



KEVIN A. LINDSEY

Kevin A. Lindsey

Technical Memorandum

To: Guy Gregory, Al Josephy, Washington Department of Ecology
CC: Jeremy Holland, HDR, Inc.; David Tobin, Boise White Paper LLC
From: Kevin Lindsey, LHg; Chris Augustine; Jeff Barry, LHg.
Date: 24 May 2013
Re: Pilot Testing Program Report, Boise White Paper Thermal ASR Project, 2012

Introduction and Background

Boise White Paper LLC (Boise) working with the Washington Department of Ecology (Ecology) embarked on an aquifer storage and recovery (ASR) project to assess the feasibility of storing cold water in the basalt aquifer system underlying Boise's Wallula Paper Mill (the Mill). The goals of the project are to provide benefits both to Boise and the Columbia River by diverting cold (<55 degrees F) water in the winter and spring to store in the subsurface for later use in the summer. Boise would realize cost savings by using stored cold water to reduce demands on the commercial chiller during summer months when the Columbia River and Wallula pool temperatures are warmer. The Columbia River would benefit from a reduction in surface diversions for Boise facility supply during low flow periods.

Boise's target for summer extraction of stored water is in excess of 4,000 gallons per minute (gpm). This provides an economical alternative cooling water supply for Boise. Feasibility testing performed in 2010 indicated that hydrogeologic conditions were suitable to support economical injection rates and volumes. The limiting factors identified during feasibility testing was the cost for developing source water treatment required as part of the ASR system and uncertainty about the ability of the aquifer to retain the cold water temperature and the compatibility of the recovered water with the Boise facility processes. Prior to large capital investments for a treatment system capable of meeting targeted injection rates and extraction rates, Boise and Ecology proposed a smaller scale pilot test program using well ASR-5 to confirm feasibility.

Temporary source water treatment, injection and pumping equipment and wellhead systems were installed in late 2011 and early 2012 to allow pilot testing of well ASR-5 at an injection rate of approximately 500 gpm and a recovery rate of approximately 800 gpm. During 2012 filtered Columbia River water was injected into the aquifer system during cold winter and spring months. After approximately 69 days of storage, a portion of the injected water was recovered.

To be deemed successful by Ecology, the project will meet the following goals:

- Statutory and permitting requirements for groundwater storage and recovery projects, as required by Chapters 90.03, 90.48, and 90.54 *Revised Code of Washington (RCW)*, and Chapters 173-157 and Chapter 173-200 *Washington Administrative Code (WAC)*.
- Columbia River water becomes available for beneficial use when supplies are more limited or not available.
- The project provides a water management technique that benefits stream flows during low flow times of the year.
- The project successfully addresses water quality issues.

For Boise, a successful project provides a water supply that is economically feasible and cost effective relative to other water supply alternatives. In addition, the water quality must be suitable for use in the plant.

Purpose

The purpose of this technical memorandum (tech memo) is to describe the results of hydrogeologic characterization, geochemical compatibility, and the potential for thermal storage in an aquifer system within the Pomona Member of the Saddle Mountains Basalt of the Columbia River Basalt Group (CRBG). Observations from the pilot testing program performed in 2012 are presented and compared to project goals listed above.

Based on the drilling and testing of ASR-5 and OBS-2 in late 2009 and early 2010 (GSI 2010), the interval within the Pomona Member targeted for this project consists of 2 basalt flows. These are a pillow basalt at the base of the upper flow (flow 1) which is approximately 455 to 507 feet below ground surface (bgs) and a normal flow top in the deeper, second unit (flow 2). The flow 2 flow top in ASR-5 appears to be repeated by a fault so that the flow top occurs twice, once at approximately 512 to 519 feet bgs and again at 542 to 549 feet bgs. This repeat section was not observed in OBS-2. Sounding of ASR-5 during the storage phase in the summer of 2012 found the bottom of the well to be approximately 546 feet bgs. The well was 558 feet deep when originally drilled.

This tech memo was prepared under Task 1.8 of Boise's grant funding agreement with Ecology and has been prepared for compliance with WAC 173-157. GSI Water Solutions, Inc. (GSI) prepared this tech memo under a subcontract from HDR, Inc. This tech memo contains the data and results from the hydrologic and chemical assessments outlined in the Ecology-approved Project Quality Assurance Project Plan Addendum (revised QAPP) dated December 2011 and integrates new pilot test observations with those from two previous interim reports:

- *First Interim Report, Boise White Paper Wallula Thermal ASR Project, April 2012, GSI Water Solutions.*
- *Second Interim Report, Boise White Paper Wallula Thermal ASR Project, June 2012, GSI Water Solutions*

This report is organized as follows:

- Project Activities Timeline and Summary.
- Monitoring Network and Data collection.
- Pilot Testing Program.

- Thermal Storage and Retention in the Target Aquifer.
- Water Quality Monitoring Program.
- Summary of Observations and Interpretations.
- Recommendations.

Figures and Tables are included at the end of the tech memo. Well logs (Appendix A), analytical water quality reports (Appendix B), and other supplemental information (Appendix C) are included as appendices. Work related to well head, infrastructure, and SCADA system testing, maintenance, and programming is not covered in this tech memo.

Project Activities Timeline and Summary

ASR pilot testing work described in the revised QAPP began in mid-January 2012. Pilot testing highlights are as follows:

- Prior to mid-January: HDR, Inc. had substantially completed work on ASR-5 injection/extraction system infrastructure.
- Mid to late-January: GSI installed a dedicated sampling pump in well OBS-2 and conducted preparation work prior to the start of pilot testing. This work included baseline sampling in wells ASR-5 and OBS-2 and the source water (between 30 January and 2 February). The results of this and other sampling are presented later in this tech memo.
- 06 February: Step draw-down pumping test and other shakedown phase testing was conducted. Pumping steps were at 300, 600, and 900 gallons per minute (gpm). The injection, storage, and recovery portions of the shakedown test were approximately 1 hour long each.
- 07 February through 09 February: Pilot test Cycle 1 injection, storage, and recovery phases conducted. The injection and storage phases lasted approximately 23 hours each. The recovery phase lasted approximately 13 hours. During Cycle 1 approximately 2.12 acre-feet of water was injected and 2.02 acre-feet of water was recovered.
- 10 February through 24 February: Boise and HDR staff engaged in various training, testing, and programming activities that focused on final system checks and training Boise operations staff. This work included injection and extraction activities and well infrastructure disinfection. During this time period approximately 28.4 acre-feet of water was injected and 1.01 acre-feet of water was recovered.
- 27 February: Pilot test Cycle 2, long-term injection, storage, and recovery begins. Digital data files for this data are included with this tech memo.
- 27-28 February 2012: The 1% injected sample of the raw source water and filtered source water was collected.
- 18-19 April 2012: The 50% injected sample of the raw source water and filtered source water was collected.

- 24 April 2012: The transducer in OBS-2 was lowered to approximately 536 feet below ground surface (bgs) to monitor temperatures at the bottom of the borehole.
- 2 May 2012: Using the installed transducer a vertical temperature profile was collected in OBS-2 from 495 feet bgs to 536 feet bgs. The transducer was lowered in approximately 10 foot intervals and held for 10 minutes to allow temperature equilibration.
- 21-22 May 2012: The 100% injected sample of the raw source water and filtered source water was collected. Injection at ASR-5 well was stopped at 15:25 on 22 May 2012. A total of approximately 210.6 acre-feet were withdrawn from the Columbia River and approximately 203.58 acre-feet was injected into the target zone.
- 23 May 2012 to 30 July 2012: Storage phase.
- 31 May through July 27, 2012: Several temperature profiles were collected from ASR-5 and OBS-2 during this period.
- 18 June 2012: Collected storage sample at ASR-5 and OBS-2 after 27 days of storage.
- 30 July 2012 to 09 August 2012: Recovery pumping at approximately 800 to 900 gpm.
- 10 -19 August 2012: Recovery pumping reduced to approximately 400 gpm because of limitations in the Boise water disposal system.
- 20 August through 17 September 2012: System idle.
- 17 - 30 September: Resume recovery pumping at ASR-5 at approximately 800 gpm. Collect final water quality sample. Approximately 97.4 acre-feet of water was recovered.

Monitoring Network and Data Collection

This section describes the monitoring network, including installed dedicated monitoring equipment for observing water level, injection and recovery flow rates, and water quality during testing.

Water Level Measurement

Groundwater levels were measured in three wells, ASR-5, OBS-1 and OBS-2. ASR-5 and OBS-2 are completed in the target zone. OBS-1 is completed in a shallower interflow zone in the Ice Harbor Member of the Saddle Mountains Basalt. Well construction information for these wells is included in Appendix A. Digital pressure transducers and data loggers were deployed in these wells, at various locations in the distribution system, and in a stilling well in the Columbia River. Additional information about these monitoring points is described below:

- At the start of pilot testing two transducers were installed in ASR-5 to depths of approximately 80 feet bgs.

- One of these was a vented (or barometrically compensated) transducer that recorded water level information for the Boise Supervisory Control and Data Acquisition (SCADA) system. This is the primary instrument used to record in-well water level and temperature during injection and extraction pumping.
 - The second pressure transducer and data logger was a non-vented model that was installed in a second water level access port as a back-up to the primary pressure transducer. During the storage and recovery phase of Cycle 2 this transducer was replaced by a vented model that was raised and lowered in the well several times during the storage and recovery pumping phase to collect vertical temperature profiles in the well.
- Well OBS-2 contained a vented transducer that measured water level fluctuations and temperature in the target storage zone. This transducer was originally installed at a depth of approximately 478 feet bgs due to a block of basalt partially obstructing access to the lower portion of the well. However, subsequent attempts to lower the transducer below the obstruction were successful and the pressure transducer was lowered to approximately 536 feet bgs on April 24, 2012. Several vertical temperature profiles were collected from OBS-2 following advancement of the pressure transducer below the obstruction.
 - Well OBS-1 contained a non-vented transducer that measured conditions in a shallower water-bearing zone approximately 380 feet above the target zone. It was periodically manually down-loaded.
 - A digital barometric pressure transducer and data logger was also installed at well OBS-1 to collect barometric data to use in adjusting the non-vented pressure transducers, as appropriate.
 - A non-vented transducer was deployed at the Columbia River Barge Slip to measure conditions in the Columbia River adjacent to the Project site.

In addition to the high frequency electronic water level measurements collected by the transducer, manual water level measurements were periodically collected using an electronic water level sounder. Manual water level measurements were made and recorded to an accuracy of 0.01 foot and referenced to the surveyed measuring point elevation (Table 1). Manual water level measurements are included in Appendix B. Table 2 summarizes water level elevations in project wells and Columbia River water level stage through 2012 testing.

Other ASR System Monitoring

Water quality and other system performance information necessary for system operation during pilot testing also was monitored and recorded by Boise's SCADA system. Source water injection parameters were monitored both up-stream (also referred to as raw source or unfiltered water) and down-stream (also referred to as treated or filtered source water) of the slow sand filtration system. Injection parameters measured at both locations include flow rate, system pressures and pressure differentials, turbidity, temperature, and electrical conductivity. These parameters were continuously monitored to evaluate performance of the filter system and determine if back flushing was required. Temperature and electrical conductivity of recovered water were monitored at the ASR well head. The reader is cautioned during the

review of this data that temperature and conductivity are only representative of source water when injection is occurring, and recovered water when extraction pumping is occurring. At other times the well head instruments are recording essentially ambient conditions in piping and the upper portions of the well.

Raw data sets from the Boise SCADA system and pressure transducers installed in the monitoring network were submitted periodically to Ecology during pilot testing in 2012. The transducer data are included in EXCEL spreadsheet format on the compact disc included with this tech memo.

Pilot Testing Program

This section describes results of the pilot testing which began on February 6, 2012 and continued until October 1, 2012. Observations and preliminary interpretations of Cycle 1 and Cycle 2 testing are presented below.

Hydraulic Response

Water Quality Effects on Hydraulic Response

Total dissolved solids concentrations and temperature change the density (or specific gravity) and dynamic viscosity of water. Density affects the pressure response to changes in hydraulic head of the aquifer, while the contrast in viscosity primarily affects the intrinsic permeability of the aquifer (Kawecki, 1995; Anderson, 2005). The contrast in these two properties between the source water and native groundwater were observed to affect the hydraulic response of the target zone aquifer, particularly during injection cycles. Detailed information describing temperature and total dissolved solids concentration effects on density and viscosity are presented in Attachment C – Supplemental Information.

Total dissolved solids (TDS) in the source water are approximately half the concentration observed in native groundwater. The temperature of the source water was between approximately 24 and 39 degree F less than the native groundwater temperature of approximately 79.4 degrees F. Adjusting the density of pure water for the total dissolved solids content and temperature of each of the waters results in source water having a density ranging from 0.12 pounds per cubic foot (lbs/ft³) to 0.197 lbs/ft³ greater than native groundwater during injection.

Viscosity is a measure of the resistance of a fluid (to flow) which is being deformed by either shear stress or tensile stress, and it varies inversely with temperature (dynamic viscosity). As temperature increases viscosity decreases. For the temperature ranges observed in the source water, viscosity would be approximately 3.228 pound force seconds per square foot (lb · s/ft²) to 2.730 lb · s /ft². Native groundwater viscosity on the other hand was approximately 1.791 lb · s /ft², or roughly half to two-thirds that of the source water. Decreased temperature and increased viscosity result in decreases in intrinsic permeability (Domenico and Schwartz, 1998; Anderson, 2005).

Typically in CRBG ASR wells the differences in density and viscosity affect the hydraulic response during injection by decreasing the effective transmissivity of the aquifer (s) and decreasing the specific capacity during injection, which both contribute to an increase in

frictional losses during injection. Due to the extremely high effective transmissivity of the target zone, the low target injection rate and the greater contrast in temperature than at other CRBG ASR locations, the hydraulic response during injection was atypical. The effects of density and viscosity on the hydraulic response during pilot testing are discussed further below.

Shakedown and Cycle 1 Testing

Table 3 summarizes flow rates and water volumes injected and extracted during pilot test activities preceding the start of Cycle 1 through the end of the recovery period. The flow rates and volumes listed in Table 3 are associated with activities described in the QAPP. Figure 1 shows a hydrograph of ASR-5, monitoring wells OBS-1 and OBS-2, and the River during pre-test, shakedown testing and Cycle 1 pilot testing. Ranges for water level elevations in all monitoring locations during Cycle 1 are shown in Table 2.

Step draw-down pumping test and other system “shakedown” testing was conducted prior to Cycle 1. During the step rate test well ASR-5 was pumped at 300, 600, and 900 gallons per minute (gpm). Observed specific capacity at the conclusion of the step draw-down test was approximately 500 gpm/ft of drawdown (dd). The injection, storage, and recovery portions of the shakedown test were approximately 1 hour long each. During 2010 testing of ASR-5 the specific capacity was observed to be approximately 440 gpm/ft of dd after 72 hours of pumping at 3000 gpm (GSI, 2010).

Cycle 1 injection, storage, and recovery phases were conducted between February 7 and February 9, 2012. The injection and storage phases lasted approximately 23 hours each. The recovery phase lasted approximately 13 hours. A total of 2.12 acre feet of filtered water were injected and 2.02 acre feet of water were recovered during Cycle 1 (Table 3). At the start of injection water levels were observed to decrease by approximately 0.5 feet initially in both of the pressure transducers installed at ASR-5. This response is interpreted to be related to density differences between the warmer, lower density native groundwater and the cooler, higher density source water and placement of pressure transducers in the well.

During injection, cold, high density source water dropped to the bottom of the well. However, because the transducers in ASR-5 were installed at a depth of approximately 80 feet bgs they observed a temporary water level decrease in the shallow portion of the well as the water column became denser in response to initial injection. If the transducer had been in the bottom of the well we likely would not have seen this type of response. With injection, we would have observed a pressure at the bottom of the well if the transducer had been deployed to the bottom. After the initial decrease of 0.5 feet, the maximum observed buildup was less than 0.5 feet during injection at 500 gpm and the maximum observed drawdown during recovery was approximately 1 foot at 800 gpm in ASR -5. Specific capacity was observed to be approximately 800 gpm/ft of dd during recovery (Figure 1). A hydraulic response to pumping was not apparent in the shallow basalt in OBS-1. Changes in water levels at OBS-1 were consistent with changes in Columbia River level, which is consistent with the observations during the ASR feasibility study. OBS-2 was observed to respond to both injection and pumping. The observed response at OBS-2 was consistent with the theoretical estimates for build-up and drawdown using the Theis equation and the aquifer properties estimated during previous testing (GSI, 2010). The density effects due to source water injection were minimal at OBS-2 due to the relatively small thickness of the target zone aquifer relative to the standing water column of warmer groundwater.

After injection was stopped, both ASR-5 and OBS-2 were observed to have water level decreases of approximately 0.24 feet and 0.16 feet respectively. ASR-5 was observed to have an overall increasing water level trend during the storage period which was 0.18 feet higher near the end of the storage period. In contrast, OBS-2 had a relatively stable water level during the short storage period after the initial decrease of 0.16 feet. The different responses during the storage period likely reflect thermal expansion of water in the target aquifer due to heat exchange with the host aquifer and within the ASR-5 well casing during the storage period.

Recovery pumping was performed at a target rate of approximately 800 gpm. During recovery pumping ASR-5 was observed to have increasing water levels while OBS-2 had the expected response of decreasing water levels. The increase in water levels at ASR-5 is consistent with an observed increase in temperature and conductivity with pumping duration (GSI, 2012a). After recovery pumping was complete static water levels in both ASR-5 and OBS-2 rose by approximately 0.65 feet and 0.2 feet respectively (Figure 1).

Post Cycle 1 Testing

Informal injection activities were conducted by Boise in the course of operational training, testing, and programming after Cycle 1 was complete and prior to the start of Cycle 2. During this period, approximately 28.4 AF of water was injected in the target aquifer (Table 3). Aquifer response and well performance were similar to Cycle 1 during this informal testing period.

On February 24, 2012 a three hour recovery pumping test was performed after operational injection testing was completed approximately 3 hours earlier that day. During recovery pumping at a target rate of 800 gpm the recovered water temperature was observed to remain below 52 °F for the duration of the 3 hour recovery period (Figure 2). This is the only occasion where cooler temperature water was observed for more than a few minutes at the start of recovery pumping during 2012 testing. Water level elevations at the end of post cycle 1 testing were above 329.5 feet above mean sea level in both ASR-5 and OBS-2, the highest elevation observed during any recovery period in 2012. It is not clear whether the short duration of storage or hydraulic head build up in the target zone promoted the observed extended period of lower recovery temperature.

Cycle 2 Testing

Cycle 2 injection started 27 February 2012 at approximately 09:30. Average injection flow rate was approximately 492 gpm. At least once a day injection was stopped to perform routine back flushing of the slow sand filter system for approximately 20 minutes at 800 gpm. To prevent physical clogging of the ASR well, back flush water was pumped to waste to the Boise storm water system and not injected into the ASR well. Table 3 summarizes the final Cycle 2 injection and recovery volumes.

Hydraulic Response

Basic observations with respect to the hydraulic responses observed during the Cycle 2 injection phase are as presented below and in Table 3. During injection water levels in OBS-2 and ASR-5 fluctuated between approximately 22 to 25 feet below ground surface. Unlike the initial response during the shakedown test and Cycle 1, water levels in ASR-5 rose rather than declined. During injection the water level rose approximately 3 feet in both ASR-5 and OBS-2,

although the maximum rise occurred before the end of the injection phase (Figure 3). The apparent leveling off of water level before the end of injection may reflect the effects of regional aquifer trends and possibly injection water density decreases (due to warming source water temperatures) affecting water levels in the ASR-5. Comparison to OBS-1 water level trends suggests the former was likely the cause. However, as source water warmed, water density and viscosity would have decreased, resulting in a reduction in the observed water level and an apparent decrease in the rate of water level rise. Cycle 2 injection specific capacity was approximately 200 gpm/ft of build-up calculated over the full length of the injection phase (Figure 4). This long term specific capacity was much lower than originally observed during the much shorter duration Cycle 1 test.

Storage began on May 22, 2012 and continued until the start of recovery pumping began on July 30 (Figure 3). Not unexpectedly, the injection mound developed during Cycle 2 began to decline almost immediately after injection was completed (Figure 3). During the storage period, water levels were observed to decrease at an average rate of approximately 0.075 feet per day in ASR -5 and OBS-2. The residual mound from Cycle 2 was observed to dissipate within 30 days after injection stopped and continued to decrease to 2 feet below water levels observed at the start of injection. Water levels were observed to decline below those observed prior to the start of Cycle 1 injection suggesting that the aquifer is not bounded hydraulically and/or that other wells were withdrawing from the aquifer and affecting water levels regionally. Water level trends in both ASR-5 and OBS-2 show both short term and long term patterns during pilot test storage that are suggestive of pumping by other water supply wells in hydraulic connection with the target zone. Short term patterns include numerous water level rises and falls that could reflect other wells switching off and on. The long term pattern is the water level decline through the summer that results in a water level lower than when pilot testing started in February. Such a trend is typical in the Columbia Basin, and commonly attributed to water level declines in the aquifer system in response to high summer pumping demands. Given that however, such patterns were not observed in the 2009 ASR-5 pumping test data sets.

Recovery began on July 30th at a pumping rate of approximately 800 gpm until August 9th when the injection rate was decreased to 400 gpm (Figure 5). The system was idled on August 20th due to limitations within Boise's storm water system. Similar to the storage period, the responses at ASR-5 and OBS-2 during recovery pumping suggest the effects of other pumping wells on water level trends in the target aquifer. During the idle period between August 20th and September 17th water levels in OBS-2 and ASR-5 appear to have been relatively stable, with minor fluctuations of less than one foot (Figure 3). The maximum drawdown during pumping was approximately 4 feet for both of the recovery periods (Figure 5).

Cycle 2 specific capacities estimated from water level elevations and pumping rates observed during recovery pumping ranged from 120 gpm/ft of dd to 375 gpm/ft of dd at 800 gpm, and approximately 350gpm/ft of dd during the period of pumping at 400 gpm (Figure 5). These specific capacities are lower than observed during the much shorter Cycle 1 test. In addition, the Cycle 2 specific capacity likely includes the effects of regional aquifer decline seen during the storage phase and potential well interference, and may underestimate actual well performance. For example, assuming that the regional water level trend continued to decrease at the rate of 0.075 ft/day observed during storage the adjusted specific capacity is greater than 350 gpm/ft of drawdown for the period of pumping between July 30th and August 9th.

Potential for Loss of Stored Water

During injection of source water into the aquifer the injected water will displace (and mix with) the native groundwater (or receiving water), forming a roughly tabular shaped cylinder or “bubble” of mixed recharge water and native groundwater around the well. With subsequent injection cycles that leave water in the aquifer, the stored water “bubble” would contain more injected water and less native groundwater. The actual geometry of the injection bubble is influenced by lateral heterogeneity in aquifer hydraulic properties and boundary conditions (e.g. faults). Estimated migration distances for the target volumes and rates for Cycle 2 and for a full scale ASR injection cycle are shown in Table 4.

Once injected into the aquifer, stored water may migrate away from the injection well under the influence of the hydraulic gradient near the well. The hydraulic gradient near the well is a combination of the regional hydraulic gradient, gradient from the injection mound, and any artificial influences on gradient such as other pumping and/or injection wells in the aquifer. The total migration distance of the injection bubble outward from the injection well is the sum of the storage migration distance and the injection radius of influence. Generally, CRBG aquifer systems have high transmissivity and low gradient, resulting in slow groundwater velocities which in turn should result in low migration distances from the injection well during the period of storage. Table 4 shows the predicted migration distances over a range of injection rates based and a range of assumed hydrogeologic properties. Under the flow conditions shown on Table 4, the total volume of injected water should be available for recovery as it has not migrated far from the injection well. This assumes that the hydraulic gradient at the site is low; however, we have an insufficient number of wells completed in the target aquifer and so we were not able to measure the gradient to confirm this assumption.

Potential mechanisms for the loss of injected water include the influence of other pumping wells and losses due to well construction (i.e. unsaturated interflow zones and vertical migration). During the feasibility study, the Ecology water well database was queried in an attempt to identify nearby water wells in the project area. Given the extremely high hydraulic diffusivity of the target zone aquifer, wells located beyond 2 miles could potentially influence water level(s) in the target aquifer. At the time of the feasibility study, wells found to be nearest to ASR-5 (< 2 miles) were interpreted to not be open to the ASR target horizon and therefore were not monitored during pilot testing. In recent weeks it has come to our attention that subsequent to the feasibility study a new municipal supply well was installed for the nearby Wallula Water District #1 approximately 1.4 to 1.5 miles to the south-southeast. Although no Ecology record for this well has yet been found, Department of Health records suggest it is over 400 feet deep, and has been in operation since at least the beginning of 2011. Pumping of this well may have influenced water levels in ASR-5 and OBS-2. Potential interference from nearby wells at various distances and pumping rates is shown in Figure 6.

As noted previously, several water level declines appear in the OBS-2 and ASR-5 water level trends and these may be potentially due to other wells pumping. The majority of high yielding wells in the CRBG are used for irrigation and have water right permits that generally limit use of the water to between March and October, and therefore would overlap with the ASR-5 storage and recovery pumping periods. Other high yield wells commonly found in the CRBG include municipal supply wells. These wells are in-use year round, but generally see peak demand in the summer months. Based on water level changes observed in ASR-5 and OBS-2

that are not the result of pilot testing, it seems likely that other wells are having some influence on the retention of injected water in the vicinity of ASR-5.

Faults and geologic structures may also influence stored water migration by acting as no-flow boundaries or barriers by limiting groundwater flow and limiting migration potential or losses. Migration behavior during and after injection may be difficult to predict in wells that are near faults, or other geologic structures that act as no-flow or flow limiting boundaries. A flow limiting boundary condition was observed in the late-time pumping response during the 72-hour pumping test at ASR-5 in 2010. However, the relatively consistent water level trends during injection and recovery during Cycle 2 do not suggest the presence of flow-limiting or no flow boundary condition having a significant effect on the long term hydraulic responses during 2012 pilot testing.

The rapid dissipation of the residual mound and decline in regional water levels during Cycle 2 storage suggests that migration distances or the potential for other pumping wells to influence recovery of stored water could be greater than originally estimated. In addition, migration distances may also be greater than estimated if regional hydraulic gradient or aquifer properties vary significantly further away from the ASR-5 and OBS-2 wells.

Thermal Energy Storage and Retention in the Target Aquifer

This section further describes the temperature data collected during the pilot test, potential for seasonal thermal energy storage in the target aquifer and the thermal retention characteristics of the target aquifer observed during pilot testing in 2012.

Recovery Water Thermal Trends

Plots of temperature and electrical conductivity versus recovery volume for Cycle 1 and Cycle 2 are shown in Figure 7 and Figure 8, respectively. As noted previously, water temperature at ASR-5 was monitored at the wellhead and in pressure transducers installed in the well. Source water temperatures at the start of Cycle 2 injection was approximately 42 degrees F and increased over the course of injection to approximately 54 to 55 degrees F. Recovered water temperatures were observed to reach near native groundwater temperatures of 79.4 degrees F within 20 minutes of the start of Cycle 2 recovery pumping on July 30, 2012. During the second start of Cycle 2 recovery pumping on September 1, 2012 temperatures were above 79 degrees F within 20 minutes. Additionally, minor decreases in temperature (less than 0.2 degrees F) with subtle increases in conductivity were observed with increased pumping duration during Cycle 2 (Figure 8).

On the basis of temperatures observed in the recovered water during Cycle 1 and Cycle 2 it would appear that limited thermal retention is occurring and the thermal energy is being transferred (or lost) due to conductive, convective and/or thermal radiation processes in the storage zone. Additionally, the electrical conductivity trends suggest that little if any signature of the source water is present in the recovered water. These observations taken at face value would suggest that thermal storage is not possible in the target aquifer. Significant contrasts in the density of the injected water with the source water exist which may have resulted in the poor thermal recovery efficiency; however, temperatures observed during recovery pumping near the end of Post Cycle 1 operational testing suggested that recovery of cool water was possible under certain conditions (i.e. elevated hydraulic head). This observation suggested that

potential geologic, hydrogeologic or hydraulic controls or a combination of these factors could be limiting thermal recovery efficiency.

Geologic and hydrogeologic causes for the observed high temperature of the recovered water were re-evaluated in the context of the pilot testing observations. One potential geologic control is that the Pomona Member consists of two basalt flows at this location (see Appendix A). These two flows are a pillow basalt (flow 1) that occurs in the upper portion of the target zone and a normal flow top in the deeper, second unit (flow 2) near the lower portion of the target zone. Hereafter, for simplicity we shall refer to the two water bearing intervals as the upper target zone and the lower target zone. These two zones are separated by a dense flow interior and an unnamed unit of the Ellensburg Formation. The vertical separation and potential differences in hydraulic and hydrogeologic characteristics within and between the water bearing zones may be contributing factors to the low thermal recovery efficiency.

Potential hypotheses for geologic, hydrogeological, and hydraulic controls on thermal recovery efficiency include:

1. Contrasts in hydraulic conductivity or hydraulic head between the upper portion of the target zone versus the lower portion of the target zone limiting injection and/or recovery of stored water within the target zone. For example, cooler (less than 55 degree F), more dense injection water is preferentially stored (or ponded) in the lower zone. At Cycle 2 pumping rates it is not recovered because the upper zone dominated by warm (79.4 degree F), less dense native groundwater has a greater hydraulic head than the lower zone.
2. Structural or physical hydrogeologic controls (e.g., faults) influence groundwater flow to the well. The flow 2 flow top in ASR-5 appeared to be repeated based on drill cuttings and comparison to OBS-2 stratigraphy and was interpreted to suggest the presence of a fault between 512 to 542 feet bgs (Appendix A).
3. Greater volumes of injected water are required to condition the aquifer and/or improve thermal retention by conditioning the host rock/aquifer matrix.
4. There is greater than anticipated loss of stored water beyond the capture zone of the ASR well.
5. Mixing is occurring during injection and/or recovery and the resulting recovered water is dominated by native groundwater from the upper part of the target zone (dominated by native groundwater quality).
6. If no hydraulic head difference is present between the upper target zone and the lower target zone, then density and/or thermal stratification within the target zone could be limiting recovery of the less dense, warmer, native groundwater dominated water.

Evaluating the first three potential hypotheses was not possible during pilot testing in 2012 due to the construction of the wellhead, the limited number of observation wells and limitations of the injection system on injection rates and volumes. Modifications would need to be made to the wellhead and/or pump to allow access for geophysical and other tools to evaluate these three hypotheses. The fourth potential cause is judged to be unlikely given the extremely high transmissivity and assumed flat hydraulic gradient in the target aquifer near ASR-5. However, the lack of available observation wells prevents evaluating this potential hypothesis. The potential for mixing, density or thermal stratification in the well could be evaluated using the existing access at ASR-5 and OBS-2. With this access, thermal profiles of the wells could be collected during injection, storage, and recovery. This data would add significantly to the

limited thermal profile data collected during the pilot during the storage and recovery phases. The results of the thermal profiles collected during Cycle 2 of the pilot testing are presented below.

Borehole Thermal Profiling

Thermal profiling at OBS-2 was performed May 2 while injection was occurring at ASR-5 (Figure 9). Temperature was observed to decrease with depth ultimately stabilizing at approximately 64 degrees F at the bottom of the well. Injection water temperature at ASR-5 during this period was approximately 50 degrees F. The approximately 14 degree F change in water temperature between ASR-5 and OBS-2 may be the result of conductive warming of the injected water by the aquifer host rock or mixing of native groundwater and injected water. The later process may be occurring due to turbulent mixing within the borehole or down hole vertical flow from the upper part of the target zone to the lower portion of the target zone. If it is assumed that no conductive heat transfer between the host rock and injected water was occurring, and only bulk mixing within the well was occurring, the observed temperature of 64 degrees F in OBS-2 would represent an approximately a 50/50 mix of groundwater and source water.

Following the completion of injection, multiple temperature profiles were collected from ASR-5 and OBS-2 to evaluate intra-borehole flow, thermal retention, and thermal stratification present within the target zone aquifer. Temperature profiles for ASR-5 during storage and at the end of recovery and for OBS-2 during storage are shown in Figures 10 through 16. Table 5 summarizes the temperature profile data. In every thermal profile, the lowest temperatures are observed in the lower portions of the target zone. These lower temperatures deep in the target zone (last profile date September 4, 2012) persisted well into the recovery phase which started on July 30, 2012.

