.004**	0.0	pCi/L	1	2080613	CK	17-Jul-12	ASTM D6239	
Uranium 238 Activity	**1.3 ± 0.5**	0.0	pCi/L	1	2080613	CK	17-Jul-12	ASTM D6239	
Total Uranium Activity	**2.7 ± 0.8**	0.0	pCi/L	1	2080613	CK	17-Jul-12	ASTM D6239	
Uranium 234 Content	**0.00022 ± 0.00009**	0.0	ug/L	1	2080613	CK	17-Jul-12	ASTM D6239	
Uranium 235 Content	**0.028 ± 0.002**	0.0	ug/L	1	2080613	CK	17-Jul-12	ASTM D6239	
Uranium 238 Content	**3.9 ± 1.6**	0.0	ug/L	1	2080613	CK	17-Jul-12	ASTM D6239	
Total Uranium Content	**3.9 ± 1.6**	0.0	ug/L	1	2080613	CK	17-Jul-12	ASTM D6239	
Inorganic Compounds									
Alkalinity, Bicarbonate	**264**	5.00	mg/L	1	2061106	HM	12-Jul-12	310.1M	
Bromide	ND	1.00	mg/L	10	2080611	CK	24-Jul-12	4500 Br	GAL
Alkalinity, Carbonate	ND	0.00	mg/L	1	2061106	HM	12-Jul-12	310.1M	
Chloride*	**32400**	4.00	mg/L	1	2071002	HM	11-Jul-12	4500-Cl-B	
Conductivity*	**114000**	1.00	uS/cm	1	2071206	HM	12-Jul-12	120.1	
Fluoride	**2.30**	0.200	mg/L	1	2080610	CK	20-Jul-12	4500F C	GAL
Nitrate as N	ND	0.100	mg/L	1	2071602	HM	11-Jul-12	353.3	
Nitrite as N	ND	0.05	mg/L	1	2071602	HM	11-Jul-12	354.1	
pH*	**6.90**	0.100	pH Units	1	2071206	HM	12-Jul-12	150.1	
Phosphorus, Total	ND	0.100	mg/L	1	2071906	HM	19-Jul-12	365.3	
Specific Gravity @ 60° F	**1.038**	0.000	[blank]	1	2071304	HM	11-Jul-12	SM 2710F	
Sulfate*	**4860**	10.0	mg/L	1	2071209	HM	12-Jul-12	375.4	

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Celey D. Keene

Celey D. Keene, Lab Director/Quality Manager

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Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:34

ICP - WS - 02-1

H201564-01 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Notes
			Cardinal Laboratories						
Inorganic Compounds									
TDS*	**61200**	5.00	mg/L	1	2071207	HM	11-Jul-12	160.1	
Alkalinity, Total*	**216**	4.00	mg/L	1	2061106	HM	12-Jul-12	310.1M	
Sulfide, total	**0.0520**	0.0100	mg/L	1	2070312	HM	18-Jul-12	376.2	
Turbidity	**1.67**	1.00	NTU	1	2080305	HM	03-Aug-12	180.1	
Organic Compounds									
GRO C6-C10	ND	1.00	mg/L	0.1	2071301	AM	13-Jul-12	8015M	
DRO >C10-C28	ND	1.00	mg/L	0.1	2071301	AM	13-Jul-12	8015M	
EXT DRO >C28-C35	ND	1.00	mg/L	0.1	2071301	AM	13-Jul-12	8015M	
Surrogate: 1-Chlorooctane		*76.8 %*	*48.7-164*		*2071301*	AM	*13-Jul-12*	*8015M*	
Surrogate: 1-Chlorooctadecane		*95.1 %*	*54.8-165*		*2071301*	AM	*13-Jul-12*	*8015M*	
Organic Compounds									
Methane	**162**	1.00	ug/L	1	2072604	CK	16-Jul-12	RSK-175	SUB-SS
Organic Compounds									
Total Organic Carbon	**2.90**	0.500	mg/L	1	2080614	CK	17-Jul-12	SM5310B	SUB-UL
Dissolved Metals									
Aluminum	**0.717**	0.500	mg/L	10	2080607	JM	18-Jul-12	200.7	GAL
Antimony	ND	0.0500	mg/L	100	2080606	JM	24-Jul-12	200.8	GAL
Arsenic	ND	0.0500	mg/L	100	2080606	JM	24-Jul-12	200.8	GAL
Barium	ND	0.0500	mg/L	100	2080606	JM	24-Jul-12	200.8	GAL
Beryllium	ND	0.0500	mg/L	100	2080606	JM	24-Jul-12	200.8	GAL
Boron	**6.51**	2.00	mg/L	10	2080607	JM	18-Jul-12	200.7	GAL
Cadmium	ND	0.0100	mg/L	100	2080606	JM	24-Jul-12	200.8	GAL
Calcium	**1380**	10.0	mg/L	10	2080607	JM	18-Jul-12	200.7	GAL
Chromium	ND	0.100	mg/L	100	2080606	JM	24-Jul-12	200.8	GAL
Cobalt	ND	0.0200	mg/L	200	2080606	JM	24-Jul-12	200.8	GAL
Copper	**0.301**	0.0100	mg/L	100	2080606	JM	24-Jul-12	200.8	GAL

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Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:34

ICP - WS - 02-1

H201564-01 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Notes
			Cardinal Laboratories						
Dissolved Metals									
Iron	**19.7**	0.500	mg/L	10	2080607	JM	18-Jul-12	200.7	GAL
Lead	ND	0.0100	mg/L	100	2080606	JM	24-Jul-12	200.8	GAL
Magnesium	**617**	10.0	mg/L	10	2080607	JM	18-Jul-12	200.7	GAL
Manganese	**0.341**	0.0500	mg/L	100	2080606	JM	24-Jul-12	200.8	GAL
Molybdenum	**0.0504**	0.0500	mg/L	100	2080606	JM	24-Jul-12	200.8	GAL
Nickel	**0.0754**	0.0500	mg/L	100	2080606	JM	24-Jul-12	200.8	GAL
Potassium	**670**	10.0	mg/L	10	2080607	JM	18-Jul-12	200.7	GAL
Selenium	**0.162**	0.100	mg/L	100	2080606	JM	24-Jul-12	200.8	GAL
Silica	**17.0**	1.07	mg/L	1	2080607	JM	18-Jul-12	CALC	GAL
Silicon	**7.94**	5.00	mg/L	10	2080607	JM	18-Jul-12	200.7	GAL
Silver	ND	0.0200	mg/L	200	2080606	JM	24-Jul-12	200.8	GAL
Sodium	**19200**	10.0	mg/L	10	2080607	JM	18-Jul-12	200.7	GAL
Strontium	**21.8**	1.00	mg/L	10	2080607	JM	18-Jul-12	200.7	GAL
Thallium	ND	0.0100	mg/L	100	2080606	JM	24-Jul-12	200.8	GAL
Tin	**9.84**	5.00	mg/L	10	2080607	JM	23-Jul-12	200.7	GAL
Uranium	ND	0.0100	mg/L	100	2080606	JM	24-Jul-12	200.8	GAL
Vanadium	ND	0.100	mg/L	200	2080606	JM	24-Jul-12	200.8	GAL
Zinc	**0.140**	0.100	mg/L	100	2080606	JM	24-Jul-12	200.8	GAL
Total Metals									
Mercury	ND	0.0002	mg/L	1	2080609	JM	24-Jul-12	245.1	GAL
Silica	**13.4**	1.07	mg/L	1	2080608	JM	18-Jul-12	CALC	GAL
Silicon	**6.24**	0.500	mg/L	1	2080608	JM	18-Jul-12	200.7	GAL

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INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:34

Inorganic Compounds - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2061106 - General Prep - Wet Chem										
Blank (2061106-BLK1)				Prepared & Analyzed: 11-Jun-12						
Alkalinity, Carbonate	ND	0.00	mg/L							
Alkalinity, Bicarbonate	ND	5.00	mg/L							
Alkalinity, Total	ND	4.00	mg/L							
LCS (2061106-BS1)				Prepared & Analyzed: 11-Jun-12						
Alkalinity, Carbonate	ND	0.00	mg/L				80-120			
Alkalinity, Bicarbonate	137	5.00	mg/L				80-120			
Alkalinity, Total	112	4.00	mg/L	100		112	80-120			
LCS Dup (2061106-BSD1)				Prepared & Analyzed: 11-Jun-12						
Alkalinity, Carbonate	ND	0.00	mg/L				80-120		20	
Alkalinity, Bicarbonate	132	5.00	mg/L				80-120	3.72	20	
Alkalinity, Total	108	4.00	mg/L	100		108	80-120	3.64	20	
Batch 2070312 - General Prep - Wet Chem										
Blank (2070312-BLK1)				Prepared & Analyzed: 03-Jul-12						
Sulfide, total	ND	0.0100	mg/L							
Duplicate (2070312-DUP1)		**Source: H201467-02**		Prepared & Analyzed: 03-Jul-12						
Sulfide, total	628	0.0100	mg/L		652			3.75	20	
Batch 2071002 - General Prep - Wet Chem										
Blank (2071002-BLK1)				Prepared & Analyzed: 09-Jul-12						
Chloride	ND	4.00	mg/L							

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Inorganic Compounds - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2071002 - General Prep - Wet Chem										
LCS (2071002-BS1)				Prepared & Analyzed: 09-Jul-12						
Chloride	100	4.00	mg/L	100		100	80-120			
LCS Dup (2071002-BSD1)				Prepared & Analyzed: 09-Jul-12						
Chloride	100	4.00	mg/L	100		100	80-120	0.00	20	
Batch 2071206 - General Prep - Wet Chem										
LCS (2071206-BS1)				Prepared & Analyzed: 12-Jul-12						
Conductivity	1420		uS/cm	1410		101	80-120			
pH	7.08		pH Units	7.00		101	90-110			
Duplicate (2071206-DUP1)		**Source: H201554-01**		Prepared & Analyzed: 12-Jul-12						
Conductivity	529000	1.00	uS/cm		527000			0.379	20	
pH	4.88	0.100	pH Units		4.85			0.617	20	
Batch 2071207 - Filtration										
Blank (2071207-BLK1)				Prepared & Analyzed: 09-Jul-12						
TDS	ND	5.00	mg/L							
LCS (2071207-BS1)				Prepared & Analyzed: 09-Jul-12						
TDS	245		mg/L	240		102	80-120			
Duplicate (2071207-DUP1)		**Source: H201554-02**		Prepared & Analyzed: 09-Jul-12						
TDS	363000	5.00	mg/L		379000			4.31	20	

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Inorganic Compounds - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2071209 - General Prep - Wet Chem										
Blank (2071209-BLK1)				Prepared & Analyzed: 12-Jul-12						
Sulfate	ND	10.0	mg/L							
LCS (2071209-BS1)				Prepared & Analyzed: 12-Jul-12						
Sulfate	19.1	10.0	mg/L	20.0		95.5	80-120			
LCS Dup (2071209-BSD1)				Prepared & Analyzed: 12-Jul-12						
Sulfate	18.9	10.0	mg/L	20.0		94.5	80-120	1.05	20	
Batch 2071304 - General Prep - Wet Chem										
Duplicate (2071304-DUP1)		**Source: H201467-02**		Prepared & Analyzed: 11-Jul-12						
Specific Gravity @ 60° F	1.076	0.000	[blank]		1.075			0.0437	200	
Batch 2071602 - General Prep - Wet Chem										
Blank (2071602-BLK1)				Prepared & Analyzed: 11-Jul-12						
Nitrite as N	ND	0.05	mg/L							
Nitrate as N	ND	0.100	mg/L							
LCS (2071602-BS1)				Prepared & Analyzed: 11-Jul-12						
Nitrate as N	5.20	0.100	mg/L	5.00		104	80-120			
Nitrite as N	0.19	0.05	mg/L	0.200		95.5	80-120			
Duplicate (2071602-DUP1)		**Source: H201564-01**		Prepared & Analyzed: 11-Jul-12						
Nitrite as N	ND	0.05	mg/L		0.00				20	
Nitrate as N	ND	0.100	mg/L		0.00				20	

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Inorganic Compounds - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2071906 - General Prep - Wet Chem										
Blank (2071906-BLK1)				Prepared & Analyzed: 19-Jul-12						
Phosphorus, Total	ND	0.100	mg/L							
LCS (2071906-BS1)				Prepared & Analyzed: 19-Jul-12						
Phosphorus, Total	0.790	0.100	mg/L	0.800		98.8	80-120			
Duplicate (2071906-DUP1)		**Source: H201599-01**		Prepared & Analyzed: 19-Jul-12						
Phosphorus, Total	0.0200	0.100	mg/L		0.0500			85.7	20	QR-01
Batch 2080305 - General Prep - Wet Chem										
Blank (2080305-BLK1)				Prepared & Analyzed: 03-Aug-12						
Turbidity	ND	1.00	NTU							
LCS (2080305-BS1)				Prepared & Analyzed: 03-Aug-12						
Turbidity	22.0	1.00	NTU	20.0		110	80-120			
Duplicate (2080305-DUP1)		**Source: H201564-01**		Prepared & Analyzed: 03-Aug-12						
Turbidity	1.51	1.00	NTU		1.67			10.1	20	
Batch 2080610 - General Prep										
Blank (2080610-BLK1)				Prepared & Analyzed: 20-Jul-12						
Fluoride	ND	0.200	mg/L							
LCS (2080610-BS1)				Prepared & Analyzed: 20-Jul-12						
Fluoride	0.969		mg/L	1.00		96.9	85-115			

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Inorganic Compounds - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2080610 - General Prep										
LCS Dup (2080610-BSD1)				Prepared & Analyzed: 20-Jul-12						
Fluoride	0.969		mg/L	1.00		96.9	85-115	0.00	20	
Batch 2080611 - General Prep										
Blank (2080611-BLK1)				Prepared & Analyzed: 24-Jul-12						
Bromide	ND	0.100	mg/L							
LCS (2080611-BS1)				Prepared & Analyzed: 24-Jul-12						
Bromide	0.585		mg/L	0.600		97.5	85-115			
LCS Dup (2080611-BSD1)				Prepared & Analyzed: 24-Jul-12						
Bromide	0.595		mg/L	0.600		99.2	85-115	1.69	20	

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Celey D. Keene, Lab Director/Quality Manager

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PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:34

Organic Compounds - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2071301 - General Prep - Organics										
Blank (2071301-BLK1)				Prepared: 13-Jul-12 Analyzed: 16-Jul-12						
GRO C6-C10	ND	10.0	mg/L							
DRO >C10-C28	ND	10.0	mg/L							
EXT DRO >C28-C35	ND	10.0	mg/L							
Surrogate: 1-Chlorooctane	*4.22*		mg/L	*5.00*		*84.4*	*48.7-164*			
Surrogate: 1-Chlorooctadecane	*5.32*		mg/L	*5.00*		*106*	*54.8-165*			
LCS (2071301-BS1)				Prepared & Analyzed: 13-Jul-12						
GRO C6-C10	43.7	1.00	mg/L	66.7		65.5	59.3-133			
DRO >C10-C28	46.9	1.00	mg/L	66.7		70.4	43.4-148			
EXT DRO >C28-C35	ND	1.00	mg/L	0.00			0-0			
Surrogate: 1-Chlorooctane	*4.92*		mg/L	*5.00*		*98.5*	*48.7-164*			
Surrogate: 1-Chlorooctadecane	*5.26*		mg/L	*5.00*		*105*	*54.8-165*			
LCS Dup (2071301-BSD1)				Prepared & Analyzed: 13-Jul-12						
GRO C6-C10	44.9	1.00	mg/L	66.7		67.4	59.3-133	2.81	24	
DRO >C10-C28	48.0	1.00	mg/L	66.7		72.0	43.4-148	2.24	27.3	
EXT DRO >C28-C35	ND	1.00	mg/L	0.00			0-0		0	
Surrogate: 1-Chlorooctane	*5.12*		mg/L	*5.00*		*102*	*48.7-164*			
Surrogate: 1-Chlorooctadecane	*5.68*		mg/L	*5.00*		*114*	*54.8-165*			

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Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:34

Organic Compounds - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2072604 - General Prep										
Blank (2072604-BLK1)				Prepared: 11-Jul-12 Analyzed: 16-Jul-12						
Methane	ND	1.00	ug/L							
Duplicate (2072604-DUP1)		**Source: H201564-01**		Prepared: 11-Jul-12 Analyzed: 16-Jul-12						
Methane	161	1.00	ug/L		162			0.619	20	

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Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:34

Total Metals by ICPMS - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2080606 - Dissolved/Potentially Dissolved Metals										
Blank (2080606-BLK1)				Prepared: 19-Jul-12 Analyzed: 24-Jul-12						
Cadmium	ND	0.00010	mg/L							
Vanadium	ND	0.000500	mg/L							
Lead	ND	0.0001	mg/L							
Zinc	ND	0.001	mg/L							
Copper	ND	0.0001	mg/L							
Silver	ND	0.00010	mg/L							
Chromium	ND	0.001	mg/L							
Thallium	ND	0.000100	mg/L							
Cobalt	ND	0.00010	mg/L							
Manganese	ND	0.0005	mg/L							
Beryllium	ND	0.000500	mg/L							
Barium	ND	0.000500	mg/L							
Uranium	ND	0.000100	mg/L							
Nickel	ND	0.0005	mg/L							
Antimony	ND	0.000500	mg/L							
Selenium	ND	0.001	mg/L							
Arsenic	ND	0.0005	mg/L							
Molybdenum	ND	0.0005	mg/L							
LCS (2080606-BS1)				Prepared: 19-Jul-12 Analyzed: 24-Jul-12						
Zinc	0.045		mg/L	0.0500		89.6	85-115			
Antimony	0.0464		mg/L	0.0500		92.8	85-115			
Barium	0.0493		mg/L	0.0500		98.6	85-115			
Cadmium	0.0460		mg/L	0.0500		92.0	85-115			
Beryllium	0.0460		mg/L	0.0500		92.0	85-115			
Thallium	0.0474		mg/L	0.0500		94.8	85-115			
Arsenic	0.0454		mg/L	0.0500		90.8	85-115			
Copper	0.0504		mg/L	0.0500		101	85-115			
Lead	0.0448		mg/L	0.0500		89.6	85-115			
Nickel	0.0483		mg/L	0.0500		96.6	85-115			
Chromium	0.044		mg/L	0.0500		89.0	85-115			
Silver	0.0432		mg/L	0.0500		86.4	85-115			

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Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:34

Total Metals by ICPMS - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2080606 - Dissolved/Potentially Dissolved Metals										
LCS (2080606-BS1)				Prepared: 19-Jul-12 Analyzed: 24-Jul-12						
Selenium	0.232		mg/L	0.250		92.8	85-115			
Vanadium	0.0425		mg/L	0.0500		85.0	85-115			
Molybdenum	0.0478		mg/L	0.0500		95.6	85-115			
Cobalt	0.0446		mg/L	0.0500		89.2	85-115			
Uranium	0.0467		mg/L	0.0500		93.4	85-115			
Manganese	0.0458		mg/L	0.0500		91.6	85-115			
LCS Dup (2080606-BSD1)				Prepared: 19-Jul-12 Analyzed: 24-Jul-12						
Silver	0.0448		mg/L	0.0500		89.6	85-115	3.64	20	
Antimony	0.0491		mg/L	0.0500		98.2	85-115	5.65	20	
Molybdenum	0.0471		mg/L	0.0500		94.2	85-115	1.48	20	
Barium	0.0481		mg/L	0.0500		96.2	85-115	2.46	20	
Nickel	0.0470		mg/L	0.0500		94.0	85-115	2.73	20	
Beryllium	0.0465		mg/L	0.0500		93.0	85-115	1.08	20	
Cobalt	0.0440		mg/L	0.0500		88.0	85-115	1.35	20	
Selenium	0.232		mg/L	0.250		92.8	85-115	0.00	20	
Arsenic	0.0465		mg/L	0.0500		93.0	85-115	2.39	20	
Manganese	0.0448		mg/L	0.0500		89.6	85-115	2.21	20	
Chromium	0.044		mg/L	0.0500		89.0	85-115	0.00	20	
Zinc	0.046		mg/L	0.0500		91.4	85-115	1.99	20	
Lead	0.0441		mg/L	0.0500		88.2	85-115	1.57	20	
Cadmium	0.0472		mg/L	0.0500		94.4	85-115	2.58	20	
Uranium	0.0461		mg/L	0.0500		92.2	85-115	1.29	20	
Copper	0.0505		mg/L	0.0500		101	85-115	0.198	20	
Thallium	0.0473		mg/L	0.0500		94.6	85-115	0.211	20	
Vanadium	0.0463		mg/L	0.0500		92.6	85-115	8.56	20	

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INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:34

Dissolved Metals - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2080607 - Dissolved/Potentially Dissolved Metals										
Blank (2080607-BLK1)				Prepared & Analyzed: 18-Jul-12						
Potassium	ND	1.00	mg/L							
Aluminum	ND	0.0500	mg/L							
Sodium	ND	1.00	mg/L							
Calcium	ND	1.00	mg/L							
Magnesium	ND	1.00	mg/L							
Iron	ND	0.050	mg/L							
Silica	ND	1.07	mg/L							
Boron	ND	0.200	mg/L							
Strontium	ND	0.100	mg/L							
Tin	ND	0.500	mg/L							
Silicon	ND	0.500	mg/L							
LCS (2080607-BS1)				Prepared & Analyzed: 18-Jul-12						
Aluminum	4.97		mg/L	5.00		99.4	85-115			
Sodium	8.13		mg/L	8.10		100	85-115			
Boron	4.81		mg/L	5.00		96.2	85-115			
Calcium	5.03		mg/L	5.00		101	85-115			
Strontium	4.87		mg/L	5.00		97.4	85-115			
Iron	4.95		mg/L	5.00		99.0	85-115			
Magnesium	25.4		mg/L	25.0		102	85-115			
Potassium	10.3		mg/L	10.0		103	85-115			
Silicon	5.12		mg/L	5.00		102	85-115			
Tin	3.89		mg/L	4.00		97.2	85-115			
LCS Dup (2080607-BSD1)				Prepared & Analyzed: 18-Jul-12						
Sodium	8.08		mg/L	8.10		99.8	85-115	0.617	20	
Calcium	5.01		mg/L	5.00		100	85-115	0.398	20	
Magnesium	25.3		mg/L	25.0		101	85-115	0.394	20	
Iron	4.93		mg/L	5.00		98.6	85-115	0.405	20	
Strontium	4.87		mg/L	5.00		97.4	85-115	0.00	20	
Boron	4.81		mg/L	5.00		96.2	85-115	0.00	20	
Aluminum	4.96		mg/L	5.00		99.2	85-115	0.201	20	
Potassium	10.5		mg/L	10.0		105	85-115	1.92	20	

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Dissolved Metals - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2080607 - Dissolved/Potentially Dissolved Metals										
LCS Dup (2080607-BSD1)				Prepared & Analyzed: 18-Jul-12						
Tin	3.87		mg/L	4.00		96.8	85-115	0.515	20	
Silicon	5.43		mg/L	5.00		109	85-115	5.88	20	

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Total Metals - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2080608 - EPA 3010										
Blank (2080608-BLK1)				Prepared & Analyzed: 18-Jul-12						
Silicon	ND	0.500	mg/L							
LCS (2080608-BS1)				Prepared & Analyzed: 18-Jul-12						
Silicon	4.01		mg/L	4.00		100	85-115			
LCS Dup (2080608-BSD1)				Prepared & Analyzed: 18-Jul-12						
Silicon	4.02		mg/L	4.00		100	85-115	0.249	20	
Batch 2080609 - EPA 245.1										
Blank (2080609-BLK1)				Prepared & Analyzed: 24-Jul-12						
Mercury	ND	0.0002	mg/L							
LCS (2080609-BS1)				Prepared & Analyzed: 24-Jul-12						
Mercury	0.0020		mg/L	0.00200		100	85-115			
LCS Dup (2080609-BSD1)				Prepared & Analyzed: 24-Jul-12						
Mercury	0.0020		mg/L	0.00200		100	85-115	0.00	20	

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Notes and Definitions

Z-01h	3.9 ± 1.6
Z-01g	28.0 ± 4.2
Z-01f	25.3 ± 4.3
Z-01e	2.7 ± 0.8
Z-01d	1.4 ± 0.6
Z-01c	1.3 ± 0.5
Z-01b	0.060 ± 0.004
Z-01a	0.028 ± 0.002
Z-01	0.00022 ± 0.00009
SUB-UL	Analysis subcontracted to Underwriters Laboratories, Inc.
SUB-SS	Analysis subcontracted to SunStar Laboratories, Inc.
SUB-RS	Analysis subcontracted to Radiation Safety Engineering, Inc.
QR-01	Analyses are not controlled on RPD values from sample concentrations less than 10 times the reporting limit. QC batch accepted based on LCS and/or LCSD QC results.
GAL	Analysis subcontracted to Green Analytical Laboratories, a subsidiary of Cardinal Laboratories.
ND	Analyte NOT DETECTED at or above the reporting limit
RPD	Relative Percent Difference
**	Samples not received at proper temperature of 6°C or below.
***	Insufficient time to reach temperature.
-	Chloride by SM4500Cl-B does not require samples be received at or below 6°C
	Samples reported on an as received basis (wet) unless otherwise noted on report

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CARDINAL Laboratories

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

101 East Marland, Hobbs, NM 88240
(575) 393-2326 FAX (575) 393-2476

Company Name: INTERA
Project Manager: Peter Castiglia
Address: 6000 Uptown Blvd. Suite 220
City: Albuquerque State: NM Zip: 87110
Phone #: 505-246-1600 Fax #:
Project #: INTCP.C001.0MP WO 9/ Project Owner: ICP
Project Name: Ochoa Mine Project
Project Location: ICP-WS-02
Sampler Name: Annelia Tinklenberg

BILL TO
P.O. #:
Company:
Attn:
Address:
City:
State: Zip:
Phone #:
Fax #:

ANALYSIS REQUEST

FOR LAB USE ONLY Lab I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	MATRIX: GROUNDWATER	WASTEWATER	SOIL	OIL	SLUDGE	OTHER:	PRESERV.: ACID/BASE:	ICE / COOL	OTHER:	SAMPLING DATE	TIME	ANALYSIS REQUEST
AT ~~ICP-WS-03-T~~ H2 55647-1	ICP-WS-02-1	G		X						X	X		7-9-12	9:40	SEE ATTACHED LIST

SEE ATTACHED LIST
1-250 ml HDPE
1-500 mL HDPE
5-Liter HDPE
1-500 mL HNO_3
1-250 mL H_2SO_4
1-500 mL NaOH
2-VOA no pres.
4-VOA HCL

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Relinquished By:	Date:	Received By:
[signature]	7-9-12 Time: 7:50	[signature]
Relinquished By: [signature]	07/10/12 Time: 7:17	Received By: [signature]

Delivered By: (Circle One)
Sampler - UPS - Bus - Other: 25°C

Sample Condition Cool	Intact	CHECKED BY: (Initials)
☑ Yes ☐ No	☑ Yes ☐ No	[initials]

Phone Result: ☐ Yes ☐ No Add'l Phone #:
Fax Result: ☐ Yes ☐ No Add'l Fax #:
REMARKS:
Please send results to:
peastiglia@intera.com
atinklenberg@intera.com

† Cardinal cannot accept verbal changes. Please fax written changes to (575) 393-2326

FORM-007
CARDINAL LABORATORIES
Revision 1.0

MASS BALANCE SHEET

Parameter	Result	Units	Method
Calcium	1380	mg/L	EPA 200.7
Magnesium	617	mg/L	EPA 200.7
Sodium	19200	mg/L	EPA 200.7
Potassium	670	mg/L	EPA 200.7
Carbonate	0	mg/L	EPA 310.1
Bicarbonate	264	mg/L	EPA 310.1
Sulfate	4860	mg/L	EPA 375.4
T-Alkalinity	216	mg/L	EPA 310.1
Chloride	32400	mg/L	SM4500
Conductance	114000	mg/L	EPA 120.1
TDS	61200	mg/L	EPA 160.1

Anion-Cation Balance Acceptable Y/N?	
Analyte	Meq/L
Carbonate	0
Bicarbonate	4
Sulfate	101
Chloride	914
Calcium	69
Magnesium	51
Sodium	835
Potassium	17

H201564-01

Comments:

Total Anions	1019
Total Cations	972
Anion/Cation (%Diff)	2.39
Calculated TDS	59256.6
TDS Ratio (Measured/Calc	1.03
TDS/COND Ratio	0.53684211

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

18 July 2012

Celey Keene
Cardinal Laboratories
101 East Marland
Hobbs, NM 88240

RE: Methane

Enclosed are the results of analyses for samples received by the laboratory on 07/11/12 11:10. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Wendy Hsiao
Project Manager

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Cardinal Laboratories	Project: Methane	
101 East Marland	Project Number: [none]	**Reported:**
Hobbs NM, 88240	Project Manager: Celey Keene	07/18/12 10:56

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
H201564-1	T121191-01	Water	07/09/12 09:40	07/11/12 11:10

SunStar Laboratories, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Wendy Hsiao, Project Manager

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Cardinal Laboratories	Project: Methane	
101 East Marland	Project Number: [none]	**Reported:**
Hobbs NM, 88240	Project Manager: Celey Keene	07/18/12 10:56

H201564-1

T121191-01 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
SunStar Laboratories, Inc.									
RSK-175									
Methane	**162**	1.00	ug/l	1	2071110	07/11/12	07/16/12	RSK-175	

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Cardinal Laboratories	Project: Methane	
101 East Marland	Project Number: [none]	**Reported:**
Hobbs NM, 88240	Project Manager: Celey Keene	07/18/12 10:56

RSK-175 - Quality Control

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2071110 - EPA 3810m Headspace										
Blank (2071110-BLK1)				Prepared: 07/11/12	Analyzed: 07/16/12					
Methane	ND	1.00	ug/l							
Duplicate (2071110-DUP1)		**Source: T121191-01**		Prepared: 07/11/12	Analyzed: 07/16/12					
Methane	161	1.00	ug/l		162			0.465	20	

SunStar Laboratories, Inc.

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Wendy Hsiao, Project Manager

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

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Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Cardinal Laboratories	Project: Methane	
101 East Marland	Project Number: [none]	**Reported:**
Hobbs NM, 88240	Project Manager: Celey Keene	07/18/12 10:56

Notes and Definitions

DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

SunStar Laboratories, Inc.

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Wendy Hsiao, Project Manager

CARDINAL Laboratories

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

101 East Marland, Hobbs, NM 88240
(575) 393-2326 FAX (575) 393-2476

T121191

Company Name: Cardinal Labs	**BILL TO**
Project Manager: Celey Keene	P.O. #:
Address: 101 E. Marland	Company:
City: Hobbs State: NM Zip: 88240	Attn:
Phone #: 575-393-2326 Fax #: 575-393-2476	Address:
Project #: Project Owner:	City:
Project Name:	State: Zip:
Project Location:	Phone #:
Sampler Name:	Fax #:

ANALYSIS REQUEST

FOR LAB USE ONLY Lab I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	MATRIX: GROUNDWATER	WASTEWATER	SOIL	OIL	SLUDGE	OTHER :	PRESERV.: ACID/BASE:	ICE / COOL	OTHER :	SAMPLING: DATE	TIME	Methane
01	H201564-1			X							✓		07/09/12	9:40	✓

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising whether based in contract or tort, shall be limited to the amount paid by the client for the analyses. All claims including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within 30 days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequental damages, including without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise.

Relinquished By: [signature]	Date: 07/10/12 Time: 4:30	Received By:	Phone Result: ☐ Yes ☐ No Add'l Phone #:
Relinquished By: FED EX	Date: 7/10/12 Time: 11:10	Received By: [signature] 7/10/12 11:10	Fax Result: ☐ Yes ☐ No Add'l Fax #:
			REMARKS:

Delivered By: (Circle One)
Sampler - UPS - Bus - Other:

Sample Condition Cool	Intact
☒ Yes	☒ Yes
☐ No	☐ No

CHECKED BY: (Initials)

† Cardinal cannot accept verbal changes. Please fax written changes to (575) 393-2326

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

SAMPLE RECEIVING REVIEW SHEET

BATCH # T121191

Client Name: CARDINAL LABS Project: METHANE

Received by: BRIAN Date/Time Received: 7.10.12 1:19

Delivered by : ☐ Client ☐ SunStar Courier ☐ GSO ☒ FedEx ☐ Other

Total number of coolers received 1 **Temp criteria = 6°C > 0°C (no frozen containers)**

Temperature: cooler #1 x °C +/- the CF (- 0.2°C) = x °C corrected temperature

cooler #2 7.4 °C +/- the CF (- 0.2°C) = 7.2 °C corrected temperature

cooler #3 _____ °C +/- the CF (- 0.2°C) = _____ °C corrected temperature

Samples outside temp. but received on ice, w/in 6 hours of final sampling.	☒ Yes	☐ No*	☐ N/A
Custody Seals Intact on Cooler/Sample	☐ Yes	☐ No*	☒ N/A
Sample Containers Intact	☒ Yes	☐ No*	
Sample labels match COC ID's	☒ Yes	☐ No*	
Total number of containers received match COC	☒ Yes	☐ No*	
Proper containers received for analyses requested on COC	☒ Yes	☐ No*	
Proper preservative indicated on COC/containers for analyses requested	☐ Yes	☐ No*	☒ N/A

Complete shipment received in good condition with correct temperatures, containers, labels, volumes preservatives and within method specified holding times. ☒ **Yes** ☐ **No***

* Complete Non-Conformance Receiving Sheet if checked Cooler/Sample Review - Initials and date BC 7.10.12

Comments:

75 Suttle Street
Durango, CO 81303
970.247.4220 Phone
970.247.4227 Fax
www.greenanalytical.com

02 August 2012

Celey Keene
Cardinal Laboratories
101 East Marland
Hobbs, NM 88240

RE: Cardinal

Enclosed are the results of analyses for samples received by the laboratory on 07/11/12 11:45. The data to follow was performed, in whole or in part, by a subcontract laboratory with an additional report attached.

If you any any further assistance, please feel free to contact me.

Sincerely,

Debbie Zufelt
Reports Manager

dzufelt@greenanalytical.com p: 970.247.4220 f: 970.247.4227 75 Suttle Street Durango, CO 81303
www.GreenAnalytical.com

Cardinal Laboratories	Project:	Cardinal	
101 East Marland	Project Name / Number:	INTCP.C001.W09	**Reported:**
Hobbs NM, 88240	Project Manager:	Celey Keene	08/02/12 14:48

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
H201564-1	1207039-01	Water	07/09/12 09:40	07/11/12 11:45

Green Analytical Laboratories

Debbie Zufelt, Reports Manager

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www.GreenAnalytical.com

Cardinal Laboratories	Project:	Cardinal	
101 East Marland	Project Name / Number:	INTCP.C001.W09	**Reported:**
Hobbs NM, 88240	Project Manager:	Celey Keene	08/02/12 14:48

Sample 1207039-01 was analyzed at 1X, 10X, 100X, and 500X dilutions for Bromide. At no dilution was a proper color change observed when initially adding indicator. All dilutions resulted in a negative bromide concentration and may not be accurate.

Green Analytical Laboratories

Debbie Zufelt, Reports Manager

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Cardinal Laboratories	Project:	Cardinal	
101 East Marland	Project Name / Number:	INTCP.C001.W09	**Reported:**
Hobbs NM, 88240	Project Manager:	Celey Keene	08/02/12 14:48

H201564-1

1207039-01 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes	Analyst
General Chemistry								
Bromide	ND	1.00	mg/L	10	07/24/12	4500Br B		ABP
Fluoride	**2.30**	0.200	mg/L	1	07/20/12	4500F C		ABP
Total Metals by ICP								
Silicon	**6.24**	0.500	mg/L	1	07/18/12	6010B	DG1	JGS
Dissolved Metals by ICP								
Aluminum	**0.717**	0.500	mg/L	10	07/18/12	200.7		JGS
Boron	**6.51**	2.00	mg/L	10	07/18/12	200.7		JGS
Calcium	**1380**	10.0	mg/L	10	07/18/12	200.7		JGS
Iron	**19.7**	0.500	mg/L	10	07/18/12	200.7		JGS
Magnesium	**617**	10.0	mg/L	10	07/18/12	200.7		JGS
Potassium	**670**	10.0	mg/L	10	07/18/12	200.7		JGS
Silica (Si02)	**17.0**	10.7	mg/L	10	07/18/12	[CALC]		JGS
Silica (SiO2)	**13.4**	1.07	mg/L	1	07/18/12	[CALC]		JGS
Silicon	**7.94**	5.00	mg/L	10	07/18/12	200.7		JGS
Sodium	**19200**	50.0	mg/L	50	07/18/12	200.7		JGS
Strontium	**21.8**	1.00	mg/L	10	07/18/12	200.7		JGS
Tin	**9.84**	5.00	mg/L	10	07/23/12	200.7		JGS
Dissolved Metals by ICPMS								
Antimony	ND	0.0500	mg/L	100	07/24/12	200.8		JGS
Arsenic	ND	0.0500	mg/L	100	07/24/12	200.8		JGS
Barium	ND	0.0500	mg/L	100	07/24/12	200.8		JGS
Beryllium	ND	0.0500	mg/L	100	07/24/12	200.8		JGS
Cadmium	ND	0.0100	mg/L	100	07/24/12	200.8		JGS
Chromium	ND	0.100	mg/L	100	07/24/12	200.8		JGS
Cobalt	ND	0.0200	mg/L	200	07/20/12	200.8		JGS
Copper	**0.301**	0.0100	mg/L	100	07/24/12	200.8		JGS
Lead	ND	0.0500	mg/L	100	07/24/12	200.8		JGS
Manganese	**0.341**	0.0500	mg/L	100	07/24/12	200.8		JGS
Molybdenum	**0.0504**	0.0500	mg/L	100	07/24/12	200.8		JGS
Nickel	**0.0754**	0.0500	mg/L	100	07/24/12	200.8		JGS
Selenium	**0.162**	0.100	mg/L	100	07/24/12	200.8		JGS
Silver	ND	0.0200	mg/L	200	07/20/12	200.8		JGS