Based on the multiple temperature profiles, the rate of temperature change in the target zone was estimated over the storage period for ASR-5 and OBS-2. The rate of temperature change in the lower portion of the target zone in OBS-2 and ASR-5 decreases with time; ranging from 1.60 degrees F per day after 10 days to less than 0.3 degrees F per day after 106 days. The decrease in the rate of change in temperature of water within the wells with time is greatest shortly after Cycle 2 injection. This may represent cooling of the near well aquifer matrix with the injected water; however, the post recovery pumping observations (day 106) may not be representative of aquifer conditions, given the potential for preferential flow and vertical mixing within the target zone.

On the basis of the observed water temperature trends in the lower portion of the target zone it would appear that retention of cooler water in the target zone is controlled several processes during storage and during recovery. The thermal profiling suggests that density stratification may be occurring. Variability in hydraulic conductivity and/or hydraulic head may result in preferential flow within the target aquifer that could contribute to the higher temperatures observed in recovered water. Also, cooler water may be moving away from the well. To improve the recovery efficiency of stored water the alteration of target injection rates and volumes, multiple cycles of injection to improve thermal retention within the target zone, or alteration of well construction to isolate the most suitable portion of the target aquifer may be needed. However, sufficient information is lacking to definitively identify which of these alternatives would improve thermal recovery efficiency.

Water Quality Monitoring Program

This section describes the results of the water quality sampling program for native (or baseline) groundwater, raw and filtered source water, and recovered water.

Sampling Program and Methodology

Several groundwater geochemical sampling events were conducted per the QAPP to collect bacteriological/viral, field parameters, geochemical parameters, regulated VOCs and SVOCS, and treatment polymer data. The analytical program for raw and filtered source water and wells completed in the target aquifer is shown in Tables 2 and 3 of the revised QAPP.

Source water quality samples were collected prior to filtration and after filtration from inline sample ports. Water quality samples for ASR-5 were collected from a dedicated sampling port at the wellhead. A dedicated submersible sampling pump was installed to collect water samples at well OBS-2.

Source Water and Groundwater Water Quality

Source water and groundwater geochemical sampling results are presented below by the analytical categories – field parameters, bacteriological/viral, treatment polymer, general geochemical parameters, and regulated compounds and radionuclides. Analytical results for source water is shown in Table 6, while Cycle 1 source water groundwater and recovered water analytical results are tabulated in Tables 7. Cycle 2 source water, storage and recovered water quality data are tabulated in Table 8.

Field Parameters

Per Section 6 of the revised QAPP, field parameters including temperature, specific conductance, pH, turbidity, oxidation-reduction potential (ORP) and dissolved oxygen were recorded at periodic intervals during the pilot test program. These parameters were collected at the well head using a YSI Multi Meter Model 556. Dissolved oxygen and ORP were measured using a closed-atmosphere flow through cell. ASR-5 was purged for a minimum of 10 minutes and until all field parameters stabilized per the criteria listed in Table 6 of the QAPP. Purge times in OBS-2 exceeded 12-hours because of pumping rate limitations imposed by the dedicated sampling pump and the volume of water in the well.

Field parameter data (Tables 6, 7, and 8) shows source water and native groundwater is distinctly different when comparing ORP, dissolved oxygen, temperature, and electrical conductivity. Plots of temperature and conductivity trends during Cycle 1 and Cycle 2 are shown in Figures 7 and 8. During Cycle 2 injection there is a steady decline in electrical conductivity of injected water. During recovery, recovered water temperature and quality appear to transition quickly from injected source water to more closely resemble native groundwater. Given that general observation, there appears to be a slight decreasing trend in recovered water temperature and conductivity late in the recovery period. This observation would suggest that with continued pumping (and lowering of hydraulic heads) recovered water quality has a minor contribution from the lower target zone which is where thermal profiling suggests cooler, more dense, injected water is accumulating.

The elevated pH values (9.03 to 9.22) observed in both baseline groundwater samples may be indicative of a longer residence time for groundwater in the subsurface. As water resides and travels through the aquifer, it interacts with the aquifer matrix, resulting in alteration minerals. This alteration process consumes H⁺ and therefore, as the water moves along its flow path, the pH increases.

Bacteriological and Viral Results

Bacteriological and viral data was collected that included e-coli bacteria, total coliform bacteria, fecal coliform bacteria, and enteric viruses. These organisms were observed to be present in both filtered and unfiltered source water samples during Cycle 1 and Cycle 2 injection. However, no detectable colonies or organisms were observed in groundwater or recovered water samples. Bacterial occurrence in raw and filtered source water samples are summarized as follows:

- Total coliform was always present, and at concentrations less than 13 (Most Probable Number (MPN)/100 ml.
- E-coli bacteria were found in 4 of six source water samples at concentrations ranging from 1 to 12.1 MPN/100 ml.
- In 2 of 4 source water samples fecal coliform was detected at concentration of 2 and 8 MPN/100 ml.

Enteric viruses were detected in one unfiltered source water sample collected on February 1 (prior to injection) where it was reported as being present at the detection limit of 0.009 plaque forming units (pfu)/L.

Treatment Polymer

Treatment Polymer results for source water and recovered groundwater are shown in Tables 6, 7 and 8. Treatment polymer samples were submitted and analyzed by NALCO labs in Naperville, Illinois. Treatment polymer was not observed at detectable concentrations in recovered water.

Regulated Constituents and Radionuclides

Regulated volatile organic compounds (VOCs) and synthetic organic compounds (SOCs) were evaluated in source water, baseline groundwater and the final recovered water quality sample. Toluene, a common laboratory contaminant, was observed at 0.0069 mg/L in the baseline water quality sample at OBS-2. No other detections were observed in ASR-5 and OBS-2 samples.

Gross alpha particles and gross beta emitter values were also evaluated during 2012. Gross beta emitter values in groundwater were observed to be greater than source water values and significantly less than the drinking water standard of 50 pCi/L. Gross alpha particles in source water, native groundwater, stored water, and recovered water values were also below the regulatory criteria of 15 pCi/L.

Cation, Anion, and Metals Results

This section presents the results for source water, groundwater and recovered water quality for major anions and cations and selected metals. The section is organized by testing phase and the type of water sampled.

Background - Source Water

Raw and filtered source water samples were collected on four separate occasions before and during pilot testing (Table 6). As might be expected, filtered and raw source water quality was observed to vary seasonally. Temperature was observed to increase during the injection cycle, while calcium, sodium, chloride, sulfate and bicarbonate were observed to decrease relative to pre-injection source water quality as injection continued. Total suspended solids in the filtered source water was observed to range from 1.0 to 4.3 mg/L. Based on the plots the source water would be classified as a calcium-bicarbonate type as shown in Figures 17 and 18.

Background - Native Groundwater

Groundwater quality was evaluated at both the ASR-5 and OBS-2 wells prior to starting Cycle 1. Baseline groundwater quality is summarized in Table 7. Major anion and cation signatures for the baseline groundwater quality samples are shown in Figure 17 and 18. From the Piper diagram (Figure 17), the different compositional character of groundwater versus source waters, particularly with respect to Na and K relative to Ca and Mg is evident. The results for the baseline groundwater samples were nearly identical to the water quality observed in 2009 (GSI, 2010). As noted during feasibility testing, Ca, Mg and sulfate depletion relative to groundwater in the “typical” CRBG basalt formations was observed at ASR-5 and OBS-2. This water is characterized as a Na-K bicarbonate type water.

Relative to the source water, the groundwater derived from the target zone is depleted in calcium (Ca), magnesium (Mg), sulfate, and DO while enriched in HCO₃, potassium (K), sodium (Na), silica (Si), and chloride (Cl). The groundwater also has a slightly elevated pH (9.03 vs. 7.86) and significantly higher temperature (79 degrees F, 26.1 degrees C) than the source water (39.4 to 53.8 degrees F, 4.13 to 12.10 degrees C). Baseline groundwater quality samples collected at ASR-5 and OBS-2 were observed to exceed the secondary drinking standards for fluoride, sodium and pH.

Cycle 1 Recovered Water Quality Observations

Cycle 1 recovered water quality data were collected near the end of pumping. Based on these data, the recovered water is classified as a Na-K bicarbonate type and closely resembles native groundwater (Figure 17 and Figure 18). The signatures suggest minor shifts in magnesium and sulfate relative to baseline groundwater concentrations prior to Cycle 1 injection. Additionally, hardness (as CaCO₃) was also elevated in recovered water quality relative to baseline groundwater quality.

Cycle 2 Storage Water Quality Observations

Water quality samples were collected at ASR-5 and OBS-2 on June 18, 2012 after 27 days of storage, approximately 50 percent of the total storage period. The field measured pH values are

much higher in ASR-5 (9.89) and OBS-2 (10.81) than those observed during previous sampling. Additionally, ORP suggests strongly reduced conditions (<-500 mV), while dissolved oxygen is slightly oxidizing. The unusual pH and ORP readings suggest that there may have been an instrument error or a faulty ORP/pH probe during sample collection.

The storage samples were generally very similar relative to one another; however, there was a notable difference in hardness, calcium, magnesium, potassium and silica between ASR-5 and OBS-2. OBS-2 water quality closely resembled baseline water quality. Sulfate was elevated relative to baseline concentrations in both ASR-5 and OBS-2. Arsenic (which may be found in pyrite in trace amounts) was observed at a concentration of 1.33 µg/L in the storage sample. These two observations would suggest that oxidation of pyrite was occurring. Additionally, the piper diagram shows that ASR-5 samples plot between filtered surface water and baseline groundwater, but still plots as a Na-K bicarbonate type water (Figure 17 and Figure 18); more closely resembling native groundwater than source water.

Cycle 2 Recovered Water Quality

Initial recovered water quality was collected on July 31, 2012 during the start of the Cycle 2 recovery period (1% of recovery volume). Temperature and pH were relatively close to native groundwater values, while ORP was slightly oxidizing, consistent with dissolved oxygen concentrations slightly greater than 1 mg/L.

The ASR-5 and OBS-2 water quality samples at 1% recovery are generally similar with only minor differences in chloride (ASR-5 is higher) and TDS (ASR-5 is lower). Bicarbonate (as CaCO₃) and alkalinity observed at ASR-5 (40.2 mg/L) and OBS-2 (44.1 mg/L) were much lower than baseline groundwater concentrations which were approximately 120 mg/L. Additionally, sulfate is elevated relative to baseline groundwater values. These two observations suggest the oxidation of pyrite is occurring and liberating sulfate and hydrogen ion. The resulting changes in concentration shift the recovered water quality signatures on both the Piper and Stiff diagrams (Figures 17 and 18).

A second recovered water quality sample was collected on September 27, 2012 prior to end of recovery pumping (approximately 50% of injected volume). Temperature was observed to be consistent with baseline groundwater, while the field measured pH was slightly lower in both ASR-5 (8.37) and OBS-2 (8.68). The dissolved oxygen (<1.0 mg/L) and ORP (>-200 mV) values suggest reducing conditions and are similar to baseline.

Bicarbonate (as CaCO₃) and alkalinity observed at ASR-5 (117 mg/L) and OBS-2 (76.8 mg/L) were closer to baseline groundwater concentrations than those observed in the initial recovery sample. Sulfate was still elevated relative to baseline values. However, the final recovery water quality plots relatively close to native groundwater quality with these minor changes (Figures 17 and 18). It should also be noted that only minor concentrations of sulfide related minerals (copper, iron and zinc) were observed in recovered water. Dissolved iron concentrations in recovered water ranged from 0.0341 and 0.0122 mg/L, while dissolved manganese was not detected at the reporting limit of 0.01 mg/L. These values are below drinking water standards. Arsenic was not detected in recovered water samples at the reporting limit of 1 µg/L. Low to nondetectable concentrations of iron, manganese, and arsenic indicate that pyrite dissolution and subsequent liberation of these constituents is not a concern.

Geochemical Compatibility

As part of the ASR pilot testing program, the geochemical compatibility of Boise source water mixing with native groundwater was evaluated per the revised QAPP. Water quality observed during pilot testing was generally consistent with results predicted from geochemical modeling performed during the feasibility study and the reader is directed to Section 5 of that report (GSI, 2010) for a detailed discussion. Below is a brief discussion of the results.

Geochemical Modeling of Recovered Water Quality

Given that the geochemistry of the native CRBG groundwater differs markedly from the Columbia River source water, there is a concern that mixing of these two waters could lead to various geochemical reactions that might adversely affect groundwater quality or potentially lead to physical or chemical plugging of the well. Such reactions were evaluated using the USGS program PHREEQC v. 2 (Parkhurst and Appelo, 1999) which uses the chemical data to simulate the mixing of these waters in various proportions.

PHREEQC results suggest that mixing of the two waters in various proportions results in a water that is oversaturated (saturation index >1) with respect to ferric hydroxide ($\text{Fe}(\text{OH})_3$) and goethite, and under saturated (saturation index <1) with respect to pyrite, gypsum, dolomite and calcite. An oversaturated condition doesn't necessarily mean the mineral will precipitate, only that it has a tendency to do so. The precipitation and growth of a mineral is complicated by the fact that before the mineral can grow, a mineral nucleus must form spontaneously in the solution. This generally requires the saturation index to be a value significantly greater than one. Based on the data collected to-date, the precipitation of chalcedony and quartz is interpreted to be unlikely, particularly over the time span of a typical ASR cycle.

Of more concern is the under saturated character of the mixed waters with respect to pyrite, which could lead to a deterioration of recovered water quality with respect to sulfate, iron, and trace metals. The difference between the native groundwater and source water with respect to sulfate is explained by the markedly different DO and ORP values of the two waters. Negative ORP values are characteristic of waters with low to very low DO, and the oxidized form of sulfur (S^{6+} in sulfate) is rapidly reduced to sulfide (S^{2-} in hydrogen sulfide) in low DO waters. Dissolved iron in the form of Fe^{2+} rapidly precipitates in the presence of oxygen. As oxidation of pyrite occurs, Fe^{2+} is rapidly oxidized to Fe^{3+} whereupon it precipitates as $\text{Fe}(\text{OH})_3$, which is relatively insoluble under normal ORP and pH conditions. During this process sulfide is converted to sulfate, which is reflected in the elevated sulfate concentrations in the recovered water relative the native groundwater. The elevated sulfate concentrations observed in stored water and recovered water quality suggests the oxidation of pyrite was occurring in the target aquifer. Dissolved iron and trace metal concentrations were not detected or at concentrations near the detection limit of 0.001 mg/L in the recovered and stored water.

The reaction model predicted that ferrihydrite ($\text{Fe}(\text{OH})_3$), in an amount similar to that of pyrite, precipitates simultaneously with pyrite dissolution. Previous work has indicated that under oxidizing conditions, the ferrihydrite phase limits the mobility of arsenic, i.e., arsenic released by the oxidation of pyrite is quickly removed from solution by sorption onto ferrihydrite. Ferric hydroxide precipitate mass would be expected to be similar to the mass of available pyrite, and therefore a decrease in aquifer permeability is not anticipated. However, the mobilization of iron could also result in opportunistic populations of bacteria developing in the

injection well and target aquifer. Under suitable environmental conditions and available nutrients, bacteria populations can proliferate and produce a mass of biofilm, plugging the aquifer pores (i.e. biofouling). Iron related bacteria (IRB) reduce Fe^{+2} to $Fe(OH)_3$ under oxidizing or reducing conditions for energy, while other bacteria can use manganese, sulfate, nitrate, and phosphate as a nutrient source. The pH and nutrient conditions (i.e. iron and sulfate poor) in native groundwater generally are not suitable for IRB, but with the introduction of lower pH and oxygenated water suitable conditions may develop (Cullimore, 2008). In the absence of a biocide treatment such as chlorination to limit bacterial populations introduced into the ASR well, continued filtration of source water is recommended to reduce the potential for biofouling to occur. Periodic maintenance of the injection well using a high concentration chlorine dose (200 to 300 mg/L) may also be warranted to control bacterial populations.

Potential for Use of Recovered Water as Process Water

Warmer recovered water could potentially be used for Boise process water if it meets water quality criteria that will prevent the buildup of scale or deposits within the system. The criteria for process water are shown in Table 9 for comparison to recovered water quality.

Native groundwater is higher in terms of HCO_3 , Cl, K, SiO_2 and Na, while the filtered source water is higher in Ca, Mg, and SO_4 . To evaluate the potential for recovered water to meet process requirements, a mixed water varying from 1 to 10 percent groundwater was modeled using the PHREEQC geochemical software package. While there is minor seasonal variability in source water quality, the filtered water quality sample collected near the end of injection on May 31, 2012 was used to represent source water.

The acceptable water quality limits for plant operations fall variably in between the two compositions (groundwater and treated Columbia River water) and a mixture that simultaneously meets all acceptable concentration limits would be very small (<1% groundwater) due to bicarbonate concentrations (Table 9). Based on Boise's criteria, the most important constituent with respect to maintaining ASR operations is silica because of the potential precipitation in tubes and turbine blades. The limit for silica in process water is 15 mg/L. It is probably not coincidental that the 15 mg/L maximum is very near the concentration of silica where the mixture becomes saturated with respect to chalcedony (a silica phase). At higher concentrations than 15 mg/L, chalcedony has the tendency to precipitate. A mix of less than 8 percent groundwater with surface water is needed to meet process water requirements for silica (Table 9). The small percentage of groundwater allowed to mix with injected water and still meet the water quality criterion for process water use will likely require a very high recovery efficiency (i.e. large quantity of treated surface water with minimal mixing) to be successful.

Observations and Interpretations of 2012 Pilot Testing Results

Basic observations and interpretations relative to aquifer conditions and 2012 pilot testing are summarized below. Observations during 2012 pilot testing are interpreted to show that the target aquifer is hydraulically suitable to accept large quantities of water for storage. However, under the conditions tested during the 2012 pilot test, recovery efficiency of stored water for thermal and process uses was poor. Additional observations and interpretations, including an updated conceptual hydrogeologic model, are summarized below.

With respect to *water levels and aquifer hydraulics*:

- Planned injection and recovery pumping rates of 500 to 550 gpm and 800 to 850 gpm, respectively, were easily attainable and should be sustainable or exceeded throughout any future testing.
- Injection well response during Cycle 1 was affected by density differences between the source water (more dense) and native groundwater (less dense) resulting in an initial apparent decrease in water levels at ASR-5 during injection. The location of the pressure transducer at a shallow depth, in warmer water, resulted in data indicative of an apparent water level decrease because the cold dense water sank to the bottom of the well.
- Unlike the 2009 aquifer testing data, the 2012 data suggests the presence of other pumping effects on the target zone. This is suggested by the pronounced water level decline seen before and during the storage phase. This apparent effect was strong enough to slow water level build-up late in the injection phase of the Pilot Test. Ecology well records do not indicate if a larger capacity water supply well was drilled and constructed in the target zone in the project area subsequent to the 2009 testing and prior to the 2012 pilot work. On the other hand, Department of Health records suggest a new water system supply well may have been drilled and constructed in this period for the Wallula Water District approximately 1.5 miles southeast of ASR-5. If the project proceeds further, the Wallula Water District well will be investigated further.
- Cycle 2 water level draw-up (rise) and drawdown observed at ASR-5 and OBS-2 were generally consistent with predicted levels based on previous feasibility study hydraulic testing results.
- With minor exceptions, water levels at ASR-5 and OBS-2 were observed to be similar in elevation, suggesting a low hydraulic gradient that would limit the potential for loss of stored water due to migration. Given this though, some of the water level trends seen in 2012 suggest there may be an unidentified off-site well(s) present in the general area influencing the target zone. The fault inferred to cross-cut the target zone might facilitate such hydraulic connection.
- OBS-1 water levels respond to changes in Columbia River water level and therefore, show smaller seasonal fluctuation relative to the deeper target zone aquifer.
- Similar to the testing in 2009, the data collected during the 2012 pilot test is interpreted to show no evidence of significant hydraulic connection between shallow groundwater and the target zone.

Temperature responses to the 2012 pilot test include the following:

- Temperature data can be used to differentiate source water and target zone ground water.
- During Cycle 2 injection, groundwater temperature in the lower portion of the target zone at OBS-2 decreased by approximately 14 °F.

- The upper portion of the target zone did not appear to be significantly affected by thermal cooling during long term injection, while the lower portion of the target zone shows significantly decreased temperatures and thermal retention over time.
- Thermal profiles collected from ASR-5 and OBS-2 suggest thermal and/or density stratification exists within the boreholes and that the cooler, slightly more viscous source water is residing predominately in the lower interval of the target zone. This stratification persisted well into the recovery phase as the coldest water was observed in the bottom ASR-5 over a month after the start of recovery pumping.
- Thermal conditions in the shallow observation well, OBS-1 are interpreted to have not been influenced by injection of cold water in ASR-5. Instead, warming and cooling trends in OBS-1 are interpreted to reflect influences from the Columbia River.

Geochemical observations and interpretations are as follows:

- Electrical conductivity data can be used to differentiate source water and target zone ground water.
- Native groundwater is higher in terms of bicarbonate, Cl, K, silica and Na, while the filtered source water is higher in Ca, Mg, and sulfate.
- Recovered water quality samples during Cycle 1 and Cycle 2 appear to be dominated by the native groundwater geochemical signature.
- Groundwater quality does not appear to be degraded by source water. Adverse geochemical reactions between the target aquifer matrix, native groundwater and source water that might limit the potential for ASR were not observed. However, sulfate and minor concentrations of trace metals were potentially liberated by the oxidation of pyrite within the aquifer matrix. This will likely decrease with continued injection and should not adversely affect long term well performance and ASR operations.
- Recovered water quality does not appear to meet the criteria for use as Boise process water. Recovered water quality mixtures with more than 8 percent groundwater would exceed Boise water quality standards for silica and bicarbonate.

With respect to the *conceptual hydrogeologic model* for the target zone developed following the 2009 testing, our view has not changed significantly. The Pomona pillow lava target zone is still interpreted to be very productive, highly transmissive, confined, has limited to no local connection to surface water, and likely has a flow limiting boundary probably related to target zone thinning and/or one or more faults. Our most significant revision to our original conceptual hydrogeologic model is related to the potential complexity and heterogeneity of the target zone.

Based on the apparent thermal stratification that were observed in the well during injection, storage and recovery pumping, and our inability to recover significant quantities of the cooler source water from the lower portion of the target zone where source water appears to accumulate during injection, and resided during storage and recovery, our interpretation of target zone hydraulics during the pilot test is evolving, but currently is as follows:

- Cold, dense source water migrated to the bottom of the target zone without significant mixing as it passed through the target zone. This apparent lack of mixing would be suggestive of limited groundwater movement related to the relatively low gradient.
- Target zone permeability likely is very high, and as a result the water at the bottom of the well is a mix of source and native water. A larger injection rate/ volume may have resulted in more displacement of the native water than achieved with the lower rates used in this high permeability interval.
- During recovery pumping most recovered water came from the largely un-mixed, warmer, and less dense upper portion of the target zone. A higher recovery rate may potentially have induced recovery of the deeper, colder water, but at the rates tested most recovered water came from the top of the target zone as the permeability of this interval was sufficient to meet our low pumping demand.

These observations and our current interpretation of them suggests that future testing, if attempted, should include some modification to the well and/or pump configuration so that higher rates can be achieved and/or water can be directly introduced to and only extracted from the lower, colder, denser interval at the bottom of the target zone.

Upwards directed vertical leakage is interpreted to not have been a major factor in the difficulty in recovering cold source water. Downwards leakage is possible given evidence for warmer of target zone water seen during 2009 aquifer testing. This warming may have been from the drawing in of warmer, deeper water present along faults likely in the project area. If so, some of the injected water may have been lost to this system and at the recovery pumping rates used for the pilot there was not enough of a pressure differential/ gradient to induce enough flow towards the well to recover this water. As noted above the possible presence of a new pumping well in the area may also account for some of the difficulty in the recovery of colder source water.

Summary: Observations during 2012 pilot testing indicated that the target aquifer is hydraulically suitable to accept large quantities of water for storage. However, recovery of cold water was hindered by current well construction, aquifer properties, and injection and recovery test pumping rates. At higher injection rates and volumes, recovery of cooler water may be feasible. On the basis of the water quality data collected during the pilot, recovered pilot test water quality is not suitable to be utilized as Boise process water. This is interpreted to at least in part reflect aquifer physical properties and the limited injection and recovery rates and volumes during pilot testing in 2012. It is possible that at the limited 2012 recovery pumping rate, recovered water was being derived predominantly from the upper portion of the target zone where native groundwater predominates rather than the lower portion of the target zone where cooler, more dense injected water was observed to accumulate based on thermal profiles.

Recovery efficiency for either thermal or process water uses at ASR-5 appears to be limited based on the conditions and responses observed during 2012 pilot testing. Several factors may have contributed to the limited recovery efficiency:

- Hydraulic conductivity or hydraulic head contrasts between the upper and lower portions of the target zone, resulting in density and thermal stratification within the target zone aquifer during storage and recovery pumping.

- Relatively low injection and recovery rates and/or volume than would be optimal for the inferred high effective transmissivity of the aquifer.
- Loss of stored water due to a regional hydraulic gradient and/or other groundwater pumping influences or structural controls on groundwater flow (e.g., faults).

ASR recovery efficiency could be improved with successive ASR cycles as aquifer water quality and thermal storage efficiency is conditioned and improved. However, modifications to ASR operation rates and volumes and/or well construction may be required to improve recovery efficiency to cost-effective levels. Further characterization and testing of the target zone is warranted. Characterization and testing recommendations are presented in the following section.

Recommendations

Based on what was learned from the 2012 pilot testing, the current construction and testing program of ASR-5 is not optimal for allowing definitive evaluation of all aspects of ASR feasibility for thermal storage or other uses. Given that, continued testing of ASR-5 will provide additional important insights into the aquifer conditions and the observed response during the 2012 pilot test. Additional characterization would be very useful in making decisions about continuing the project and its chances of successfully meeting Ecology and Boise objectives. If Ecology and Boise decide to continue this project, heterogeneities and hydraulic contrasts within the target zone will need to be better characterized so that the fate of injected cold water can be better understood.

There are several basic configurations, or options, further characterization and testing could take. These options are listed below and described further in subsequent pages. Basic options we have identified include the following:

1. Option 1 focuses on using ASR-5 essentially as is, but with an expanded suite of analysis tools and sensors. The additional data collection would be at injection/recovery rates similar to those used in the 2012 pilot test. This option would require minimal infrastructure modification. If enough funding is available, this option would include the lowering of the pump intake to near the bottom of the target zone to better improve the chances of cold water recovery.
2. Option 2 focuses solely on long duration, high pumping rate well tests with an expanded suite of analysis tools and sensors. Option 2 would require installation of a higher capacity pump and piping to discharge pumped water to a location designated by Boise.
3. Option 3 includes two variants. Option 3A uses the existing injection system to inject cold filtered water into the well before modifying the well for high capacity recovery pumping. Option 3B which uses a temporary high injection rate system followed by recovery testing using the existing test pump. An expanded suite of data collection and analysis tools would be used in both options.
4. Option 4 focuses on both increased injection rates and recovery rates coupled with use of an expanded suite of analysis tools and sensors. Variants to Option 4 include use of

un-filtered Columbia River water (Option 4A) or use a filtered water from several systems (Option 4B), potentially including the existing pilot test sand filter, Ranney collector wells, and/or other in-plant sources. In both Options recovered water would be directed to a location where high recovery rates could be sustained.

In Options 1, 3, and 4 injection, storage, and recovery phases would generally occur in the winter 2013/2014, spring 2014, and summer 2014, respectively. Option 2 would be performed several times during the 2013 and 2014. We have assumed that work can be performed under the existing revised QAPP with some modifications. Each option is explored further below and cost estimates are summarized in Table 10.

Option 1 - Limited to No Wellhead Modification

The goal of Option 1 is to get a better understanding of the fate and movement of cold injected water in ASR-5 using an expanded suite of tools, but without significant modification to the well, water supply, and the water disposal system. With this option wellhead modification would be limited to small changes needed to facilitate deployment of additional data collection instruments. This option assumes the existing pump is not removed or modified, and that injection and recovery is done using existing infrastructure. Recommended actions include the following:

- Perform short duration injection and recovery testing evaluate vertical flow within the injection well ASR-5, while observing hydraulic and thermal response in it and at OBS-2 with depth discrete temperature and conductivity probes. Using multiple conductivity, temperature, and pressure transducers in each well will allow collection of multiple vertical profiles and discrete interval data within the upper and lower target zones during each phase of testing.
- Use the BESST flow profiling and discrete interval sampling system during an injection period, storage period, and recovery period. This will allow the collection of flow profiles to better characterize the flow contribution of different zones and water quality samples to evaluate potential mixing and vertical stratification within the target zone of ASR-5 during each phase of the proposed cycle. We assume for costing purposes that only ASR-5 will be profiled.
- Conduct a tracer test during injection and recovery, using bromide and an ion selective electrode (ISE) bromide probe and instrument, assuming it can be done with the minimal modifications anticipated in this option.
- Modify the intake of the well as much as possible depending on budget constraints to maximize recovery of cold water from the lower part of the target zone and minimize recovery of warm water from the upper part of the target zone.
- Coordinate with Wallula Water District to monitor their new well during any Boise testing.
- Report on additional characterization as an addendum to this report.

- Groundwater and source water geochemical sampling could focus on general chemistry, cations, anions, metals, field parameters and other indicator parameters, following a schedule similar to that used in the first pilot test.

Option 1 could be executed at a variety of time scales, including a very limited set of tests over just a few weeks to a longer injection/storage/recovery test over 3 to 4 months. In either case, this option will result in the collection of the most limited data set. While it will build on the data reported on herein, and as a result more will be learned about potential aquifer conditions and ASR feasibility, its reliance on injection and recovery rates similar to those used in the 2012 pilot may still result in a higher degree of uncertainty and risk when judging the potential feasibility of this project. However, the integration of vertical flow profiling and evaluation of the upper and lower target zone may provide additional insight to previous observations from the 2012 pilot testing program.

Costs associated with this option range from approximately \$40,000 for several weeks of testing to approximately \$126,000 for a 3 to 4 month injection/storage/and recovery cycle test. This option offers the lowest cost alternative to moving forward. It is only recommended if funding for other options is not available.

Option 2 - Expanded Well Hydraulic Testing

The basic objective of Option 2 is to better characterize aquifer hydraulic conditions using an expanded suite of tools and sensors. Option 2 focuses solely on long duration, high pumping rate well tests, and would require installation of a higher capacity pump and of piping to discharge pumped water to a location designated by Boise. Additional characterization of ASR-5 would be done after modifying access to the wellhead and replacing the pumping system to achieve higher recovery rates.

The basic actions associated with Option 2 include the following:

- Remove pump, drop tubes, and well head at ASR-5 and remove accumulated filter sand and other debris from ASR-5. Additionally, clean out the obstruction in OBS-2.
- Perform a down hole video survey of both wells to confirm subsurface conditions. This would be done to evaluate whether access and borehole rugosity (i.e. breakouts or washouts) would limit installation of isolation tools or packer, geophysical logging or other analysis tools during testing of ASR-5.
- Modify wellhead and well house to allow, at a minimum, the following:
 - Two 2-inch drop tubes for use in deploying additional temperature sensors and conductivity probes.
 - One 3-inch drop tube to allow access of the geophysical sondes if borehole conditions are suitable. Geophysical logging would potentially include a temperature/caliper sonde, an impeller or heat pulse flow meter (i.e. spinner log), and a water quality sonde that measures pH, fluid conductivity, ORP, DO and temperature.
 - Install a pump and discharge piping capable of the highest pumping rate possible (approximately 2,000+ gpm) compatible with the three drop tubes

installed under the previous two bullets. Discharge piping would need to deliver pumped water to a location acceptable to Boise.

- Perform a series of high-rate pumping rates to evaluate vertical flow within the well, while:
 - Observing hydraulic, thermal, and conductivity response at OBS-2.
 - Using the BESST flow profiling and discrete interval sampling system to evaluate ASR-5 under ambient and pumping conditions.
 - Geophysical logging in ASR-5.
- Because injection is not contemplated in this option, groundwater geochemical sampling could focus on general chemistry, cations, anions, metals, selected parameters and field parameters. The timing of sample collection would likely be at the beginning and end of any pumping test activity.
- Coordinate with Wallula Water District to monitor their new well during any Boise testing.

The primary limitation of this approach will be that recovery rates will be limited by well size, access required for data collection, constraints on disposal of recovered water during high rates pumping tests. In addition, under the base case, Option 2, testing does not evaluate injection conditions. Data collected under either Option 2 or would provide a more robust data set from which to resolve uncertainties described in this report, and then judge potential project feasibility.