Green Analytical Laboratories

Debbie Zufelt

Debbie Zufelt, Reports Manager

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www.GreenAnalytical.com

Cardinal Laboratories	Project:	Cardinal	
101 East Marland	Project Name / Number:	INTCP.C001.W09	**Reported:**
Hobbs NM, 88240	Project Manager:	Celey Keene	08/02/12 14:48

H201564-1

1207039-01 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes	Analyst
Dissolved Metals by ICPMS								
Thallium	ND	0.0100	mg/L	100	07/24/12	200.8		JGS
Uranium	ND	0.0100	mg/L	100	07/24/12	200.8		JGS
Vanadium	ND	0.100	mg/L	200	07/20/12	200.8		JGS
Zinc	**0.140**	0.100	mg/L	100	07/24/12	200.8		JGS
Total Mercury by CVAA								
Mercury	ND	0.0002	mg/L	1	07/24/12	245.1		JGS

Green Analytical Laboratories

Debbie Zufelt, Reports Manager

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www.GreenAnalytical.com

Cardinal Laboratories	Project:	Cardinal	
101 East Marland	Project Name / Number:	INTCP.C001.W09	**Reported:**
Hobbs NM, 88240	Project Manager:	Celey Keene	08/02/12 14:48

General Chemistry - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B207134 - General Prep - Wet Chem										
Blank (B207134-BLK1)				Prepared & Analyzed: 07/20/12						
Fluoride	ND	0.200	mg/L							
LCS (B207134-BS1)				Prepared & Analyzed: 07/20/12						
Fluoride	0.969	0.200	mg/L	1.00		96.9	85-115			
LCS Dup (B207134-BSD1)				Prepared & Analyzed: 07/20/12						
Fluoride	0.969	0.200	mg/L	1.00		96.9	85-115	0.00	20	
Batch B207146 - General Prep - Wet Chem										
Blank (B207146-BLK1)				Prepared & Analyzed: 07/24/12						
Bromide	ND	0.100	mg/L							
LCS (B207146-BS1)				Prepared & Analyzed: 07/24/12						
Bromide	0.585	0.100	mg/L	0.600		97.6	85-115			
LCS Dup (B207146-BSD1)				Prepared & Analyzed: 07/24/12						
Bromide	0.595	0.100	mg/L	0.600		99.2	85-115	1.64	20	

Green Analytical Laboratories

Debbie Zufelt, Reports Manager

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Cardinal Laboratories	Project:	Cardinal	
101 East Marland	Project Name / Number:	INTCP.C001.W09	**Reported:**
Hobbs NM, 88240	Project Manager:	Celey Keene	08/02/12 14:48

Total Metals by ICP - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B207091 - EPA 3010										
Blank (B207091-BLK1)				Prepared & Analyzed: 07/18/12						
Silicon	ND	0.500	mg/L							
LCS (B207091-BS1)				Prepared & Analyzed: 07/18/12						
Silicon	4.01	0.500	mg/L	4.00		100	85-115			
LCS Dup (B207091-BSD1)				Prepared & Analyzed: 07/18/12						
Silicon	4.02	0.500	mg/L	4.00		100	85-115	0.0297	20	

Green Analytical Laboratories

Debbie Zufelt, Reports Manager

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www.GreenAnalytical.com

Cardinal Laboratories	Project:	Cardinal	
101 East Marland	Project Name / Number:	INTCP.C001.W09	**Reported:**
Hobbs NM, 88240	Project Manager:	Celey Keene	08/02/12 14:48

Dissolved Metals by ICP - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B207088 - Dissolved/Potentially Dissolved Metals										
Blank (B207088-BLK1)				Prepared & Analyzed: 07/18/12						
Aluminum	ND	0.050	mg/L							
Boron	ND	0.200	mg/L							
Calcium	ND	1.00	mg/L							
Iron	ND	0.050	mg/L							
Magnesium	ND	1.00	mg/L							
Potassium	ND	1.00	mg/L							
Silicon	ND	0.500	mg/L							
Sodium	ND	1.00	mg/L							
Strontium	ND	0.100	mg/L							
LCS (B207088-BS1)				Prepared & Analyzed: 07/18/12						
Aluminum	4.97	0.050	mg/L	5.00		99.4	85-115			
Boron	4.81	0.200	mg/L	5.00		96.1	85-115			
Calcium	5.03	1.00	mg/L	5.00		101	85-115			
Iron	4.95	0.050	mg/L	5.00		99.1	85-115			
Magnesium	25.4	1.00	mg/L	25.0		101	85-115			
Potassium	10.3	1.00	mg/L	10.0		103	85-115			
Silicon	5.12	0.500	mg/L	5.00		102	85-115			
Sodium	8.13	1.00	mg/L	8.10		100	85-115			
Strontium	4.87	0.100	mg/L	5.00		97.5	85-115			
LCS Dup (B207088-BSD1)				Prepared & Analyzed: 07/18/12						
Aluminum	4.96	0.050	mg/L	5.00		99.1	85-115	0.286	20	
Boron	4.81	0.200	mg/L	5.00		96.1	85-115	0.0378	20	
Calcium	5.01	1.00	mg/L	5.00		100	85-115	0.396	20	
Iron	4.93	0.050	mg/L	5.00		98.7	85-115	0.429	20	
Magnesium	25.3	1.00	mg/L	25.0		101	85-115	0.289	20	
Potassium	10.5	1.00	mg/L	10.0		105	85-115	2.33	20	
Silicon	5.43	0.500	mg/L	5.00		109	85-115	5.85	20	
Sodium	8.08	1.00	mg/L	8.10		99.7	85-115	0.653	20	
Strontium	4.87	0.100	mg/L	5.00		97.4	85-115	0.0200	20	

Green Analytical Laboratories

Debbie Zufelt, Reports Manager

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www.GreenAnalytical.com

Cardinal Laboratories	Project:	Cardinal	
101 East Marland	Project Name / Number:	INTCP.C001.W09	**Reported:**
Hobbs NM, 88240	Project Manager:	Celey Keene	08/02/12 14:48

Dissolved Metals by ICP - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B207136 - Dissolved/Potentially Dissolved Metals										
Blank (B207136-BLK1)				Prepared & Analyzed: 07/23/12						
Tin	ND	0.500	mg/L							
LCS (B207136-BS1)				Prepared & Analyzed: 07/23/12						
Tin	3.89	0.500	mg/L	4.00		97.3	85-115			
LCS Dup (B207136-BSD1)				Prepared & Analyzed: 07/23/12						
Tin	3.87	0.500	mg/L	4.00		96.8	85-115	0.512	20	

Green Analytical Laboratories

Debbie Zufelt, Reports Manager

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Cardinal Laboratories	Project:	Cardinal	
101 East Marland	Project Name / Number:	INTCP.C001.W09	**Reported:**
Hobbs NM, 88240	Project Manager:	Celey Keene	08/02/12 14:48

Dissolved Metals by ICPMS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B207107 - Dissolved/Potentially Dissolved Metals										
Blank (B207107-BLK1)				Prepared & Analyzed: 07/19/12						
Antimony	ND	0.0005	mg/L							
Arsenic	ND	0.0005	mg/L							
Barium	ND	0.0005	mg/L							
Beryllium	ND	0.0005	mg/L							
Cadmium	ND	0.0001	mg/L							
Chromium	ND	0.0010	mg/L							
Cobalt	ND	0.0001	mg/L							
Copper	ND	0.0001	mg/L							
Lead	ND	0.0005	mg/L							
Manganese	ND	0.0005	mg/L							
Molybdenum	ND	0.0005	mg/L							
Nickel	ND	0.0005	mg/L							
Selenium	ND	0.0010	mg/L							
Silver	ND	0.0001	mg/L							
Thallium	ND	0.0001	mg/L							
Uranium	ND	0.0001	mg/L							
Vanadium	ND	0.0005	mg/L							
Zinc	ND	0.0010	mg/L							
LCS (B207107-BS1)				Prepared & Analyzed: 07/19/12						
Antimony	0.0464	0.0005	mg/L	0.0500		92.9	85-115			
Arsenic	0.0454	0.0005	mg/L	0.0500		90.7	85-115			
Barium	0.0493	0.0005	mg/L	0.0500		98.7	85-115			
Beryllium	0.0460	0.0005	mg/L	0.0500		92.0	85-115			
Cadmium	0.0460	0.0001	mg/L	0.0500		92.0	85-115			
Chromium	0.0445	0.0010	mg/L	0.0500		89.0	85-115			
Cobalt	0.0446	0.0001	mg/L	0.0500		89.2	85-115			
Copper	0.0504	0.0001	mg/L	0.0500		101	85-115			
Lead	0.0448	0.0005	mg/L	0.0500		89.6	85-115			
Manganese	0.0458	0.0005	mg/L	0.0500		91.7	85-115			
Molybdenum	0.0478	0.0005	mg/L	0.0500		95.6	85-115			
Nickel	0.0483	0.0005	mg/L	0.0500		96.7	85-115			
Selenium	0.232	0.0010	mg/L	0.250		92.9	85-115			
Silver	0.0432	0.0001	mg/L	0.0500		86.4	85-115			
Thallium	0.0474	0.0001	mg/L	0.0500		94.7	85-115			
Uranium	0.0467	0.0001	mg/L	0.0500		93.4	85-115			
Vanadium	0.0425	0.0005	mg/L	0.0500		85.0	85-115			
Zinc	0.0448	0.0010	mg/L	0.0500		89.5	85-115			

Green Analytical Laboratories

Debbie Zufelt

Debbie Zufelt, Reports Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety. In no event shall Green Analytical Laboratories be liable for incidental or consequential damages. GALs liability, and clients exclusive remedy for any claim arising, shall be limited to the amount paid by client for analyses. All claims, including those for negligence and any other cause whatsoever, shall be deemed waived unless made in writing and received within thirty days after completion of the applicable service.

dzufelt@greenanalytical.com p: 970.247.4220 f: 970.247.4227 75 Suttle Street Durango, CO 81303
www.GreenAnalytical.com

Cardinal Laboratories	Project: Cardinal	
101 East Marland	Project Name / Number: INTCP.C001.W09	**Reported:**
Hobbs NM, 88240	Project Manager: Celey Keene	08/02/12 14:48

Dissolved Metals by ICPMS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B207107 - Dissolved/Potentially Dissolved Metals										
LCS Dup (B207107-BSD1)				Prepared & Analyzed: 07/19/12						
Antimony	0.0491	0.0005	mg/L	0.0500		98.3	85-115	5.62	20	
Arsenic	0.0465	0.0005	mg/L	0.0500		92.9	85-115	2.40	20	
Barium	0.0481	0.0005	mg/L	0.0500		96.3	85-115	2.44	20	
Beryllium	0.0465	0.0005	mg/L	0.0500		92.9	85-115	1.04	20	
Cadmium	0.0472	0.0001	mg/L	0.0500		94.5	85-115	2.61	20	
Chromium	0.0445	0.0010	mg/L	0.0500		89.0	85-115	0.0947	20	
Cobalt	0.0440	0.0001	mg/L	0.0500		88.1	85-115	1.31	20	
Copper	0.0505	0.0001	mg/L	0.0500		101	85-115	0.336	20	
Lead	0.0441	0.0005	mg/L	0.0500		88.1	85-115	1.61	20	
Manganese	0.0448	0.0005	mg/L	0.0500		89.5	85-115	2.39	20	
Molybdenum	0.0471	0.0005	mg/L	0.0500		94.2	85-115	1.47	20	
Nickel	0.0470	0.0005	mg/L	0.0500		94.0	85-115	2.85	20	
Selenium	0.232	0.0010	mg/L	0.250		92.9	85-115	0.0436	20	
Silver	0.0448	0.0001	mg/L	0.0500		89.7	85-115	3.72	20	
Thallium	0.0473	0.0001	mg/L	0.0500		94.6	85-115	0.0922	20	
Uranium	0.0461	0.0001	mg/L	0.0500		92.3	85-115	1.22	20	
Vanadium	0.0463	0.0005	mg/L	0.0500		92.6	85-115	8.59	20	
Zinc	0.0457	0.0010	mg/L	0.0500		91.3	85-115	2.00	20	

Green Analytical Laboratories

Debbie Zufelt, Reports Manager

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dzufelt@greenanalytical.com p: 970.247.4220 f: 970.247.4227 75 Suttle Street Durango, CO 81303
www.GreenAnalytical.com

Cardinal Laboratories	Project:	Cardinal	
101 East Marland	Project Name / Number:	INTCP.C001.W09	**Reported:**
Hobbs NM, 88240	Project Manager:	Celey Keene	08/02/12 14:48

Total Mercury by CVAA - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B207141 - EPA 245.1/7470										
Blank (B207141-BLK1)				Prepared & Analyzed: 07/24/12						
Mercury	ND	0.0002	mg/L							
LCS (B207141-BS1)				Prepared & Analyzed: 07/24/12						
Mercury	0.0020	0.0002	mg/L	0.00200		101	85-115			
LCS Dup (B207141-BSD1)				Prepared & Analyzed: 07/24/12						
Mercury	0.0020	0.0002	mg/L	0.00200		99.0	85-115	1.75	20	

Green Analytical Laboratories

Debbie Zufelt, Reports Manager

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dzufelt@greenanalytical.com p: 970.247.4220 f: 970.247.4227 75 Suttle Street Durango, CO 81303
www.GreenAnalytical.com

Cardinal Laboratories	Project:	Cardinal	
101 East Marland	Project Name / Number:	INTCP.C001.W09	**Reported:**
Hobbs NM, 88240	Project Manager:	Celey Keene	08/02/12 14:48

Notes and Definitions

Q1	Sample received outside of acceptable temperature range for analyses requiring cold storage.
DG1	Analyte is not an approved analyte for selected prep/digest method.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis *Results reported on as received basis unless designated as dry.
RPD	Relative Percent Difference
LCS	Laboratory Control Sample (Blank Spike)

Green Analytical Laboratories

Debbie Zufelt, Reports Manager

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CARDINAL Laboratories

1207-039-01

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

101 East Marland, Hobbs, NM 88240
(575) 393-2326 FAX (575) 393-2476

Company Name:	Cardinal Labs
Project Manager:	Celey Keene
Address:	101 E. Marland
City:	Hobbs State: NM Zip: 88240
Phone #:	575-393-2326 Fax #: 575-393-2476
Project #:	Project Owner:
Project Name:	
Project Location:	
Sampler Name:	

BILL TO

P.O. #:	
Company:	
Attn:	
Address:	
City:	
State:	Zip:
Phone #:	
Fax #:	

ANALYSIS REQUEST

See Attached List

FOR LAB USE ONLY Lab I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	MATRIX: GROUNDWATER	WASTEWATER	SOIL	OIL	SLUDGE	OTHER:	PRESERV.: ACID/BASE: H2SO4	ICE / COOL	OTHER:	SAMPLING DATE	TIME
	H201564-1			✓						✓	✓		07/09/12	9:40

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising whether based in contract or tort, shall be limited to the amount paid by the client for the analyses. All claims including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within 30 days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequental damages, including without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise.

Relinquished By: Hope S. Moreno	Date: 07/10/12 Time: 14:30	Received By: Debbie Zepeda	7-11-12 11:45
Relinquished By:	Date: Time:	Received By:	

Phone Result: ☐ Yes ☐ No Add'l Phone #:
Fax Result: ☐ Yes ☐ No Add'l Fax #:
REMARKS: Please run everything with the GAL label.

13.0°C Ice All Method

Delivered By: (Circle One)
Sampler - UPS - Bus - Other:

Sample Condition: Cool ☐ Yes ☐ No; Intact ☐ Yes ☐ No

CHECKED BY: (Initials)

† Cardinal cannot accept verbal changes. Please fax written changes to (575) 393-2326

TABLE 1: Analytical Parameters and Analysis Methods for Aqueous Samples Collected from Groundwater Monitoring Wells in the Capitan Aquifer.

Analytical Parameter	Analysis Method	Practical Quantitation Limit (mg/L unless noted)	Sample Holding Times
Anions			
Fluoride GAL	SM4500F C	0.2	28 days
Bromide GAL	SM4500Br	0.1	28 days
Chloride	SM4500CL B	4.0	28 days
Nitrogen, Nitrite (as N)	EPA Method 354.1	0.05	2 days
Nitrogen, Nitrate (as N)	EPA Method 353.3	0.1	2 days
Sulfate	EPA Method 375.4	10.0	28 days
Dissolved Metals (Filtered at 0.45 µm prior to preservation)			
Aluminum (Al) GAL	EPA Method 200.7	0.02	6 months
Antimony (Sb)	EPA Method 200.8	0.001	6 months
Arsenic (As)	EPA Method 200.8	0.001	6 months
Barium (Ba)	EPA Method 200.8	0.002	6 months
Beryllium (Be)	EPA Method 200.8	0.002	6 months
Boron (B)	EPA Method 200.7	0.04	6 months
Cadmium (Cd)	EPA Method 200.8	0.002	6 months
Calcium (Ca)	EPA Method 200.7	1.0	6 months
Chromium (Cr)	EPA Method 200.8	0.006	6 months
Cobalt (Co)	EPA Method 200.8	0.006	6 months
Copper (Cu)	EPA Method 200.8	0.006	6 months
Iron (Fe)	EPA Method 200.7	0.02	6 months
Lead (Pb)	EPA Method 200.8	0.005	6 months
Magnesium (Mg)	EPA Method 200.7	1.0	6 months
Manganese (Mn)	EPA Method 200.8	0.002	6 months
Mercury (Hg)	EPA Method 245.1	0.0002	28 days
Molybdenum (Mo)	EPA Method 200.8	0.008	6 months
Nickel (Ni)	EPA Method 200.8	0.01	6 months
Total Phosphorus (P)	SM 4500PF or EPA Method 365.1	0.1	6 months
Potassium (K) GAL	EPA Method 200.7	1.0	6 months
Selenium (Se)	EPA Method 200.8	0.001	6 months

Analytical Parameter	Analysis Method	Practical Quantitation Limit (mg/L unless noted)	Sample Holding Times
Silicon (Si) GAL	EPA Method 200.7	0.08	6 months
Silver (Ag)	EPA Method 200.8	0.005	6 months
Sodium (Na)	EPA Method 200.7	1.0	6 months
Strontium (Sr)	EPA Method 200.7	0.01	6 months
Thallium (Tl)	EPA Method 200.8	0.001	6 months
Tin (Sn)	EPA Method 200.7	0.01	6 months
Uranium (U)	EPA Method 200.8	0.001	6 months
Vanadium (V)	EPA Method 200.8	0.05	6 months
Zinc (Zn)	EPA Method 200.8	0.01	6 months
Solids			
Total Dissolved Solids (TDS)	EPA 160.1	5.0	7 days
Alkalinity			
Alkalinity, total (as $CaCO_3$)	EPA 310.1	4.0	7 days
Carbonate	EPA 310.1	2.0	7 days
Bicarbonate	EPA 310.1	5.0	7 days
Radiochemistry*			
Gross Alpha Radioactivity GAL	EPA Method 900.0	[-]	6 months
Isotopic Uranium (^{234}U, ^{235}U, ^{238}U)	HSL 300M	[-]	6 months
Dissolved Gases And Hydrocarbons			
Methane (CH_4) SunStar	RSK 175 or EPA Method 8015M	0.001	14 days
Ext. Diesel Range Organics (DRO)***	EPA Method 8015 M	1.00	14 days
Gasoline Range Organics (GRO)	EPA Method 8015 M	1.00	14 days
Other			
pH	EPA 150.1	0.1 pH Units	Upon receipt
Specific Conductance	EPA Method 120.1	1.0 µmhos/cm	28 days
Specific Gravity	SM 2710F	0.001	NA
Turbidity	EPA Method 180.1	0.5 NTU	48 hours
Total Organic Carbon GAL	SM 5310B	2.0	14 days
Hydrogen Sulfide (H_2S)^ Sulfide	EPA Method 376.2	0.01	7 days
Dissolved Silica GAL	EPA Method 200.7	2.1	6 months
Total Silica	EPA Method 200.7	2.1	6 months

Radiation Safety Engineering, Inc.