Preliminary cost estimates for data collection and analysis suggest costs for Option 2 are approximately \$255,000, depending on the final suite of data collection tools and analyses selected and the rental of a higher capacity test pump. This option is not recommended because it does not include injection.

Option 3 – Partial Well Modification for Either Higher Injection Rates or Higher Recovery Rates

Option 3 includes two variations, referred to as Options 3A and 3B.

- In Option 3A the existing injection system would be used to inject cold, filtered water into the well before modifying it for high capacity pumping tests. Data collection during injection would be done as described in Option 1. The high rate recovery phase, including data collection, would be conducted as described in Option 2. In Option 3A it also is recommended that the pump be removed prior to the start of testing so the well can be cleaned and video logged.
- In Option 3B a temporary high injection rate system would be installed. During the recovery pumping phase the existing test pump would be used for recovery testing. Testing and data collection under this option would be very similar to that described in Option 4 below. In addition, an important limitation to Option 3A is source water availability and quality. As is described below, in Option 4A and Option 4B, the source of high injection rate water could be untreated river water or water from the Ranney wells. With untreated/unfiltered source water there is the potential for setting up conditions that could lead to bio-fouling and/or physical plugging of the well. Use of

the Ranney wells for source water has not yet been evaluated and additional thoughts on that source are explored below in Option 4B.

- In either option modify the intake of the well as much as possible given budget constraints to maximize recovery of cold water from the lower part of the target zone and minimize recovery of warm water from the upper part of the target zone.
- Under Option 3A groundwater and source water geochemical sampling could focus on general chemistry, cations, anions, metals, selected parameters and field parameters, following a schedule similar to that used in the first pilot test.
- Under Option 3B, which would use unfiltered source water, groundwater and source water geochemical sampling likely would be very similar to what was done in the previous pilot test.
- Coordinate with Wallula Water District to monitor their new well during any Boise testing.

Preliminary cost estimates for data collection and analysis suggest costs for Options 3A and 3B are approximately \$300,000, depending on the final suite of data collection tools and analyses selected and the rental of a higher capacity test pump. Of these two options we prefer Option 3A because it will fill many of our data gaps and it is easily started as it uses the existing injection system and requires minimal initial modification. Given that, a point of discharge capable of handling high recovery rates will need to be identified. Because of the potential for well plugging and bio-fouling with the use of untreated/filtered water, we would only recommend Option 3B if project stakeholders are willing to risk that.

Option 4 - Expanded Wellhead Modification for High Rate Injection and High Rate Recovery

In Option 4 both high injection and recovery rates would be used, which coupled with an expanded suite of data collection tools, to get a better understanding of the fate and movement of cold injected water in ASR-5. The goal of this option is to test aquifer dynamics at injection and recovery rates closer to an operational-scale ASR cycle so that the data and interpretations more closely resemble what would occur at build-out. Characterization of ASR-5 could be done with removal of the pump, modifying access to the wellhead, and replacing the injection and pumping system to achieve higher injection and recovery rates. Conducting additional cycle testing and installing more thermal transducers in the upper and lower target zones would improve the understanding of the potential for vertical flow and hydraulic conditions within the target zone. This testing may result in answering the recovery efficiency questions that would support Ecology's decision to participate in project expansion. For this option we are assuming modifications for potential testing would be temporary.

Increased water supply for Option 4 looks at two main variants, Option 4A use of un-filtered Columbia River water and Option 4B use a filtered water from one or more systems, including the existing pilot test sand filter, Ranney collector wells, and/or other in-plant sources. In both options disposal of recovered water would likely be to one of two locations, the mill lagoons or the Columbia River (if permission were to be acquired).

Option 4A, Unfiltered Source Water

Actions associated with Option 4A include the following:

- Similar to what would be done in Option 2: (1) remove the pump and well head from the well and (2) perform a down hole video survey of both wells to confirm subsurface conditions and to evaluate whether access and borehole rugosity (i.e. breakouts or washouts) would limit installation of isolation tools or packer, geophysical logging or other analysis tools during testing of ASR-5.
- Modify wellhead and well house to allow for higher injection rates. At a minimum, modifications would include:
 - Two 2-inch drop tubes for use in deploying additional temperature sensors and conductivity probes.
 - One 3-inch drop tube to allow access of the geophysical sondes if borehole conditions are suitable. Geophysical logging would potentially include a temperature/caliper sonde, an impeller or heat pulse flow meter (i.e. spinner log), and a water quality sonde that measures pH, fluid conductivity, ORP, DO and temperature.
 - Injection pipe (or pump column) capable of the highest pumping rate possible compatible with the three drop tubes installed under the previous two bullets.
- High rate injection water would be supplied using untreated, unfiltered source water directly into ASR-5 via a temporary tap off the Boise water supply system. Use of untreated and unfiltered water may be problematic and could result in physical clogging and biofouling conditions developing within the ASR-5 well and the aquifer.
- Depending on the configuration of the injection system, the wellhead may again need to be modified prior to the start of recovery pumping to accommodate a recovery pump. The pump would be of capable of the highest pumping rate possible (approximately 2,000+ gpm) compatible with the three drop tubes.
- Perform high-rate injection and recovery testing to evaluate vertical flow within the injection well, while observing hydraulic and thermal response at OBS-2 and/or using a bromide tracer test. Injection and pumping rates should approach full-scale target rates and fully stress the aquifer, to the extent possible given the equipment used.
- Coordinate with Wallula Water District to monitor their new well during any Boise testing.

The primary limitation with the use of unfiltered Columbia River water is the enhanced potential for aquifer plugging due to higher total suspended solids and through introduction of bacteria and oxygen that could lead to biofouling of the well. However, preliminary evaluations by HDR suggest that unfiltered source water with turbidity below 1.5 NTUs is achievable. Preliminary cost estimates for Option 4A is approximately \$318,000 depending on the final suite of data collection tools and analyses selected. We only recommend Option 4A if project stakeholders are willing to run the risk of plugging and biofouling the well. Water quality sampling for this option likely would be very similar to what was done in the 2012 pilot test.

Option 4B, Filtered Source Water

The actions associated with Option 4B generally include the following:

- Similar to what would be done in Option 2: (1) remove the pump and well head from the well and (2) perform a down hole video survey to confirm subsurface conditions and to evaluate whether access and borehole rugosity (i.e. breakouts or washouts) would limit installation of isolation tools or packer, geophysical logging or other analysis tools during testing of ASR-5.
- Recondition the borehole as needed; clean filter sand out, etc.
- Modify wellhead and well house to allow for higher injection rates. At a minimum, modifications would include:
 - Two 2-inch drop tubes for use in deploying additional temperature sensors and conductivity probes.
 - One 3-inch drop tube to allow access of the geophysical sondes if borehole conditions are suitable. Geophysical logging would potentially include a temperature/caliper sonde, an impeller or heat pulse flow meter (i.e. spinner log), and a water quality sonde that measures pH, fluid conductivity, ORP, DO and temperature.
 - Injection pipe (or pump column) capable of the highest pumping rate possible with the space limitation resulting from the three drop tubes installed under the previous two bullets.
 - In addition, reconfigure the depth/length of injection and recovery pipes, with or without packers.
- High rate injection water would be supplied using one or a combination of the following possible sources:
 - Existing pilot test sand filter, supplying 500 to possibly 600 gpm.
 - Ranney well(s), up to 1,500 to 2,000 gpm, depending on existing capacity, water quality and infrastructure mods. Note: The Ranney well(s) will need to be characterized to verify that water quality from them is acceptable. With this effort, they may not become available to add to the recharge stream until part way into the (potential) second pilot season.
 - Existing treated plant water if 500 to 1,000 gpm could be made available.
 - Untreated, unfiltered source water directly into ASR-5 via a temporary tap off the Boise water supply system. It is important to note that use of untreated and unfiltered water is high risk and could result in physical clogging and/or biofouling conditions developing within the ASR-5 well and the aquifer.
- Recovered water might be disposed of to one or more of the following locations:
 - Ranney well(s); return via the discharge piping. This approach may not require much in the way of permitting, except maybe getting it registered as a class 5 UIC, at least temporarily. However, it may temporarily impact the quality of water produced by the Ranney Wells.

- Direct to Columbia River; this could be accomplished under the existing NPDES permit or could require a new NPDES permit. May or may not be done easily.
 - Direct to Mill lagoons; this will require temporary piping across the mill for several months.
 - To the back flush sump; in the past, the sump could not handle high rates such as we are contemplating here.
- Perform high-rate injection and recovery testing to evaluate vertical flow within the injection well, while observing hydraulic and thermal response at OBS-2 and/or using a bromide tracer test. Injection and pumping rates should approach full-scale target rates and fully stress the aquifer, to the extent possible given the equipment used.
 - Depending on the configuration of the injection system, the wellhead may again need to be modified prior to the start of recovery pumping to accommodate a recovery pump. The pump would be of capable of the highest pumping rate possible (approximately 2,000+ gpm) compatible with the three drop tubes use for instrumentation.

Other actions/activities/considerations:

- With a new source such as the Ranney well, project will likely need to have a source/groundwater geochemical sampling and analysis program similar to pilot year 1. This is partially driven by needing to know what source water quality is before injecting it.
- This testing could start just with pilot sand filter, bringing other sources on-line as they are brought into readiness. As such, once well is rebuilt for instrumentation, injection piping reconfigured, and the well is cleaned, injection could start later in 2013.
- With respect to the potential use of the collector well, specific work activities include the following:
 - Cleanup/cleanout. Work with CWI to inspect, jet, swab, and flush the caisson and laterals to remove accumulations of scale, rust, organic material, and particulate.
 - Consider closing upgradient (landward) laterals if there are indications of water quality problems or corrosion.
 - Install temporary temperature/conductivity probes in several laterals.
 - Pump the collector until water quality (i.e. river contribution) stabilizes.
 - Sample the collector to assess water quality
 - Evaluate directional changes in temperature and water quality, assess relative contribution.
 - Develop mixing models and re-assess compatibility with blended recharge water (collector+filter plant).

- Develop recommendations for altering the collector laterals or proceeding with recharge.

Preliminary cost estimates for data collection and analysis suggest costs for Options 4A and 4B range from \$380,000 to \$475,000, depending on the final suite of data collection tools and analyses selected, which water source or sources are used which dictates changes in the injection system, and rental of a higher capacity test pump. Of these two options, Option 4B is recommended because it uses cleaner water for injection. Use of the existing pilot filter and the Ranney wells should generate source water suitable for a sequence of injection, storage, and recovery tests. While the Ranney wells are being characterized testing could be started with just the existing pilot filter, with the Ranney wells being added to the system once they are characterized and determined to be suitable. Discharge of recovered water could be to the lagoons, but an alternative will be explored that would allow temporary discharge direct to the Columbia River under the site's existing NPDES permit. Because of the potential for well plugging and bio-fouling with the use of untreated/filtered water, we would only recommend Option 4A if project stakeholders are willing to risk that.

Recommendations Summary

The preferred option, Option 4B, is recommended because it has the best chance of answering the outstanding questions surrounding aquifer response to injection, storage, and recovery of cold water suitable for Boise cooling and operations. It is deemed to have the best chance of addressing these issues because it most closely resembles the potential final build-out of the proposed thermal ASR project. As with any of the other options, work on it can start as soon as funding is available, potentially in the mid-summer of 2013. If work could start at that time, the QAPP would be revised to accommodate characterization and use of the Ranney well, including geochemical sampling. If approved, our objective would be to have Ranney well and ASR-5 characterization complete, rehabilitation work done, or nearly so, and be ready to begin injection testing late in 2013 or early 2014. Such a schedule would then see injection through the winter, followed by spring storage and summer recovery.

Once Boise and the Department of Ecology select a preferred option for moving the project forward, the project team can prepare a more detailed work plan including scopes of work, cost estimates, conceptual engineering, and schedule.

References Cited

- Anderson, Mary P., 2005. Heat as a Groundwater Tracer. *Ground Water*, November–December 2005, Vol. 43, No. 6, p. 951–968.
- Cullimore, D. Roy. 2008. *Practical manual of Groundwater Microbiology*, Second Edition. New York: CRC Press.
- Domenico, P.A., and F.W. Schwartz. 1998. *Physical and Chemical Hydrogeology*, Second Edition. New York: John Wiley & Sons Inc.
- GSI Water Solutions Inc. and HDR, Inc., 2010. ASR-5 Test Well Report, Boise Paper Products, LLC Wallula Mill Thermal ASR Project. Prepared by GSI Water Solutions, Inc. and HDR,

Inc. for Boise Paper Products, LLC and The Washington Department of Ecology, March 2010.

GSI Water Solutions, 2012a. First Interim Report, Boise White Paper Wallula Thermal ASR Project. Prepared by GSI Water Solutions, Inc. for Boise Paper Products, LLC and The Washington Department of Ecology, April 2012.

GSI Water Solutions, 2012b. Second Interim Report, Boise White Paper Wallula Thermal ASR Project. Prepared by GSI Water Solutions, Inc. for Boise Paper Products, LLC and The Washington Department of Ecology, June 2012.

Kawecki, M.W., 1995. Correction for Temperature Effect in the Recovery of a Pumped Well. *Ground Water*, Vol. 33, No. 6, p. 917 to 926.

Pyne, R. David G., 2005. *Aquifer Storage and Recovery, Second Edition*. Gainesville, Florida: ASR Systems Publications.

Columbia River	Well OBS-2	Well OBS-1	Well ASR-5
354.39	356.03	356.83	357.3

Table 1. Reference Point Elevations for Water Level Data

Boise White Paper Thermal ASR Pilot Test Program, 2012

Phase of Testing	Obs-2 Elev (ft amsl)	ASR-5 Elev (ft amsl)	Obs-1 Elev (ft amsl)	Columbia River Elev (ft amsl)
Pre-Pilot (Feb 1-Feb 6)	325.8 - 326.5	324.5 - 328.2	336.4 - 336.8	339.0 ± 0.4
Step Drawdown and Shakedown Tests	326.2 - 326.5	324.4 - 327.8	336.6 - 336.8	338.5 - 339.0
Cycle 1 Injection	326.4 - 326.6	325.8 - 326.3	336.1 - 336.3	338.0 - 338.3
Cycle 1 Storage	326.3 - 326.5	325.7 - 326.2	336.2 - 336.6	338.0 - 339.4
Cycle 1 Recovery	325.9 - 326.2	325.4 - 326.5	336.5 - 336.9	339.4 - 339.6
Operational Testing and Training	326.3 - 328.8	326.0 - 328.4	336.3 - 337.2	338.2 - 340.2
Cycle 2 Injection	328.4 - 332.1	327.2 - 332.8	336.2 - 338.1	336.9 - 340.1
Cycle 2 Storage	325.0 - 331.7	324.4 - 331.6	336.1 - 337.8	337.3 - 340.2
Cycle 2 Recovery	316.4 - 322.6	315.8 - 321.7	334.8 - 336.6	338.0 - 340.2
Max	316.4	315.8	334.8	336.9
Min	332.1	332.8	338.1	340.2
Difference	15.7	17.0	3.3	3.3

Notes

Elev (ft amsl) = Elevation in feet above mean sea level

Table 2. Approximate Water Level Elevations in Feet Above Mean Sea Level

Boise White Paper Thermal ASR Pilot Test Program, 2012

Activity/Event	Injection Rate ¹ gpm	Recovery Rate ¹ gpm	Raw Source Water Injected acre-feet	Total Backflush Volume acre-feet	Total Injected Volume acre-feet	Total Recovered Volume acre-feet
Step Drawdown Test	300/600/900	576	--	--	--	0.35
Shakedown Test	483	724	0.17	--	0.17	0.10
Cycle 1	477	799	2.20	0.07	2.12	2.02
Operational Testing and Training	502	773	29.07	0.61	28.36	1.00
Cycle 2	492	679	180.19	4.32	175.21	93.58

Notes

1 Injection and recovery rates are averages when system is active.

GPM = gallons per minute

Table 3. Summary of Flow Rate and Volumes

Table 4. Theoretical Migration Distance During Injection and Storage

Boise White Paper Thermal ASR Pilot Test Program, 2012.

Injection Rate (gpm)	Injection Rate (acre feet per year)	Regional gradient (ft/ft)	Hydraulic Conductivity (ft/day) ¹	Injection Volume (acre feet)	Injection Migration Distance (miles)	Injection plus 60 days Storage (miles)
550	887	0.01	2,000	292	3.35	5.62
2000	3226	0.01	2,000	1,061	3.47	5.74
3000	4838	0.01	2,000	1,591	3.53	5.80
4000	6451	0.01	2,000	2,121	3.57	5.85
550	887	0.001	2,000	292	0.45	0.68
2000	3226	0.001	2,000	1,061	0.57	0.80
3000	4838	0.001	2,000	1,591	0.63	0.85
4000	6451	0.001	2,000	2,121	0.67	0.90
550	887	0.0001	2,000	292	0.16	0.19
2000	3226	0.0001	2,000	1,061	0.28	0.30
3000	4838	0.0001	2,000	1,591	0.34	0.36
4000	6451	0.0001	2,000	1,503	0.39	0.41

Notes:

¹ Hydraulic conductivity values are consistent with ranges observed in Feasibility Study

Injection Time = 85 days

Assumed thickness of Aquifer = 60 feet

Effective porosity = 0.10 (LaSala and Doty, 1970; Hardy and Hocking, 1978)

1 MGD = 694.44 gpm = 1120 acre feet per year

Calculations assume simple plug flow

Boise White Paper Thermal Storage ASR Pilot Testing Program, 2012

Date	Days of Storage	Lower Zone Temperature (degrees F)	Upper Zone Temperature (degrees F)	Rate of Temperature Change from end of Injection (degrees F/day)	Rate of Temperature Change from Previous Profile (degrees F/day)	Static Water Level Elevation (ft msl)
ASR 5 - Storage						
6/7/2012	17	64.84	76.5	0.87	0.87	329.6
6/15/2012	25	65.98	76.5	0.64	0.14	328.9
7/17/2012	57	70.5	79.3	0.36	0.14	325.1
7/25/2012	65	71.5	79.2	0.33	0.13	324.9
ASR 5 - Post Recovery Pumping - Sytem Idle						
9/4/2012	106	74	79.4	0.28	0.06	318.4
OBS 2 - Storage						
5/31/2012	10	65.98	79.4	1.60	1.60	331.5
7/23/2012	63	73.2	79.5	0.37	0.14	325.6
OBS 2 -Injection						
5/2/21012	--	64.5	79	--	--	331.5

ft msl = feet mean sea level

F = Fahrenheit

Lower Zone is 520 to bottom of hole temperature

Upper zone is 490 to 495 interval in middle of pillow complex.

Table 5. Temperature Profile Surveys Summary

Table 6. Raw and Filtered Source Water Quality Data for Cycle 1 and Cycle 2

Boise White Paper Thermal ASR Storage Pilot Test Program, 2012

Analyte ¹	Units	Storage Duration	MCL	Baseline Source Water		Cycle 1 Source Water		Cycle 2 Source Water												
				Raw Water	Filtered Water	Raw Water	Filtered Water	Raw Water	Filtered Water	Raw Water	Filtered Water	Raw Water	Filtered Water							
				2/2/2012 ²	2/3/2012 ²	2/7/2012	2/7/2012	2/28/2012 ³	2/28/2012 ³	4/19/2012 ³	4/19/2012 ³	5/21/2012 ³	5/21/2012 ³							
				NA	NA	NA	0 days	1 day	1 day	52 days	52 days	84 days	84 days							
Bacteriological	Enteric Virus	PFU/L		0.009	ND	0.009	NA	NA	ND	0.009	ND	0.009	ND	0.01	ND	0.01	ND	0.01	ND	0.01
	E. Coli	MPN/100mL		12.1	ND	1	2.0	ND	2	4.1	1.0	ND	1	6.3	1.0					
	Total Coliform	MPN/100mL		13.0	2.0		4.0	2.0		13.0	2.0	6.9	ND	1.1	50.0	7.0				
	Fecal Coliform	MPN/100mL		NA	NA		2.0	ND	2	8.0	ND	2	3.6	ND	1.1	4.0			17.0	
Field Parameters	Temperature	Celsius	None	4.30	4.13		NA	4.28		4.46	4.62	8.35	8.35	12.06	12.10					
	Specific Conductance	mS/cm	None	231	183		NA	187		192	195	181	179	139	135					
	Dissolved Oxygen	mg/L	None	85.2	73.2		NA	90.3		36.60	41.20	12.70	12.34	10.23	9.47					
	pH	Units	6 - 8.5	7.74	7.86		NA	7.87		7.73	7.68	7.99	7.98	7.36	7.63					
	Oxidation Reduction Potential (ORP)	mV	None	37.3	198.7		NA	67.2		46	108	-48	-48	72	196					
Geochemical	Bicarbonate (as CaCO ₃)	mg/L	None	84	70.2		NA	71.8		76.9	75.3	73.8	76.9	60	58.4					
	Calcium	mg/L	None	22.1	19.4		NA	18.6		22.4	22.1	21.7	22.1	15.6	15.1					
	Carbonate (as CaCO ₃)	mg/L	None	ND	5	ND	5	NA	5	ND	5	ND	5	ND	5	ND	5	ND	5	
	Chloride	mg/L	250	6.72	4.09		NA	4.15		5.79	5.94	4.42	5.08	3.1	2.7					
	Hardness (as CaCO ₃)	mg/L	250	81.9	69.7		NA	66.8		81.5	80.3	78.4	80.1	55.9	59.3					
	Magnesium	mg/L	None	6.48	5.15		NA	4.93		6.2	6.08	5.86	6.04	4.1	3.91					
	Nitrate as N	mg/L	10	ND	0.1	ND	0.1	NA	0.1	ND	0.1	0.273	ND	0.1	ND	0.1	ND	0.1	ND	0.1
	Nitrite as N	mg/L	1	0.451	0.223		NA	0.21		0.297	0.273	0.200	0.235	0.122	0.115					
	Total Nitrate-Nitrite	mg/L	10	0.451	0.223		NA	0.21		0.297	ND	0.1	0.200	0.235	0.122	0.115				
	Potassium	mg/L	None	1.5	0.01		NA	0.86		1.29	1.25	1.10	1.18	0.852	0.789					
	Silica	mg/L	None	10.2	6.57		NA	6.59		9.05	8.69	7.9	8.88	9.01	8.28					
	Silicon	mg/L	None	4.77	3.07		NA	3.08		4.23	4.06	3.69	4.15	4.21	3.87					
	Sodium	mg/L	20	8.76	5.18		NA	5.09		7.64	7.40	6.18	7.12	4.46	3.83					
	Sulfate	mg/L	250	18.8	12.8		NA	13.1		14.1	14.0	12.8	13.4	8.84	8.31					
	Total Alkalinity (as CaCO ₃)	mg/L	250	84	70.2		NA	71.8		76.9	75.3	73.8	76.9	60	58.4					
	Total Dissolved Solid	mg/L	500	144	102		NA	118		132	111	149	148	93	121					
	Total Organic Carbon	mg/L	None	1.5	1.27		NA	1.24		1.33	1.22	1.09	1.12	2.13	2.09					
	Total Suspended Solids	mg/L	None	2.33	1.47		NA	ND	1	4.19	1.00	ND	1	4.27	9.71	ND	1			
Metals	Aluminum	mg/L	0.05	0.0351	0.0161		NA	ND	0.01	0.0527	ND	0.01	0.0114	0.121	0.142	ND	0.01			
	Arsenic	mg/L	0.05	0.00138	ND	0.001	NA	ND	0.001	ND	0.001	ND	0.001	0.00102	0.00118	ND	0.001			
	Barium	mg/L	1	0.0289	0.0213		NA	0.0294		0.0289	0.0276	0.0306	0.0329	0.0294	0.0265					
	Chromium	mg/L	0.05	ND	0.001	ND	0.001	NA	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001			
	Copper	mg/L	1.3	ND	0.001	ND	0.001	NA	0.001	0.00107	ND	0.001	0.0012	0.00131	0.00208	0.00367				
	Iron (Total)	mg/L	None	0.0548	0.0152		NA	ND	0.01	0.102	ND	0.01	ND	0.178	0.223	ND	0.01			
	Iron (Dissolved)	mg/L	0.3	ND	0.01	ND	0.01	NA	0.01	0.0100	ND	0.01	ND	0.0166	0.0194	ND	0.01			
	Lead	mg/L	0.015	ND	0.001	ND	0.001	NA	0.01	ND	0.01	ND	0.01	ND	0.01	0.00132	ND	0.01		
	Manganese (Total)	mg/L	None	0.0351	0.0384		NA	0.0432		0.0518	0.0464	0.0484	0.0631	0.0443	0.0240					
	Manganese (Dissolved)	mg/L	0.05	0.0221	0.0311		NA	0.0431		0.0338	0.0447	0.0466	0.0331	0.0120	0.0219					
	Nickel	mg/L	None	ND	0.001	ND	0.001	NA	0.001	ND	0.001	ND	0.001	ND	0.00115	ND	0.001			
	Selenium	mg/L	0.01	ND	0.001	ND	0.001	NA	0.00133	ND	0.001	ND	0.001	ND	0.001	ND	0.001			
	Zinc	mg/L	3	0.00279	0.00183		NA	0.00429		0.00252	0.00181	0.00402	0.00448	0.0111	0.0133					
Miscellaneous	Fluoride	mg/L	2	0.192	ND	0.1	NA	ND	0.1	0.111	0.113	ND	0.01	ND	0.01	ND	0.01	ND	0.01	
Radionuclides	Gross Alpha	pCi/L	15	1.08+/-1.34	0.552+/-0.975		NA	0.144 +/- 0.984		NA	NA	1.44 +/- 1.35	0.667 +/- 1.24	NA	NA					
	Gross Beta	pCi/L	50	1.33+/-0.913	0.553+/-1.08		NA	-0.524 +/- 0.856		NA	NA	1.78 +/- 1.21	1.54 +/- 1.20	NA	NA					
VOCs	Toluene	mg/L	1	ND	0.5	ND	0.0005	NA	ND	0.0005	NA	ND	0.0005	ND	0.5	NA	NA	ND	0.0005	

Notes:

- 1 Only detected analytes are listed
 - 2 Raw water biological sample was collected on 2/1/2012 and filtered water biological sample collected on 2/2/2012 for baseline groundwater
 - 3 Raw water and filtered water biological samples collected on 2/27/2012, 4/18/2012 and 5/22/2012 during the injection period
- VOCs = Volatile Organic Compounds
MCL = maximum cont: field using Hach colorimeter
PFU/L = plaque forming units per liter
MPN/100mL = most probable number per 100 milliliters
mS/cm = micro siemens per centimeter
mg/L = milligrams per liter
NTU = number of transfer units
mV = millivolts
ug/L = micrograms per liter
ND = not detected
NA = not analyzed
Bold = analytical result exceeds MCL

Table 6. Raw and Filtered Source Water Quality Data for Cycle 1 and Cycle 2

Table 7. ASR 5 and Obs-2 Cycle 1 Water Quality Data

Boise White Paper Thermal ASR Storage Pilot Test Program, 2012

	Analyte ¹	Units	MCL	Sample Location	ASR 5		Baseline Water		Obs-2		Source Water		Recovered Water	
					Sample Date	Storage Duration	ASR 5	Filtered Water	Obs-2	Filtered Water	Filtered Water	ASR 5		
				Process Water	1/31/2012 ⁴	NA	2/3/2012 ⁴	NA	2/6/2012 ⁴	NA	2/7/2012	0 days	2/9/2012	0 days
				Requirements ²										
Bacteriological	Enteric Virus	PFU/L	TT ³	None	ND	0.007	ND	0.009	ND	0.009	NA		NA	
	E. Coli	MPN/100mL	Detection	None	Absent		ND	1	ND	1	ND	2	ND	1
	Total Coliform	MPN/100mL	1 Detect/Month	None	Absent		2.0		ND	1.1	2.0		ND	20
	Fecal Coliform	MPN/100mL	Detection	None	NA		NA		NA		NA	2	ND	20
Field Parameters	Temperature	Celsius	None	None	26.13		4.13		22.9		4.28		20.38	
	Specific Conductance	mS/cm	None	None	327		183		329		187		308	
	Dissolved Oxygen	mg/L	None	None	0.18		73.2		1.5		90.3		3.30	
	pH	Units	6 - 8.5	None	9.03		7.86		9.22		7.87		9.16	
	Oxidation Reduction Potential (ORP)	mV	None	None	-211		198.7		-218.8		67.2		-266	
Geochemical	Bicarbonate (as CaCO ₃)	mg/L	None	75	123		70.2		119		71.8		120	
	Calcium	mg/L	None	20.0	2.21		19.4		2.11		18.6		3.87	
	Carbonate (as CaCO ₃)	mg/L	None	0.05	ND	5	ND	5	ND	5	ND	5	ND	5
	Chloride	mg/L	250	5	19.6		4.09		21.4		4.15		19.2	
	Hardness (as CaCO ₃)	mg/L	250	70.0	6.03		69.7		5.28		66.8		11.9	
	Magnesium	mg/L	None	5.0	0.122		5.15		ND	0.1	4.93		0.537	
	Nitrate as N	mg/L	10	None	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1
	Nitrite as N	mg/L	1	None	ND	0.1	0.223		ND	0.1	0.21		ND	0.1
	Total Nitrate-Nitrite	mg/L	10	None	ND	0.1	0.223		ND	0.1	0.21		ND	0.1
	Potassium	mg/L	None	5.0	8.47		0.01		7.37		0.86		7.34	
	Silica	mg/L	None	15.0	77.5		6.57		77		6.59		80.5	
	Silicon	mg/L	None	8.0	36.2		3.07		36		3.08		37.6	
	Sodium	mg/L	20	15.0	51.7		5.18		46.5		5.09		44.9	
	Sulfate	mg/L	250	10.0	0.474		12.8		ND	0.1	13.1		2.64	
	Total Alkalinity (as CaCO ₃)	mg/L	250	75	123		70.2		119		71.8		120	
	Total Dissolved Solid	mg/L	500	150	253		102		266		118		269	
Total Organic Carbon	mg/L	None	0.5	0.378		1.27		0.681		1.24		0.411		
Total Suspended Solids	mg/L	None	0.50	ND	1	1.47		ND	1	ND	1	ND	1	
Metals	Aluminum	mg/L	0.05	ND	ND	0.01	0.0161		0.0125		ND	0.01	0.0114	
	Arsenic	mg/L	0.05	ND	ND	0.001	ND	0.001	ND	0.001	ND	0.001	0.00149	
	Barium	mg/L	1	0.05	0.0129		0.0213		0.0144		0.0294		0.0233	
	Chromium	mg/L	0.05	0.05	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
	Copper	mg/L	1.3	0.05	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001
	Iron (Total)	mg/L	None	0.05	0.01		0.0152		0.0118		ND	0.01	ND	0.01

Table 7. ASR 5 and Obs-2 Cycle 1 Water Quality Data

Boise White Paper Thermal ASR Storage Pilot Test Program, 2012

Analyte ¹	Units	MCL	Process Water Requirements ²	Sample Location		Baseline Water		Source Water		Recovered Water	
				ASR 5	Sample Date	Filtered Water	Obs-2	Filtered Water	ASR 5		
				1/31/2012 ⁴	2/3/2012 ⁴	2/6/2012 ⁴	2/7/2012	2/9/2012			
				NA	NA	NA	0 days	0 days			
Iron (Dissolved)	mg/L	0.3	0.05	ND	0.01	ND	0.01	ND	0.01	ND	0.01
Lead	mg/L	0.015	0.1	ND	0.001	ND	0.001	ND	0.001	ND	0.001
Manganese (Total)	mg/L	None	0.05	ND	0.01	0.0384		ND	0.01	0.0432	
Manganese (Dissolved)	mg/L	0.05	0.05	ND	0.01	0.0311		ND	0.01	0.0431	
Nickel	mg/L	None	0.05	ND	0.001	ND	0.001	ND	0.001	ND	0.001
Selenium	mg/L	0.01	0.05	0.001		ND	0.001	0.00867		0.00133	
Zinc	mg/L	3	0.05	0.00216		0.00183		0.00118		0.00429	
Miscellaneous	Fluoride	mg/L	2	1.0	3.47	ND	0.1	3.51		ND	0.1
Radionuclides	Gross Alpha	pCi/L	15	None	0.390 +/- 1.17		0.552+/-0.975	-0.185 +/- 0.852		0.144 +/- 0.984	
	Gross Beta	pCi/L	50	None	5.56 +/- 1.21		0.553+/-1.08	6.13 +/- 1.45		-0.524 +/- 0.856	
VOCs	Toluene	mg/L	1	None	ND	0.0005	ND	0.0005		0.00069	