3245 N. WASHINGTON ST. • CHANDLER, ARIZONA 85225-1121 (480) 897-9459
Website: www.radsafe.com FAX (480) 892-5446

Radiochemical Activity in Water (pCi/L)

Green Analytical
75 Suttle St. Durango, CO 81303
Attn: Debbie Zufelt Phone Number: 970-247-4220

Sampling Date: July 09, 2012
Sample Received: July 12, 2012
Analysis Completed: July 25, 2012

Sample ID	Gross Alpha Activity Method 600/00-02 (pCi/L)	Uranium Activity Method ASTM D6239 (pCi/L)	Adjusted Gross Alpha (pCi/L)
H201564-1	28.0 ± 4.2	2.7 ± 0.8	25.3 ± 4.3

Date of Analysis	7/23/2012	7/17/2012	7/23/2012

Robert L. Metzger, Ph.D., C.H.P.

Radiation Safety Engineering, Inc.

3245 N. WASHINGTON ST. · CHANDLER, ARIZONA 85225-1121 (480) 897-9459
Website: www.radsafe.com FAX (480) 892-5446

Isotopic Uranium Analysis

Green Analytical
75 Suttle St. Durango, CO 81303
Attn: Debbie Zufelt Phone Number: 970-247-4220

Sampling Date: July 09, 2012
Sample Received: July 12, 2012
Uranium Analysis Date: July 17, 2012

Sample No.	^{238}U	^{235}U	^{234}U	Total	
H201564-1	1.3 ± 0.5	0.060 ± 0.004	1.4 ± 0.6	2.7 ± 0.8	Activity (pCi/L)
	3.9 ± 1.6	0.028 ± 0.002	0.00022 ± 0.00009	3.9 ± 1.6	Content (ug/L)
	Comments:				

Robert L. Metzger, Ph.D., C.H.P.

Radiation Safety

CHAIN OF CUSTODY RECORD

Page_____ of _____

Client: GREEN ANALYTICAL
Contact: DEBBIE ZUFELT
Address: 75 SUTTLE ST
DURANGO, CO 81303
Phone Number: 970-247-4220
FAX Number: 970-247-4227

NOTES:
1) Ensure proper container packaging.
2) Ship samples promptly following collection.
3) Designate Sample Reject Disposition.

PO# GA12-160
Project Name: Cardinal Labs

Table 1. – Matrix Type
1 = Surface Water, 2 = Ground Water
3 = Soil/Sediment, 4 = Rinsate, 5 = Oil
6 = Waste, 7 = Other (Specify) _____

FOR GAL USE ONLY
GAL JOB # _____

Samplers Signature:

PLEASE CALL WITH ANY QUESTIONS

Lab Name: Green Analytical Laboratories (970) 247-4220 FAX (970) 247-4227
Address: 75 Suttle Street, Durango, CO 81303

Sample ID	Collection: Date	Collection: Time	Collected by: (Init.)	Matrix Type From Table 1	No. of Containers	Sample Filtered ? Y/N	Unpreserved (Ice Only)	HNO3	HCL	H2SO4	NAOH	Other (Specify)	Gross Alpha	Isotopic U (234, 235, 238)							Comments
1. H201564-1	7-9-12	09:40		2	4			X					X	X							1207-039-01
2.																	444871				
3.																					
4.																					
5.																					
6.																					
7.																					
8.																					
9.																					
10.																					

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Michael Valentine UPS	7-12-12	1600	UPS	7-12-12	1600
Relinquished by:	Date:	Time:	Received by:	Date:	Time:

* Sample Reject: [ ] Return [ ] Dispose [ ] Store (30 Days)

LABORATORY REPORT

This report contains ___6___ pages.
(including the cover page)

If you have any questions concerning this report, please do not hesitate to call us at (800) 332-4345 or (574) 233-4777.

This report may not be reproduced, except in full, without written approval from UL.

UL LLC
110 S. Hill St., South Bend, IN 46617-2702 USA
T: 800.332.4345 / F: 574.233.8207 / W: UL.com

Laboratory Report

Client:	Green Analytical Laboratories	Report:	282524
Attn:	Debbie Zufelt 75 Suttle Street Durango, CO 81303	Priority:	Standard Written
		Status:	Final
		PWS ID:	Not Supplied

Copies to: None

Sample Information

UL ID #	Client ID	Method	Collected Date / Time	Collected By:	Received Date / Time
2674962	1207-039-01/H201564-1	5310 C	07/09/12 09:40	Client	07/13/12 09:45

Report Summary

Project: Cardinal Labs

Note: Sample was provided by the client in a clear glass container preserved with hydrochloric acid.

Detailed quantitative results are presented on the following pages. The results presented relate only to the samples provided for analysis.

We appreciate the opportunity to provide you with this analysis. If you have any questions concerning this report, please do not hesitate to call Kelly Trott at (574) 233-4777.

Note: This report may not be reproduced, except in full, without written approval from UL.

Rhonda Day Section Manager

Digitally signed by rhonda.s.day@ul.com
Date: 2012.07.31 11:35:56 -04'00'

Authorized Signature | Title | Date

Client Name: Green Analytical Laboratories
Report #: 282524

UL LLC
110 S. Hill St., South Bend, IN 46617-2702 USA
T: 800.332.4345 / F: 574.233.8207 / W: UL.com

Client Name: Green Analytical Laboratories

Report #: 282524

Sampling Point: 1207-039-01/H201564-1

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
---	Total Organic Carbon (TOC)	5310 C	---	0.500	**2.90**	mg/L	---	07/17/12 13:56	2674962

† UL has demonstrated it can achieve these report limits in reagent water, but can not document them in all sample matrices.

Reg Limit Type:	MCL	SMCL	AL
Symbol:	*	^	!

Lab Definitions

Continuing Calibration Check Standard (CCC) / Continuing Calibration Verification (CCV) / Initial Calibration Verification Standard (ICV) / Initial Performance Check (IPC) - is a standard containing one or more of the target analytes that is prepared from the same standards used to calibrate the instrument. This standard is used to verify the calibration curve at the beginning of each analytical sequence, and may also be analyzed throughout and at the end of the sequence. The concentration of continuing standards may be varied, when prescribed by the reference method, so that the range of the calibration curve is verified on a regular basis.

Internal Standards (IS) - are pure compounds with properties similar to the analytes of interest, which are added to field samples or extracts, calibration standards, and quality control standards at a known concentration. They are used to measure the relative responses of the analytes of interest and surrogates in the sample, calibration standard or quality control standard.

Laboratory Duplicate (LD) - is a field sample aliquot taken from the same sample container in the laboratory and analyzed separately using identical procedures. Analysis of laboratory duplicates provides a measure of the precision of the laboratory procedures.

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS) - is an aliquot of reagent water to which known concentrations of the analytes of interest are added. The LFB is analyzed exactly the same as the field samples. LFBs are used to determine whether the method is in control.

Laboratory Method Blank (LMB) / Laboratory Reagent Blank (LRB) - is a sample of reagent water included in the sample batch analyzed in the same way as the associated field samples. The LMB is used to determine if method analytes or other background contamination have been introduced during the preparation or analytical procedure. The LMB is analyzed exactly the same as the field samples.

Laboratory Trip Blank (LTB) / Field Reagent Blank (FRB) - is a sample of laboratory reagent water placed in a sample container in the laboratory and treated as a field sample, including storage, preservation, and all analytical procedures. The FRB/LTB container follows the collection bottles to and from the collection site, but the FRB/LTB is not opened at any time during the trip. The FRB/LTB is primarily a travel blank used to verify that the samples were not contaminated during shipment.

Matrix Spike Duplicate Sample (MSD) / Laboratory Fortified Sample Matrix Duplicate (LFSMD) - is a sample aliquot taken from the same field sample source as the Matrix Spike Sample to which known quantities of the analytes of interest are added in the laboratory. The MSD is analyzed exactly the same as the field samples. Analysis of the MSD provides a measure of the precision of the laboratory procedures in a specific matrix.

Matrix Spike Sample (MS) / Laboratory Fortified Sample Matrix (LFSM) - is a sample aliquot taken from field sample source to which known quantities of the analytes of interest are added in the laboratory. The MS is analyzed exactly the same as the field samples. The purpose is to demonstrate recovery of the analytes from a sample matrix to determine if the specific matrix contributes bias to the analytical results.

Quality Control Standard (QCS) / Second Source Calibration Verification (SSCV) - is a solution containing known concentrations of the analytes of interest prepared from a source different from the source of the calibration standards. The solution is obtained from a second manufacturer or lot if the lot can be demonstrated by the manufacturer as prepared independently from other lots. The QCS sample is analyzed using the same procedures as field samples. The QCS is used as a check on the calibration standards used in the method on a routine basis.

Reporting Limit Check (RLC) / Initial Calibration Check Standard (ICCS) - is a procedural standard that is analyzed each day to evaluate instrument performance at or below the minimum reporting limit (MRL).

Surrogate Standard (SS) / Surrogate Analyte (SUR) - is a pure compound with properties similar to the analytes of interest, which is highly unlikely to be found in any field sample, that is added to the field samples, calibration standards, blanks and quality control standards before sample preparation. The SS is used to evaluate the efficiency of the sample preparation process.

the standard in safety

110 S. Hill Street
South Bend, IN 46617
T: 1.800.332.4345
F: 574.233.8207

Order # 225558
Batch # 282524

www.ul.com/water

Shaded area for UL use only

CHAIN OF CUSTODY RECORD

Page 1 of 1

REPORT TO: Green Analytical Laboratories
75 Suttle St
Durango, CO 81303

SAMPLER (Signature)

STATE (of sample origin)

PWS ID#

PROJECT NAME: Cardinal Labs

PO#: GA-12-161

BILL TO: Same

COMPLIANCE MONITORING: Yes [ ] No [X]

POPULATION SERVED

SOURCE WATER

	LAB Number 2674962	COLLECTION DATE	TIME	AM	PM	SAMPLING SITE	TEST NAME	SAMPLE REMARKS	CHLORINATED YES	CHLORINATED NO	# OF CONTAINERS	MATRIX CODE	TURNAROUND TIME
1		7-9-12	09:40	K		H201564-1	TOC (HCl preserved)	1001-039-01	pH<2	SS	2	GW	SW
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													

Client Provided Sample Container / Clear vials w/ HCl SS 7-13-12

Okay to send per J. Timm. 7/13/12

RELINQUISHED BY:(Signature)	DATE	TIME	RECEIVED BY:(Signature)	DATE	TIME
Michael Valentine	7-12-12	1600 AM PM	UPS	7-12-12	1600 AM PM
UPS		AM PM			AM PM
		AM PM	RECEIVED FOR LABORATORY BY: SLogan	7-13-12	0945 AM PM

LAB RESERVES THE RIGHT TO RETURN UNUSED PORTIONS OF NON-AQUEOUS SAMPLES TO CLIENT

LAB COMMENTS:

CONDITIONS UPON RECEIPT (check one): Iced: Wet / Blue: ____ Ambient ____ °C Upon Receipt ____ N/A

MATRIX CODES:
DW-DRINKING WATER
RW-REAGENT WATER
GW-GROUND WATER
EW-EXPOSURE WATER
SW-SURFACE WATER
PW-POOL WATER
WW-WASTE WATER

TURN-AROUND TIME (TAT) - SURCHARGES

SW = Standard Written: (15 working days) **0%**
RV* = Rush Verbal: (5 working days) **50%**
RW* = Rush Written: (5 working days) **75%**
*Please call, Expedited service not available for all testing

IV* = Immediate Verbal: (3 working days) **100%**
IW* = Immediate Written: (3 working days) **125%**
SP* = Weekend, Holiday **CALL**
STAT* = Less than 48 hours **CALL**

Samples received unannounced less than 48 hours holding time remaining may be subject to additional charges.

UL-SBN-SHIP-F-002-09 Effective Date: 05/08/2009

Sample analysis will be provided according to the standard UL GSA/Water Services Terms, which are available upon request. Any other terms proposed by Customer are deemed material alterations and are rejected unless expressly agree to in writing by UL.

PURCHASE REQUEST

Green Analytical Laboratories, [redacted].
75 Suttle Street
Durango, CO 81303
Phone: 970-247-4220
Fax: 970-247-4227

Supplier: UL

Phone:
Fax:
Account:
Reference:
Contact:

PO Number: GA12-161
Date Ordered: 7-12-12
Ordered By: M. Valentine
Date Required:

All items will be shipped UPS Ground (5-7 day delivery) unless otherwise specified.

Part Number	Description	Quantity	Unit Price	Per	Ext	Date Rcvd	Insp By	Comments
Analysis	TOC	1						1207-039-01

Requested By: Date:

$ Total

Additional Comments:

Dept. Approval: Michael Valentine Date: 7-12-12

Lab Approval: Date:

page ____ of ____

501E

QUALITY ASSURANCE REVIEW FORM
LABORATORY ANALYTICAL RESULTS

Project No.	INTCP.C001 Work Order 9, Task 1 (Aquifer Test)
Client Name:	Intercontinental Potash Corp. (USA)
Project Name:	Ochoa Mine Project
Laboratory Name:	Cardinal Laboratories

Laboratory Order No.:	**NA**	**Well No. or Name:**	**ICP-WS-02**
Laboratory ID No.:	**H201599-01**	**Collection Date:**	**07/12/2012**
Client Sample ID(s):	**ICP-WS-02-2**	**Sample Time:**	**15:15**

Analytical Parameters requested By INTERA for sample(s) are defined by unique ID Code for COC: *INTCP.C001.WO9T1*. Check the boxes that apply to each question below:

Analytical Parameter	Analysis Method	Was the Parameter Analyzed (Y/N)?	Comments
Anions			
Fluoride	SM4500F C	Y	
Bromide	SM4500Br	Y	
Chloride	SM4500CL B	Y	
Nitrogen, Nitrite (as N)	EPA Method 354.1	Y	
Nitrogen, Nitrate (as N)	EPA Method 353.3	Y	
Sulfate	EPA Method 375.4	Y	
Dissolved Metals (Filtered at 0.45 µm prior to preservation)			
Aluminum (Al)	EPA Method 200.7	Y	
Antimony (Sb)	EPA Method 200.8	Y	
Arsenic (As)	EPA Method 200.8	Y	
Barium (Ba)	EPA Method 200.8	Y	
Beryllium (Be)	EPA Method 200.8	Y	
Boron (B)	EPA Method 200.7	Y	
Cadmium (Cd)	EPA Method 200.8	Y	

Analytical Parameter	Analysis Method	Was the Parameter Analyzed (Y/N)?	Comments
Calcium (Ca)	EPA Method 200.7	Y	
Chromium (Cr)	EPA Method 200.8	Y	
Cobalt (Co)	EPA Method 200.8	Y	
Copper (Cu)	EPA Method 200.8	Y	
Iron (Fe)	EPA Method 200.7	Y	
Lead (Pb)	EPA Method 200.8	Y	
Magnesium (Mg)	EPA Method 200.7	Y	
Manganese (Mn)	EPA Method 200.8	Y	
Mercury (Hg)	EPA Method 245.1	Y	
Molybdenum (Mo)	EPA Method 200.8	Y	
Nickel (Ni)	EPA Method 200.8	Y	
Total Phosphorus (P)	SM 4500PF or EPA Method 365.1	Y	Used method EPA 365.3
Potassium (K)	EPA Method 200.7	Y	
Selenium (Se)	EPA Method 200.8	Y	
Silicon (Si)	EPA Method 200.7	Y	
Silver (Ag)	EPA Method 200.8	Y	
Sodium (Na)	EPA Method 200.7	Y	
Strontium (Sr)	EPA Method 200.7	Y	
Thallium (Tl)	EPA Method 200.8	Y	
Tin (Sn)	EPA Method 200.7	Y	
Uranium (U)	EPA Method 200.8	Y	
Vanadium (V)	EPA Method 200.8	Y	
Zinc (Zn)	EPA Method 200.8	Y	
Solids			
Total Dissolved Solids (TDS)	EPA 160.1	Y	
Alkalinity			
Alkalinity, total (as $CaCO_3$)	EPA 310.1	Y	Used method EPA 310.1M
Carbonate	EPA 310.1	Y	Used method EPA 310.1M
Bicarbonate	EPA 310.1	Y	Used method EPA 310.1M
Radiochemistry*			
Gross Alpha Radioactivity	EPA Method 900.0	Y	Used method 600/00-02 instead

Analytical Parameter	Analysis Method	Was the Parameter Analyzed (Y/N)?	Comments
Isotopic Uranium (^{234}U, ^{235}U, ^{238}U)	HSL 300M	Y	Used ASTM D6239
Dissolved Gases And Hydrocarbons			
Methane (CH_4)	RSK 175 or EPA Method 8015M	Y	
Diesel Range Organics (DRO)***	EPA Method 8015 M	Y	
Gasoline Range Organics (GRO)	EPA Method 8015 M	Y	
Other			
pH	EPA 150.1	Y	
Specific Conductance	EPA Method 120.1	Y	
Specific Gravity	SM 2710F	Y	
Turbidity	EPA Method 180.1	Y	
Total Organic Carbon	SM 5310B	Y	
Hydrogen Sulfide (H_2S)^	EPA Method 376.2	Y	Total sulfide reported. Use pH to determine presence as H_2S.
Dissolved Silica	EPA Method 200.7	Y	Calculated
Total Silica	EPA Method 200.7	Y	Calculated

Notes: Practical Quantitation Limit = the minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence;

SM = Standard Method;

EPA = U.S. Environmental Protection Agency;

*Sub-contracted to laboratory to be identified by INTERA/ICP;

^Calculated from analysis of sulfide in water;

***DRO should be left on the chromatogram long enough to detect motor-oil range organics (MRO)

NTU = natural turbidity unit;

ASTM = American Society for Testing and Materials

I hereby affirm that I have completed a review of the analytical results as reported by the laboratory indicated above and confirm that, to the best of my knowledge, that all analytical results requested have been received.

Annelia Tinklenberg 8/24/12

Signature Date

Annelia Tinklenberg

Name Printed

SAMPLE NO. ICP-WS-02-2

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

August 23, 2012

PETER CASTIGLIA

INTERA, INC.

6000 UPTOWN BLVD, NE SUITE 220

ALBUQUERQUE, NM 87110

RE: OCHOA MINE PROJECT

Enclosed are the results of analyses for samples received by the laboratory on 07/12/12 16:40.

Cardinal Laboratories is accredited through Texas NELAP under certificate number T104704398-11-3. Accreditation applies to drinking water, non-potable water and solid and chemical materials. All accredited analytes are denoted by an asterisk (*). For a complete list on accredited analytes and matrices visit the TCEQ website at www.tceq.texas.gov/field/qa/lab_accred_certif.html.

Cardinal Laboratories is accreditated through the State of Colorado Department of Public Health and Environment for:

Method EPA 552.2	Haloacetic Acids (HAA-5)
Method EPA 524.2	Total Trihalomethanes (TTHM)
Method EPA 524.4	Regulated VOCs (V1, V2, V3)

Accreditation applies to public drinking water matrices.

This report meets NELAP requirements and is made up of a cover page, analytical results, and a copy of the original chain-of-custody. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Celey D. Keene

Celey D. Keene

Lab Director/Quality Manager

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:17

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
ICP-WS-02-2	H201599-01	Water	12-Jul-12 15:15	12-Jul-12 16:40

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Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

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INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:17

ICP-WS-02-2

H201599-01 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Notes
Cardinal Laboratories									
Radionuclides									**SUB-RS**
Gross Alpha	**30.8 ± 4.5**	0.0	pCi/L	1	2080612	CK	26-Jul-12	600/00-02	
Adjusted Gross Alpha	**29.5 ± 4.5**	0.0	pCi/L	1	2080612	CK	26-Jul-12	600/00-02	
Uranium 234 Activity	< 0.9	0.0	pCi/L	1	2080613	CK	24-Jul-12	ASTM D6239	
Uranium 235 Activity	< 0.007	0.0	pCi/L	1	2080613	CK	24-Jul-12	ASTM D6239	
Uranium 238 Activity	< 0.9	0.0	pCi/L	1	2080613	CK	24-Jul-12	ASTM D6239	
Total Uranium Activity	< 1.3	0.0	pCi/L	1	2080613	CK	24-Jul-12	ASTM D6239	
Uranium 234 Content	< 0.00014	0.0	ug/L	1	2080613	CK	24-Jul-12	ASTM D6239	
Uranium 235 Content	< 0.003	0.0	ug/L	1	2080613	CK	24-Jul-12	ASTM D6239	
Uranium 238 Content	< 3	0.0	ug/L	1	2080613	CK	24-Jul-12	ASTM D6239	
Total Uranium Content	< 3	0.0	ug/L	1	2080613	CK	24-Jul-12	ASTM D6239	
Inorganic Compounds									
Alkalinity, Bicarbonate	**371**	5.00	mg/L	1	2061106	HM	17-Jul-12	310.1M	
Bromide	ND	0.100	mg/L	1	2080919	CK	24-Jul-12	4500 Br	GAL
Alkalinity, Carbonate	ND	0.00	mg/L	1	2061106	HM	17-Jul-12	310.1M	
Chloride*	**48000**	4.00	mg/L	1	2071002	AP	19-Jul-12	4500-Cl-B	
Conductivity*	**126000**	1.00	uS/cm	1	2072710	HM	16-Jul-12	120.1	
Fluoride	**2.81**	0.400	mg/L	2	2080920	CK	30-Jul-12	4500F C	GAL
Nitrate as N	**2.80**	0.100	mg/L	1	2081012	AP	13-Jul-12	353.3	
Nitrite as N	ND	0.05	mg/L	1	2081012	AP	13-Jul-12	354.1	
pH*	**7.06**	0.100	pH Units	1	2072710	HM	16-Jul-12	150.1	
Phosphorus, Total	ND	0.100	mg/L	1	2071906	HM	19-Jul-12	365.3	
Specific Gravity @ 60° F	**1.043**	0.000	[blank]	1	2071808	HM	18-Jul-12	SM 2710F	
Sulfate*	**6660**	10.0	mg/L	1	2072411	AP	24-Jul-12	375.4	

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Celey D. Keene

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:17

ICP-WS-02-2

H201599-01 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Notes
			Cardinal Laboratories						
Inorganic Compounds									
TDS*	**68300**	5.00	mg/L	1	2071207	HM	16-Jul-12	160.1	
Alkalinity, Total*	**304**	4.00	mg/L	1	2061106	HM	17-Jul-12	310.1M	
Sulfide, total	**28.6**	0.500	mg/L	50	2070312	HM	18-Jul-12	376.2	
Turbidity	**11.2**	1.00	NTU	1	2080305	HM	03-Aug-12	180.1	
Organic Compounds									
GRO C6-C10	ND	1.00	mg/L	0.1	2071301	AM	13-Jul-12	8015M	
DRO >C10-C28	ND	1.00	mg/L	0.1	2071301	AM	13-Jul-12	8015M	
EXT DRO >C28-C35	ND	1.00	mg/L	0.1	2071301	AM	13-Jul-12	8015M	
Surrogate: 1-Chlorooctane		*81.5 %*	*48.7-164*		*2071301*	AM	*13-Jul-12*	*8015M*	
Surrogate: 1-Chlorooctadecane		*105 %*	*54.8-165*		*2071301*	AM	*13-Jul-12*	*8015M*	
Organic Compounds									
Methane	**927**	1.00	ug/L	1	2072605	CK	24-Jul-12	RSK-175	SUB-SS
Organic Compounds									
Total Organic Carbon	**0.651**	0.500	mg/L	1	2080921	CK	23-Jul-12	SM5310B	SUB-UL
Dissolved Metals									
Aluminum	**0.808**	0.500	mg/L	10	2080912	CK	23-Jul-12	200.7	GAL
Antimony	ND	0.0500	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Arsenic	ND	0.0500	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Barium	ND	0.0500	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Beryllium	ND	0.0500	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Boron	**4.10**	2.00	mg/L	10	2080912	CK	23-Jul-12	200.7	GAL
Cadmium	ND	0.0100	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Calcium	**1440**	100	mg/L	100	2080912	CK	23-Jul-12	200.7	GAL
Chromium	ND	0.100	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Cobalt	ND	0.0100	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Copper	**0.290**	0.0100	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL

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Celey D. Keene, Lab Director/Quality Manager

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Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:17

ICP-WS-02-2

H201599-01 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Notes
Cardinal Laboratories									
Dissolved Metals									
Iron	**7.01**	0.500	mg/L	10	2080912	CK	23-Jul-12	200.7	GAL
Lead	ND	0.0500	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Magnesium	**641**	100	mg/L	100	2080912	CK	23-Jul-12	200.7	GAL
Manganese	**0.176**	0.0500	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Molybdenum	ND	0.0500	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Nickel	**0.0516**	0.0500	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Potassium	**701**	100	mg/L	100	2080912	CK	23-Jul-12	200.7	GAL
Selenium	**0.149**	0.100	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Silica	**15.3**	10.7	mg/L	10	2080912	CK	23-Jul-12	CALC	GAL
Silicon	**7.15**	5.00	mg/L	10	2080912	CK	23-Jul-12	200.7	GAL
Silver	ND	0.0100	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Sodium	**20600**	100	mg/L	100	2080912	CK	23-Jul-12	200.7	GAL
Strontium	**23.7**	10.0	mg/L	100	2080912	CK	23-Jul-12	200.7	GAL
Thallium	ND	0.0100	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Tin	ND	5.00	mg/L	10	2080912	CK	23-Jul-12	200.7	GAL
Uranium	ND	0.0100	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Vanadium	ND	0.0500	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Zinc	ND	0.100	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Total Metals									
Mercury	ND	0.0002	mg/L	1	2080916	CK	24-Jul-12	245.1	GAL
Silica	**16.1**	10.7	mg/L	10	2080915	CK	26-Jul-12	CALC	GAL
Silicon	**7.54**	5.00	mg/L	10	2080915	CK	26-Jul-12	200.7	A-01, GAL

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Celey D. Keene

Celey D. Keene, Lab Director/Quality Manager

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Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:17

Inorganic Compounds - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2061106 - General Prep - Wet Chem										
Blank (2061106-BLK1)				Prepared & Analyzed: 11-Jun-12						
Alkalinity, Carbonate	ND	0.00	mg/L							
Alkalinity, Bicarbonate	ND	5.00	mg/L							
Alkalinity, Total	ND	4.00	mg/L							
LCS (2061106-BS1)				Prepared & Analyzed: 11-Jun-12						
Alkalinity, Carbonate	ND	0.00	mg/L				80-120			
Alkalinity, Bicarbonate	137	5.00	mg/L				80-120			
Alkalinity, Total	112	4.00	mg/L	100		112	80-120			
LCS Dup (2061106-BSD1)				Prepared & Analyzed: 11-Jun-12						
Alkalinity, Carbonate	ND	0.00	mg/L				80-120		20	
Alkalinity, Bicarbonate	132	5.00	mg/L				80-120	3.72	20	
Alkalinity, Total	108	4.00	mg/L	100		108	80-120	3.64	20	
Batch 2070312 - General Prep - Wet Chem										
Blank (2070312-BLK1)				Prepared & Analyzed: 03-Jul-12						
Sulfide, total	ND	0.0100	mg/L							
Duplicate (2070312-DUP1)		**Source: H201467-02**		Prepared & Analyzed: 03-Jul-12						
Sulfide, total	628	0.0100	mg/L		652			3.75	20	
Batch 2071002 - General Prep - Wet Chem										
Blank (2071002-BLK1)				Prepared & Analyzed: 09-Jul-12						
Chloride	ND	4.00	mg/L							

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Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:17

Inorganic Compounds - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2071002 - General Prep - Wet Chem										
LCS (2071002-BS1)				Prepared & Analyzed: 09-Jul-12						
Chloride	100	4.00	mg/L	100		100	80-120			
LCS Dup (2071002-BSD1)				Prepared & Analyzed: 09-Jul-12						
Chloride	100	4.00	mg/L	100		100	80-120	0.00	20	
Batch 2071207 - Filtration										
Blank (2071207-BLK1)				Prepared & Analyzed: 09-Jul-12						
TDS	ND	5.00	mg/L							
LCS (2071207-BS1)				Prepared & Analyzed: 09-Jul-12						
TDS	245		mg/L	240		102	80-120			
Duplicate (2071207-DUP1)		**Source: H201554-02**		Prepared & Analyzed: 09-Jul-12						
TDS	363000	5.00	mg/L		379000			4.31	20	
Batch 2071808 - General Prep - Wet Chem										
Duplicate (2071808-DUP1)		**Source: H201599-01**		Prepared & Analyzed: 18-Jul-12						
Specific Gravity @ 60° F	1.042	0.000	[blank]		1.043			0.0921	200	
Batch 2071906 - General Prep - Wet Chem										
Blank (2071906-BLK1)				Prepared & Analyzed: 19-Jul-12						
Phosphorus, Total	ND	0.100	mg/L							

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Inorganic Compounds - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2071906 - General Prep - Wet Chem										
LCS (2071906-BS1)				Prepared & Analyzed: 19-Jul-12						
Phosphorus, Total	0.790	0.100	mg/L	0.800		98.8	80-120			
Duplicate (2071906-DUP1)		**Source: H201599-01**		Prepared & Analyzed: 19-Jul-12						
Phosphorus, Total	0.0200	0.100	mg/L		0.0500			85.7	20	QR-01
Batch 2072411 - General Prep - Wet Chem										
Blank (2072411-BLK1)				Prepared & Analyzed: 24-Jul-12						
Sulfate	ND	10.0	mg/L							
LCS (2072411-BS1)				Prepared & Analyzed: 24-Jul-12						
Sulfate	19.9	10.0	mg/L	20.0		99.4	80-120			
Duplicate (2072411-DUP1)		**Source: H201599-01**		Prepared & Analyzed: 24-Jul-12						
Sulfate	6840	10.0	mg/L		6660			2.74	20	
Batch 2072710 - General Prep - Wet Chem										
LCS (2072710-BS1)				Prepared & Analyzed: 16-Jul-12						
pH	7.08		pH Units	7.00		101	90-110			
Conductivity	1420		uS/cm	1410		101	80-120			
Duplicate (2072710-DUP1)		**Source: H201599-01**		Prepared & Analyzed: 16-Jul-12						
Conductivity	126000	1.00	uS/cm		126000			0.00	20	
pH	7.09	0.100	pH Units		7.06			0.424	20	

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Celey D. Keene, Lab Director/Quality Manager

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Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:17

*** DEFAULT GENERAL METHOD *** - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2080305 - General Prep - Wet Chem										
Blank (2080305-BLK1)				Prepared & Analyzed: 03-Aug-12						
Turbidity	ND	1.00	NTU							
LCS (2080305-BS1)				Prepared & Analyzed: 03-Aug-12						
Turbidity	22.0	1.00	NTU	20.0		110	80-120			
Duplicate (2080305-DUP1)		**Source: H201564-01**		Prepared & Analyzed: 03-Aug-12						
Turbidity	1.51	1.00	NTU		1.67			10.1	20	
Batch 2080919 - General Prep										
Blank (2080919-BLK1)				Prepared & Analyzed: 24-Jul-12						
Bromide	ND	0.100	mg/L							
LCS (2080919-BS1)				Prepared & Analyzed: 24-Jul-12						
Bromide	0.585		mg/L	0.600		97.5	85-115			
LCS Dup (2080919-BSD1)				Prepared & Analyzed: 24-Jul-12						
Bromide	0.595		mg/L	0.600		99.2	85-115	1.69	20	
Batch 2080920 - General Prep										
Blank (2080920-BLK1)				Prepared & Analyzed: 30-Jul-12						
Fluoride	ND	0.200	mg/L							
LCS (2080920-BS1)				Prepared & Analyzed: 30-Jul-12						
Fluoride	0.943		mg/L	1.00		94.3	85-115			

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Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:17

Inorganic Compounds - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2080920 - General Prep										
LCS Dup (2080920-BSD1)				Prepared & Analyzed: 30-Jul-12						
Fluoride	0.902		mg/L	1.00		90.2	85-115	4.44	20	
Batch 2081012 - General Prep - Wet Chem										
Blank (2081012-BLK1)				Prepared & Analyzed: 13-Jul-12						
Nitrate as N	ND	0.100	mg/L							
Nitrite as N	ND	0.05	mg/L							
LCS (2081012-BS1)				Prepared & Analyzed: 13-Jul-12						
Nitrate as N	5.10	0.100	mg/L	5.00		102	80-120			
Nitrite as N	0.18	0.05	mg/L	0.200		91.0	80-120			
Duplicate (2081012-DUP1)		**Source: H201599-01**		Prepared & Analyzed: 13-Jul-12						
Nitrite as N	ND	0.05	mg/L		0.00				20	
Nitrate as N	3.30	0.100	mg/L		2.80			16.4	20	

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Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:17

Organic Compounds - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2071301 - General Prep - Organics										
Blank (2071301-BLK1)				Prepared: 13-Jul-12 Analyzed: 16-Jul-12						
GRO C6-C10	ND	10.0	mg/L							
DRO >C10-C28	ND	10.0	mg/L							
EXT DRO >C28-C35	ND	10.0	mg/L							
Surrogate: 1-Chlorooctane	*4.22*		mg/L	*5.00*		*84.4*	*48.7-164*			
Surrogate: 1-Chlorooctadecane	*5.32*		mg/L	*5.00*		*106*	*54.8-165*			
LCS (2071301-BS1)				Prepared & Analyzed: 13-Jul-12						
GRO C6-C10	43.7	1.00	mg/L	66.7		65.5	59.3-133			
DRO >C10-C28	46.9	1.00	mg/L	66.7		70.4	43.4-148			
EXT DRO >C28-C35	ND	1.00	mg/L	0.00			0-0			
Surrogate: 1-Chlorooctane	*4.92*		mg/L	*5.00*		*98.5*	*48.7-164*			
Surrogate: 1-Chlorooctadecane	*5.26*		mg/L	*5.00*		*105*	*54.8-165*			
LCS Dup (2071301-BSD1)				Prepared & Analyzed: 13-Jul-12						
GRO C6-C10	44.9	1.00	mg/L	66.7		67.4	59.3-133	2.81	24	
DRO >C10-C28	48.0	1.00	mg/L	66.7		72.0	43.4-148	2.24	27.3	
EXT DRO >C28-C35	ND	1.00	mg/L	0.00			0-0		0	
Surrogate: 1-Chlorooctane	*5.12*		mg/L	*5.00*		*102*	*48.7-164*			
Surrogate: 1-Chlorooctadecane	*5.68*		mg/L	*5.00*		*114*	*54.8-165*			

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Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:17

Organic Compounds - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2072605 - General Prep										
Blank (2072605-BLK1)				Prepared: 19-Jul-12 Analyzed: 24-Jul-12						
Methane	ND	1.00	ug/L							
Duplicate (2072605-DUP1)		**Source: H201629-02**		Prepared: 19-Jul-12 Analyzed: 24-Jul-12						
Methane	874	1.00	ug/L		921			5.24	20	

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Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:17

Dissolved Metals - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2080912 - Dissolved/Potentially Dissolved Metals										
Blank (2080912-BLK1)				Prepared & Analyzed: 23-Jul-12						
Potassium	ND	1.00	mg/L							
Boron	ND	0.200	mg/L							
Calcium	ND	1.00	mg/L							
Magnesium	ND	1.00	mg/L							
Iron	ND	0.050	mg/L							
Sodium	ND	1.00	mg/L							
Strontium	ND	0.100	mg/L							
Aluminum	ND	0.0500	mg/L							
Silicon	ND	0.500	mg/L							
Tin	ND	0.500	mg/L							
LCS (2080912-BS1)				Prepared & Analyzed: 23-Jul-12						
Magnesium	26.5		mg/L	25.0		106	85-115			
Aluminum	5.16		mg/L	5.00		103	85-115			
Iron	5.15		mg/L	5.00		103	85-115			
Strontium	5.13		mg/L	5.00		103	85-115			
Boron	5.04		mg/L	5.00		101	85-115			
Calcium	5.22		mg/L	5.00		104	85-115			
Sodium	7.73		mg/L	8.10		95.4	85-115			
Potassium	10.2		mg/L	10.0		102	85-115			
Silicon	5.36		mg/L	5.00		107	85-115			
Tin	3.89		mg/L	4.00		97.2	85-115			
LCS Dup (2080912-BSD1)				Prepared & Analyzed: 23-Jul-12						
Aluminum	5.12		mg/L	5.00		102	85-115	0.778	20	
Calcium	5.19		mg/L	5.00		104	85-115	0.576	20	
Sodium	7.65		mg/L	8.10		94.4	85-115	1.04	20	
Strontium	5.10		mg/L	5.00		102	85-115	0.587	20	
Iron	5.12		mg/L	5.00		102	85-115	0.584	20	
Magnesium	26.4		mg/L	25.0		106	85-115	0.378	20	
Potassium	10.1		mg/L	10.0		101	85-115	0.985	20	
Boron	5.03		mg/L	5.00		101	85-115	0.199	20	
Tin	3.87		mg/L	4.00		96.8	85-115	0.515	20	

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Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:17