- Notes:**
- 1 Only detected analytes are listed
 - 2 Process Water Requirements from Boise White Paper.
 - 3 EPA's surface water treatment rules require systems to remove/inactivate 99.99% of viruses.
 - 4 ASR 5 biological sample was collected on 1/30/2012, filtered water biological sample collected on 2/2/2012 and Obs-2 biological sampled was collected on 2/1/2012 for baseline groundwater
- VOCs = Volatile Organic Compounds
MCL = maximum contaminant level
TT = Treatment Technique
PFU/L = plaque forming units per liter
MPN/100mL = most probable number per 100 milliliters
mS/cm = micro siemens per centimeter
mg/L = milligrams per liter
NTU = number of transfer units
mV = millivolts
ND = not detected
NA = not analyzed
Red Bold = analytical result exceeds MCL and Process Water Requirements
Blue Bold = analytical result exceeds Process Water Requirements

Table 8. ASR 5 and Obs-2 Cycle 2 Water Quality Data

Analyte ¹	Units	MCL	Sample Location Sample Date Storage Duration Process Water Requirements ²	Baseline Groundwater				Source Water				Storage Water				Recovered Water											
				ASR 5		Obs-2		Filtered Water		Filtered Water		ASR 5		Obs-2		ASR 5		Obs-2									
				1/31/2012 ⁴	2/3/2012 ⁴	2/6/2012 ⁴	2/28/2012 ⁵	4/19/2012 ⁵	5/21/2012 ⁵	6/18/2012 ⁶	6/18/2012 ⁶	7/31/2012	7/31/2012	9/27/2012	9/27/2012												
				NA	NA	NA	1 day	52 days	84 days	27 days	27 days	1 day	1 day	59 days	59 days												
Bacteriological	Enteric Virus	PFU/L	TT ³	None	ND	0.007	ND	0.009	ND	0.009	ND	0.009	ND	0.009	ND	0.009	ND	0.009	NA	NA							
	E. Coli	MPN/100mL	Detection	None	Absent		1	ND	1	1.0	ND	1	1.0	ND	1	ND	1	ND	1	NA	NA						
	Total Coliform	MPN/100mL	1 Detect/Month	None	Absent		2.0	ND	1.1	2.0	ND	1.1	7.0	ND	2	ND	2	ND	2	NA	NA						
	Fecal Coliform	MPN/100mL	Detection	None	NA	NA	NA	NA	NA	ND	2	ND	1.1	17.0	ND	2	ND	2	ND	2	NA	NA					
Field Parameters	Temperature	Celsius	None	None	26.13		4.13		22.9		4.62		8.35		12.10		25.86		25.58		26.32		25.70		26.10		25.60
	Specific Conductance	mS/cm	None	None	327		183		329		195		179		135		293		320		308		323		285		322
	Dissolved Oxygen	mg/L	None	None	0.18		73.2		1.5		41.20		12.34		9.47		1.30		1.20		1.20		1.00		0.82		0.74
	pH	Units	6 - 8.5	None	9.03		7.86		9.22		7.68		7.98		7.63		9.89		10.81		8.93		9.35		8.37		8.68
	Oxidation Reduction Potential (ORP)	mV	None	None	-211		198.7		-218.8		108		-48		196		-505		-558		11		1		-201		-267
Geochemical	Bicarbonate (as CaCO ₃)	mg/L	None	75	123		70.2		119		75.3		76.9		58.4		103		117		40.2		44.1		117		76.8
	Calcium	mg/L	None	20.0	2.21		19.4		2.11		22.1		22.1		15.1		9.24		2.35		4.34		2.31		3.09		2.22
	Carbonate (as CaCO ₃)	mg/L	None	0.05	ND	5	ND	5	ND	5	ND	5	ND	5	ND	5	ND	5	ND	5	ND	5	ND	5	ND	5	ND
	Chloride	mg/L	250	5	19.6		4.09		21.4		5.94		5.08		2.7		16.3		16.3		14.6		14.3		17.6		17.9
	Hardness (as CaCO ₃)	mg/L	250	70.0	6.03		69.7		5.28		80.3		80.1		59.3		32		6.32		14.4		6.22		9.72		5.99
	Magnesium	mg/L	None	5.0	0.122		5.15		0.1		6.08		6.04		3.91		2.17		0.0259		0.851		ND	0.1	0.484		0.107
	Nitrate as N	mg/L	10	None	ND	0.1	ND	0.1	ND	0.1	0.273		ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND
	Nitrite as N	mg/L	1	None	ND	0.1	0.223		ND	0.1	0.273		0.235		0.115		ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND
	Total Nitrate-Nitrite	mg/L	10	None	ND	0.1	0.223		ND	0.1	0.235		0.115		0.115		ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND
	Potassium	mg/L	None	5.0	8.47		0.01		7.37		1.25		1.18		0.789		4.13		8.17		6.28		8.27		6.62		7.69
	Silica	mg/L	None	15.0	77.5		6.57		77		8.69		8.88		8.28		63.3		80.7		74.9		82		76.4		79.4
	Silicon	mg/L	None	8.0	36.2		3.07		36		4.06		4.15		3.87		29.6		37.7		35		38.3		35.7		37.1
	Sodium	mg/L	20	15.0	51.7		5.18		46.5		7.40		7.12		3.83		40.2		52.1		48.6		52.7		47.5		50.5
	Sulfate	mg/L	250	10.0	0.474		12.8		ND	0.1	14.0		13.4		8.31		5.48		4.37		5.06		4.69		4.58		4.22
	Total Alkalinity (as CaCO ₃)	mg/L	250	75	123		70.2		119		75.3		76.9		58.4		103		117		42.2		44.1		117		76.8
	Total Dissolved Solid	mg/L	500	150	253		102		266		111		148		121		215		240		268		358		213		232
	Total Organic Carbon	mg/L	None	0.5	0.378		1.27		0.681		1.22		1.12		2.09		1.08		0.623		0.644		0.65		0.456		0.471
	Total Suspended Solids	mg/L	None	0.50	ND	1	1.47		ND	1	1.00		4.27		ND	1	ND	1	ND	1	ND	1	ND	1	ND	1	ND
Metals	Aluminum	mg/L	0.05	ND	ND	0.01	0.0161		0.0125		ND	0.01	0.121		ND	0.01	ND	0.01	ND	0.01	0.0119		ND	0.01	ND	0.01	ND
	Arsenic	mg/L	0.05	ND	ND	0.001	ND	0.001	ND	0.001	0.00102		ND	0.001	0.00133		ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
	Barium	mg/L	1	0.05	0.0129		0.0213		0.0144		0.0276		0.0329		0.0265		0.0226		0.0128		0.0108		0.0124		0.00925		0.0123
	Chromium	mg/L	0.05	0.05	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	0.0012		0.00147
	Copper	mg/L	1.3	0.05	ND	0.001	ND	0.001	ND	0.001	0.00131		0.00367		ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	0.00926
	Iron (Total)	mg/L	None	0.05	0.01		0.0152		0.0118		ND	0.01	0.178		ND	0.01	0.0482		0.0259		ND	0.01	0.0149		ND	0.01	0.0414
	Iron (Dissolved)	mg/L	0.3	0.05	ND	0.01	ND	0.01	ND	0.01	0.0166		ND	0.01	0.0341		0.0122		0.0122		ND	0.01	ND	0.01	ND	0.01	0.0172
	Lead	mg/L	0.015	0.1	ND	0.001	ND	0.001	ND	0.001	ND	0.01	ND	0.01	ND	0.01	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
	Manganese (Total)	mg/L	None	0.05	ND	0.01	0.0384		ND	0.01	0.0464		0.0631		0.0240		0.0341		ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND
	Manganese (Dissolved)	mg/L	0.05	0.05	ND	0.01	0.0311		ND	0.01	0.0447		0.0331		0.0219		0.0328		ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND
	Nickel	mg/L	None	0.05	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
	Selenium	mg/L	0.01	0.05	0.001		ND	0.001	0.00867		ND	0.001	ND	0.001	ND	0.001	0.00107		0.015		ND	0.001	ND	0.001	ND	0.001	ND
	Zinc	mg/L	3	0.05	0.00216		0.00183		0.00118		0.00181		0.00448		0.0133		0.00646		0.00228		0.00342		ND	0.001	0.00122		0.0112
Miscellaneous	Fluoride	mg/L	2	1.0	3.47		ND	0.1	3.51		0.113		ND	0.1	ND	0.1	3.04		3.37		3.18		3.23		3.25		3.22
Radionuclides	Gross Alpha	pCi/L	15	None	0.390 +/- 1.17		0.552 +/- 0.975		-0.185 +/- 0.852		NA		0.667 +/- 1.24		NA		NA		NA		NA		NA		0.217 +/- 0.432		-0.030 +/- 0.521
	Gross Beta	pCi/L	50	None	5.56 +/- 1.21		0.553 +/- 1.08		6.13 +/- 1.45		NA		1.54 +/- 1.20		NA		NA		NA		NA		NA		5.92 +/- 0.554		7.95 +/- 0.600
VOCs	Toluene	mg/L	1	None	ND	0.0005	ND	0.0005	0.00069		ND	0.0005	NA		ND	0.0005	NA		NA		NA		NA		ND	0.0005	ND

Table 8. ASR 5 and Obs-2 Cycle 2 Water Quality Data

Notes:

1 Only detected analytes are listed

2 Process Water Requirements from Boise White Paper.

3 EPA's surface water treatment rules require systems to remove/inactivate 99.99% of viruses.

4 ASR 5 biological sample was collected on 1/30/2012, filtered water biological sample collected on 2/2/2012 and Obs-2 biological sample was collected on 2/1/2012 for baseline groundwater

5 Filtered water biological samples collected on 2/27/2012, 4/18/2012 and 5/22/2012 during the injection period

6 ASR 5 biological sample collected on 6/26/2012 and Obs-2 biological sample collected on 6/27/2012 during the storage period

VOCs = Volatile Organic Compounds

MCL = maximum contaminant level

TT = Treatment Technique

PFU/L = plaque forming units per liter

MPN/100mL = most probable number per 100 milliliters

mS/cm = micro siemens per centimeter

mg/L = milligrams per liter

NTU = number of transfer units

mV = millivolts

ug/L = micrograms per liter

ND = not detected

NA = not analyzed

Bold = analytical result exceeds MCL

Bold = analytical result exceeds Process Water Requirements

ASR Storage Pilot Test Program, 2012

Component	Units	Percentage of Native Groundwater in Mixture						Acceptable Limits (mg/L)
		1%	2%	5%	8%	10%	12%	
Bicarbonate	mg/L	75.6	76.3	78.08	79.91	80.76	81.86	<75
Calcium	mg/L	14.98	14.83	14.46	14.07	13.83	13.54	<20
Chloride	mg/L	2.88	3.04	3.55	4.05	4.4	4.73	<5
Magnesium	mg/L	3.82	3.79	3.68	3.57	3.49	3.42	<5
Sodium	mg/L	4.3	4.78	6.21	7.59	8.62	9.58	<15
Potassium	mg/L	0.86	0.94	1.17	1.41	1.56	1.72	<5
Sulfate	mg/L	8.22	8.15	7.9	7.68	7.48	7.36	<10
Silica	mg/L	8.94	9.66	11.7	13.8	15.2	16.6	<15
Dissolved Iron	mg/L	0	0	0	0	0	0	<0.05

Table 9. Compositions of Mixtures between 2012 native groundwater and filtered surface water.

Table 10. Planning (Preliminary) Level Costs Estimates for Continuing Evaluation Options.

Testing Program and System Modifications

<i>Option</i>	<i>Testing Program</i>	<i>Target Injection rate (gpm)</i>	<i>Target Recovery Rate (gpm)</i>	<i>Wellhead Modifications for Sensor Access</i>	<i>Use BESST and/or other Geophysical Tools</i>	<i>Clean Well</i>	<i>Pump and Discharge System Modifications</i>	<i>Injection System Modifications</i>	<i>Source Water Modifications</i>
Option 1 focuses on using ASR-5 essentially as is, but with an expanded suite of analysis tools and sensors. The additional data collection would be at injection/recovery rates similar to those used in the 2012 pilot test. This option would require minimal infrastructure modification to allow access of additional sensors and flow profiling tools.	Injection, Storage and Recovery (approximately 30-45 days each)	500	800 to 1000	No	Yes	No	No ¹	No	No
Option 2 focuses solely on long duration, high pumping rate well tests at ASR-5 with an expanded suite of analysis tools and sensors. Installation of a higher capacity pump and piping to discharge groundwater to a location designated by Boise. No injection testing under this option.	Multiple events in late summer 2013 and 2014	--	3000	Yes	Yes	Yes	Yes ²	No	No
Option 3A would use the existing injection system to inject cold water into the well before modifying the well for high capacity pumping tests. No injection or source water treatment modifications would be needed.	Injection, Storage and Recovery (approximately 30-45 days each)	500	3000	Yes	Yes	Yes	Yes ²	No	No
Option 3B would use a temporary high injection rate system followed by recovery testing using the existing test pump. This option would use cold unfiltered Columbia River source water during injection. Because injection rates are higher than recovery and water is untreated this option risks plugging and/or biofouling of the ASR well.	Injection, Storage and Recovery (approximately 30-45 days each)	2500	800 to 1000	Yes	Yes	Yes	No ¹	Yes	Ranney well/ Unfiltered River Water ³
Option 4A focuses on increased injection rates and recovery rates (as practicable) coupled with use of an expanded suite of analysis tools and sensors. This option would use cold unfiltered Columbia River source water during injection. Because water is untreated this option risks plugging and/or biofouling of the ASR well.	Injection, Storage and Recovery (approximately 30-45 days each)	2500	3000	Yes	Yes	Yes	Yes	Yes	Unfiltered River Water ³
Option 4B focuses on increased injection rates and recovery rates (as practicable) coupled with use of an expanded suite of analysis tools and sensors. This option would use a combination of filtered water from the pilot filter, Ranney wells, and/or potentially another in-plant source.	Injection, Storage and Recovery (approximately 30-45 days each)	2500	3000	Yes	Yes	Yes	Yes	Yes	Ranney Well/ Pilot Filter Water

Table 10. Planning (Preliminary) Level Costs Estimates for Continuing Evaluation Options (continued).

Associated Approximate Cost Estimates (Estimates to be Revised Once Preferred Option Selected)

Option	GSI Labor, Equipment, and Expense⁴	HDR Labor and Expenses⁵	Analytical Laborator⁶	BESST Flow Profiling⁷	Geophysical Logging	Video Survey⁸	Pump-Drilling subcontractor^{9, 10}	Ranney subcontractor¹¹	Mechanical-Piping subcontractor	Electrical-Programming Subcontracto¹²	Higher Capacity Injection System¹³	Higher Capacity Discharge System¹⁴	Consulting Subtotal	Subcontractor Subtotal	Totals
1 (low)	\$35,000	\$4,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0 ¹	\$0	\$0	\$0	\$39,000	\$0	\$39,000
1 (high)	\$65,000	\$5,000	\$9,000	\$45,000	\$0	\$1,000	\$0	\$0	\$0 ¹	\$1,000	\$0	\$0	\$70,000	\$56,000	\$126,000
2	\$65,000	\$10,000	\$0	\$20,000	\$18,000	\$1,000	\$80,000	\$0	\$10,000 ²	\$1,000	\$0	\$50,000	\$75,000	\$180,000	\$255,000
3A	\$90,000	\$10,000	\$9,000	\$45,000	\$9,000	\$1,000	\$80,000	\$0	\$0 ¹	\$1,000	\$0	\$50,000	\$100,000	\$195,000	\$295,000
3B	\$90,000	\$15,000	\$15,000	\$45,000	\$18,000	\$1,000	\$20,000	\$25,000	\$10,000 ²	\$8,000	\$50,000	\$0	\$105,000	\$192,000	\$297,000
4A	\$90,000	\$20,000	\$15,000	\$45,000	\$18,000	\$1,000	\$80,000	\$0	\$10,000 ²	\$8,000	\$50,000	\$50,000	\$110,000	\$277,000	\$387,000
4B	\$110,000	\$35,000	\$15,000	\$45,000	\$18,000	\$1,000	\$80,000	\$25,000	\$25,000	\$8,000	\$50,000	\$50,000	\$145,000	\$317,000	\$462,000

1. Assumes that the discharge water can be directed to Boise backwash sump.
2. For high recovery rates it is assumed that recovered water can be discharged to lagoons and/or direct to the Columbia River.
3. If untreated Columbia River water cannot be used, another option may be to use warm, chlorinated Boise process water for injection to reduce biofouling risk. However such an approach does not allow evaluation of cold water density and stratification conditions via direct observation.
4. GSI labor and expenses include project management, contracting, subcontractor oversight, data collection and analysis, and reporting.
5. HDR labor and expenses includes project management, coordination, design support and engineering/operational support.
6. Analytical lab costs do not include SOC and viral sampling except for Options 3B, 4A, and 4B where limited sampling of Ranney collector could be done.
7. Option 1, 3A, 3B, 4A, and 4B assume 3 BESST flow profile surveys of ASR-5. Option 2 is limited to one survey of ASR-5. Each survey consists of an ambient and dynamic survey.
8. Assumes video survey of ASR-5 only.
9. Costs assumes mobilization of driller, removal and installation of pump, bailing of filter sand at ASR-5 and drilling out the obstruction at OBS-2. Also includes some work on removal, installation, and/or modification of sounding tubes.
10. Options 2 through 4 include costs associated with additional discharge piping to clarifier and/or lagoon.
11. Assumes minimal modification required, work primarily focused on assessing condition.
12. Costs are to override level alarms if SCADA based level sensor is removed.
13. Costs are to replace existing injection tubes with higher capacity temporary piping/tubing.
14. Includes costs for labor and materials for additional sounding tubes, well head fabrication, additional column and materials to install at ASR-5.

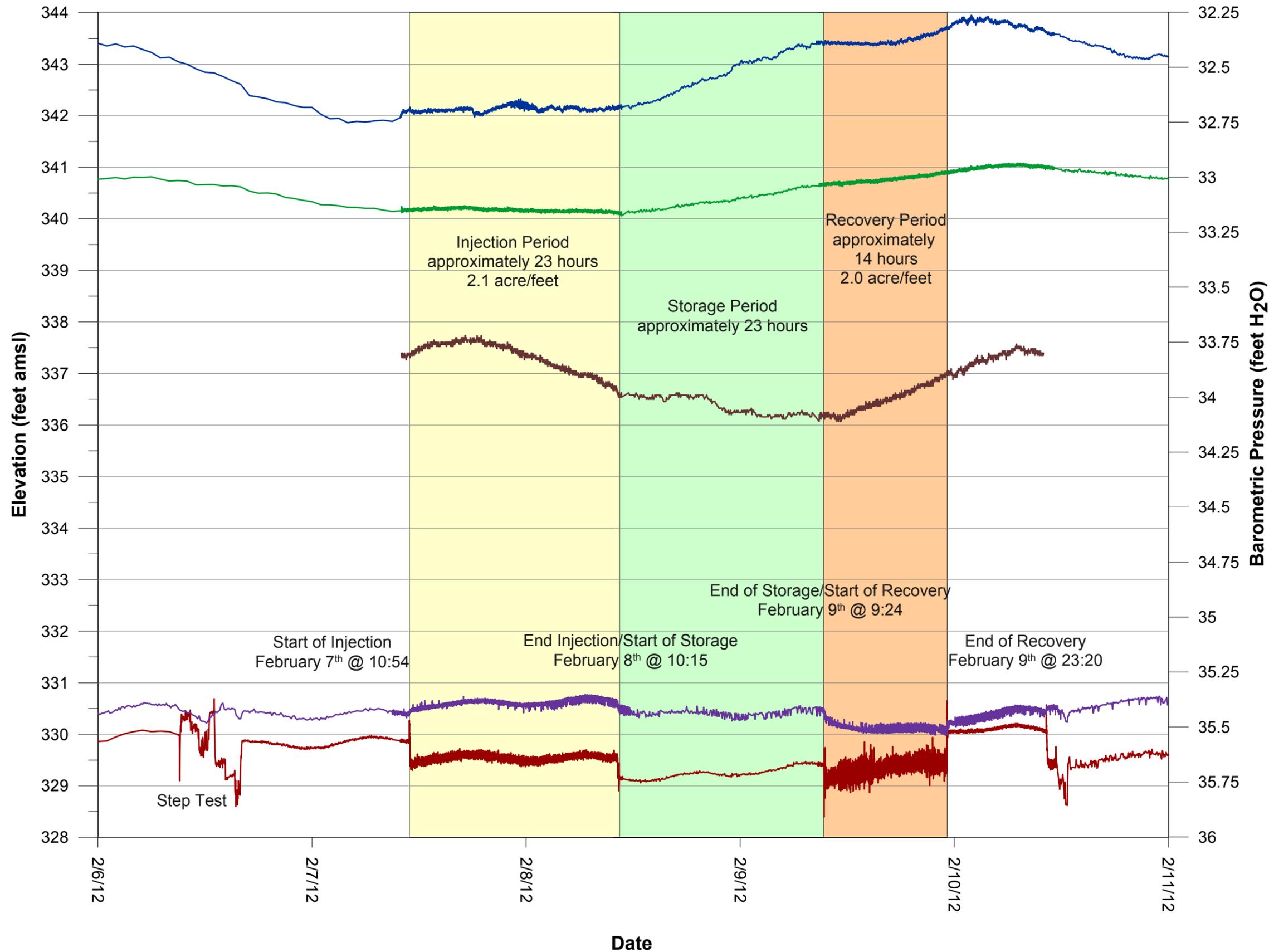


Figure 1
Cycle 1 Injection, Storage
and Recovery Hydrograph

Cycle 1 Testing Results, Water Year 2012
Boise White Paper, Wallula

- LEGEND**
- ASR 5 Transducer
 - OBS 1 Transducer
 - OBS 2 Transducer
 - Columbia River Transducer
 - Barometric Pressure Transducer

Note:

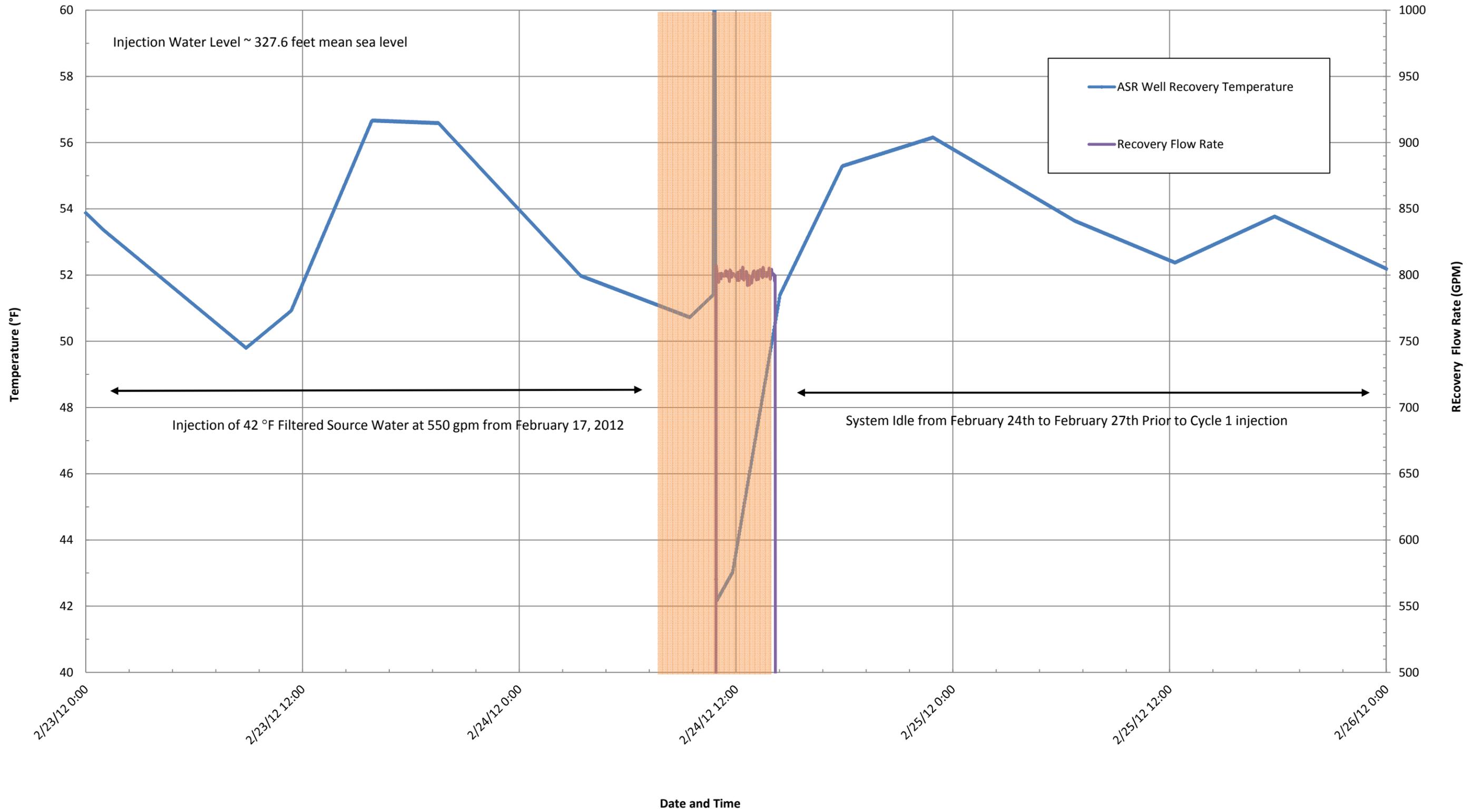
Injection started February 7th at 10:54 to February 8th at 10:15 at an average injection rate of 477 gpm.

Recovery was from February 9th at 9:24 to February 9th at 23:20 at an average recovery rate of 799 gpm.

gpm = gallons per minute



Figure 2. Post Cycle 1 Operation Testing Recovery Flow Rate and Temperature Trends
February 24, 2012



Cycle 2 Injection, Storage, and Recovery Hydrograph

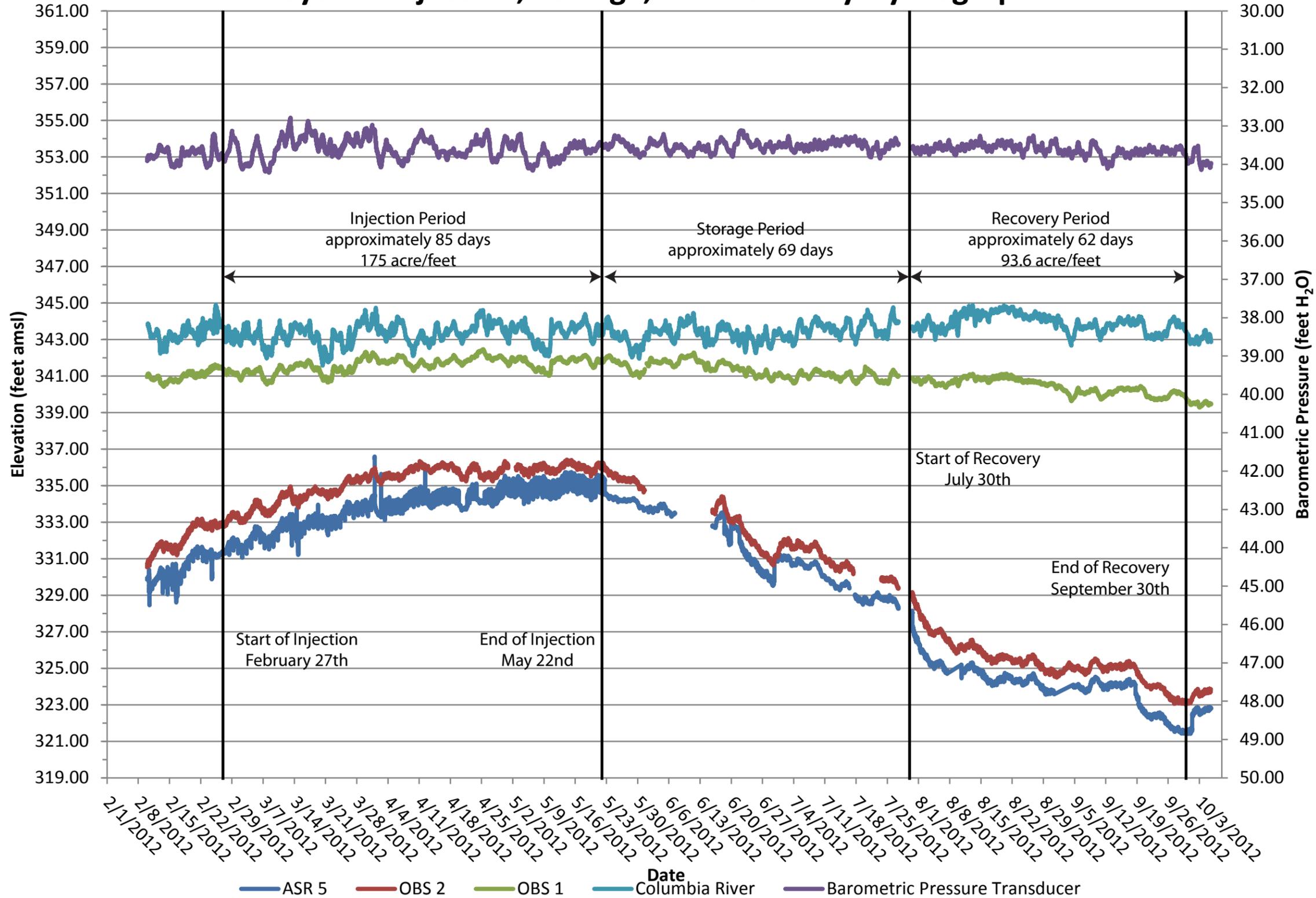


Figure 3
Cycle 2 Injection, Storage and Recovery Hydrograph
Cycle 2 Testing Results, Water Year 2012
Boise White Paper, Wallula

- LEGEND**
- ASR 5 Transducer
 - OBS 1 Transducer
 - OBS 2 Transducer
 - Columbia River Transducer
 - Barometric Pressure Transducer

Note:
 Injection started February 27th to May 22nd at an average injection rate of 492 gpm. The specific capacity (Q/s) observed at the end of injection was approximately 200 gpm/ft of drawup.
 Recovery was from July 30th to September 30th. The target recovery rate from July 30th to August 10th was 800 gpm. On August 10th, the target rate was reduced to 400 gpm. From August 20th to September 17th, recovery was temporarily idle. From September 17th to September 30th, the target recovery rate was 800 gpm. The specific capacity (Q/s) observed at the end of recovery was approximately 325 gpm/ft of drawdown.

gpm = gallons per minute



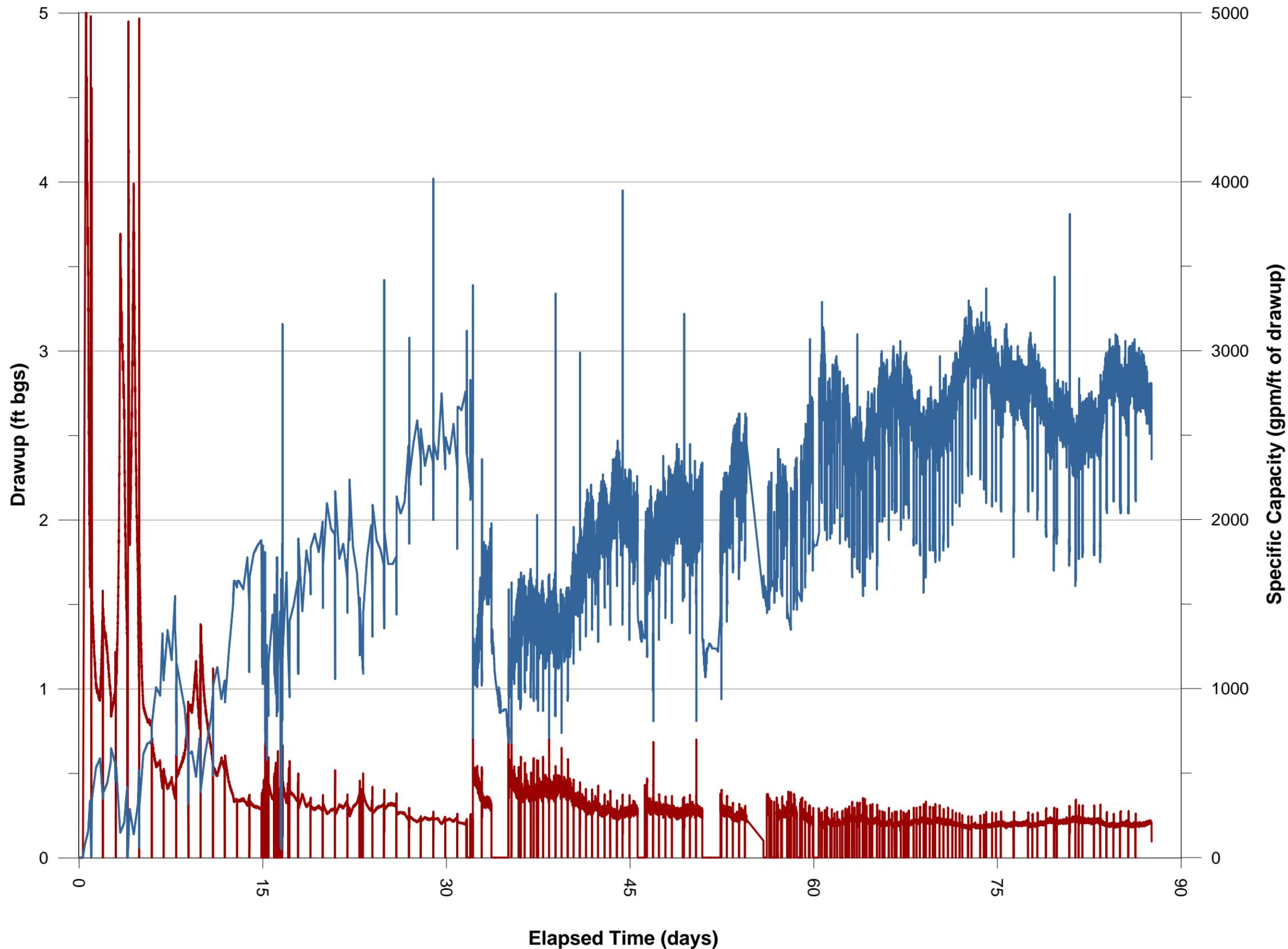


Figure 4
Injection Specific Capacity
for ASR 5 during Cycle 2 Testing

Cycle 2 Testing Results, Water Year 2012
Boise White Paper, Wallula

LEGEND
 — Drawup
 — Specific Capacity

Note:
 Injection started February 27th to May 22nd
 at an average injection rate of 492 gpm. The
 specific capacity at the end of the injection
 period was approximately 200 gpm/ft of drawup.