Inorganic Compounds - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2080912 - Dissolved/Potentially Dissolved Metals										
LCS Dup (2080912-BSD1)				Prepared & Analyzed: 23-Jul-12						
Silicon	5.32		mg/L	5.00		106	85-115	0.749	20	
Batch 2080917 - Dissolved/Potentially Dissolved Metals										
Blank (2080917-BLK1)				Prepared: 24-Jul-12 Analyzed: 25-Jul-12						
Uranium	ND	0.000100	mg/L							
Chromium	ND	0.001	mg/L							
Zinc	ND	0.001	mg/L							
Cobalt	ND	0.00010	mg/L							
Antimony	ND	0.000500	mg/L							
Thallium	ND	0.000100	mg/L							
Copper	ND	0.0001	mg/L							
Molybdenum	ND	0.0005	mg/L							
Vanadium	ND	0.000500	mg/L							
Barium	ND	0.000500	mg/L							
Beryllium	ND	0.000500	mg/L							
Arsenic	ND	0.0005	mg/L							
Silver	ND	0.00010	mg/L							
Nickel	ND	0.0005	mg/L							
Lead	ND	0.0005	mg/L							
Selenium	ND	0.001	mg/L							
Cadmium	ND	0.00010	mg/L							
Manganese	ND	0.0005	mg/L							
LCS (2080917-BS1)				Prepared: 24-Jul-12 Analyzed: 25-Jul-12						
Cadmium	0.0498		mg/L	0.0500		99.6	85-115			
Arsenic	0.0478		mg/L	0.0500		95.6	85-115			
Antimony	0.0487		mg/L	0.0500		97.4	85-115			
Barium	0.0488		mg/L	0.0500		97.6	85-115			
Beryllium	0.0480		mg/L	0.0500		96.0	85-115			
Selenium	0.237		mg/L	0.250		94.8	85-115			
Vanadium	0.0500		mg/L	0.0500		100	85-115			
Chromium	0.049		mg/L	0.0500		98.8	85-115			

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Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:17

Total Metals by ICPMS - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2080917 - Dissolved/Potentially Dissolved Metals										
LCS (2080917-BS1)				Prepared: 24-Jul-12 Analyzed: 25-Jul-12						
Molybdenum	0.0477		mg/L	0.0500		95.4	85-115			
Uranium	0.0499		mg/L	0.0500		99.8	85-115			
Zinc	0.046		mg/L	0.0500		93.0	85-115			
Manganese	0.0493		mg/L	0.0500		98.6	85-115			
Nickel	0.0505		mg/L	0.0500		101	85-115			
Lead	0.0496		mg/L	0.0500		99.2	85-115			
Silver	0.0438		mg/L	0.0500		87.6	85-115			
Copper	0.0522		mg/L	0.0500		104	85-115			
Thallium	0.0512		mg/L	0.0500		102	85-115			
Cobalt	0.0481		mg/L	0.0500		96.2	85-115			
LCS Dup (2080917-BSD1)				Prepared: 24-Jul-12 Analyzed: 25-Jul-12						
Selenium	0.245		mg/L	0.250		98.0	85-115	3.32	20	
Barium	0.0487		mg/L	0.0500		97.4	85-115	0.205	20	
Beryllium	0.0469		mg/L	0.0500		93.8	85-115	2.32	20	
Silver	0.0434		mg/L	0.0500		86.8	85-115	0.917	20	
Uranium	0.0487		mg/L	0.0500		97.4	85-115	2.43	20	
Vanadium	0.0469		mg/L	0.0500		93.8	85-115	6.40	20	
Antimony	0.0478		mg/L	0.0500		95.6	85-115	1.87	20	
Arsenic	0.0468		mg/L	0.0500		93.6	85-115	2.11	20	
Manganese	0.0481		mg/L	0.0500		96.2	85-115	2.46	20	
Chromium	0.047		mg/L	0.0500		94.2	85-115	4.77	20	
Cobalt	0.0471		mg/L	0.0500		94.2	85-115	2.10	20	
Zinc	0.048		mg/L	0.0500		96.6	85-115	3.80	20	
Copper	0.0504		mg/L	0.0500		101	85-115	3.51	20	
Lead	0.0485		mg/L	0.0500		97.0	85-115	2.24	20	
Cadmium	0.0471		mg/L	0.0500		94.2	85-115	5.57	20	
Molybdenum	0.0479		mg/L	0.0500		95.8	85-115	0.418	20	
Nickel	0.0482		mg/L	0.0500		96.4	85-115	4.66	20	
Thallium	0.0494		mg/L	0.0500		98.8	85-115	3.58	20	

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Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:17

Total Metals - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2080915 - EPA 3010										
Blank (2080915-BLK1)				Prepared & Analyzed: 26-Jul-12						
Silicon	ND	0.500	mg/L							A-01
LCS (2080915-BS1)				Prepared & Analyzed: 26-Jul-12						
Silicon	0.125		mg/L	4.00		3.12	85-115			A-01
LCS Dup (2080915-BSD1)				Prepared & Analyzed: 26-Jul-12						
Silicon	0.168		mg/L	4.00		4.20	85-115	29.4	20	A-01
Batch 2080916 - EPA 245.1										
Blank (2080916-BLK1)				Prepared & Analyzed: 24-Jul-12						
Mercury	ND	0.0002	mg/L							
LCS (2080916-BS1)				Prepared & Analyzed: 24-Jul-12						
Mercury	0.0020		mg/L	0.00200		100	85-115			
LCS Dup (2080916-BSD1)				Prepared & Analyzed: 24-Jul-12						
Mercury	0.0020		mg/L	0.00200		100	85-115	0.00	20	

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Celey D. Keene, Lab Director/Quality Manager

Notes and Definitions

Z-01g	30.8 ± 4.5
Z-01f	29.5 ± 4.5
Z-01e	< 3
Z-01d	< 1.3
Z-01c	< 0.9
Z-01b	< 0.007
Z-01a	< 0.003
Z-01	< 0.00014
SUB-UL	Analysis subcontracted to Underwriters Laboratories, Inc.
SUB-SS	Analysis subcontracted to SunStar Laboratories, Inc.
SUB-RS	Analysis subcontracted to Radiation Safety Engineering, Inc.
QR-01	Analyses are not controlled on RPD values from sample concentrations less than 10 times the reporting limit. QC batch accepted based on LCS and/or LCSD QC results.
GAL	Analysis subcontracted to Green Analytical Laboratories, a subsidiary of Cardinal Laboratories.
A-01	Analyte is not an approved analyte for selected prep/digest method.
ND	Analyte NOT DETECTED at or above the reporting limit
RPD	Relative Percent Difference
**	Samples not received at proper temperature of 6°C or below.
***	Insufficient time to reach temperature.
-	Chloride by SM4500Cl-B does not require samples be received at or below 6°C
	Samples reported on an as received basis (wet) unless otherwise noted on report

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Celey D. Keene

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

101 East Marland, Hobbs, NM 88240
(575) 393-2326 FAX (575) 393-2476

Company Name: INTERA	**BILL TO**
Project Manager: Peter Castiglia	P.O. #:
Address: 6000 Uptown Blvd Suite 220	Company:
City: Albuquerque State: NM Zip: 87110	Attn:
Phone #: 505-296-1600 Fax #:	Address:
Project #: INTCP.C001.W091 Project Owner: ICP	City:
Project Name: Ochoa Mine Project	State: Zip:
Project Location: ICP-WS-02	Phone #:
Sampler Name: Amelia Tinklenberg	Fax #:

ANALYSIS REQUEST

FOR LAB USE ONLY Lab I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	MATRIX: GROUNDWATER	WASTEWATER	SOIL	OIL	SLUDGE	OTHER:	PRESERV.: ACID/BASE:	ICE / COOL	OTHER:	SAMPLING DATE	TIME	ANALYSIS REQUEST
H201599 -1	ICP-WS-02-2	G		X						X	X		7-12-12	3:15	SEE ATTACHED LIST 1-250 mL HDPE 1-500 mL HDPE 5-1 liter HDPE 1-500 mL HNO_3 1-250 mL H_2SO_4 1-500 mL NaOH 2-VOA no pres. 4-VOA HCL

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising whether based in contract or tort, shall be limited to the amount paid by the client for the analyses. All claims including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within 30 days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise.

Relinquished By: [signature]	Date: 7/12/12 Time: 4:40	Received By: [signature]	Phone Result: ☐ Yes ☐ No Add'l Phone #:
Relinquished By:	Date: Time:	Received By:	Fax Result: ☐ Yes ☐ No Add'l Fax #: REMARKS:
Delivered By: (Circle One) Sampler - UPS - Bus - Other: 19°		Sample Condition Cool: ☐ Yes ☐ No Intact: ☑ Yes ☐ No	CHECKED BY: (Initials)

† Cardinal cannot accept verbal changes. Please fax written changes to (575) 393-2326

#26

FORM-007
CARDINAL LABORATORIES
Revision 1.0

MASS BALANCE SHEET

Parameter	Result	Units	Method
Calcium	1440	mg/L	EPA 200.7
Magnesium	641	mg/L	EPA 200.7
Sodium	20600	mg/L	EPA 200.7
Potassium	701	mg/L	EPA 200.7
Carbonate	0	mg/L	EPA 310.1
Bicarbonate	371	mg/L	EPA 310.1
Sulfate	6660	mg/L	EPA 375.4
T-Alkalinity	304	mg/L	EPA 310.1
Chloride	48000	mg/L	SM4500
Conductance	126000	mg/L	EPA 120.1
TDS	68300	mg/L	EPA 160.1

Anion-Cation Balance Acceptable Y/N?	
Analyte	Meq/L
Carbonate	0
Bicarbonate	6
Sulfate	139
Chloride	1354
Calcium	72
Magnesium	53
Sodium	896
Potassium	18

H201599-01

Comments:

Total Anions	1499
Total Cations	1039
Anion/Cation (%Diff)	18.13
Calculated TDS	78224.4
TDS Ratio (Measured/Calc	0.87
TDS/COND Ratio	0.54206349

QUALITY ASSURANCE REVIEW FORM
LABORATORY ANALYTICAL RESULTS

Project No.	INTCP.C001 Work Order 9, Task 1 (Aquifer Test)
Client Name:	Intercontinental Potash Corp. (USA)
Project Name:	Ochoa Mine Project
Laboratory Name:	Cardinal Laboratories

Laboratory Order No.:	**NA**	**Well No. or Name:**	**ICP-WS-02**
Laboratory ID No.:	**H201629-01**	**Collection Date:**	**07/16/2012**
Client Sample ID(s):	**ICP-WS-02-3**	**Collection Time:**	**18:30**

Analytical Parameters requested By INTERA for sample(s) are defined by unique ID Code for COC: *INTCP.C001.WO9T1*. Check the boxes that apply to each question below:

Analytical Parameter	Analysis Method	Was the Parameter Analyzed (Y/N)?	Comments
Anions			
Fluoride	SM4500F C	Y	
Bromide	SM4500Br	Y	
Chloride	SM4500CL B	Y	
Nitrogen, Nitrite (as N)	EPA Method 354.1	Y	
Nitrogen, Nitrate (as N)	EPA Method 353.3	Y	
Sulfate	EPA Method 375.4	Y	
Dissolved Metals (Filtered at 0.45 µm prior to preservation)			
Aluminum (Al)	EPA Method 200.7	Y	
Antimony (Sb)	EPA Method 200.8	Y	
Arsenic (As)	EPA Method 200.8	Y	
Barium (Ba)	EPA Method 200.8	Y	
Beryllium (Be)	EPA Method 200.8	Y	
Boron (B)	EPA Method 200.7	Y	

Analytical Parameter	Analysis Method	Was the Parameter Analyzed (Y/N)?	Comments
Cadmium (Cd)	EPA Method 200.8	Y	
Calcium (Ca)	EPA Method 200.7	Y	
Chromium (Cr)	EPA Method 200.8	Y	
Cobalt (Co)	EPA Method 200.8	Y	
Copper (Cu)	EPA Method 200.8	Y	
Iron (Fe)	EPA Method 200.7	Y	
Lead (Pb)	EPA Method 200.8	Y	
Magnesium (Mg)	EPA Method 200.7	Y	
Manganese (Mn)	EPA Method 200.8	Y	
Mercury (Hg)	EPA Method 245.1	Y	
Molybdenum (Mo)	EPA Method 200.8	Y	
Nickel (Ni)	EPA Method 200.8	Y	
Total Phosphorus (P)	SM 4500PF or EPA Method 365.1	Y	Used method EPA 365.3
Potassium (K)	EPA Method 200.7	Y	
Selenium (Se)	EPA Method 200.8	Y	
Silicon (Si)	EPA Method 200.7	Y	
Silver (Ag)	EPA Method 200.8	Y	
Sodium (Na)	EPA Method 200.7	Y	
Strontium (Sr)	EPA Method 200.7	Y	
Thallium (Tl)	EPA Method 200.8	Y	
Tin (Sn)	EPA Method 200.7	Y	
Uranium (U)	EPA Method 200.8	Y	
Vanadium (V)	EPA Method 200.8	Y	
Zinc (Zn)	EPA Method 200.8	Y	
Solids			
Total Dissolved Solids (TDS)	EPA 160.1	Y	
Alkalinity			
Alkalinity, total (as $CaCO_3$)	EPA 310.1	Y	Used method EPA 310.1M
Carbonate	EPA 310.1	Y	Used method EPA 310.1M
Bicarbonate	EPA 310.1	Y	Used method EPA 310.1M
Radiochemistry*			
Gross Alpha Radioactivity	EPA Method 900.0	Y	Used method

Analytical Parameter	Analysis Method	Was the Parameter Analyzed (Y/N)?	Comments
			600/00-02
Isotopic Uranium (^{234}U, ^{235}U, ^{238}U)	HSL 300M	Y	Used ASTM D6239 instead
Dissolved Gases And Hydrocarbons			
Methane (CH_4)	RSK 175 or EPA Method 8015M	Y	
Diesel Range Organics (DRO)***	EPA Method 8015 M	Y	
Gasoline Range Organics (GRO)	EPA Method 8015 M	Y	
Other			
pH	EPA 150.1	Y	
Specific Conductance	EPA Method 120.1	Y	
Specific Gravity	SM 2710F	Y	
Turbidity	EPA Method 180.1	Y	
Total Organic Carbon	SM 5310B	Y	
Hydrogen Sulfide (H_2S)^	EPA Method 376.2	Y	Total sulfide reported. Use pH to determine presence as H_2S.
Dissolved Silica	EPA Method 200.7	Y	Calculated
Total Silica	EPA Method 200.7	Y	Calculated

Notes: Practical Quantitation Limit = the minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence;

SM = Standard Method;

EPA = U.S. Environmental Protection Agency;

*Sub-contracted to laboratory to be identified by INTERA/ICP;

^Calculated from analysis of sulfide in water;

***DRO should be left on the chromatogram long enough to detect motor-oil range organics (MRO)

NTU = natural turbidity unit;

ASTM = American Society for Testing and Materials

I hereby affirm that I have completed a review of the analytical results as reported by the laboratory indicated above and confirm that, to the best of my knowledge, that all analytical results requested have been received.

Annelia Tinklenberg 8/24/12

Signature Date

Annelia Tinklenberg

Name Printed

SAMPLE NO. ICP-WS-02-3

QUALITY ASSURANCE REVIEW FORM
LABORATORY ANALYTICAL RESULTS

Project No.	INTCP.C001 Work Order 9, Task 1 (Aquifer Test)
Client Name:	Intercontinental Potash Corp. (USA)
Project Name:	Ochoa Mine Project
Laboratory Name:	Cardinal Laboratories

Laboratory Order No.:	**NA**	**Well No. or Name:**	**ICP-WS-02**
Laboratory ID No.:	**H201629-02**	**Collection Date:**	**07/16/2012**
Client Sample ID(s):	**ICP-WS-02-4**	**Collection Time:**	**19:05**

Analytical Parameters requested By INTERA for sample(s) are defined by unique ID Code for COC: *INTCP.C001.WO9T1*. Check the boxes that apply to each question below:

Analytical Parameter	Analysis Method	Was the Parameter Analyzed (Y/N)?	Comments
Anions			
Fluoride	SM4500F C	Y	
Bromide	SM4500Br	Y	
Chloride	SM4500CL B	Y	
Nitrogen, Nitrite (as N)	EPA Method 354.1	Y	
Nitrogen, Nitrate (as N)	EPA Method 353.3	Y	
Sulfate	EPA Method 375.4	Y	
Dissolved Metals (Filtered at 0.45 µm prior to preservation)			
Aluminum (Al)	EPA Method 200.7	Y	
Antimony (Sb)	EPA Method 200.8	Y	
Arsenic (As)	EPA Method 200.8	Y	
Barium (Ba)	EPA Method 200.8	Y	
Beryllium (Be)	EPA Method 200.8	Y	
Boron (B)	EPA Method 200.7	Y	

Analytical Parameter	Analysis Method	Was the Parameter Analyzed (Y/N)?	Comments
Cadmium (Cd)	EPA Method 200.8	Y	
Calcium (Ca)	EPA Method 200.7	Y	
Chromium (Cr)	EPA Method 200.8	Y	
Cobalt (Co)	EPA Method 200.8	Y	
Copper (Cu)	EPA Method 200.8	Y	
Iron (Fe)	EPA Method 200.7	Y	
Lead (Pb)	EPA Method 200.8	Y	
Magnesium (Mg)	EPA Method 200.7	Y	
Manganese (Mn)	EPA Method 200.8	Y	
Mercury (Hg)	EPA Method 245.1	Y	
Molybdenum (Mo)	EPA Method 200.8	Y	
Nickel (Ni)	EPA Method 200.8	Y	
Total Phosphorus (P)	SM 4500PF or EPA Method 365.1	Y	Used method EPA 365.3
Potassium (K)	EPA Method 200.7	Y	
Selenium (Se)	EPA Method 200.8	Y	
Silicon (Si)	EPA Method 200.7	Y	
Silver (Ag)	EPA Method 200.8	Y	
Sodium (Na)	EPA Method 200.7	Y	
Strontium (Sr)	EPA Method 200.7	Y	
Thallium (Tl)	EPA Method 200.8	Y	
Tin (Sn)	EPA Method 200.7	Y	
Uranium (U)	EPA Method 200.8	Y	
Vanadium (V)	EPA Method 200.8	Y	
Zinc (Zn)	EPA Method 200.8	Y	
Solids			
Total Dissolved Solids (TDS)	EPA 160.1	Y	
Alkalinity			
Alkalinity, total (as $CaCO_3$)	EPA 310.1	Y	Used method EPA 310.1M
Carbonate	EPA 310.1	Y	Used method EPA 310.1M
Bicarbonate	EPA 310.1	Y	Used method EPA 310.1M
Radiochemistry*			
Gross Alpha Radioactivity	EPA Method 900.0	Y	Used method

Analytical Parameter	Analysis Method	Was the Parameter Analyzed (Y/N)?	Comments
			600/00-02 instead
Isotopic Uranium (^{234}U, ^{235}U, ^{238}U)	HSL 300M	Y	Used ASTM D6239
Dissolved Gases And Hydrocarbons			
Methane (CH_4)	RSK 175 or EPA Method 8015M	Y	
Diesel Range Organics (DRO)***	EPA Method 8015 M	Y	
Gasoline Range Organics (GRO)	EPA Method 8015 M	Y	
Other			
pH	EPA 150.1	Y	
Specific Conductance	EPA Method 120.1	Y	
Specific Gravity	SM 2710F	Y	
Turbidity	EPA Method 180.1	Y	
Total Organic Carbon	SM 5310B	Y	
Hydrogen Sulfide (H_2S)^	EPA Method 376.2	Y	Total sulfide reported. Use pH to determine presence as H_2S.
Dissolved Silica	EPA Method 200.7	Y	Calculated
Total Silica	EPA Method 200.7	Y	Calculated

Notes: Practical Quantitation Limit = the minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence;

SM = Standard Method;

EPA = U.S. Environmental Protection Agency;

*Sub-contracted to laboratory to be identified by INTERA/ICP;

^Calculated from analysis of sulfide in water;

***DRO should be left on the chromatogram long enough to detect motor-oil range organics (MRO)

NTU = natural turbidity unit;

ASTM = American Society for Testing and Materials

I hereby affirm that I have completed a review of the analytical results as reported by the laboratory indicated above and confirm that, to the best of my knowledge, that all analytical results requested have been received.