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



Date Modified: December 2012

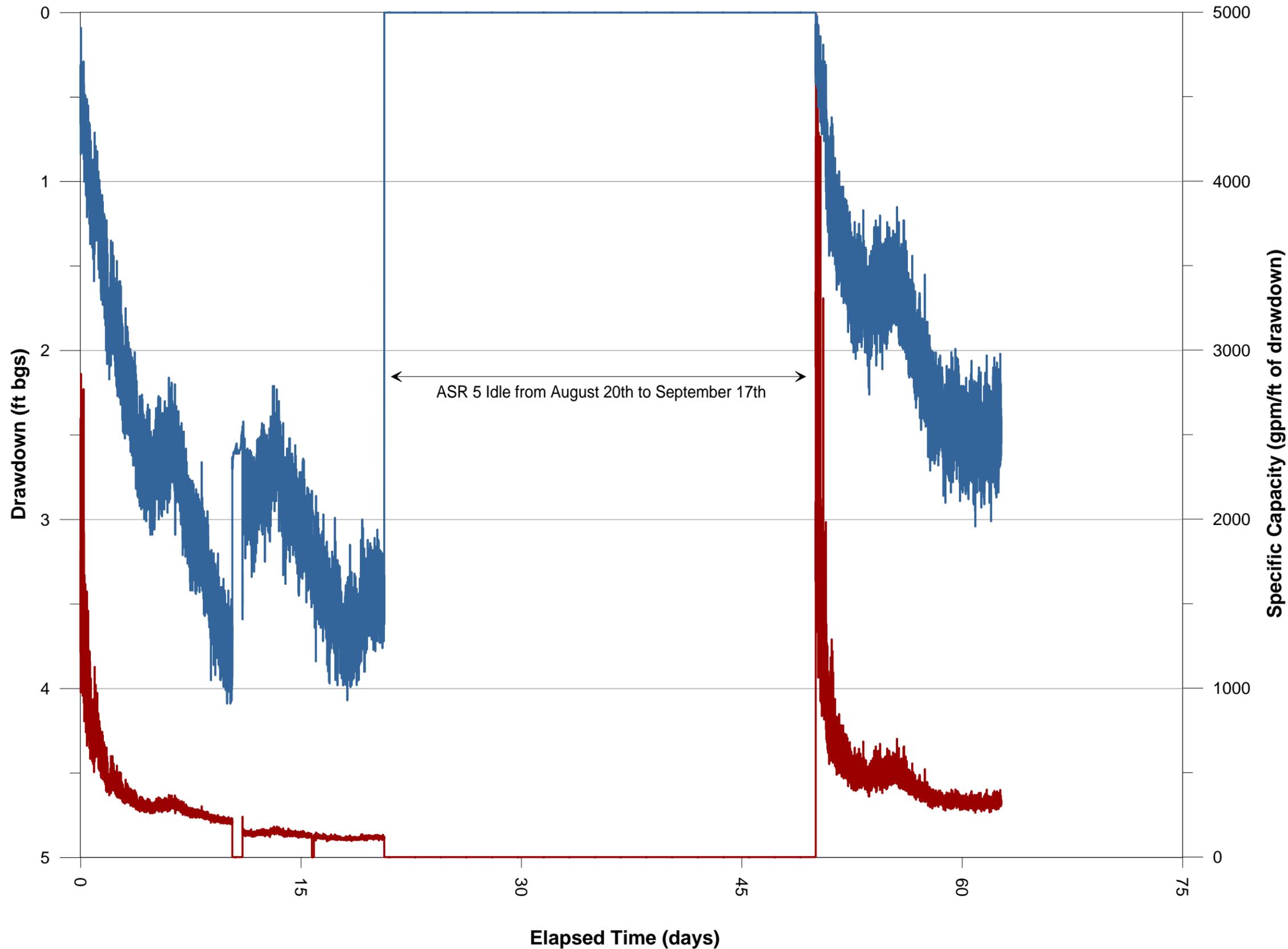


Figure 5
Recovery Specific Capacity
for ASR 5 during Cycle 2 Testing

Cycle 2 Testing Results, Water Year 2012
Boise White Paper, Wallula

LEGEND

- Drawdown
- Specific Capacity

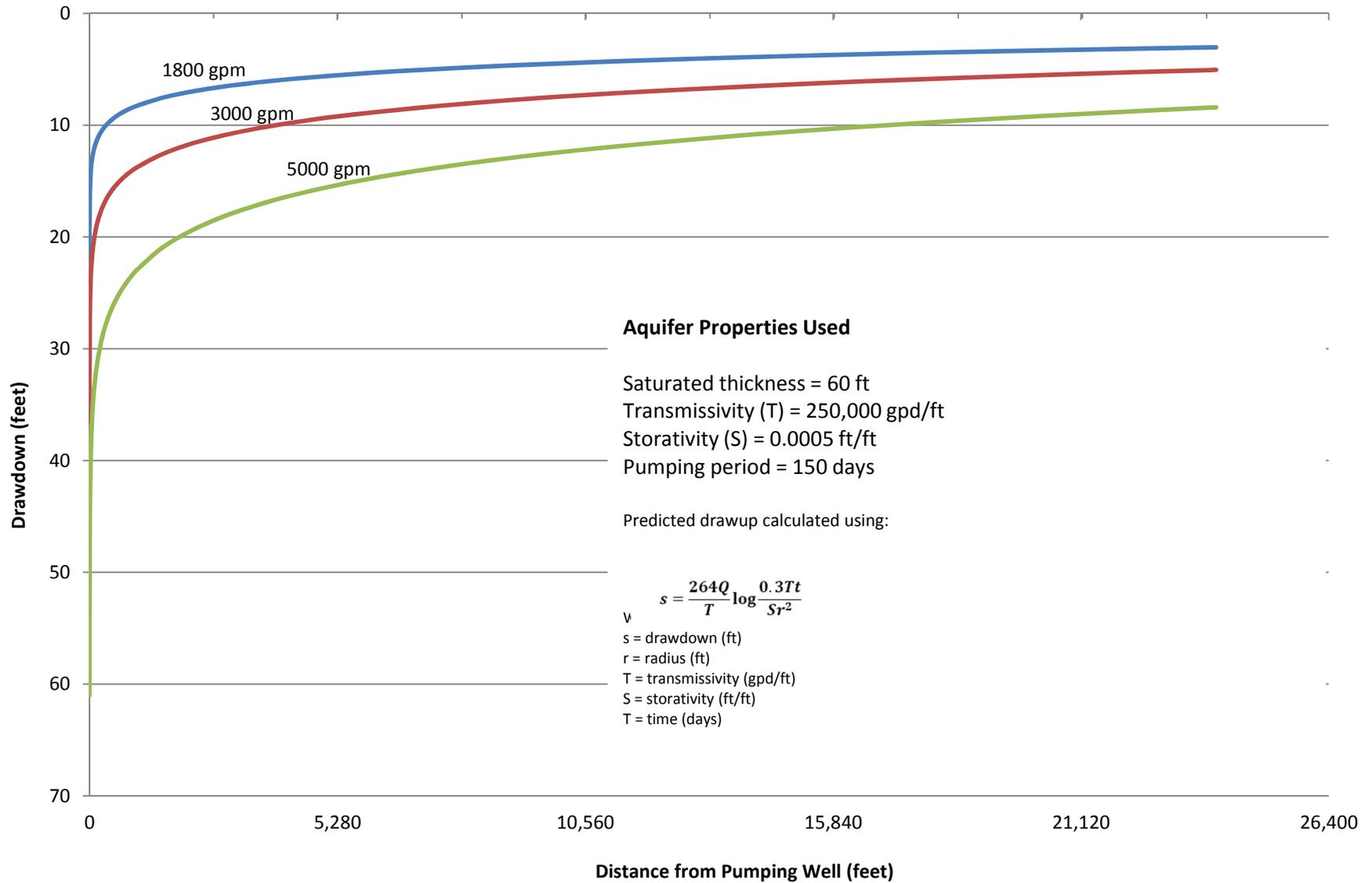
Note:
 Recovery was from July 30th to September 30th. The target recovery rate from July 30th to August 10th was 800 gpm. On August 10th, the target rate was reduced to 400 gpm. From August 20th to September 17th, recovery was temporarily idle. From September 17th to September 30th, the target recovery rate was 800 gpm. The specific capacity (Q/s) observed at the end of recovery was approximately 325 gpm/ft of drawdown.

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



Figure 6. Estimated Well Interference from Nearby Pumping

Boise White Paper Thermal ASR Pilot Test Program, 2012



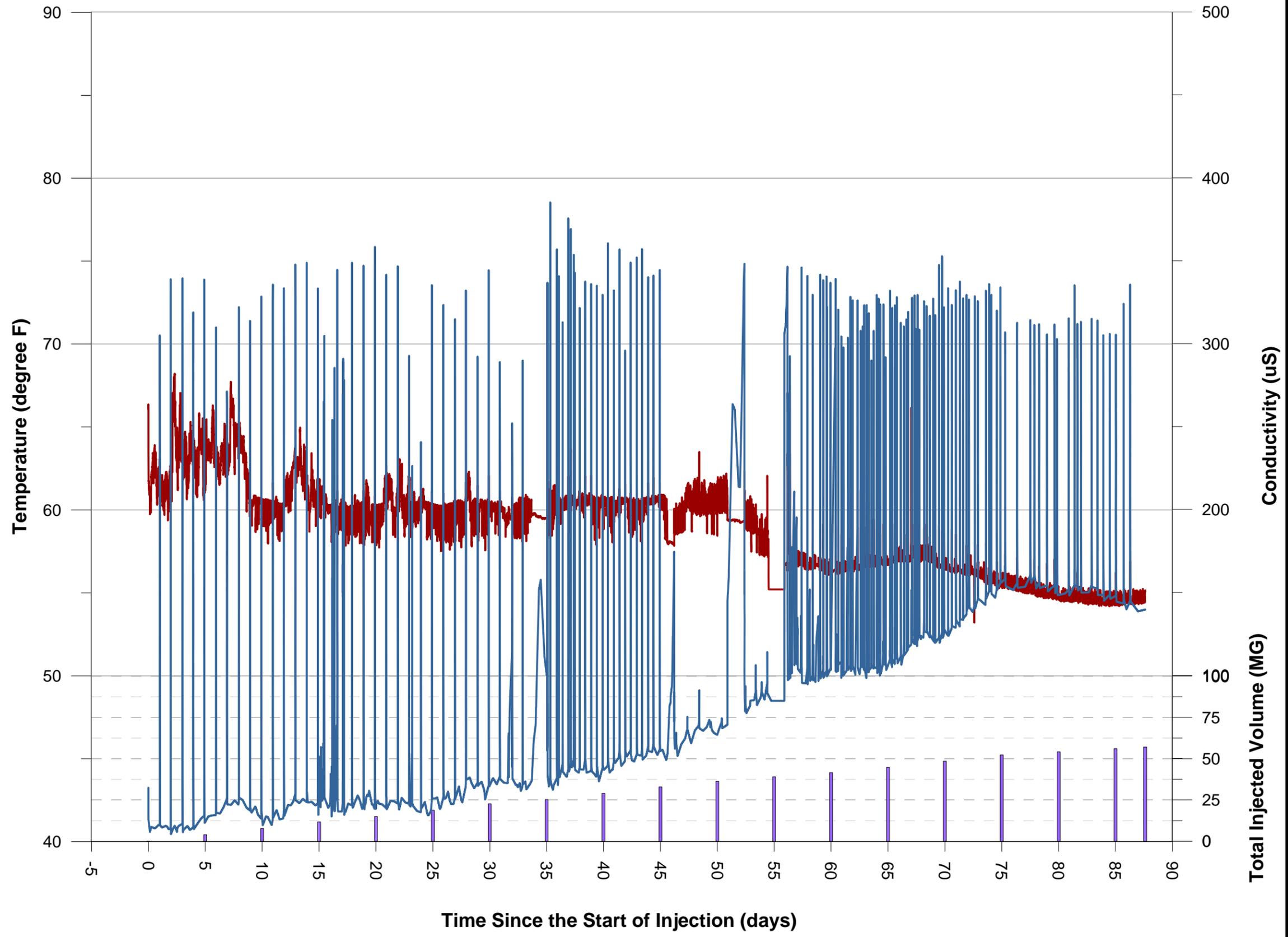


Figure 7
Injected Temperature, Conductivity
and Total Injected Volume during
the Injection Period
for ASR 5 during Cycle 2 Testing

Cycle 2 Testing Results, Water Year 2012
Boise White Paper, Wallula

LEGEND
 — Temperature
 — Conductivity
 Total Injected Volume

Note:
 Injection started February 27th and ended
 May 22nd, 2012. Total volume injected was
 57.1 MG (175.2 AF). The total injected volume
 prior to Cycle 2 was 10.3 MG (31.7 AF).

degree F = degree Fahrenheit
 uS = microSiemens
 MG = million gallons
 AF = acre-feet



Date Modified: December 2012

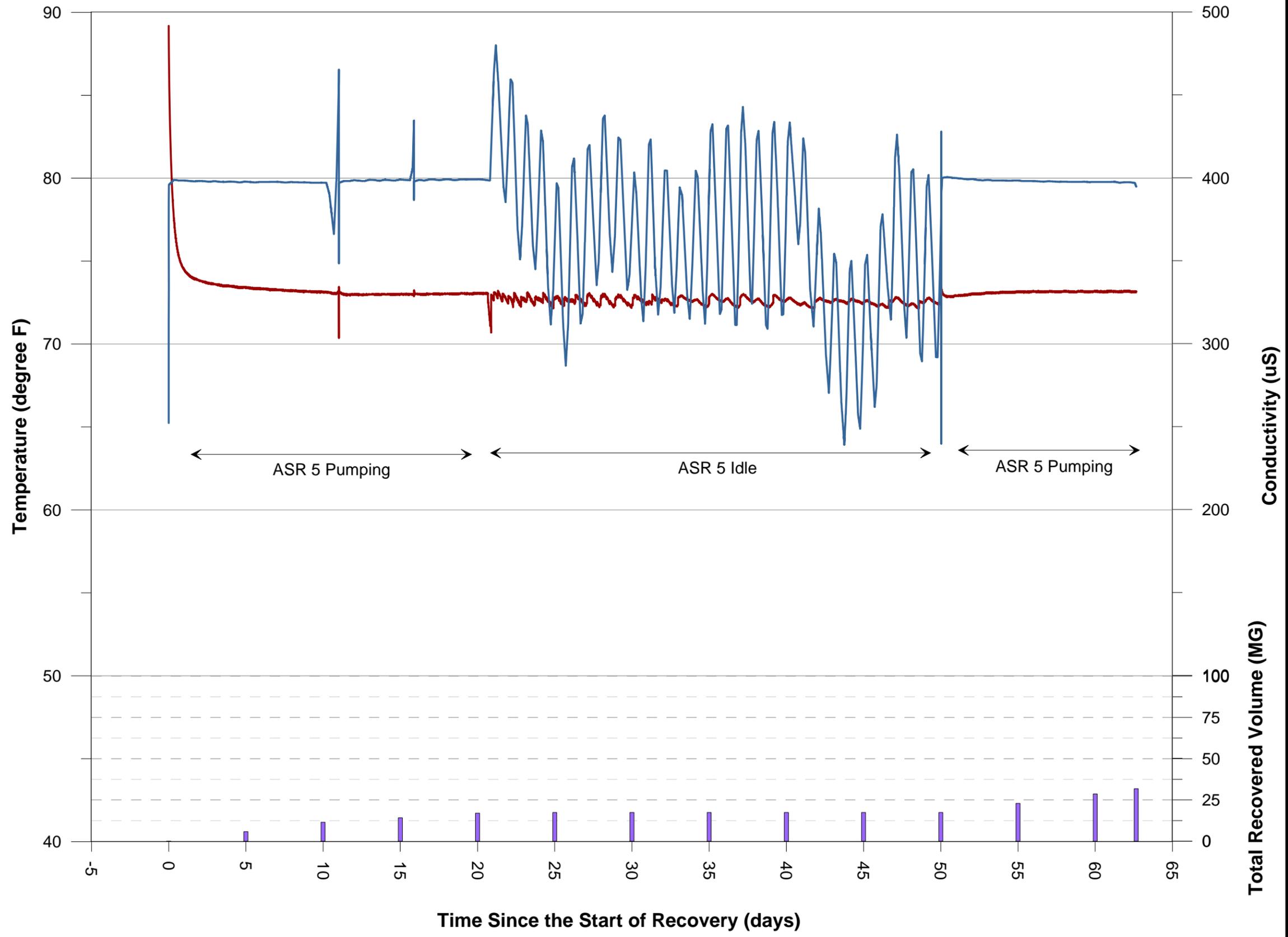


Figure 8
Recovered Temperature, Conductivity
and Total Recovered Volume during
the Recovery Period
for ASR 5 during Cycle 2 Testing

Cycle 2 Testing Results, Water Year 2012
Boise White Paper, Wallula

LEGEND
 — Temperature
 — Conductivity
 Total Recovered Volume

Note:
 Recovery pumping occurred between July 30th to September 30th, 2012. Recovery well idle from August 20th to September 17th. Total volume recovered was 30.5 MG (93.6 AF)

Peaks in temperature during the injection cycle represent backflush events or periods when injection was idle.

degree F = degree Fahrenheit
 uS = microSiemens
 MG = million gallons
 AF = acre-feet



Figure 9. OBS-2 Target Zone Temperature Profile During Injection at ASR-5
Boise White Paper Pilot Testing Program - Cycle 2, May 2, 2012

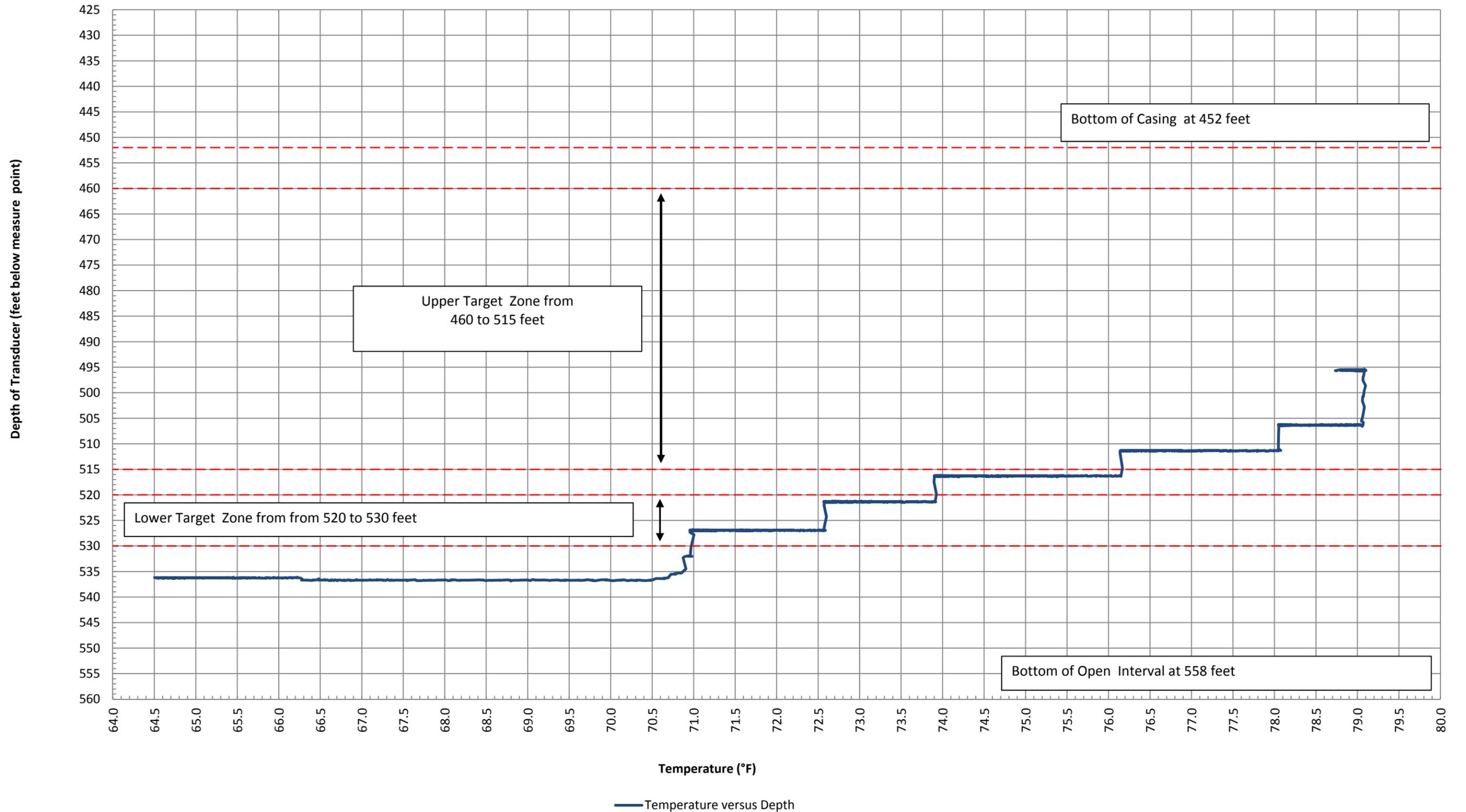


Figure 10. ASR 5 Target Zone Temperature Profile after 17 Days Storage
Boise White Paper Pilot Testing Program - Cycle 2, June 7, 2012

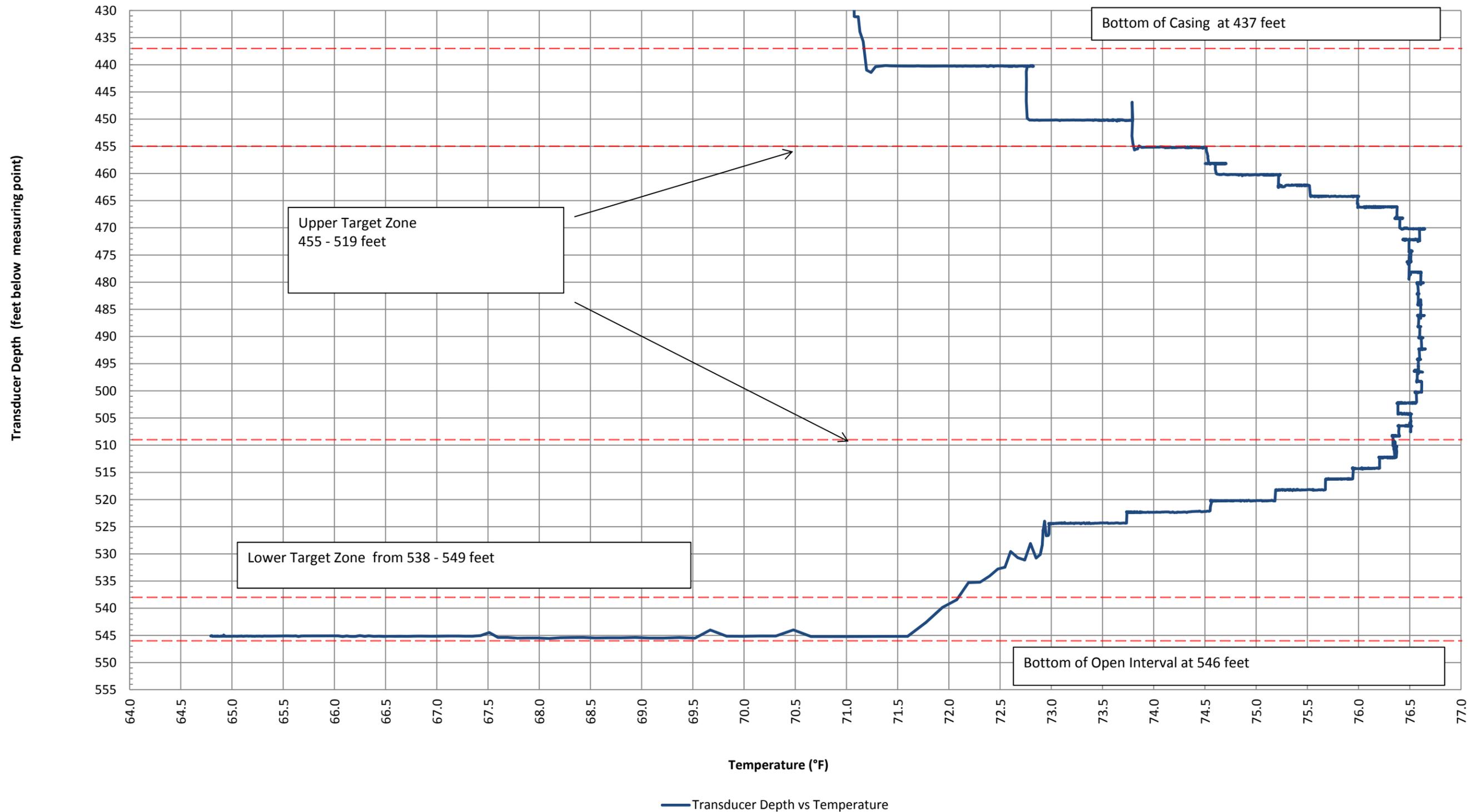


Figure 11. ASR 5 Lower Target Zone Temperature Profile after 25 Days Storage
Boise White Paper Pilot Testing Program - Cycle 2, June 15, 2012

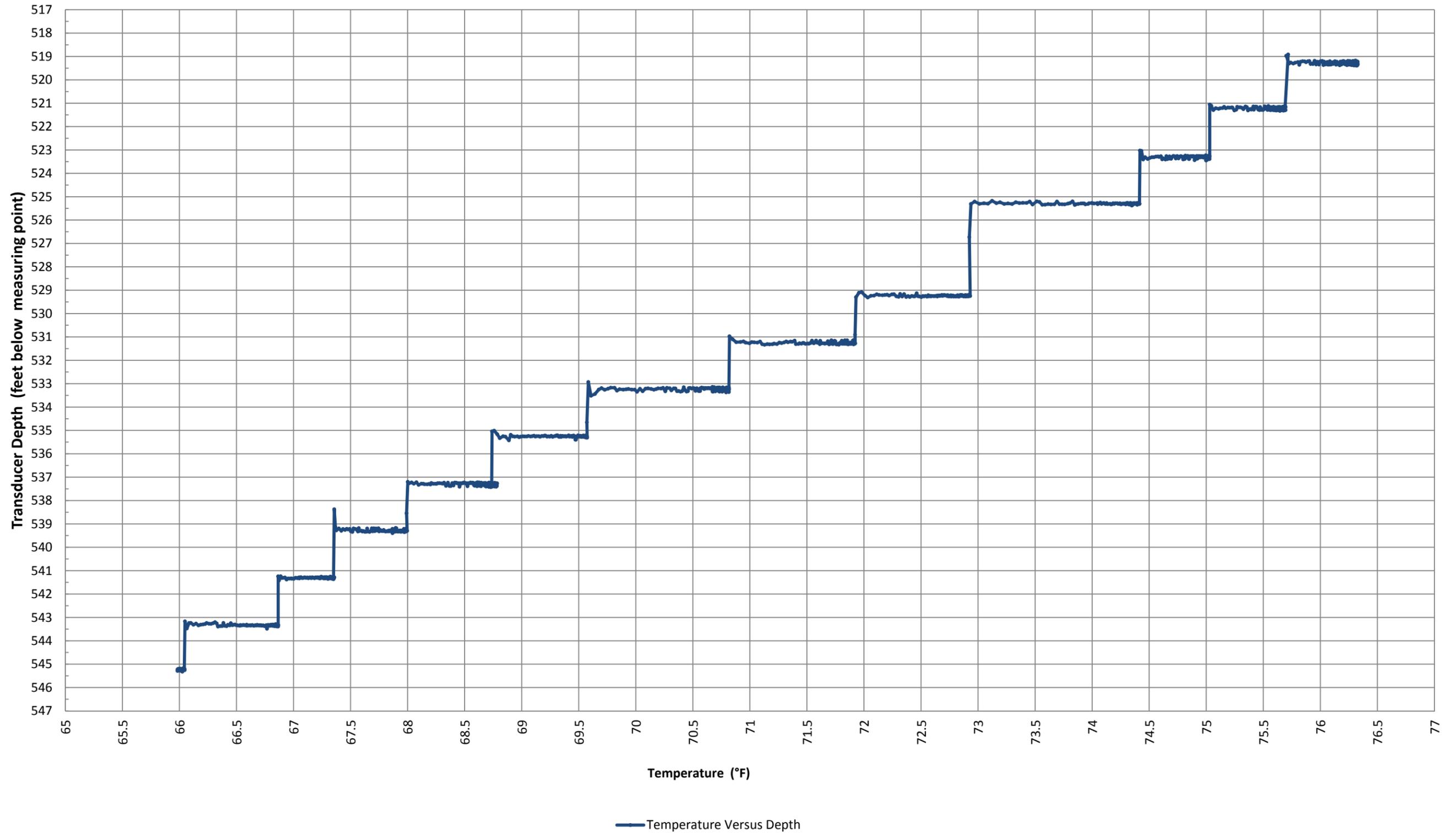


Figure 12. ASR 5 Target Zone Temperature Profile after 57 Days Storage
Boise White Paper Pilot Testing Program - Cycle 2, July 17, 2012

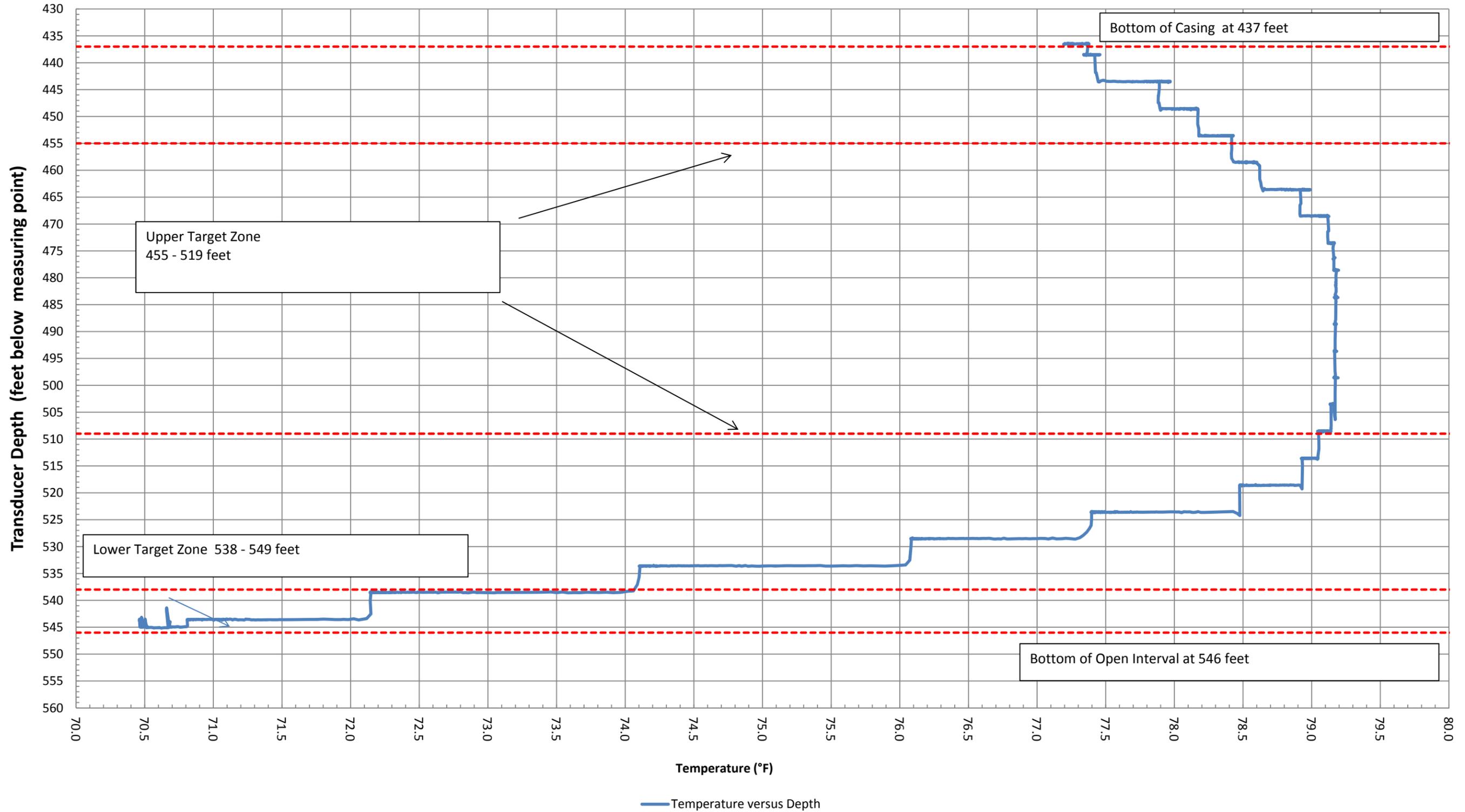


Figure 13. ASR 5 Target Zone Temperature Profile after 65 Days Storage
Boise White Paper Pilot Testing Program - Cycle 2, July 25, 2012

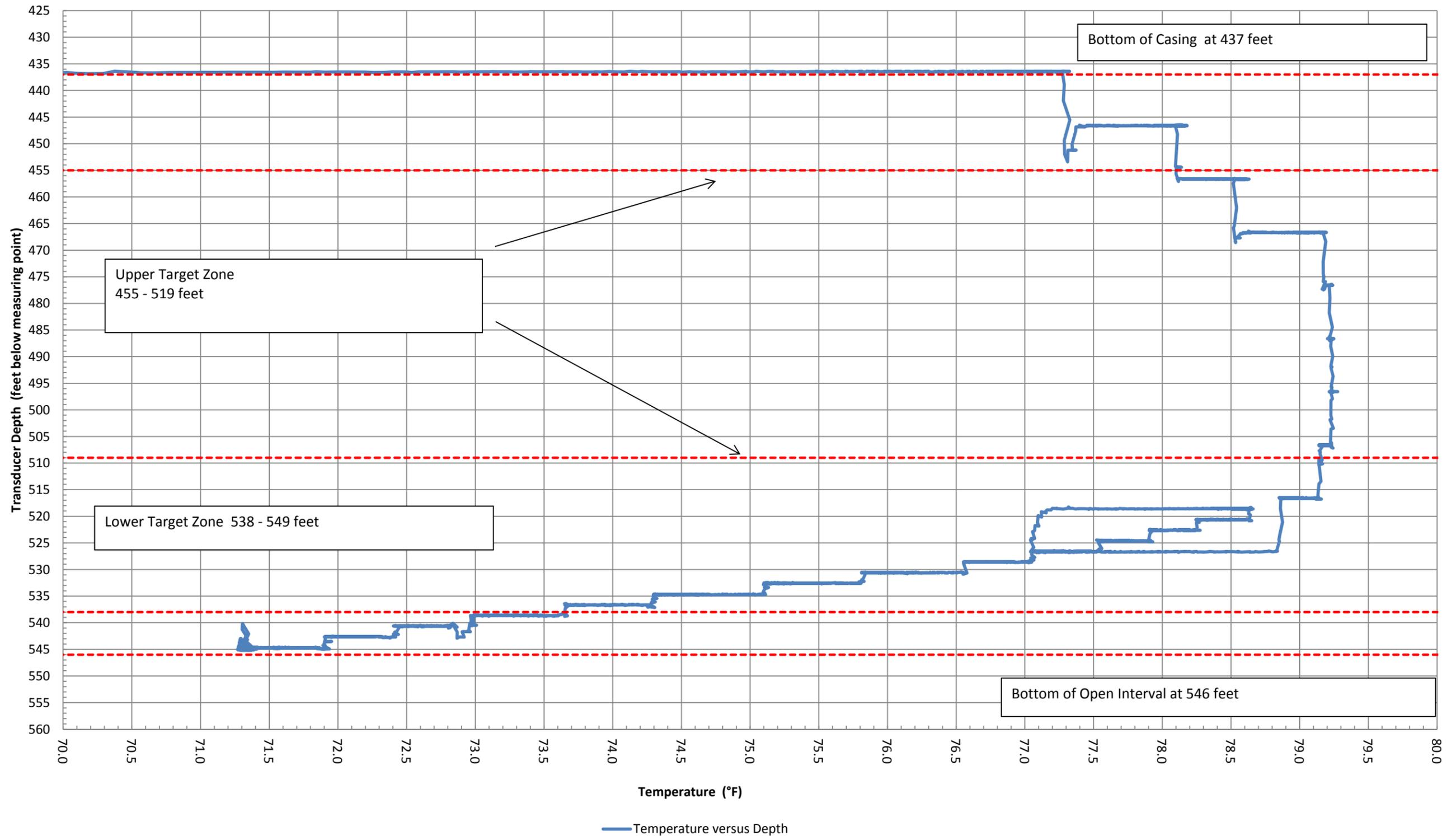


Figure 14. OBS-2 Target Zone Temperature Profile After 10 Days Storage
Boise White Paper Pilot Testing Program - Cycle 2, May 31, 2012

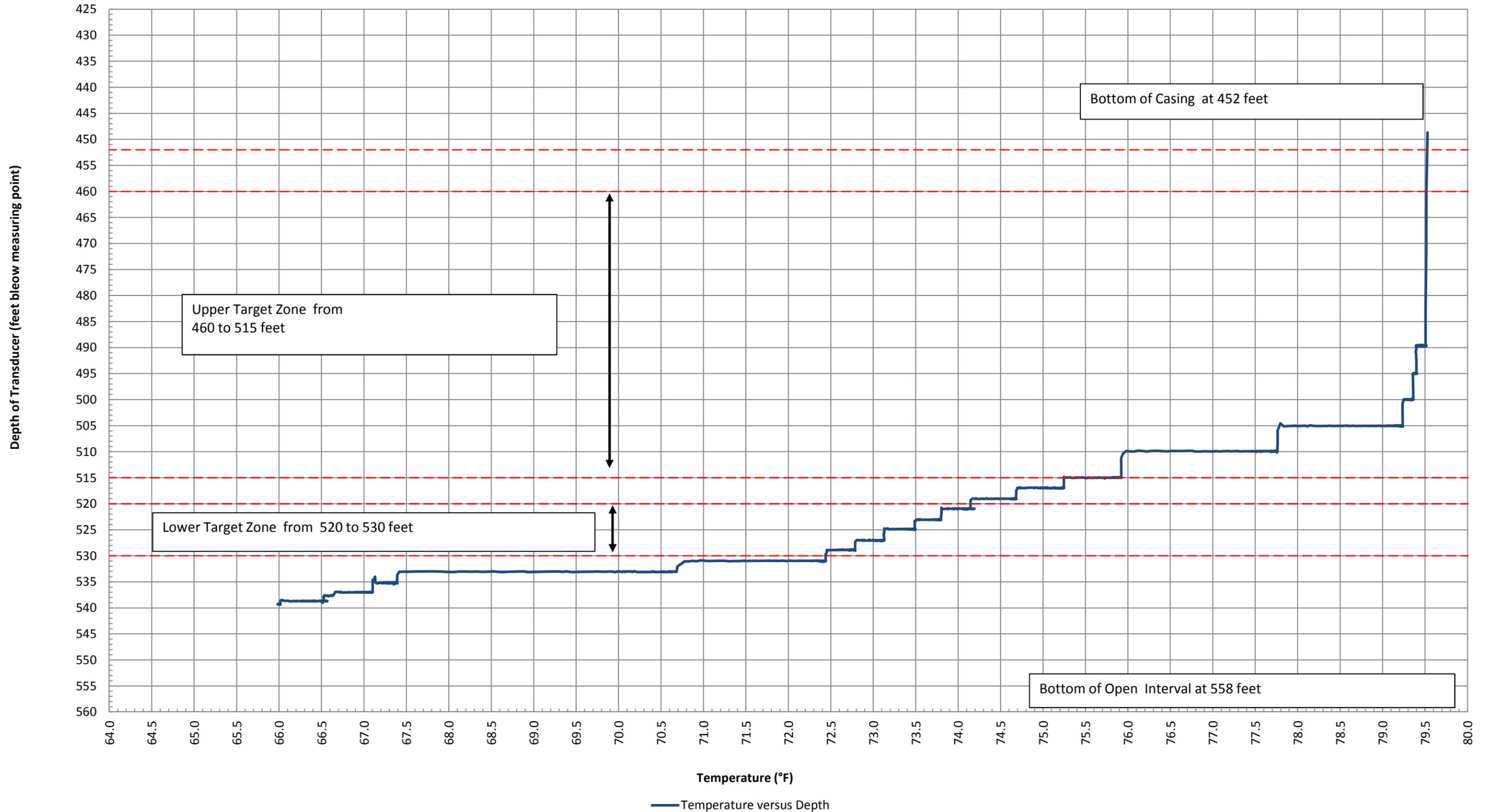


Figure 15. OBS-2 Target Zone Temperature Profile After 63 Days Storage
Boise White Paper Pilot Testing Program - Cycle 2, July 23, 2012

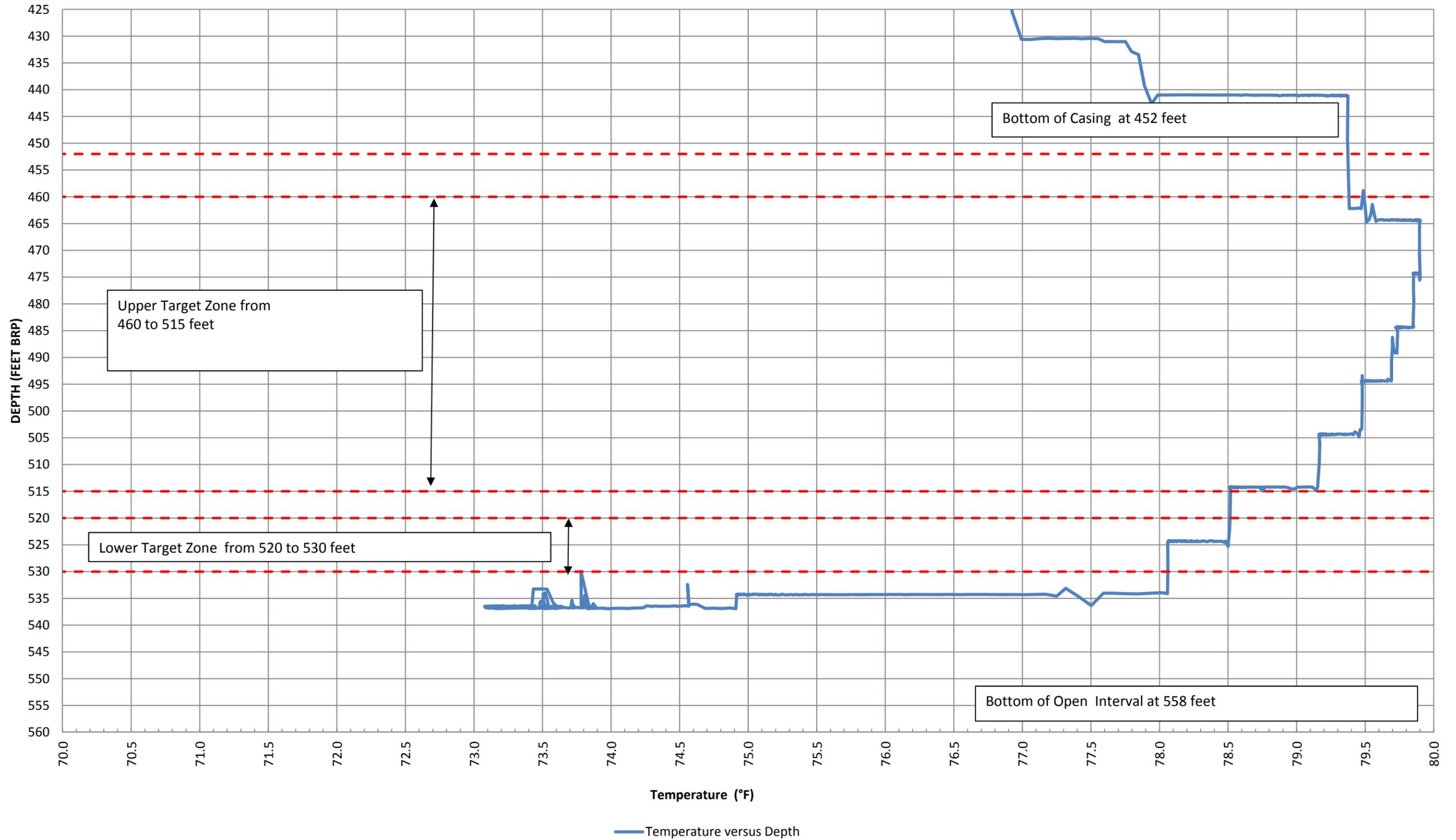


Figure 16. ASR 5 Target Zone Temperature Profile after 106 Days Storage/ 37 Days Recovery Pumping
 Boise White Paper Pilot Testing Program - Cycle 2, September 4, 2012

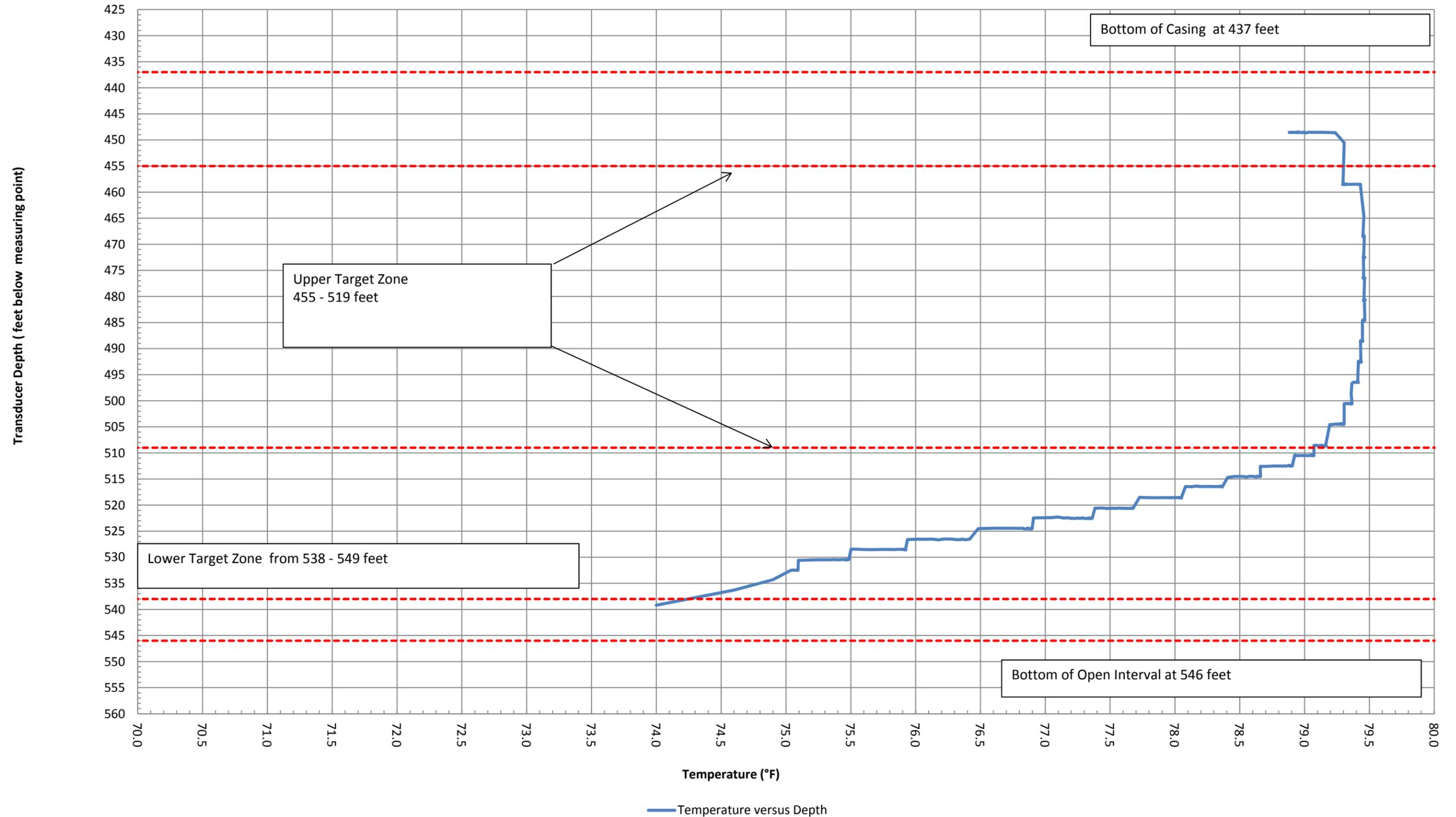


Figure 17. Piper Diagram of Source Water and Groundwater Observed in 2012

▲ ASR 5	1/31/2012
▲ ASR 5	2/09/2012
▲ ASR 5	6/18/2012
▲ ASR 5	7/31/2012
▲ ASR 5	9/27/2012
■ Filtered Water	2/03/2012
■ Filtered Water	2/07/2012
■ Filtered Water	2/08/2012
■ Filtered Water	4/19/2012
■ Filtered Water	5/21/2012
○ Obs-2	2/06/2012
○ Obs-2	6/18/2012
○ Obs-2	7/31/2012
○ Obs-2	9/27/2012

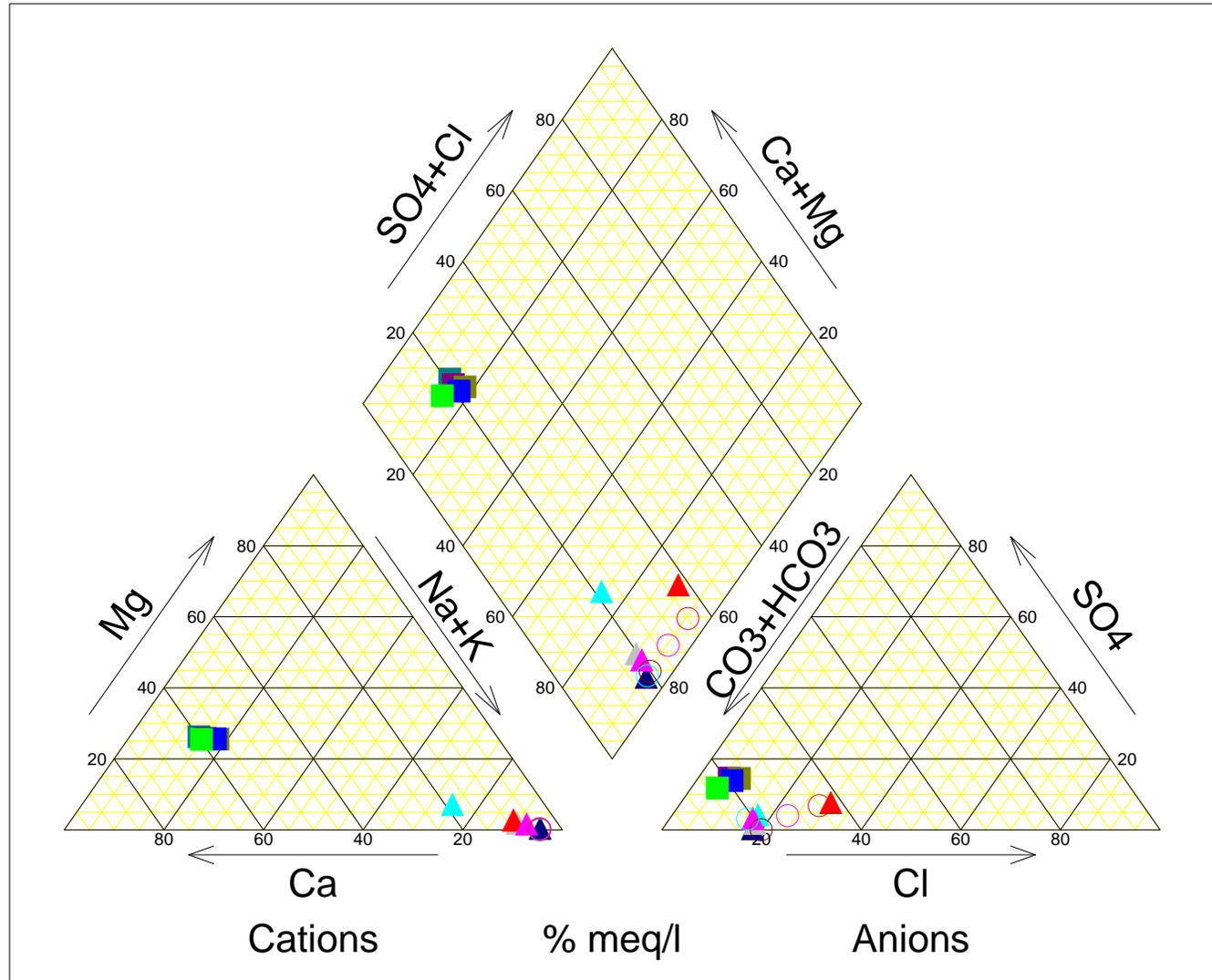
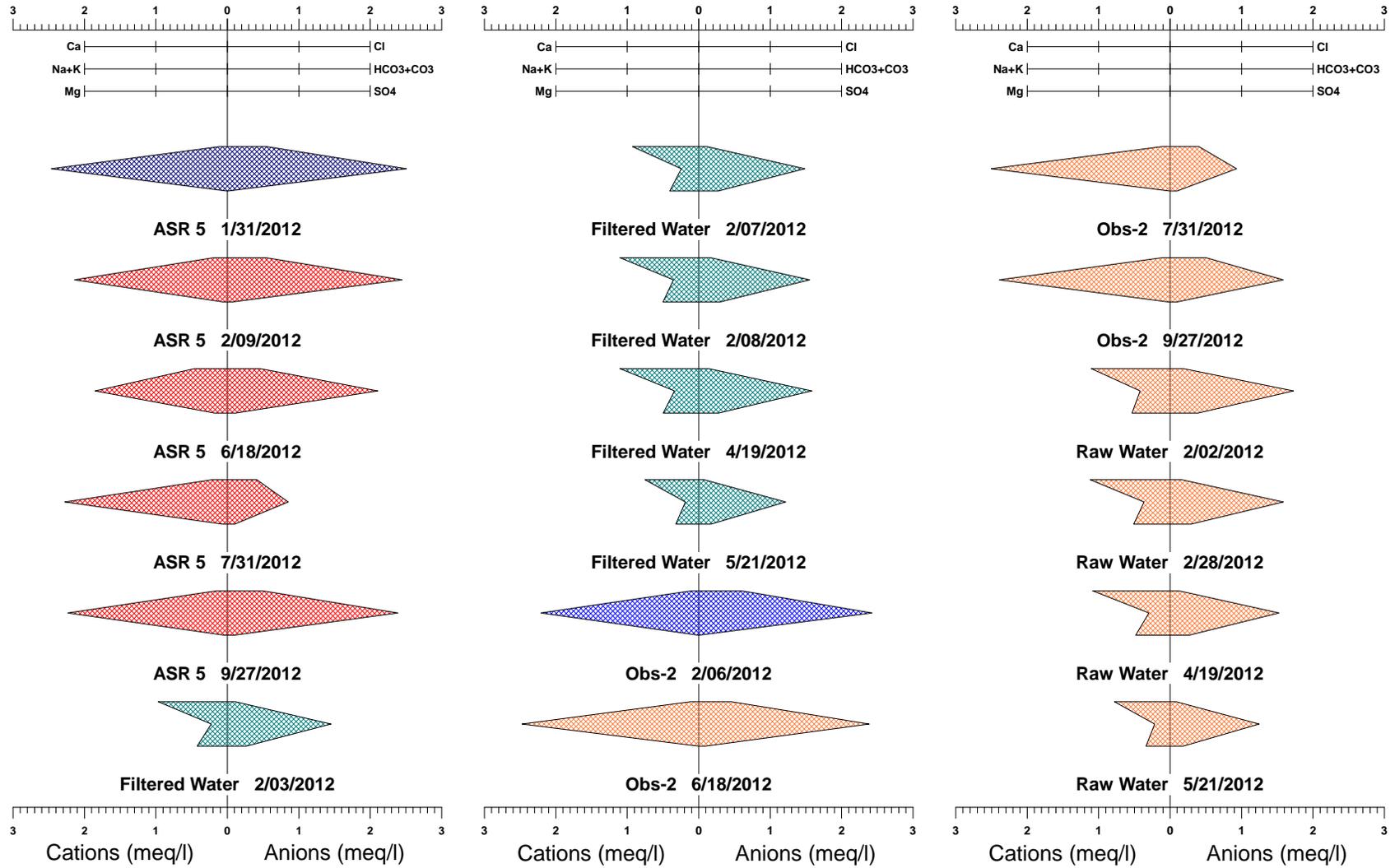


Figure 18. Stiff Diagram of Source Water and Groundwater Quality Observed in 2012



Prepared by: GSI

Appendix A

Geologic Logs and As-Built Diagrams for Project Wells ASR-5, OBS-1,
and OBS-2

Log of Borehole: ASR Well #5

Also known as:

Project: Boise Thermal ASR

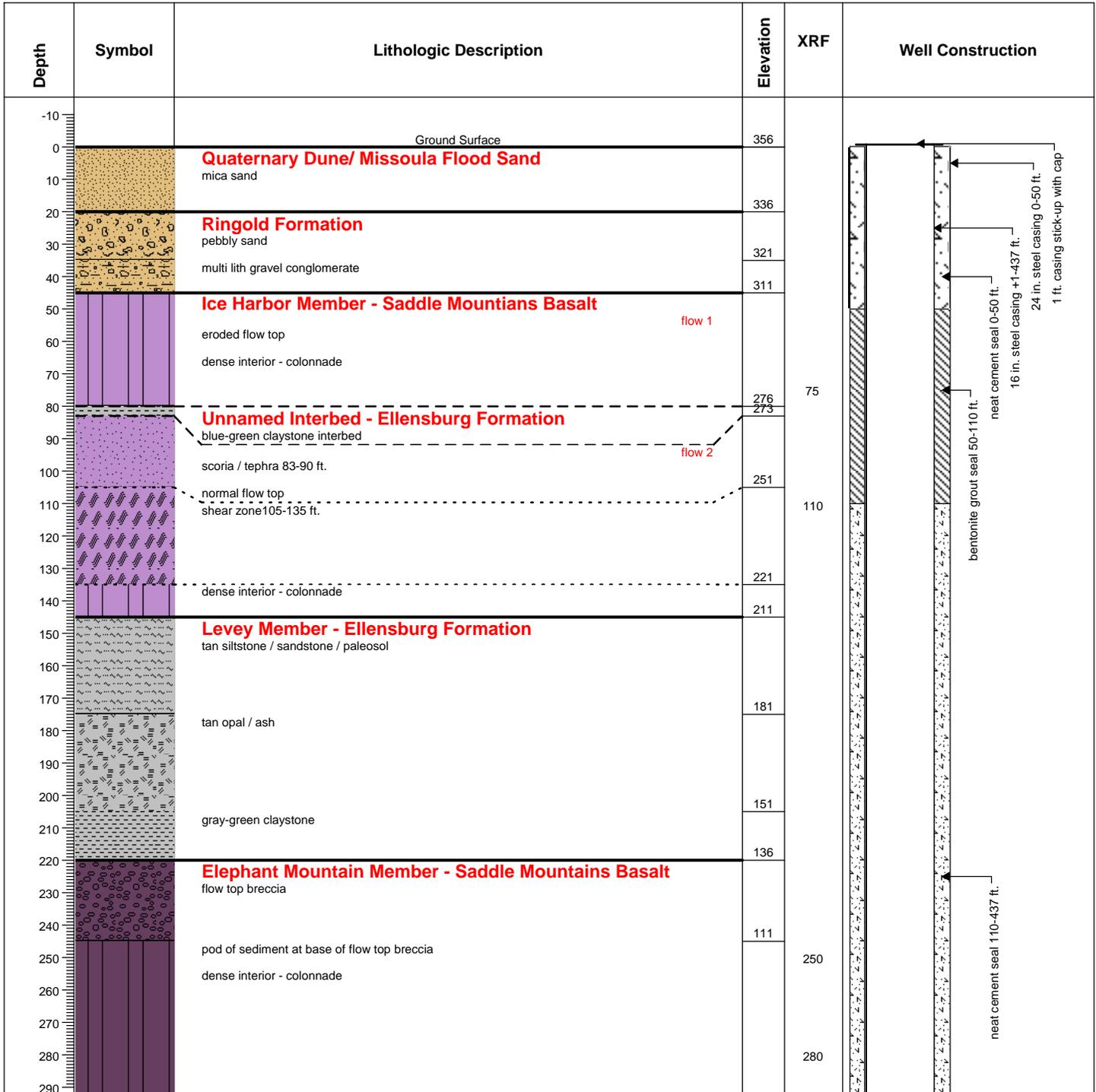
Well ID: BAR 667

Location: Boise Wallula Mill

Geologist: Terry L. Tolan, L.H.G.



1020 N. Center Parkway, Suite F
 Kennewick, Washington 99336
 509-735-7135
 FAX 509-735-7067
 www.gsiwatersolutions.com



Drilled By: Person Pump and Drilling
 Drill Method: Cable Tool and Direct Air Rotary
 Drill Date: 9-23-2009 to 11-9-2009

Total Depth: 558 ft.