Annelia Tinklenberg _____8/24/12_____

Signature Date

Annelia Tinklenberg

Name Printed

SAMPLE NO. ICP-WS-02-4

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

August 23, 2012

PETER CASTIGLIA

INTERA, INC.

6000 UPTOWN BLVD, NE SUITE 220

ALBUQUERQUE, NM 87110

RE: OCHOA MINE PROJECT

Enclosed are the results of analyses for samples received by the laboratory on 07/17/12 9:53.

Cardinal Laboratories is accredited through Texas NELAP under certificate number T104704398-11-3. Accreditation applies to drinking water, non-potable water and solid and chemical materials. All accredited analytes are denoted by an asterisk (*). For a complete list on accredited analytes and matrices visit the TCEQ website at www.tceq.texas.gov/field/qa/lab_accred_certif.html.

Cardinal Laboratories is accreditated through the State of Colorado Department of Public Health and Environment for:

Method EPA 552.2	Haloacetic Acids (HAA-5)
Method EPA 524.2	Total Trihalomethanes (TTHM)
Method EPA 524.4	Regulated VOCs (V1, V2, V3)

Accreditation applies to public drinking water matrices.

This report meets NELAP requirements and is made up of a cover page, analytical results, and a copy of the original chain-of-custody. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Celey D. Keene

Celey D. Keene

Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:03

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
ICP-WS-02-3	H201629-01	Water	16-Jul-12 00:00	17-Jul-12 09:53
ICP-WS-02-4	H201629-02	Water	16-Jul-12 00:00	17-Jul-12 09:53

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Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:03

ICP-WS-02-3

H201629-01 (Water)

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Notes
Radionuclides									**SUB-RS**
Gross Alpha	**35.8 ± 4.3**	0.0	pCi/L	1	2080612	CK	26-Jul-12	600/00-02	
Adjusted Gross Alpha	**34.5 ± 4.3**	0.0	pCi/L	1	2080612	CK	26-Jul-12	600/00-02	
Uranium 234 Activity	< 0.9	0.0	pCi/L	1	2080613	CK	24-Jul-12	ASTM D6239	
Uranium 235 Activity	< 0.007	0.0	pCi/L	1	2080613	CK	24-Jul-12	ASTM D6239	
Uranium 238 Activity	< 0.9	0.0	pCi/L	1	2080613	CK	24-Jul-12	ASTM D6239	
Total Uranium Activity	< 1.3	0.0	pCi/L	1	2080613	CK	24-Jul-12	ASTM D6239	
Uranium 234 Content	< 0.00014	0.0	ug/L	1	2080613	CK	24-Jul-12	ASTM D6239	
Uranium 235 Content	< 0.003	0.0	ug/L	1	2080613	CK	24-Jul-12	ASTM D6239	
Uranium 238 Content	< 3	0.0	ug/L	1	2080613	CK	24-Jul-12	ASTM D6239	
Total Uranium Content	< 3	0.0	ug/L	1	2080613	CK	24-Jul-12	ASTM D6239	
Inorganic Compounds									
Alkalinity, Bicarbonate	**239**	5.00	mg/L	1	2061106	HM	27-Jul-12	310.1M	
Bromide	ND	0.100	mg/L	1	2080919	CK	24-Jul-12	4500 Br	GAL
Alkalinity, Carbonate	ND	0.00	mg/L	1	2061106	HM	27-Jul-12	310.1M	
Chloride*	**40000**	4.00	mg/L	1	2071907	AP	19-Jul-12	4500-Cl-B	
Conductivity*	**126000**	1.00	uS/cm	1	2072711	HM	18-Jul-12	120.1	
Fluoride	**2.69**	0.400	mg/L	2	2080920	CK	30-Jul-12	4500F C	GAL
Nitrate as N	**5.69**	0.100	mg/L	1	2081013	HM	18-Jul-12	353.3	
Nitrite as N	**0.06**	0.05	mg/L	1	2081013	HM	18-Jul-12	354.1	
pH*	**7.01**	0.100	pH Units	1	2072711	HM	18-Jul-12	150.1	
Phosphorus, Total	ND	0.100	mg/L	1	2071906	HM	19-Jul-12	365.3	
Specific Gravity @ 60° F	**1.043**	0.000	[blank]	1	2071808	HM	18-Jul-12	SM 2710F	
Sulfate*	**10200**	10.0	mg/L	1	2072411	AP	24-Jul-12	375.4	

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Celey D. Keene

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:03

ICP-WS-02-3

H201629-01 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Notes
			Cardinal Laboratories						
Inorganic Compounds									
TDS*	**69100**	5.00	mg/L	1	2071207	HM	17-Jul-12	160.1	
Alkalinity, Total*	**196**	4.00	mg/L	1	2061106	HM	27-Jul-12	310.1M	
Sulfide, total	**77.6**	1.00	mg/L	100	2070312	HM	18-Jul-12	376.2	
Turbidity	ND	1.00	NTU	1	2080305	HM	03-Aug-12	180.1	
Organic Compounds									
GRO C6-C10	ND	1.00	mg/L	0.1	2071803	AM	18-Jul-12	8015M	
DRO >C10-C28	ND	1.00	mg/L	0.1	2071803	AM	18-Jul-12	8015M	
EXT DRO >C28-C35	ND	1.00	mg/L	0.1	2071803	AM	18-Jul-12	8015M	
Surrogate: 1-Chlorooctane		*90.2 %*	*48.7-164*		*2071803*	AM	*18-Jul-12*	*8015M*	
Surrogate: 1-Chlorooctadecane		*117 %*	*54.8-165*		*2071803*	AM	*18-Jul-12*	*8015M*	
Organic Compounds									
Methane	**1660**	5.00	ug/L	5	2072605	CK	24-Jul-12	RSK-175	SUB-SS
Organic Compounds									
Total Organic Carbon	ND	0.500	mg/L	1	2080921	CK	23-Jul-12	SM5310B	SUB-UL
Dissolved Metals									
Aluminum	**0.912**	0.500	mg/L	10	2080912	CK	23-Jul-12	200.7	GAL
Antimony	ND	0.0500	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Arsenic	ND	0.0500	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Barium	ND	0.0500	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Beryllium	ND	0.0500	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Boron	**4.14**	2.00	mg/L	10	2080912	CK	23-Jul-12	200.7	GAL
Cadmium	ND	0.0100	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Calcium	**1450**	100	mg/L	100	2080912	CK	23-Jul-12	200.7	GAL
Chromium	ND	0.100	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Cobalt	ND	0.0100	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Copper	**0.327**	0.0100	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL

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Celey D. Keene, Lab Director/Quality Manager

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Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:03

ICP-WS-02-3

H201629-01 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Notes
Cardinal Laboratories									
Dissolved Metals									
Iron	**1.11**	0.500	mg/L	10	2080912	CK	23-Jul-12	200.7	GAL
Lead	ND	0.0500	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Magnesium	**649**	100	mg/L	100	2080912	CK	23-Jul-12	200.7	GAL
Manganese	**0.102**	0.0500	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Molybdenum	ND	0.0500	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Nickel	**0.0553**	0.0500	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Potassium	**666**	100	mg/L	100	2080912	CK	23-Jul-12	200.7	GAL
Selenium	**0.144**	0.100	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Silica	**15.1**	10.7	mg/L	10	2080912	CK	23-Jul-12	CALC	GAL
Silicon	**7.06**	5.00	mg/L	10	2080912	CK	23-Jul-12	200.7	GAL
Silver	ND	0.0100	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Sodium	**21000**	100	mg/L	100	2080912	CK	23-Jul-12	200.7	GAL
Strontium	**23.8**	10.0	mg/L	100	2080912	CK	23-Jul-12	200.7	GAL
Thallium	ND	0.0100	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Tin	ND	5.00	mg/L	10	2080912	CK	23-Jul-12	200.7	GAL
Uranium	ND	0.0100	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Vanadium	ND	0.0500	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Zinc	ND	0.100	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Total Metals									
Mercury	ND	0.0002	mg/L	1	2080916	CK	24-Jul-12	245.1	GAL
Silica	**16.1**	10.7	mg/L	10	2080915	CK	26-Jul-12	CALC	GAL
Silicon	**7.55**	5.00	mg/L	10	2080915	CK	26-Jul-12	200.7	A-01, GAL

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Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:03

ICP-WS-02-4

H201629-02 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Notes
				Cardinal Laboratories					
Radionuclides									**SUB-RS**
Gross Alpha	**27.4 ± 5.5**	0.0	pCi/L	1	2080612	CK	26-Jul-12	600/00-02	
Adjusted Gross Alpha	**26.1 ± 5.5**	0.0	pCi/L	1	2080612	CK	26-Jul-12	600/00-02	
Uranium 234 Activity	< 0.9	0.0	pCi/L	1	2080613	CK	24-Jul-12	ASTM D6239	
Uranium 235 Activity	< 0.007	0.0	pCi/L	1	2080613	CK	24-Jul-12	ASTM D6239	
Uranium 238 Activity	< 0.9	0.0	pCi/L	1	2080613	CK	24-Jul-12	ASTM D6239	
Total Uranium Activity	< 1.3	0.0	pCi/L	1	2080613	CK	24-Jul-12	ASTM D6239	
Uranium 234 Content	< 0.00014	0.0	ug/L	1	2080613	CK	24-Jul-12	ASTM D6239	
Uranium 235 Content	< 0.003	0.0	ug/L	1	2080613	CK	24-Jul-12	ASTM D6239	
Uranium 238 Content	< 3	0.0	ug/L	1	2080613	CK	24-Jul-12	ASTM D6239	
Total Uranium Content	< 3	0.0	ug/L	1	2080613	CK	24-Jul-12	ASTM D6239	
Inorganic Compounds									
Alkalinity, Bicarbonate	**332**	5.00	mg/L	1	2061106	HM	27-Jul-12	310.1M	
Bromide	ND	0.100	mg/L	1	2080919	CK	24-Jul-12	4500 Br	GAL
Alkalinity, Carbonate	ND	0.00	mg/L	1	2061106	HM	27-Jul-12	310.1M	
Chloride*	**39600**	4.00	mg/L	1	2071907	AP	19-Jul-12	4500-Cl-B	
Conductivity*	**127000**	1.00	uS/cm	1	2072711	HM	18-Jul-12	120.1	
Fluoride	**2.81**	0.400	mg/L	2	2080920	CK	30-Jul-12	4500F C	GAL
Nitrate as N	**2.80**	0.100	mg/L	1	2081013	HM	18-Jul-12	353.3	
Nitrite as N	ND	0.05	mg/L	1	2081013	HM	18-Jul-12	354.1	
pH*	**6.71**	0.100	pH Units	1	2072711	HM	18-Jul-12	150.1	
Phosphorus, Total	ND	0.100	mg/L	1	2071906	HM	19-Jul-12	365.3	
Specific Gravity @ 60° F	**1.044**	0.000	[blank]	1	2071808	HM	18-Jul-12	SM 2710F	
Sulfate*	**7970**	10.0	mg/L	1	2072411	AP	24-Jul-12	375.4	
TDS*	**69900**	5.00	mg/L	1	2071207	HM	17-Jul-12	160.1	

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Celey D. Keene

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Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:03

ICP-WS-02-4

H201629-02 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Notes
			Cardinal Laboratories						
Inorganic Compounds									
Alkalinity, Total*	**272**	4.00	mg/L	1	2061106	HM	27-Jul-12	310.1M	
Sulfide, total	**83.6**	1.25	mg/L	125	2070312	HM	18-Jul-12	376.2	
Turbidity	**1.81**	1.00	NTU	1	2080305	HM	03-Aug-12	180.1	
Organic Compounds									
GRO C6-C10	ND	1.00	mg/L	0.1	2071803	AM	18-Jul-12	8015M	
DRO >C10-C28	ND	1.00	mg/L	0.1	2071803	AM	18-Jul-12	8015M	
EXT DRO >C28-C35	ND	1.00	mg/L	0.1	2071803	AM	18-Jul-12	8015M	
Surrogate: 1-Chlorooctane		*85.5 %*	*48.7-164*		*2071803*	AM	*18-Jul-12*	*8015M*	
Surrogate: 1-Chlorooctadecane		*114 %*	*54.8-165*		*2071803*	AM	*18-Jul-12*	*8015M*	
Organic Compounds									
Methane	**921**	1.00	ug/L	1	2072605	CK	24-Jul-12	RSK-175	SUB-SS
Organic Compounds									
Total Organic Carbon	ND	0.500	mg/L	1	2080921	CK	23-Jul-12	SM5310B	SUB-UL
Dissolved Metals									
Aluminum	**0.814**	0.500	mg/L	10	2080912	CK	23-Jul-12	200.7	GAL
Antimony	ND	0.0500	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Arsenic	ND	0.0500	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Barium	ND	0.0500	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Beryllium	ND	0.0500	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Boron	**4.17**	2.00	mg/L	10	2080912	CK	23-Jul-12	200.7	GAL
Cadmium	ND	0.0100	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Calcium	**1450**	100	mg/L	100	2080912	CK	23-Jul-12	200.7	GAL
Chromium	ND	0.100	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Cobalt	ND	0.0100	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Copper	**0.360**	0.0100	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Iron	**1.22**	0.500	mg/L	10	2080912	CK	23-Jul-12	200.7	GAL

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Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:03

ICP-WS-02-4

H201629-02 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Notes
Cardinal Laboratories									
Dissolved Metals									
Lead	ND	0.0500	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Magnesium	**655**	100	mg/L	100	2080912	CK	23-Jul-12	200.7	GAL
Manganese	**0.0969**	0.0500	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Molybdenum	ND	0.0500	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Nickel	**0.0569**	0.0500	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Potassium	**683**	100	mg/L	100	2080912	CK	23-Jul-12	200.7	GAL
Selenium	**0.143**	0.100	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Silica	**15.3**	10.7	mg/L	10	2080912	CK	23-Jul-12	CALC	GAL
Silicon	**7.17**	5.00	mg/L	10	2080912	CK	23-Jul-12	200.7	GAL
Silver	ND	0.0100	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Sodium	**21000**	100	mg/L	100	2080912	CK	23-Jul-12	200.7	GAL
Strontium	**23.7**	10.0	mg/L	100	2080912	CK	23-Jul-12	200.7	GAL
Thallium	ND	0.0100	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Tin	ND	5.00	mg/L	10	2080912	CK	23-Jul-12	200.7	GAL
Uranium	ND	0.0100	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Vanadium	ND	0.0500	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Zinc	ND	0.100	mg/L	100	2080917	CK	25-Jul-12	200.8	GAL
Total Metals									
Mercury	ND	0.0002	mg/L	1	2080916	CK	24-Jul-12	245.1	GAL
Silica	**18.3**	10.7	mg/L	10	2080915	CK	26-Jul-12	CALC	GAL
Silicon	**8.55**	5.00	mg/L	10	2080915	CK	26-Jul-12	200.7	A-01, GAL

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Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:03

Inorganic Compounds - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2061106 - General Prep - Wet Chem										
Blank (2061106-BLK1)				Prepared & Analyzed: 11-Jun-12						
Alkalinity, Carbonate	ND	0.00	mg/L							
Alkalinity, Bicarbonate	ND	5.00	mg/L							
Alkalinity, Total	ND	4.00	mg/L							
LCS (2061106-BS1)				Prepared & Analyzed: 11-Jun-12						
Alkalinity, Carbonate	ND	0.00	mg/L				80-120			
Alkalinity, Bicarbonate	137	5.00	mg/L				80-120			
Alkalinity, Total	112	4.00	mg/L	100		112	80-120			
LCS Dup (2061106-BSD1)				Prepared & Analyzed: 11-Jun-12						
Alkalinity, Carbonate	ND	0.00	mg/L				80-120		20	
Alkalinity, Bicarbonate	132	5.00	mg/L				80-120	3.72	20	
Alkalinity, Total	108	4.00	mg/L	100		108	80-120	3.64	20	
Batch 2070312 - General Prep - Wet Chem										
Blank (2070312-BLK1)				Prepared & Analyzed: 03-Jul-12						
Sulfide, total	ND	0.0100	mg/L							
Duplicate (2070312-DUP1)		**Source: H201467-02**		Prepared & Analyzed: 03-Jul-12						
Sulfide, total	628	0.0100	mg/L		652			3.75	20	
Batch 2071207 - Filtration										
Blank (2071207-BLK1)				Prepared & Analyzed: 09-Jul-12						
TDS	ND	5.00	mg/L							

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Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:03

Inorganic Compounds - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2071207 - Filtration										
LCS (2071207-BS1)				Prepared & Analyzed: 09-Jul-12						
TDS	245		mg/L	240		102	80-120			
Duplicate (2071207-DUP1)		**Source: H201554-02**		Prepared & Analyzed: 09-Jul-12						
TDS	363000	5.00	mg/L		379000			4.31	20	
Batch 2071808 - General Prep - Wet Chem										
Duplicate (2071808-DUP1)		**Source: H201599-01**		Prepared & Analyzed: 18-Jul-12						
Specific Gravity @ 60° F	1.042	0.000	[blank]		1.043			0.0921	200	
Batch 2071906 - General Prep - Wet Chem										
Blank (2071906-BLK1)				Prepared & Analyzed: 19-Jul-12						
Phosphorus, Total	ND	0.100	mg/L							
LCS (2071906-BS1)				Prepared & Analyzed: 19-Jul-12						
Phosphorus, Total	0.790	0.100	mg/L	0.800		98.8	80-120			
Duplicate (2071906-DUP1)		**Source: H201599-01**		Prepared & Analyzed: 19-Jul-12						
Phosphorus, Total	0.0200	0.100	mg/L		0.0500			85.7	20	QR-01
Batch 2071907 - General Prep - Wet Chem										
Blank (2071907-BLK1)				Prepared & Analyzed: 19-Jul-12						
Chloride	ND	4.00	mg/L							

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Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:03

Inorganic Compounds - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2071907 - General Prep - Wet Chem										
LCS (2071907-BS1)				Prepared & Analyzed: 19-Jul-12						
Chloride	100	4.00	mg/L	100		100	80-120			
LCS Dup (2071907-BSD1)				Prepared & Analyzed: 19-Jul-12						
Chloride	100	4.00	mg/L	100		100	80-120	0.00	20	
Batch 2072411 - General Prep - Wet Chem										
Blank (2072411-BLK1)				Prepared & Analyzed: 24-Jul-12						
Sulfate	ND	10.0	mg/L							
LCS (2072411-BS1)				Prepared & Analyzed: 24-Jul-12						
Sulfate	19.9	10.0	mg/L	20.0		99.4	80-120			
Duplicate (2072411-DUP1)		**Source: H201599-01**		Prepared & Analyzed: 24-Jul-12						
Sulfate	6840	10.0	mg/L		6660			2.74	20	
Batch 2072711 - General Prep - Wet Chem										
LCS (2072711-BS1)				Prepared & Analyzed: 18-Jul-12						
pH	7.05		pH Units	7.00		101	90-110			
Conductivity	1410		uS/cm	1410		100	80-120			
Duplicate (2072711-DUP1)		**Source: H201629-01**		Prepared & Analyzed: 18-Jul-12						
Conductivity	127000	1.00	uS/cm		126000			0.791	20	
pH	7.04	0.100	pH Units		7.01			0.427	20	