Page: 1 of 2

Log of Borehole: ASR Well #5

Also known as:

Project: Boise Thermal ASR

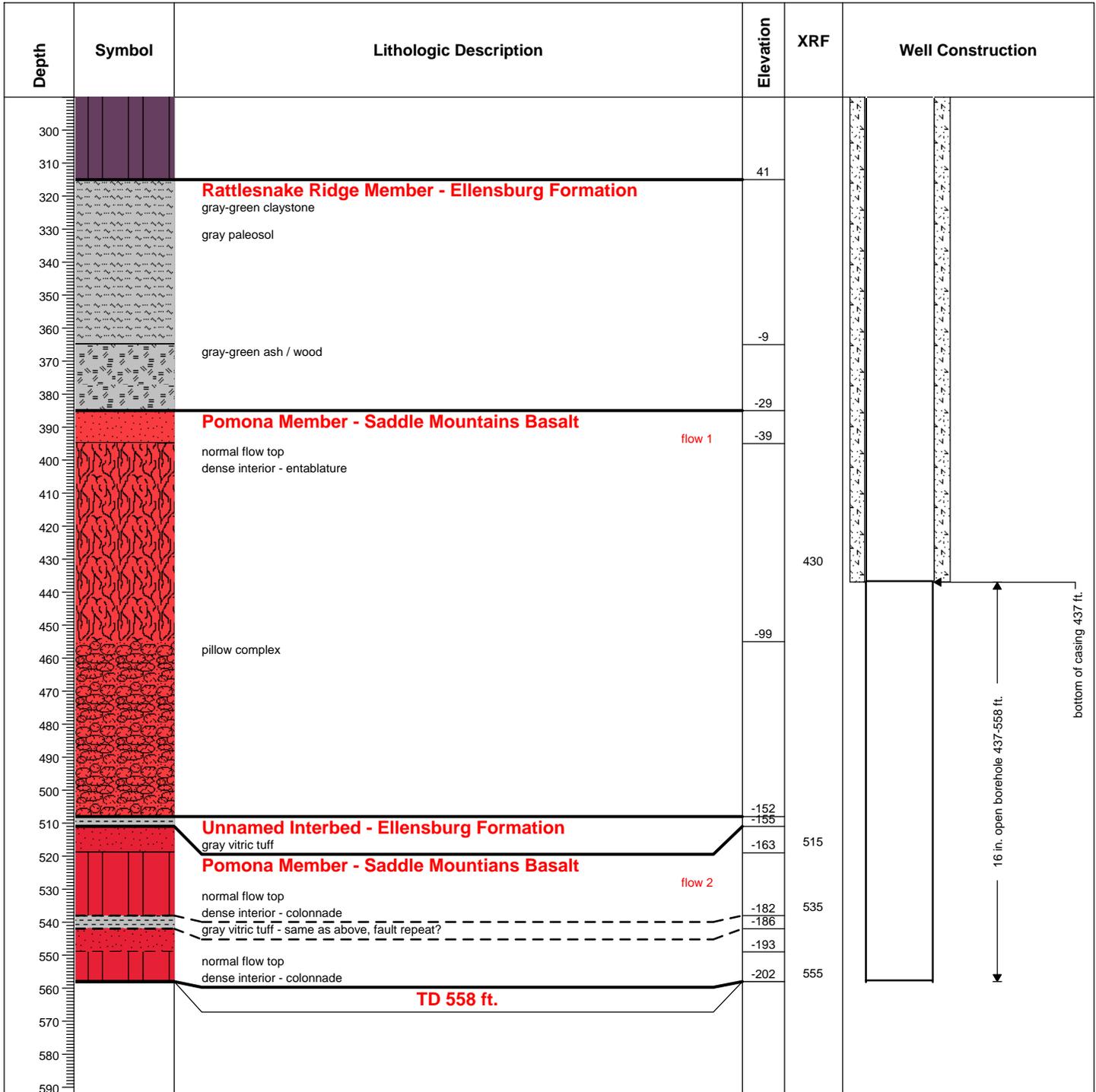
Well ID: BAR 667

Location: Boise Wallula Mill

Geologist: Terry L. Tolan, L.H.G.



1020 N. Center Parkway, Suite F
 Kennewick, Washington 99336
 509-735-7135
 FAX 509-735-7067
 www.gsiwatersolutions.com

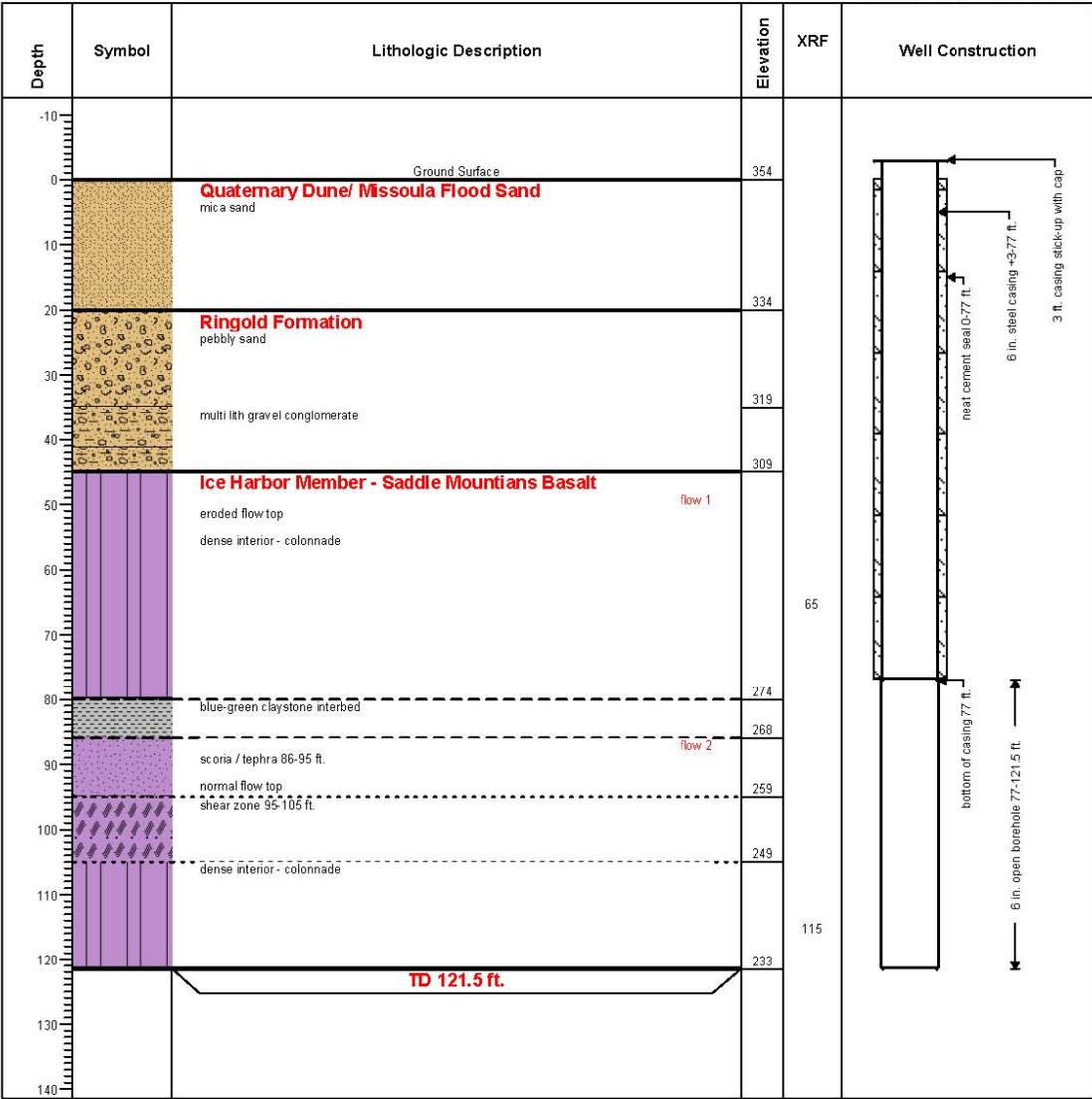


Drilled By: Person Pump and Drilling
 Drill Method: Cable Tool and Direct Air Rotary
 Drill Date: 9-23-2009 to 11-9-2009

Total Depth: 558 ft.

Log of Borehole: OBS Well #1
 Also known as:
Project: Boise Thermal ASR **Well ID: BAR 668**
Location: Boise Wallula Mill
Geologist: Terry L. Tolan, L.H.G.


 Water Solutions, Inc.
 1020 N. Center Parkway, Suite F
 Kennewick, Washington 99336
 509-735-7135
 FAX 509-735-7067
 www.gsiwatersolutions.com



Drilled By: Person Pump and Drilling **Total Depth: 122 ft.**
Drill Method: Direct Air Rotary
Drill Date: 11-11-2009 to 11-12-2009 **Page: 1 of 1**

Figure 3-2. Borehole geologic log and well as-built for OBS-1.

Log of Borehole: OBS Well #2

Also known as:

Project: Boise Thermal ASR

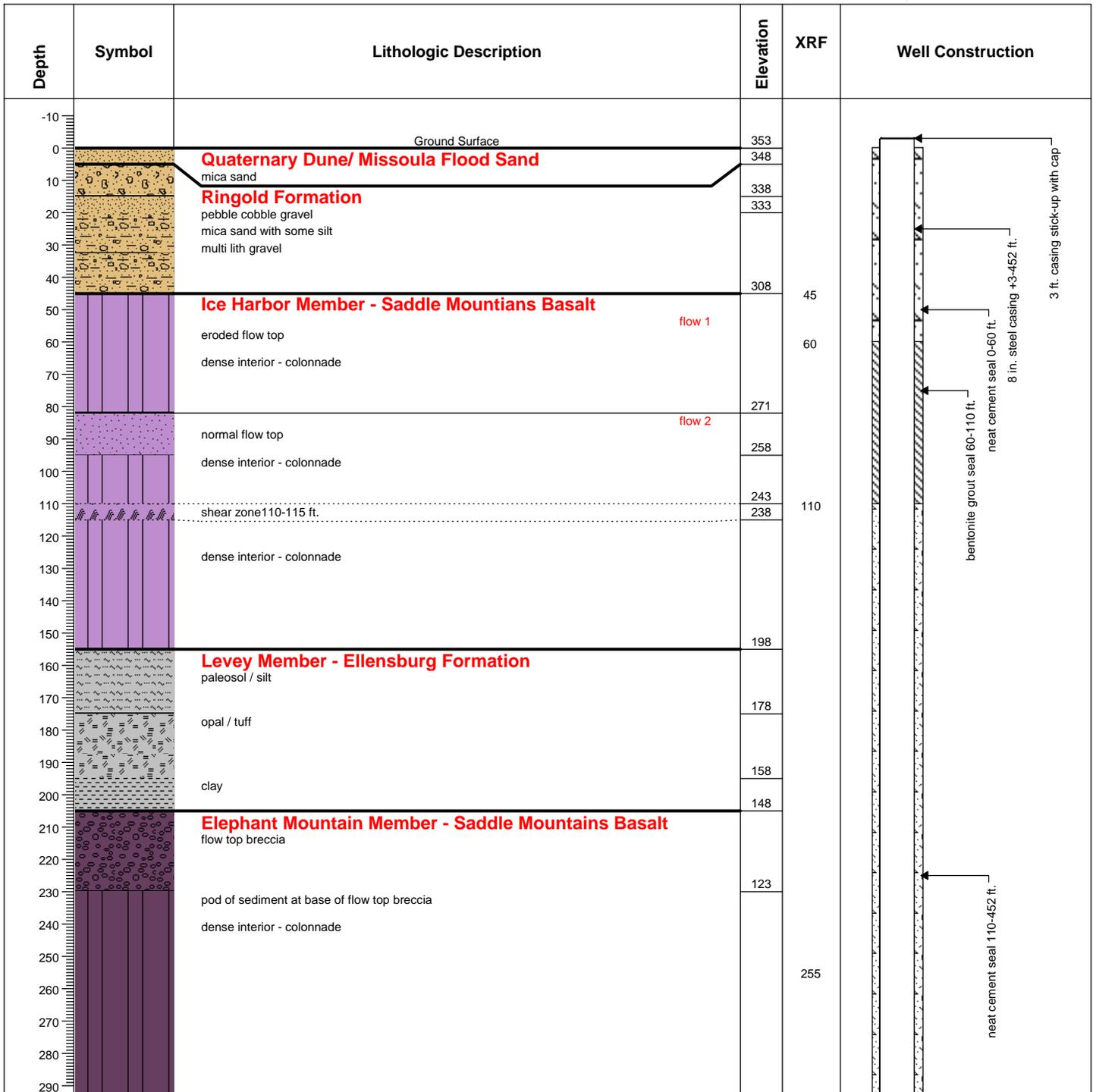
Well ID: BAR 665

Location: Boise Wallula Mill

Geologist: Terry L. Tolan, L.H.G.



1020 N. Center Parkway, Suite F
 Kennewick, Washington 99336
 509-735-7135
 FAX 509-735-7067
 www.gsiwatersolutions.com



Drilled By: Person Pump and Drilling

Total Depth: 558 ft.

Drill Method: Direct Air Rotary

Drill Date: 9-23-2009 to 10-6-2009

Page: 1 of 2

Log of Borehole: OBS Well #2

Also known as:

Project: Boise Thermal ASR

Well ID: BAR 665

Location: Boise Wallula Mill

Geologist: Terry L. Tolan, L.H.G.



1020 N. Center Parkway, Suite F
 Kennewick, Washington 99336
 509-735-7135
 FAX 509-735-7067
 www.gsiwatersolutions.com

Depth	Symbol	Lithologic Description	Elevation	XRF	Well Construction
300			43		
310		Rattlesnake Ridge Member - Ellensburg Formation silt / sand			
320		paleosol			
330					
340					
350					
360			-12		
370		ash / wood / silt			
380			-27		
390		Pomona Member - Saddle Mountains Basalt flow top breccia normal flow top dense interior - entablature	-37 -47	406	
400					
410					
420					
430					
440		dense interior - colonnade	-87		
450		vessicular zone above pillow complex	-98		
460		pillow complex	-107		
470					
480					
490					
500					
510			-162		
520		Unnamed Interbed Member - Ellensburg Formation clay	-167		
530		Pomona Member - Saddle Mountains Basalt normal flow top dense interior - colonnade	-177	550	
540					
550			-205		
560		TD 558 ft.			
570					
580					
590					

Drilled By: Person Pump and Drilling

Total Depth: 558 ft.

Drill Method: Direct Air Rotary

Drill Date: 9-23-2009 to 10-6-2009

Page: 2 of 2

Appendix B

Water Quality and Groundwater Geochemistry Laboratory Reports

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: GSI WATER SOLUTIONS INC
Address: 8019 W. QUINAULT AVE
KENNEWICK, WA 99336
Attn: KEVIN LINDSEY

Batch #: 120229027
Project Name: BOISE ASR 222.004.008

Analytical Results Report

Sample Number	120229027-001	Sampling Date	2/28/2012	Date/Time Received	2/29/2012 11:28 AM
Client Sample ID	RSOURCE-C2-1 PERCENT	Sampling Time	11:30 AM		
Matrix	Drinking Water	Sample Location			
Comments					

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Alkalinity	76.9	mg/L	2	3/13/2012	KFG	SM2320B	
Aluminum	0.0527	mg/L	0.01	3/9/2012	ETL	EPA 200.7	
Antimony	ND	mg/L	0.001	3/5/2012	ETL	EPA 200.8	
Arsenic	ND	mg/L	0.001	3/5/2012	ETL	EPA 200.8	
Barium	0.0289	mg/L	0.001	3/5/2012	ETL	EPA 200.8	
Beryllium	ND	mg/L	0.0003	3/5/2012	ETL	EPA 200.8	
Bicarbonate	76.9	mg/L	2	3/13/2012	KFG	SM2320B	
Cadmium	ND	mg/L	0.001	3/5/2012	ETL	EPA 200.8	
Carbonate	ND	mg/L	5	3/13/2012	KFG	SM2320B	
Chloride	5.79	mg/L	0.1	3/7/2012	JTT	EPA 300.0	
Chromium	ND	mg/L	0.001	3/5/2012	ETL	EPA 200.8	
Copper	0.00107	mg/L	0.001	3/5/2012	ETL	EPA 200.8	
Dissolved Iron	0.0100	mg/L	0.01	3/9/2012	ETL	EPA 200.7	
Dissolved Manganese	0.0338	mg/L	0.01	3/9/2012	ETL	EPA 200.7	
Fluoride	0.111	mg/L	0.1	3/7/2012	JTT	EPA 300.0	
Calcium	22.4	mg/L	0.1	3/9/2012	ETL	EPA 200.7	
Hardness	81.5	mg/L	1	3/9/2012	ETL	EPA 200.7	
Magnesium	6.20	mg/L	0.1	3/9/2012	ETL	EPA 200.7	
Iron	0.102	mg/L	0.01	3/9/2012	ETL	EPA 200.7	
Lead	ND	mg/L	0.001	3/5/2012	ETL	EPA 200.8	
Manganese	0.0518	mg/L	0.01	3/9/2012	ETL	EPA 200.7	
Mercury-ICPMS	ND	mg/L	0.0001	3/5/2012	ETL	EPA 200.8	
Nickel	ND	mg/L	0.001	3/5/2012	ETL	EPA 200.8	
NO3/N	0.297	mg/L	0.1	3/1/2012	JTT	EPA 300.0	
NO3/N+NO2/N	0.297	mg/L	0.1	3/1/2012	JTT	EPA 300.0	
NO2/N	ND	mg/L	0.1	3/1/2012	JTT	EPA 300.0	
Potassium	1.29	mg/L	0.01	3/9/2012	ETL	EPA 200.7	
Selenium	ND	mg/L	0.001	3/5/2012	ETL	EPA 200.8	
Silica (as SiO2)	9.05	mg/L	0.1	3/9/2012	ETL	EPA 200.7	
Silicon	4.23	mg/L	0.1	3/9/2012	ETL	EPA 200.7	
Silver	ND	mg/L	0.001	3/5/2012	ETL	EPA 200.8	
Sodium	7.64	mg/L	0.1	3/9/2012	ETL	EPA 200.7	
TDS	132	mg/L	10	3/6/2012	JTT	SM 2540C	
TSS	4.19	mg/L	1	3/6/2012	JTT	SM 2540D	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C585; MT:Cert0095

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: GSI WATER SOLUTIONS INC
Address: 8019 W. QUINAULT AVE
KENNEWICK, WA 99336
Attn: KEVIN LINDSEY

Batch #: 120229027
Project Name: BOISE ASR 222.004.008

Analytical Results Report

Sample Number	120229027-001	Sampling Date	2/28/2012	Date/Time Received	2/29/2012 11:28 AM		
Client Sample ID	RSOURCE-C2-1 PERCENT	Sampling Time	11:30 AM				
Matrix	Drinking Water	Sample Location					
Comments							
Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Sulfate	14.1	mg/L	0.1	3/7/2012	JTT	EPA 300.0	
Thallium	ND	mg/L	0.001	3/5/2012	ETL	EPA 200.8	
TOC	1.33	mg/L	0.1	3/6/2012	JWC	SM 5310B	
Zinc	0.00252	mg/L	0.001	3/5/2012	ETL	EPA 200.8	

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: GSI WATER SOLUTIONS INC
Address: 8019 W. QUINAULT AVE
KENNEWICK, WA 99336
Attn: KEVIN LINDSEY

Batch #: 120229027
Project Name: BOISE ASR 222.004.008

Analytical Results Report

Sample Number 120229027-002 **Sampling Date** 2/28/2012 **Date/Time Received** 2/29/2012 11:28 AM
Client Sample ID FSOURCE-C2-1 PERCENT **Sampling Time** 12:00 PM
Matrix Drinking Water **Sample Location**
Comments

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Alkalinity	75.3	mg/L	2	3/13/2012	KFG	SM2320B	
Aluminum	ND	mg/L	0.01	3/9/2012	ETL	EPA 200.7	
Antimony	ND	mg/L	0.001	3/5/2012	ETL	EPA 200.8	
Arsenic	ND	mg/L	0.001	3/5/2012	ETL	EPA 200.8	
Barium	0.0276	mg/L	0.001	3/5/2012	ETL	EPA 200.8	
Beryllium	ND	mg/L	0.0003	3/5/2012	ETL	EPA 200.8	
Bicarbonate	75.3	mg/L	2	3/13/2012	KFG	SM2320B	
Cadmium	ND	mg/L	0.001	3/5/2012	ETL	EPA 200.8	
Carbonate	ND	mg/L	5	3/13/2012	KFG	SM2320B	
Chloride	5.94	mg/L	0.1	3/7/2012	JTT	EPA 300.0	
Chromium	ND	mg/L	0.001	3/5/2012	ETL	EPA 200.8	
Copper	ND	mg/L	0.001	3/5/2012	ETL	EPA 200.8	
Dissolved Iron	ND	mg/L	0.01	3/9/2012	ETL	EPA 200.7	
Dissolved Manganese	0.0447	mg/L	0.01	3/9/2012	ETL	EPA 200.7	
Fluoride	0.113	mg/L	0.1	3/7/2012	JTT	EPA 300.0	
Calcium	22.1	mg/L	0.1	3/9/2012	ETL	EPA 200.7	
Hardness	80.3	mg/L	1	3/9/2012	ETL	EPA 200.7	
Magnesium	6.08	mg/L	0.1	3/9/2012	ETL	EPA 200.7	
Iron	ND	mg/L	0.01	3/9/2012	ETL	EPA 200.7	
Lead	ND	mg/L	0.001	3/5/2012	ETL	EPA 200.8	
Manganese	0.0464	mg/L	0.01	3/9/2012	ETL	EPA 200.7	
Mercury-ICPMS	ND	mg/L	0.0001	3/5/2012	ETL	EPA 200.8	
Nickel	ND	mg/L	0.001	3/5/2012	ETL	EPA 200.8	
NO3/N	0.273	mg/L	0.1	3/1/2012	JTT	EPA 300.0	
NO3/N+NO2/N	0.273	mg/L	0.1	3/1/2012	JTT	EPA 300.0	
NO2/N	ND	mg/L	0.1	3/1/2012	JTT	EPA 300.0	
Potassium	1.25	mg/L	0.01	3/9/2012	ETL	EPA 200.7	
Selenium	ND	mg/L	0.001	3/5/2012	ETL	EPA 200.8	
Silica (as SiO2)	8.69	mg/L	0.1	3/9/2012	ETL	EPA 200.7	
Silicon	4.06	mg/L	0.1	3/9/2012	ETL	EPA 200.7	
Silver	ND	mg/L	0.001	3/5/2012	ETL	EPA 200.8	
Sodium	7.40	mg/L	0.1	3/9/2012	ETL	EPA 200.7	
TDS	111	mg/L	10	3/6/2012	JTT	SM 2540C	
TSS	1.00	mg/L	1	3/6/2012	JTT	SM 2540D	
Sulfate	14.0	mg/L	0.1	3/7/2012	JTT	EPA 300.0	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C585; MT:Cert0095

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

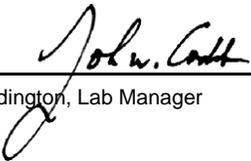
Client: GSI WATER SOLUTIONS INC
Address: 8019 W. QUINAULT AVE
KENNEWICK, WA 99336
Attn: KEVIN LINDSEY

Batch #: 120229027
Project Name: BOISE ASR 222.004.008

Analytical Results Report

Sample Number	120229027-002	Sampling Date	2/28/2012	Date/Time Received	2/29/2012 11:28 AM		
Client Sample ID	FSOURCE-C2-1 PERCENT	Sampling Time	12:00 PM				
Matrix	Drinking Water	Sample Location					
Comments							
Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Thallium	ND	mg/L	0.001	3/5/2012	ETL	EPA 200.8	
TOC	1.22	mg/L	0.1	3/6/2012	JWC	SM 5310B	
Zinc	0.00181	mg/L	0.001	3/5/2012	ETL	EPA 200.8	

Authorized Signature


John Coddington, Lab Manager

MCL EPA's Maximum Contaminant Level
ND Not Detected
PQL Practical Quantitation Limit

This report shall not be reproduced except in full, without the written approval of the laboratory.
The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Login Report

Customer Name: GSI WATER SOLUTIONS INC

Order ID: 120229027

8019 W. QUINAULT AVE

Order Date: 2/29/2012

KENNEWICK

WA

99336

Contact Name: KEVIN LINDSEY

Project Name: BOISE ASR 222.004.008

Comment:

Sample #: 120229027-001 **Customer Sample #:** RSOURCE-C2-1 PERCENT

Recv'd:

Collector: JON

Date Collected: 2/28/2012

Quantity: 4

Matrix: Drinking Water

Date Received: 2/29/2012 11:28:00 A

Comment:

Test	Lab	Method	Due Date	Priority
ALKALINITY	M	SM2320B	3/12/2012	<u>Normal (6-10 Days)</u>
ALUMINUM ICP	M	EPA 200.7	3/12/2012	<u>Normal (6-10 Days)</u>
ANTIMONY	M	EPA 200.8	3/12/2012	<u>Normal (6-10 Days)</u>
ARSENIC	M	EPA 200.8	3/12/2012	<u>Normal (6-10 Days)</u>
BARIIUM	M	EPA 200.8	3/12/2012	<u>Normal (6-10 Days)</u>
BERYLLIUM	M	EPA 200.8	3/12/2012	<u>Normal (6-10 Days)</u>
BICARBONATE	M	SM2320B	3/12/2012	<u>Normal (6-10 Days)</u>
CADMIUM	M	EPA 200.8	3/12/2012	<u>Normal (6-10 Days)</u>
CARBONATE	M	SM2320B	3/12/2012	<u>Normal (6-10 Days)</u>
CHLORIDE	M	EPA 300.0	3/12/2012	<u>Normal (6-10 Days)</u>
CHROMIUM	M	EPA 200.8	3/12/2012	<u>Normal (6-10 Days)</u>
COPPER	M	EPA 200.8	3/12/2012	<u>Normal (6-10 Days)</u>
DISSOLVED IRON BY ICP	M	EPA 200.7	3/12/2012	<u>Normal (6-10 Days)</u>
DISSOLVED MANGANESE BY ICP	M	EPA 200.7	3/12/2012	<u>Normal (6-10 Days)</u>
FLUORIDE	M	EPA 300.0	3/12/2012	<u>Normal (6-10 Days)</u>
HARDNESS by EPA 200.7	M	EPA 200.7	3/12/2012	<u>Normal (6-10 Days)</u>
IRON ICP	M	EPA 200.7	3/12/2012	<u>Normal (6-10 Days)</u>
LEAD	M	EPA 200.8	3/12/2012	<u>Normal (6-10 Days)</u>
MANGANESE ICP	M	EPA 200.7	3/12/2012	<u>Normal (6-10 Days)</u>
MERCURY-ICPMS	M	EPA 200.8	3/12/2012	<u>Normal (6-10 Days)</u>
NICKEL	M	EPA 200.8	3/12/2012	<u>Normal (6-10 Days)</u>
NITRATE/N	M	EPA 300.0	3/12/2012	<u>Normal (6-10 Days)</u>
NITRATE+ NITRITE AS N	M	EPA 300.0	3/12/2012	<u>Normal (6-10 Days)</u>

Customer Name: GSI WATER SOLUTIONS INC
 8019 W. QUINAULT AVE
 KENNEWICK WA 99336

Order ID: 120229027
Order Date: 2/29/2012

Contact Name: KEVIN LINDSEY

Project Name: BOISE ASR 222.004.008

Comment:

NITRITE/N	M	EPA 300.0	3/12/2012	<u>Normal (6-10 Days)</u>
POTASSIUM ICP	M	EPA 200.7	3/12/2012	<u>Normal (6-10 Days)</u>
SELENIUM	M	EPA 200.8	3/12/2012	<u>Normal (6-10 Days)</u>
SILICON ICP	M	EPA 200.7	3/12/2012	<u>Normal (6-10 Days)</u>
SILVER	M	EPA 200.8	3/12/2012	<u>Normal (6-10 Days)</u>
SODIUM ICP	M	EPA 200.7	3/12/2012	<u>Normal (6-10 Days)</u>
SOLIDS - TDS	M	SM 2540C	3/12/2012	<u>Normal (6-10 Days)</u>
SOLIDS - TSS	M	SM 2540D	3/12/2012	<u>Normal (6-10 Days)</u>
SULFATE	M	EPA 300.0	3/12/2012	<u>Normal (6-10 Days)</u>
THALLIUM	M	EPA 200.8	3/12/2012	<u>Normal (6-10 Days)</u>
TOC - MOSC	M	SM 5310B	3/12/2012	<u>Normal (6-10 Days)</u>
ZINC	M	EPA 200.8	3/12/2012	<u>Normal (6-10 Days)</u>

Sample #: 120229027-002 **Customer Sample #:** FSOURCE-C2-1 PERCENT

Recv'd: **Collector:** JON **Date Collected:** 2/28/2012
Quantity: 4 **Matrix:** Drinking Water **Date Received:** 2/29/2012 11:28:00 A

Comment:

Test	Lab	Method	Due Date	Priority
ALKALINITY	M	SM2320B	3/12/2012	<u>Normal (6-10 Days)</u>
ALUMINUM ICP	M	EPA 200.7	3/12/2012	<u>Normal (6-10 Days)</u>
ANTIMONY	M	EPA 200.8	3/12/2012	<u>Normal (6-10 Days)</u>
ARSENIC	M	EPA 200.8	3/12/2012	<u>Normal (6-10 Days)</u>
BARIUM	M	EPA 200.8	3/12/2012	<u>Normal (6-10 Days)</u>
BERYLLIUM	M	EPA 200.8	3/12/2012	<u>Normal (6-10 Days)</u>
BICARBONATE	M	SM2320B	3/12/2012	<u>Normal (6-10 Days)</u>
CADMIUM	M	EPA 200.8	3/12/2012	<u>Normal (6-10 Days)</u>
CARBONATE	M	SM2320B	3/12/2012	<u>Normal (6-10 Days)</u>
CHLORIDE	M	EPA 300.0	3/12/2012	<u>Normal (6-10 Days)</u>
CHROMIUM	M	EPA 200.8	3/12/2012	<u>Normal (6-10 Days)</u>
COPPER	M	EPA 200.8	3/12/2012	<u>Normal (6-10 Days)</u>
DISSOLVED IRON BY ICP	M	EPA 200.7	3/12/2012	<u>Normal (6-10 Days)</u>
DISSOLVED MANGANESE BY ICP	M	EPA 200.7	3/12/2012	<u>Normal (6-10 Days)</u>
FLUORIDE	M	EPA 300.0	3/12/2012	<u>Normal (6-10 Days)</u>
HARDNESS by EPA 200.7	M	EPA 200.7	3/12/2012	<u>Normal (6-10 Days)</u>
IRON ICP	M	EPA 200.7	3/12/2012	<u>Normal (6-10 Days)</u>
LEAD	M	EPA 200.8	3/12/2012	<u>Normal (6-10 Days)</u>

Customer Name: GSI WATER SOLUTIONS INC
8019 W. QUINAULT AVE
KENNEWICK WA 99336

Order ID: 120229027
Order Date: 2/29/2012

Contact Name: KEVIN LINDSEY

Project Name: BOISE ASR 222.004.008

Comment:

MANGANESE ICP	M	EPA 200.7	3/12/2012	<u>Normal (6-10 Days)</u>
MERCURY-ICPMS	M	EPA 200.8	3/12/2012	<u>Normal (6-10 Days)</u>
NICKEL	M	EPA 200.8	3/12/2012	<u>Normal (6-10 Days)</u>
NITRATE/N	M	EPA 300.0	3/12/2012	<u>Normal (6-10 Days)</u>
NITRATE+ NITRITE AS N	M	EPA 300.0	3/12/2012	<u>Normal (6-10 Days)</u>
NITRITE/N	M	EPA 300.0	3/12/2012	<u>Normal (6-10 Days)</u>
POTASSIUM ICP	M	EPA 200.7	3/12/2012	<u>Normal (6-10 Days)</u>
SELENIUM	M	EPA 200.8	3/12/2012	<u>Normal (6-10 Days)</u>
SILICON ICP	M	EPA 200.7	3/12/2012	<u>Normal (6-10 Days)</u>
SILVER	M	EPA 200.8	3/12/2012	<u>Normal (6-10 Days)</u>
SODIUM ICP	M	EPA 200.7	3/12/2012	<u>Normal (6-10 Days)</u>
SOLIDS - TDS	M	SM 2540C	3/12/2012	<u>Normal (6-10 Days)</u>
SOLIDS - TSS	M	SM 2540D	3/12/2012	<u>Normal (6-10 Days)</u>
SULFATE	M	EPA 300.0	3/12/2012	<u>Normal (6-10 Days)</u>
THALLIUM	M	EPA 200.8	3/12/2012	<u>Normal (6-10 Days)</u>
TOC - MOSC	M	SM 5310B	3/12/2012	<u>Normal (6-10 Days)</u>
ZINC	M	EPA 200.8	3/12/2012	<u>Normal (6-10 Days)</u>

SAMPLE CONDITION RECORD

Samples received in a cooler?	Yes
Samples received intact?	Yes
What is the temperature inside the cooler?	3.7
Samples received with a COC?	Yes
Samples received within holding time?	Yes
Are all sample bottles properly preserved?	Yes
Are VOC samples free of headspace?	N/A
Is there a trip blank to accompany VOC samples?	N/A
Labels and chain agree?	Yes

Table 2. Measurement Quality Objectives for Water Samples
Boise Paper ASR Project