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Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:03

*** DEFAULT GENERAL METHOD *** - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2080305 - General Prep - Wet Chem										
Blank (2080305-BLK1)				Prepared & Analyzed: 03-Aug-12						
Turbidity	ND	1.00	NTU							
LCS (2080305-BS1)				Prepared & Analyzed: 03-Aug-12						
Turbidity	22.0	1.00	NTU	20.0		110	80-120			
Duplicate (2080305-DUP1)		**Source: H201564-01**		Prepared & Analyzed: 03-Aug-12						
Turbidity	1.51	1.00	NTU		1.67			10.1	20	
Batch 2080919 - General Prep										
Blank (2080919-BLK1)				Prepared & Analyzed: 24-Jul-12						
Bromide	ND	0.100	mg/L							
LCS (2080919-BS1)				Prepared & Analyzed: 24-Jul-12						
Bromide	0.585		mg/L	0.600		97.5	85-115			
LCS Dup (2080919-BSD1)				Prepared & Analyzed: 24-Jul-12						
Bromide	0.595		mg/L	0.600		99.2	85-115	1.69	20	
Batch 2080920 - General Prep										
Blank (2080920-BLK1)				Prepared & Analyzed: 30-Jul-12						
Fluoride	ND	0.200	mg/L							
LCS (2080920-BS1)				Prepared & Analyzed: 30-Jul-12						
Fluoride	0.943		mg/L	1.00		94.3	85-115			

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Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:03

Inorganic Compounds - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2080920 - General Prep										
LCS Dup (2080920-BSD1)				Prepared & Analyzed: 30-Jul-12						
Fluoride	0.902		mg/L	1.00		90.2	85-115	4.44	20	
Batch 2081013 - General Prep - Wet Chem										
Blank (2081013-BLK1)				Prepared & Analyzed: 18-Jul-12						
Nitrate as N	ND	0.100	mg/L							
Nitrite as N	ND	0.05	mg/L							
LCS (2081013-BS1)				Prepared & Analyzed: 18-Jul-12						
Nitrate as N	5.60	0.100	mg/L	5.00		112	80-120			
Nitrite as N	0.20	0.05	mg/L	0.200		102	80-120			
Duplicate (2081013-DUP1)		**Source: H201629-01**		Prepared & Analyzed: 18-Jul-12						
Nitrite as N	0.05	0.05	mg/L		0.06			15.4	20	
Nitrate as N	5.95	0.100	mg/L		5.69			4.47	20	

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Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:03

Organic Compounds - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2071803 - General Prep - Organics										
Blank (2071803-BLK1)				Prepared & Analyzed: 18-Jul-12						
GRO C6-C10	ND	1.00	mg/L							
DRO >C10-C28	ND	1.00	mg/L							
EXT DRO >C28-C35	ND	1.00	mg/L							
Surrogate: 1-Chlorooctane	*3.90*		mg/L	*5.00*		*77.9*	*48.7-164*			
Surrogate: 1-Chlorooctadecane	*5.21*		mg/L	*5.00*		*104*	*54.8-165*			
LCS (2071803-BS1)				Prepared & Analyzed: 18-Jul-12						
GRO C6-C10	44.5	1.00	mg/L	66.7		66.7	59.3-133			
DRO >C10-C28	46.9	1.00	mg/L	66.7		70.4	43.4-148			
EXT DRO >C28-C35	ND	1.00	mg/L	0.00			0-0			
Surrogate: 1-Chlorooctane	*5.03*		mg/L	*5.00*		*101*	*48.7-164*			
Surrogate: 1-Chlorooctadecane	*5.45*		mg/L	*5.00*		*109*	*54.8-165*			
LCS Dup (2071803-BSD1)				Prepared & Analyzed: 18-Jul-12						
GRO C6-C10	42.0	1.00	mg/L	66.7		63.0	59.3-133	5.69	24	
DRO >C10-C28	43.4	1.00	mg/L	66.7		65.1	43.4-148	7.76	27.3	
EXT DRO >C28-C35	ND	1.00	mg/L	0.00			0-0		0	
Surrogate: 1-Chlorooctane	*4.83*		mg/L	*5.00*		*96.6*	*48.7-164*			
Surrogate: 1-Chlorooctadecane	*5.33*		mg/L	*5.00*		*107*	*54.8-165*			

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Celey D. Keene, Lab Director/Quality Manager

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Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:03

Organic Compounds - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2072605 - General Prep										
Blank (2072605-BLK1)				Prepared: 19-Jul-12 Analyzed: 24-Jul-12						
Methane	ND	1.00	ug/L							
Duplicate (2072605-DUP1)		**Source: H201629-02**		Prepared: 19-Jul-12 Analyzed: 24-Jul-12						
Methane	874	1.00	ug/L		921			5.24	20	

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Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:03

Dissolved Metals - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2080912 - Dissolved/Potentially Dissolved Metals										
Blank (2080912-BLK1)				Prepared & Analyzed: 23-Jul-12						
Boron	ND	0.200	mg/L							
Potassium	ND	1.00	mg/L							
Magnesium	ND	1.00	mg/L							
Calcium	ND	1.00	mg/L							
Aluminum	ND	0.0500	mg/L							
Iron	ND	0.050	mg/L							
Sodium	ND	1.00	mg/L							
Strontium	ND	0.100	mg/L							
Tin	ND	0.500	mg/L							
Silicon	ND	0.500	mg/L							
LCS (2080912-BS1)				Prepared & Analyzed: 23-Jul-12						
Magnesium	26.5		mg/L	25.0		106	85-115			
Iron	5.15		mg/L	5.00		103	85-115			
Strontium	5.13		mg/L	5.00		103	85-115			
Boron	5.04		mg/L	5.00		101	85-115			
Calcium	5.22		mg/L	5.00		104	85-115			
Aluminum	5.16		mg/L	5.00		103	85-115			
Sodium	7.73		mg/L	8.10		95.4	85-115			
Potassium	10.2		mg/L	10.0		102	85-115			
Silicon	5.36		mg/L	5.00		107	85-115			
Tin	3.89		mg/L	4.00		97.2	85-115			
LCS Dup (2080912-BSD1)				Prepared & Analyzed: 23-Jul-12						
Aluminum	5.12		mg/L	5.00		102	85-115	0.778	20	
Strontium	5.10		mg/L	5.00		102	85-115	0.587	20	
Sodium	7.65		mg/L	8.10		94.4	85-115	1.04	20	
Iron	5.12		mg/L	5.00		102	85-115	0.584	20	
Magnesium	26.4		mg/L	25.0		106	85-115	0.378	20	
Calcium	5.19		mg/L	5.00		104	85-115	0.576	20	
Potassium	10.1		mg/L	10.0		101	85-115	0.985	20	
Boron	5.03		mg/L	5.00		101	85-115	0.199	20	
Tin	3.87		mg/L	4.00		96.8	85-115	0.515	20	

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Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:03

Inorganic Compounds - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2080912 - Dissolved/Potentially Dissolved Metals										
LCS Dup (2080912-BSD1)				Prepared & Analyzed: 23-Jul-12						
Silicon	5.32		mg/L	5.00		106	85-115	0.749	20	
Batch 2080917 - Dissolved/Potentially Dissolved Metals										
Blank (2080917-BLK1)				Prepared: 24-Jul-12 Analyzed: 25-Jul-12						
Beryllium	ND	0.000500	mg/L							
Lead	ND	0.0005	mg/L							
Cobalt	ND	0.00010	mg/L							
Vanadium	ND	0.000500	mg/L							
Antimony	ND	0.000500	mg/L							
Thallium	ND	0.000100	mg/L							
Chromium	ND	0.001	mg/L							
Copper	ND	0.0001	mg/L							
Selenium	ND	0.001	mg/L							
Molybdenum	ND	0.0005	mg/L							
Manganese	ND	0.0005	mg/L							
Silver	ND	0.00010	mg/L							
Arsenic	ND	0.0005	mg/L							
Nickel	ND	0.0005	mg/L							
Zinc	ND	0.001	mg/L							
Barium	ND	0.000500	mg/L							
Cadmium	ND	0.00010	mg/L							
Uranium	ND	0.000100	mg/L							
LCS (2080917-BS1)				Prepared: 24-Jul-12 Analyzed: 25-Jul-12						
Beryllium	0.0480		mg/L	0.0500		96.0	85-115			
Arsenic	0.0478		mg/L	0.0500		95.6	85-115			
Antimony	0.0487		mg/L	0.0500		97.4	85-115			
Barium	0.0488		mg/L	0.0500		97.6	85-115			
Cadmium	0.0498		mg/L	0.0500		99.6	85-115			
Manganese	0.0493		mg/L	0.0500		98.6	85-115			
Vanadium	0.0500		mg/L	0.0500		100	85-115			
Uranium	0.0499		mg/L	0.0500		99.8	85-115			

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Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:03

Total Metals by ICPMS - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2080917 - Dissolved/Potentially Dissolved Metals										
LCS (2080917-BS1)				Prepared: 24-Jul-12 Analyzed: 25-Jul-12						
Molybdenum	0.0477		mg/L	0.0500		95.4	85-115			
Selenium	0.237		mg/L	0.250		94.8	85-115			
Zinc	0.046		mg/L	0.0500		93.0	85-115			
Silver	0.0438		mg/L	0.0500		87.6	85-115			
Nickel	0.0505		mg/L	0.0500		101	85-115			
Lead	0.0496		mg/L	0.0500		99.2	85-115			
Copper	0.0522		mg/L	0.0500		104	85-115			
Thallium	0.0512		mg/L	0.0500		102	85-115			
Cobalt	0.0481		mg/L	0.0500		96.2	85-115			
Chromium	0.049		mg/L	0.0500		98.8	85-115			
LCS Dup (2080917-BSD1)				Prepared: 24-Jul-12 Analyzed: 25-Jul-12						
Silver	0.0434		mg/L	0.0500		86.8	85-115	0.917	20	
Selenium	0.245		mg/L	0.250		98.0	85-115	3.32	20	
Antimony	0.0478		mg/L	0.0500		95.6	85-115	1.87	20	
Barium	0.0487		mg/L	0.0500		97.4	85-115	0.205	20	
Beryllium	0.0469		mg/L	0.0500		93.8	85-115	2.32	20	
Uranium	0.0487		mg/L	0.0500		97.4	85-115	2.43	20	
Vanadium	0.0469		mg/L	0.0500		93.8	85-115	6.40	20	
Arsenic	0.0468		mg/L	0.0500		93.6	85-115	2.11	20	
Cadmium	0.0471		mg/L	0.0500		94.2	85-115	5.57	20	
Thallium	0.0494		mg/L	0.0500		98.8	85-115	3.58	20	
Cobalt	0.0471		mg/L	0.0500		94.2	85-115	2.10	20	
Zinc	0.048		mg/L	0.0500		96.6	85-115	3.80	20	
Manganese	0.0481		mg/L	0.0500		96.2	85-115	2.46	20	
Lead	0.0485		mg/L	0.0500		97.0	85-115	2.24	20	
Molybdenum	0.0479		mg/L	0.0500		95.8	85-115	0.418	20	
Chromium	0.047		mg/L	0.0500		94.2	85-115	4.77	20	
Nickel	0.0482		mg/L	0.0500		96.4	85-115	4.66	20	
Copper	0.0504		mg/L	0.0500		101	85-115	3.51	20	

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Analytical Results For:

INTERA, INC. 6000 UPTOWN BLVD, NE SUITE 220 ALBUQUERQUE NM, 87110	Project: OCHOA MINE PROJECT Project Number: INTCP.COOL.OMPWO 9.1 Project Manager: PETER CASTIGLIA Fax To: (505) 246-2600	Reported: 23-Aug-12 16:03

Total Metals - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2080915 - EPA 3010										
Blank (2080915-BLK1)				Prepared & Analyzed: 26-Jul-12						
Silicon	ND	0.500	mg/L							A-01
LCS (2080915-BS1)				Prepared & Analyzed: 26-Jul-12						
Silicon	0.125		mg/L	4.00		3.12	85-115			A-01
LCS Dup (2080915-BSD1)				Prepared & Analyzed: 26-Jul-12						
Silicon	0.168		mg/L	4.00		4.20	85-115	29.4	20	A-01
Batch 2080916 - EPA 245.1										
Blank (2080916-BLK1)				Prepared & Analyzed: 24-Jul-12						
Mercury	ND	0.0002	mg/L							
LCS (2080916-BS1)				Prepared & Analyzed: 24-Jul-12						
Mercury	0.0020		mg/L	0.00200		100	85-115			
LCS Dup (2080916-BSD1)				Prepared & Analyzed: 24-Jul-12						
Mercury	0.0020		mg/L	0.00200		100	85-115	0.00	20	

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Celey D. Keene, Lab Director/Quality Manager

Notes and Definitions

Z-01b	< 0.007
GAL	Analysis subcontracted to Green Analytical Laboratories, a subsidiary of Cardinal Laboratories.
QR-01	Analyses are not controlled on RPD values from sample concentrations less than 10 times the reporting limit. QC batch accepted based on LCS and/or LCSD QC results.
SUB-RS	Analysis subcontracted to Radiation Safety Engineering, Inc.
SUB-SS	Analysis subcontracted to SunStar Laboratories, Inc.
SUB-UL	Analysis subcontracted to Underwriters Laboratories, Inc.
A-01	Analyte is not an approved analyte for selected prep/digest method.
Z-01a	< 0.003
Z-01i	35.8 ± 4.3
Z-01c	< 0.9
Z-01d	< 1.3
Z-01e	< 3
Z-01f	26.1 ± 5.5
Z-01g	27.4 ± 5.5
Z-01h	34.5 ± 4.3
Z-01	< 0.00014
ND	Analyte NOT DETECTED at or above the reporting limit
RPD	Relative Percent Difference
**	Samples not received at proper temperature of 6°C or below.
***	Insufficient time to reach temperature.
-	Chloride by SM4500Cl-B does not require samples be received at or below 6°C
	Samples reported on an as received basis (wet) unless otherwise noted on report

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Celey D. Keene, Lab Director/Quality Manager

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CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

101 East Marland, Hobbs, NM 88240
(575) 393-2326 FAX (575) 393-2476

Company Name:	INTERA
Project Manager:	Peter Castiglia
Address:	6000 Uptown Blvd Suite 220
City:	Albuquerque State: NM Zip: 87110
Phone #:	505-246-1600 Fax #:
Project #:	INTCP 0001.W091 Project Owner: ICP
Project Name:	Ochoa Mine Project
Project Location:	ICP-WS-02 Pumping Well
Sampler Name:	Annelia Tinklenberg

BILL TO

P.O. #:	
Company:	
Attn:	
Address:	
City:	
State:	Zip:
Phone #:	
Fax #:	

ANALYSIS REQUEST

FOR LAB USE ONLY Lab I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	MATRIX: GROUNDWATER	WASTEWATER	SOIL	OIL	SLUDGE	OTHER:	PRESERV.: ACID/BASE:	ICE / COOL	OTHER:	SAMPLING DATE	TIME
H201629														
1	ICP-WS-02-3	G		X						X	X		7/16/12	
2	ICP-WS-02-4	G		X						X	X		7/16/12	

SEE ATTACHED LIST FOR EACH SAMPLE:
1-250 mL HDPE
1-500mL HDPE
5-Liter HDPE
1-500mL HNO_3
1-250 mL H_2SO_4
1-500 mL NaOH
2-VOA no pres
4-VOA HCL

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising whether based in contract or tort, shall be limited to the amount paid by the client for the analyses. All claims including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within 30 days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequental damages, including without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise.

Relinquished By:	Date:	Received By:
[signature]	7/17/12 Time: 9:53	Jodi Henson
Relinquished By:	Date: Time:	Received By:

Phone Result:	☐ Yes ☐ No	Add'l Phone #:
Fax Result:	☐ Yes ☐ No	Add'l Fax #:
REMARKS:		

Please send results to:
pcastiglia@intera.com
atinklenberg@intera.com

Delivered By: (Circle One)
Sampler - UPS - Bus - Other: 3.5°C

Sample Condition: Cool ☑ Yes ☐ No; Intact ☑ Yes ☐ No

CHECKED BY: (Initials) [initials]

† Cardinal cannot accept verbal changes. Please fax written changes to (575) 393-2326

#26

FORM-007
CARDINAL LABORATORIES
Revision 1.0

MASS BALANCE SHEET

Parameter	Result	Units	Method
Calcium	1450	mg/L	EPA 200.7
Magnesium	649	mg/L	EPA 200.7
Sodium	21000	mg/L	EPA 200.7
Potassium	666	mg/L	EPA 200.7
Carbonate	0	mg/L	EPA 310.1
Bicarbonate	239	mg/L	EPA 310.1
Sulfate	10200	mg/L	EPA 375.4
T-Alkalinity	196	mg/L	EPA 310.1
Chloride	40000	mg/L	SM4500
Conductance	126000	mg/L	EPA 120.1
TDS	69100	mg/L	EPA 160.1

Anion-Cation Balance Acceptable Y/N?	
Analyte	Meq/L
Carbonate	0
Bicarbonate	4
Sulfate	212
Chloride	1128
Calcium	72
Magnesium	53
Sodium	913
Potassium	17

H201629-01

Comments:

Total Anions	1345
Total Cations	1056
Anion/Cation (%Diff)	12.01
Calculated TDS	74082.6
TDS Ratio (Measured/Calc	0.93
TDS/COND Ratio	0.5484127

FORM-007
CARDINAL LABORATORIES
Revision 1.0

MASS BALANCE SHEET

Parameter	Result	Units	Method
Calcium	1450	mg/L	EPA 200.7
Magnesium	655	mg/L	EPA 200.7
Sodium	21000	mg/L	EPA 200.7
Potassium	683	mg/L	EPA 200.7
Carbonate	0	mg/L	EPA 310.1
Bicarbonate	332	mg/L	EPA 310.1
Sulfate	7970	mg/L	EPA 375.4
T-Alkalinity	272	mg/L	EPA 310.1
Chloride	39600	mg/L	SM4500
Conductance	127000	mg/L	EPA 120.1
TDS	69900	mg/L	EPA 160.1

Anion-Cation Balance Acceptable Y/N?	
Analyte	Meq/L
Carbonate	0
Bicarbonate	5
Sulfate	166
Chloride	1117
Calcium	72
Magnesium	54
Sodium	913
Potassium	17

H201629-02

Comments:

Total Anions	1288
Total Cations	1057
Anion/Cation (%Diff)	9.86
Calculated TDS	71521.2
TDS Ratio (Measured/Calc	0.98
TDS/COND Ratio	0.5503937