Analyte	LCOMT Regulatory Standard	Units	Regulatory Criteria	MRL	Analysis Method	QA/QC Frequency and Limits											
						Surrogate	Laboratory Duplicate	Matrix Spike	Matrix Spike Duplicate	Lab. Control Sample	Lab. Control Sample Duplicate						
						Frequency	Frequency	Frequency	Frequency	Frequency	Frequency	Frequency	Frequency	Frequency	Frequency		
Barium	None	mg/L	None	5	SM 2320B	N/A	120	20	120	20	120	20	120	20	120	N/A	N/A
Beryllium	None	mg/L	None	0.001	EPA 200.8	N/A	120	20	120	20	120	20	120	20	120	N/A	N/A
Bromine	None	mg/L	None	5	SM 2320B	N/A	120	20	120	20	120	20	120	20	120	N/A	N/A
Chloride	250	mg/L	GC, SMCL	10	EPA 200.0	N/A	120	20	120	20	120	20	120	20	120	N/A	N/A
Chloride (as CaCO3)	None	mg/L	None	0.1	SM 2340B	N/A	120	20	120	20	120	20	120	20	120	N/A	N/A
Hardness (as CaCO3)	None	mg/L	None	0.1	EPA 200.8	N/A	120	20	120	20	120	20	120	20	120	N/A	N/A
Magnesium	None	mg/L	None	0.1	EPA 200.8	N/A	120	20	120	20	120	20	120	20	120	N/A	N/A
Nitrate as N	10	mg/L	GC, MCL	0.1	EPA 200.8	N/A	120	20	120	20	120	20	120	20	120	N/A	N/A
Total Nitrate-Nitrite	10	mg/L	GC, MCL	0.1	EPA 200.8	N/A	120	20	120	20	120	20	120	20	120	N/A	N/A
Phosphorus	None	mg/L	None	0.1	EPA 200.8	N/A	120	20	120	20	120	20	120	20	120	N/A	N/A
Sulfate	None	mg/L	None	0.1	EPA 200.8	N/A	120	20	120	20	120	20	120	20	120	N/A	N/A
Total Dissolved Carbon	250	mg/L	None	0.1	SM 3111B	N/A	120	20	120	20	120	20	120	20	120	N/A	N/A
Total Dissolved Solids	500	mg/L	None	0.1	EPA 200.8	N/A	120	20	120	20	120	20	120	20	120	N/A	N/A
Total Suspended Solids (TSS)	None	mg/L	None	0.5	EPA 160.1	N/A	120	20	120	20	120	20	120	20	120	N/A	N/A
Aluminum	0.05 - 0.2	mg/L	None	1	EPA 160.2	N/A	120	20	120	20	120	20	120	20	120	N/A	N/A
Antimony	0.006	mg/L	SMCL	0.001	EPA 200.8	N/A	120	20	120	20	120	20	120	20	120	N/A	N/A
Arsenic	0.00005	mg/L	GC	0.001	EPA 200.8	N/A	120	20	120	20	120	20	120	20	120	N/A	N/A
Barium	1	mg/L	GC	0.001	EPA 200.8	N/A	120	20	120	20	120	20	120	20	120	N/A	N/A
Beryllium	0.004	mg/L	MCL	0.001	EPA 200.8	N/A	120	20	120	20	120	20	120	20	120	N/A	N/A
Cadmium	0.005	mg/L	MCL	0.001	EPA 200.8	N/A	120	20	120	20	120	20	120	20	120	N/A	N/A
Chromium	0.65	mg/L	GC	0.001	EPA 200.8	N/A	120	20	120	20	120	20	120	20	120	N/A	N/A
Copper	1	mg/L	GC, SMCL	0.001	EPA 200.8	N/A	120	20	120	20	120	20	120	20	120	N/A	N/A
Iron (Total)	None	mg/L	None	0.01	EPA 200.8	N/A	120	20	120	20	120	20	120	20	120	N/A	N/A
Iron (Dissolved)	0.3	mg/L	GC, SMCL	0.01	EPA 200.8	N/A	120	20	120	20	120	20	120	20	120	N/A	N/A
Lead	0.015	mg/L	MCL	0.001	EPA 200.8	N/A	120	20	120	20	120	20	120	20	120	N/A	N/A
Manganese (Total)	None	mg/L	None	0.001	EPA 200.8	N/A	120	20	120	20	120	20	120	20	120	N/A	N/A
Manganese (Dissolved)	0.05	mg/L	GC, SMCL	0.001	EPA 200.8	N/A	120	20	120	20	120	20	120	20	120	N/A	N/A
Mercury	0.002	mg/L	GC, MCL	0.001	EPA 200.8	N/A	120	20	120	20	120	20	120	20	120	N/A	N/A
Nickel	None	mg/L	None	0.001	EPA 200.8	N/A	120	20	120	20	120	20	120	20	120	N/A	N/A
Selenium	0.01	mg/L	GC	0.001	EPA 200.8	N/A	120	20	120	20	120	20	120	20	120	N/A	N/A
Silver	0.05	mg/L	GC	0.001	EPA 200.8	N/A	120	20	120	20	120	20	120	20	120	N/A	N/A
Thallium	0.002	mg/L	MCL	0.001	EPA 200.8	N/A	120	20	120	20	120	20	120	20	120	N/A	N/A
Zinc	5	mg/L	GC, SMCL	0.001	EPA 200.8	N/A	120	20	120	20	120	20	120	20	120	N/A	N/A

NOTE: All items are for MRL = Milligram per liter MCL = Maximum Reporting Limit from Arsenic Laboratories ND = Not detected at concentrations greater than the MCL NT = Analyte not tested MCL = Federal maximum contaminant level for drinking water SMCL = Federal secondary maximum contaminant level for drinking water GC = Washington Groundwater Quality Criteria (WAGQC 175-200-040) 1 = These compounds would be analyzed if Gross Alpha or Beta exceed an MCL. Matrix spike duplicates generally fill lab duplicate requirements N/A = Not Applicable TBD = To be determined

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: GSI WATER SOLUTIONS INC
Address: 8019 W. QUINAULT AVE
KENNEWICK, WA 99336
Attn: JON TRAVIS

Batch #: 120619037
Project Name: BOISE

Analytical Results Report

Sample Number	120619037-001	Sampling Date	6/18/2012	Date/Time Received	6/19/2012 11:55 AM
Client Sample ID	C2-OBS2-STOR50	Sampling Time	1:50 PM		
Matrix	Drinking Water	Sample Location			
Comments					

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Alkalinity	117	mg CaCO3/L	2	6/29/2012	ETL	SM2320B	
Aluminum	ND	mg/L	0.01	6/26/2012	ETL	EPA 200.7	
Antimony	ND	mg/L	0.001	6/29/2012	JTT	EPA 200.8	
Arsenic	ND	mg/L	0.001	6/29/2012	JTT	EPA 200.8	
Barium	0.0128	mg/L	0.001	6/29/2012	JTT	EPA 200.8	
Beryllium	ND	mg/L	0.0003	6/29/2012	JTT	EPA 200.8	
Bicarbonate	117	mg CaCO3/L	2	6/29/2012	ETL	SM2320B	
Cadmium	ND	mg/L	0.001	6/29/2012	JTT	EPA 200.8	
Carbonate	ND	mg CaCO3/L	5	6/29/2012	ETL	SM2320B	
Chloride	16.3	mg/L	0.1	6/19/2012	JTT	EPA 300.0	
Chromium	ND	mg/L	0.001	6/29/2012	JTT	EPA 200.8	
Copper	ND	mg/L	0.001	6/29/2012	JTT	EPA 200.8	
Dissolved Iron	0.0122	mg/L	0.01	6/26/2012	ETL	EPA 200.7	
Dissolved Manganese	ND	mg/L	0.01	6/26/2012	ETL	EPA 200.7	
Fluoride	3.37	mg/L	0.1	6/19/2012	JTT	EPA 300.0	
Calcium	2.35	mg/L	0.1	6/26/2012	ETL	EPA 200.7	
Hardness	6.32	mg/L	1	6/26/2012	ETL	EPA 200.7	
Magnesium	0.109	mg/L	0.1	6/26/2012	ETL	EPA 200.7	
Iron	0.0259	mg/L	0.01	6/26/2012	ETL	EPA 200.7	
Lead	ND	mg/L	0.001	6/29/2012	JTT	EPA 200.8	
Manganese	ND	mg/L	0.01	6/26/2012	ETL	EPA 200.7	
Mercury-ICPMS	ND	mg/L	0.0001	7/3/2012	ETL	EPA 200.8	
Nickel	ND	mg/L	0.001	6/29/2012	JTT	EPA 200.8	
NO3/N	ND	mg/L	0.1	6/19/2012	JTT	EPA 300.0	
NO3/N+NO2/N	ND	mg/L	0.1	6/19/2012	JTT	EPA 300.0	
NO2/N	ND	mg/L	0.1	6/19/2012	JTT	EPA 300.0	
Potassium	8.17	mg/L	0.01	6/26/2012	ETL	EPA 200.7	
Selenium	0.0150	mg/L	0.001	6/29/2012	JTT	EPA 200.8	
Silica (as SiO2)	80.7	mg/L	0.1	6/26/2012	ETL	EPA 200.7	
Silicon	37.7	mg/L	0.1	6/26/2012	ETL	EPA 200.7	
Silver	ND	mg/L	0.001	6/29/2012	JTT	EPA 200.8	
Sodium	52.1	mg/L	0.1	6/26/2012	ETL	EPA 200.7	
TDS	240	mg/L	10	6/25/2012	JTT	SM 2540C	
TSS	ND	mg/L	1	6/25/2012	ETL	SM 2540D	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: GSI WATER SOLUTIONS INC
Address: 8019 W. QUINAULT AVE
KENNEWICK, WA 99336
Attn: JON TRAVIS

Batch #: 120619037
Project Name: BOISE

Analytical Results Report

Sample Number	120619037-001	Sampling Date	6/18/2012	Date/Time Received	6/19/2012 11:55 AM		
Client Sample ID	C2-OBS2-STOR50	Sampling Time	1:50 PM				
Matrix	Drinking Water	Sample Location					
Comments							
Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Sulfate	4.37	mg/L	0.1	6/19/2012	JTT	EPA 300.0	
Thallium	ND	mg/L	0.001	6/29/2012	JTT	EPA 200.8	
TOC	0.623	mg/L	0.1	6/21/2012	JWC	SM 5310B	
Zinc	0.00228	mg/L	0.001	6/29/2012	JTT	EPA 200.8	

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: GSI WATER SOLUTIONS INC
Address: 8019 W. QUINAULT AVE
KENNEWICK, WA 99336
Attn: JON TRAVIS

Batch #: 120619037
Project Name: BOISE

Analytical Results Report

Sample Number 120619037-002 **Sampling Date** 6/18/2012 **Date/Time Received** 6/19/2012 11:55 AM
Client Sample ID C2-ASR5-STOR50 **Sampling Time** 1:00 PM
Matrix Drinking Water **Sample Location**
Comments

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Alkalinity	103	mg CaCO3/L	2	6/29/2012	ETL	SM2320B	
Aluminum	ND	mg/L	0.01	6/26/2012	ETL	EPA 200.7	
Antimony	ND	mg/L	0.001	6/29/2012	JTT	EPA 200.8	
Arsenic	0.00133	mg/L	0.001	6/29/2012	JTT	EPA 200.8	
Barium	0.0226	mg/L	0.001	6/29/2012	JTT	EPA 200.8	
Beryllium	ND	mg/L	0.0003	6/29/2012	JTT	EPA 200.8	
Bicarbonate	103	mg CaCO3/L	2	6/29/2012	ETL	SM2320B	
Cadmium	ND	mg/L	0.001	6/29/2012	JTT	EPA 200.8	
Carbonate	ND	mg CaCO3/L	5	6/29/2012	ETL	SM2320B	
Chloride	16.3	mg/L	0.1	6/19/2012	JTT	EPA 300.0	
Chromium	ND	mg/L	0.001	6/29/2012	JTT	EPA 200.8	
Copper	ND	mg/L	0.001	6/29/2012	JTT	EPA 200.8	
Dissolved Iron	0.0340	mg/L	0.01	6/26/2012	ETL	EPA 200.7	
Dissolved Manganese	0.0328	mg/L	0.01	6/26/2012	ETL	EPA 200.7	
Fluoride	3.04	mg/L	0.1	6/19/2012	JTT	EPA 300.0	
Calcium	9.24	mg/L	0.1	6/26/2012	ETL	EPA 200.7	
Hardness	32.0	mg/L	1	6/26/2012	ETL	EPA 200.7	
Magnesium	2.17	mg/L	0.1	6/26/2012	ETL	EPA 200.7	
Iron	0.0482	mg/L	0.01	6/26/2012	ETL	EPA 200.7	
Lead	ND	mg/L	0.001	6/29/2012	JTT	EPA 200.8	
Manganese	0.0341	mg/L	0.01	6/26/2012	ETL	EPA 200.7	
Mercury-ICPMS	ND	mg/L	0.0001	7/3/2012	ETL	EPA 200.8	
Nickel	ND	mg/L	0.001	6/29/2012	JTT	EPA 200.8	
NO3/N	ND	mg/L	0.1	6/19/2012	JTT	EPA 300.0	
NO3/N+NO2/N	ND	mg/L	0.1	6/19/2012	JTT	EPA 300.0	
NO2/N	ND	mg/L	0.1	6/19/2012	JTT	EPA 300.0	
Potassium	4.13	mg/L	0.01	6/26/2012	ETL	EPA 200.7	
Selenium	0.00107	mg/L	0.001	6/29/2012	JTT	EPA 200.8	
Silica (as SiO2)	63.3	mg/L	0.1	6/26/2012	ETL	EPA 200.7	
Silicon	29.6	mg/L	0.1	6/26/2012	ETL	EPA 200.7	
Silver	ND	mg/L	0.001	6/29/2012	JTT	EPA 200.8	
Sodium	40.2	mg/L	0.1	6/26/2012	ETL	EPA 200.7	
TDS	215	mg/L	10	6/25/2012	JTT	SM 2540C	
TSS	ND	mg/L	1	6/25/2012	ETL	SM 2540D	
Sulfate	5.48	mg/L	0.1	6/19/2012	JTT	EPA 300.0	

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: GSI WATER SOLUTIONS INC
Address: 8019 W. QUINAULT AVE
KENNEWICK, WA 99336
Attn: JON TRAVIS

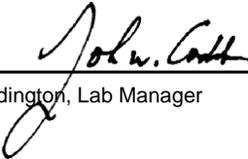
Batch #: 120619037
Project Name: BOISE

Analytical Results Report

Sample Number	120619037-002	Sampling Date	6/18/2012	Date/Time Received	6/19/2012 11:55 AM
Client Sample ID	C2-ASR5-STOR50	Sampling Time	1:00 PM		
Matrix	Drinking Water	Sample Location			
Comments					

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Thallium	ND	mg/L	0.001	6/29/2012	JTT	EPA 200.8	
TOC	1.08	mg/L	0.1	6/21/2012	JWC	SM 5310B	
Zinc	0.00646	mg/L	0.001	6/29/2012	JTT	EPA 200.8	

Authorized Signature



John Coddington, Lab Manager

MCL EPA's Maximum Contaminant Level
ND Not Detected
PQL Practical Quantitation Limit

This report shall not be reproduced except in full, without the written approval of the laboratory.
The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Login Report

Customer Name: GSI WATER SOLUTIONS INC

Order ID: 120619037

8019 W. QUINAULT AVE

Order Date: 6/19/2012

KENNEWICK

WA

99336

Contact Name: JON TRAVIS

Project Name: BOISE

Comment:

Sample #: 120619037-001 **Customer Sample #:** C2-OBS2-STOR50

Recv'd:

Collector: JON

Date Collected: 6/18/2012

Quantity: 4

Matrix: Drinking Water

Date Received: 6/19/2012 11:55:00 A

Comment:

Test	Lab	Method	Due Date	Priority
ALKALINITY	M	SM2320B	6/29/2012	<u>Normal (6-10 Days)</u>
ALUMINUM ICP	M	EPA 200.7	6/29/2012	<u>Normal (6-10 Days)</u>
ANTIMONY	M	EPA 200.8	6/29/2012	<u>Normal (6-10 Days)</u>
ARSENIC	M	EPA 200.8	6/29/2012	<u>Normal (6-10 Days)</u>
BARIUM	M	EPA 200.8	6/29/2012	<u>Normal (6-10 Days)</u>
BERYLLIUM	M	EPA 200.8	6/29/2012	<u>Normal (6-10 Days)</u>
BICARBONATE	M	SM2320B	6/29/2012	<u>Normal (6-10 Days)</u>
CADMIUM	M	EPA 200.8	6/29/2012	<u>Normal (6-10 Days)</u>
CARBONATE	M	SM2320B	6/29/2012	<u>Normal (6-10 Days)</u>
CHLORIDE	M	EPA 300.0	6/29/2012	<u>Normal (6-10 Days)</u>
CHROMIUM	M	EPA 200.8	6/29/2012	<u>Normal (6-10 Days)</u>
COPPER	M	EPA 200.8	6/29/2012	<u>Normal (6-10 Days)</u>
DISSOLVED IRON BY ICP	M	EPA 200.7	6/29/2012	<u>Normal (6-10 Days)</u>
DISSOLVED MANGANESE BY ICP	M	EPA 200.7	6/29/2012	<u>Normal (6-10 Days)</u>
FLUORIDE	M	EPA 300.0	6/29/2012	<u>Normal (6-10 Days)</u>
HARDNESS by EPA 200.7	M	EPA 200.7	6/29/2012	<u>Normal (6-10 Days)</u>
IRON ICP	M	EPA 200.7	6/29/2012	<u>Normal (6-10 Days)</u>
LEAD	M	EPA 200.8	6/29/2012	<u>Normal (6-10 Days)</u>
MANGANESE ICP	M	EPA 200.7	6/29/2012	<u>Normal (6-10 Days)</u>
MERCURY-ICPMS	M	EPA 200.8	6/29/2012	<u>Normal (6-10 Days)</u>
NICKEL	M	EPA 200.8	6/29/2012	<u>Normal (6-10 Days)</u>
NITRATE/N	M	EPA 300.0	6/29/2012	<u>Normal (6-10 Days)</u>
NITRATE+ NITRITE AS N	M	EPA 300.0	6/29/2012	<u>Normal (6-10 Days)</u>

Customer Name: GSI WATER SOLUTIONS INC
 8019 W. QUINAULT AVE
 KENNEWICK WA 99336

Order ID: 120619037
Order Date: 6/19/2012

Contact Name: JON TRAVIS

Project Name: BOISE

Comment:

NITRITE/N	M	EPA 300.0	6/29/2012	<u>Normal (6-10 Days)</u>
POTASSIUM ICP	M	EPA 200.7	6/29/2012	<u>Normal (6-10 Days)</u>
SELENIUM	M	EPA 200.8	6/29/2012	<u>Normal (6-10 Days)</u>
SILICON ICP	M	EPA 200.7	6/29/2012	<u>Normal (6-10 Days)</u>
SILVER	M	EPA 200.8	6/29/2012	<u>Normal (6-10 Days)</u>
SODIUM ICP	M	EPA 200.7	6/29/2012	<u>Normal (6-10 Days)</u>
SOLIDS - TDS	M	SM 2540C	6/29/2012	<u>Normal (6-10 Days)</u>
SOLIDS - TSS	M	SM 2540D	6/29/2012	<u>Normal (6-10 Days)</u>
SULFATE	M	EPA 300.0	6/29/2012	<u>Normal (6-10 Days)</u>
THALLIUM	M	EPA 200.8	6/29/2012	<u>Normal (6-10 Days)</u>
TOC - MOSC	M	SM 5310B	6/29/2012	<u>Normal (6-10 Days)</u>
ZINC	M	EPA 200.8	6/29/2012	<u>Normal (6-10 Days)</u>

Sample #: 120619037-002 **Customer Sample #:** C2-ASR5-STOR50

Recv'd: **Collector:** JON **Date Collected:** 6/18/2012
Quantity: 4 **Matrix:** Drinking Water **Date Received:** 6/19/2012 11:55:00 A

Comment:

Test	Lab	Method	Due Date	Priority
ALKALINITY	M	SM2320B	6/29/2012	<u>Normal (6-10 Days)</u>
ALUMINUM ICP	M	EPA 200.7	6/29/2012	<u>Normal (6-10 Days)</u>
ANTIMONY	M	EPA 200.8	6/29/2012	<u>Normal (6-10 Days)</u>
ARSENIC	M	EPA 200.8	6/29/2012	<u>Normal (6-10 Days)</u>
BARIUM	M	EPA 200.8	6/29/2012	<u>Normal (6-10 Days)</u>
BERYLLIUM	M	EPA 200.8	6/29/2012	<u>Normal (6-10 Days)</u>
BICARBONATE	M	SM2320B	6/29/2012	<u>Normal (6-10 Days)</u>
CADMIUM	M	EPA 200.8	6/29/2012	<u>Normal (6-10 Days)</u>
CARBONATE	M	SM2320B	6/29/2012	<u>Normal (6-10 Days)</u>
CHLORIDE	M	EPA 300.0	6/29/2012	<u>Normal (6-10 Days)</u>
CHROMIUM	M	EPA 200.8	6/29/2012	<u>Normal (6-10 Days)</u>
COPPER	M	EPA 200.8	6/29/2012	<u>Normal (6-10 Days)</u>
DISSOLVED IRON BY ICP	M	EPA 200.7	6/29/2012	<u>Normal (6-10 Days)</u>
DISSOLVED MANGANESE BY ICP	M	EPA 200.7	6/29/2012	<u>Normal (6-10 Days)</u>
FLUORIDE	M	EPA 300.0	6/29/2012	<u>Normal (6-10 Days)</u>
HARDNESS by EPA 200.7	M	EPA 200.7	6/29/2012	<u>Normal (6-10 Days)</u>
IRON ICP	M	EPA 200.7	6/29/2012	<u>Normal (6-10 Days)</u>
LEAD	M	EPA 200.8	6/29/2012	<u>Normal (6-10 Days)</u>

Customer Name: GSI WATER SOLUTIONS INC
8019 W. QUINAULT AVE
KENNEWICK WA 99336

Order ID: 120619037
Order Date: 6/19/2012

Contact Name: JON TRAVIS

Project Name: BOISE

Comment:

MANGANESE ICP	M	EPA 200.7	6/29/2012	<u>Normal (6-10 Days)</u>
MERCURY-ICPMS	M	EPA 200.8	6/29/2012	<u>Normal (6-10 Days)</u>
NICKEL	M	EPA 200.8	6/29/2012	<u>Normal (6-10 Days)</u>
NITRATE/N	M	EPA 300.0	6/29/2012	<u>Normal (6-10 Days)</u>
NITRATE+ NITRITE AS N	M	EPA 300.0	6/29/2012	<u>Normal (6-10 Days)</u>
NITRITE/N	M	EPA 300.0	6/29/2012	<u>Normal (6-10 Days)</u>
POTASSIUM ICP	M	EPA 200.7	6/29/2012	<u>Normal (6-10 Days)</u>
SELENIUM	M	EPA 200.8	6/29/2012	<u>Normal (6-10 Days)</u>
SILICON ICP	M	EPA 200.7	6/29/2012	<u>Normal (6-10 Days)</u>
SILVER	M	EPA 200.8	6/29/2012	<u>Normal (6-10 Days)</u>
SODIUM ICP	M	EPA 200.7	6/29/2012	<u>Normal (6-10 Days)</u>
SOLIDS - TDS	M	SM 2540C	6/29/2012	<u>Normal (6-10 Days)</u>
SOLIDS - TSS	M	SM 2540D	6/29/2012	<u>Normal (6-10 Days)</u>
SULFATE	M	EPA 300.0	6/29/2012	<u>Normal (6-10 Days)</u>
THALLIUM	M	EPA 200.8	6/29/2012	<u>Normal (6-10 Days)</u>
TOC - MOSC	M	SM 5310B	6/29/2012	<u>Normal (6-10 Days)</u>
ZINC	M	EPA 200.8	6/29/2012	<u>Normal (6-10 Days)</u>

SAMPLE CONDITION RECORD

Samples received in a cooler?	Yes
Samples received intact?	Yes
What is the temperature inside the cooler?	6.0
Samples received with a COC?	Yes
Samples received within holding time?	Yes
Are all sample bottles properly preserved?	Yes
Are VOC samples free of headspace?	N/A
Is there a trip blank to accompany VOC samples?	N/A
Labels and chain agree?	Yes

Table 2. Measurement Quality Objectives for Water Samples
Boise Paper ASR Project

Geochemical	Analyte	Lowest Regulatory Standard	Units	Regulatory Criteria	MRL	Analysis Method
	Bicarbonate	None	mg/L	None	5	SM 2320B
	Calcium	None	mg/L	None	0.1	EPA 200.8
	Carbonate	None	mg/L	None	5	SM 2320B
	Chloride	250	mg/L	GQC, SMCL	0.1	EPA 200.8
	Hardness (as CaCO ₃)	None	mg/L	None	0.1	SM 2408
	Magnesium	None	mg/L	None	0.1	EPA 200.8
	Nitrate as N	10	mg/L	GQC, HCL	0.1	EPA 300.0
	Nitrite as N	10	mg/L	GQC, HCL	0.1	EPA 300.0
	Total Nitrate-Nitrite	None	mg/L	None	0.1	EPA 200.8
	Potassium	None	mg/L	None	0.1	EPA 200.8
	Silica	None	mg/L	None	0.1	SM 3111B
	Sulfate	250	mg/L	GQC, SMCL	0.1	EPA 200.8
	Fluoride	2	mg/L	SMCL	0.1	EPA 300.0
	Total Alkalinity	None	mg/L	None	5	SM 2320B
	Total Dissolved Solid	500	mg/L	GQC, SMCL	10	EPA 160.1
	Total Organic Carbon	None	mg/L	None	6.5	SM 5310C
	Total Suspended Solids (TSS)	None	mg/L	None	1	EPA 160.2
	Aluminum	0.05 - 0.2	mg/L	SMCL	0.01	EPA 200.8
	Arsenic	0.006	mg/L	MCL	0.001	EPA 200.8
	Beryllium	0.00005	mg/L	GQC	0.001	EPA 200.8
	Boron	1	mg/L	GQC	0.001	EPA 200.8
	Cadmium	0.004	mg/L	MCL	0.001	EPA 200.8
	Chromium	0.005	mg/L	MCL	0.001	EPA 200.8
	Chromium	0.05	mg/L	GQC	0.001	EPA 200.8
	Copper	1	mg/L	GQC, SMCL	0.001	EPA 200.8
	Iron (Total)	None	mg/L	None	0.1	EPA 200.8
	Iron (Dissolved)	0.3	mg/L	GQC, SMCL	0.01	EPA 200.8
	Lead	0.015	mg/L	MCL	0.001	EPA 200.8
	Manganese (Total)	None	mg/L	None	0.001	EPA 200.8
	Manganese (Dissolved)	0.05	mg/L	GQC, SMCL	0.001	EPA 200.8
	Mercury	0.002	mg/L	GQC, MCL	0.0001	EPA 200.8
	Nickel	None	mg/L	None	0.001	EPA 200.8
	Selenium	0.01	mg/L	GQC	0.001	EPA 200.8
	Silver	0.05	mg/L	MCL	0.001	EPA 200.8
	Thallium	0.002	mg/L	MCL	0.001	EPA 200.8
	Zinc	5	mg/L	GQC, SMCL	0.001	EPA 200.8

NOTE

MRL = milligram per liter
 None = Not detected
 ND = Not detected at concentrations greater than the MDL
 NI = Analyte not listed
 MCL = Federal maximum contaminant level for drinking water
 SMCL = Federal secondary maximum contaminant level for drinking water
 GQC = Washington Groundwater Quality Criteria (WAGC 173-200-040)
 None = Not detected
 Samples are unfiltered unless noted (i.e., filtered)
 TSS = To be determined

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: GSI WATER SOLUTIONS INC
Address: 8019 W. QUINAULT AVE
KENNEWICK, WA 99336
Attn: JON TRAVIS

Batch #: 120928047
Project Name: BOISE

Analytical Results Report

Sample Number 120928047-001 **Sampling Date** 9/27/2012 **Date/Time Received** 9/28/2012 11:20 A
Client Sample ID C2-OBS2-REC-FINAL **Sampling Time** 3:30 PM
Matrix Drinking Water **Sample Location**
Comments RADIOLOGICAL ANALYSES PERFORMED BY PACE ANALYTICAL, GREENSBURG PA

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Alkalinity	76.8	mg CaCO3/L	2	10/2/2012	ETL	SM2320B	
Aluminum	ND	mg/L	0.01	10/11/2012	ETL	EPA 200.7	
Antimony	ND	mg/L	0.001	10/11/2012	ETL	EPA 200.8	
Arsenic	ND	mg/L	0.001	10/11/2012	ETL	EPA 200.8	
Barium	0.0123	mg/L	0.001	10/11/2012	ETL	EPA 200.8	
Beryllium	ND	mg/L	0.0003	10/11/2012	ETL	EPA 200.8	
Bicarbonate	76.8	mg CaCO3/L	2	10/2/2012	ETL	SM2320B	
Cadmium	ND	mg/L	0.001	10/11/2012	ETL	EPA 200.8	
Carbonate	ND	mg CaCO3/L	5	10/2/2012	ETL	SM2320B	
Chloride	17.9	mg/L	0.1	9/28/2012	JTT	EPA 300.0	
Chromium	0.00147	mg/L	0.001	10/11/2012	ETL	EPA 200.8	
Copper	0.00926	mg/L	0.001	10/11/2012	ETL	EPA 200.8	
Dissolved Iron	0.0172	mg/L	0.01	10/8/2012	ETL	EPA 200.7	
Dissolved Manganese	ND	mg/L	0.01	10/8/2012	ETL	EPA 200.7	
1,2-Dibromoethane (EDB)	ND	ug/L	0.01	10/2/2012	MAH	EPA 504.1	
Fluoride	3.22	mg/L	0.1	9/28/2012	JTT	EPA 300.0	
Gross Alpha	-0.030 +/- 0.521	pCi/L	0.960	10/8/2012	SUB	EPA 900.0	
Gross Beta	7.95 +/- 0.600	pCi/L	0.729	10/8/2012	SUB	EPA 900.0	
Calcium	2.22	mg/L	0.1	10/11/2012	ETL	EPA 200.7	
Hardness	5.99	mg/L	1	10/11/2012	ETL	EPA 200.7	
Magnesium	0.107	mg/L	0.1	10/11/2012	ETL	EPA 200.7	
2,4,5-TP (Silvex)	ND	ug/L	0.1	10/5/2012	MAH	EPA 515.3	
2,4-D	ND	ug/L	0.1	10/5/2012	MAH	EPA 515.3	
Iron	0.0414	mg/L	0.01	10/11/2012	ETL	EPA 200.7	
Lead	ND	mg/L	0.001	10/11/2012	ETL	EPA 200.8	
Manganese	ND	mg/L	0.01	10/11/2012	ETL	EPA 200.7	
Mercury-ICPMS	ND	mg/L	0.0001	10/11/2012	ETL	EPA 200.8	
Nickel	ND	mg/L	0.001	10/11/2012	ETL	EPA 200.8	
NO3/N	ND	mg/L	0.1	9/28/2012	JTT	EPA 300.0	
NO3/N+NO2/N	ND	mg/L	0.1	9/28/2012	JTT	EPA 300.0	
NO2/N	ND	mg/L	0.1	9/28/2012	JTT	EPA 300.0	
4,4-DDD	ND	ug/L	0.1	10/3/2012	MAH	EPA 505	
4,4-DDE	ND	ug/L	0.1	10/3/2012	MAH	EPA 505	
4,4-DDT	ND	ug/L	0.1	10/3/2012	MAH	EPA 505	

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: GSI WATER SOLUTIONS INC
Address: 8019 W. QUINAULT AVE
KENNEWICK, WA 99336
Attn: JON TRAVIS

Batch #: 120928047
Project Name: BOISE

Analytical Results Report

Sample Number	120928047-001	Sampling Date	9/27/2012	Date/Time Received	9/28/2012 11:20 A
Client Sample ID	C2-OBS2-REC-FINAL	Sampling Time	3:30 PM		
Matrix	Drinking Water	Sample Location			
Comments	RADIOLOGICAL ANALYSES PERFORMED BY PACE ANALYTICAL, GREENSBURG PA				

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Chlordane	ND	ug/L	0.2	10/3/2012	MAH	EPA 505	
Dieldrin	ND	ug/L	0.1	10/3/2012	MAH	EPA 505	
Endrin	ND	ug/L	0.01	10/3/2012	MAH	EPA 505	
Heptachlor epoxide	ND	ug/L	0.02	10/3/2012	MAH	EPA 505	
PCBs	ND	µg/L	0.5	10/3/2012	MAH	EPA 505	
Toxaphene	ND	ug/L	1	10/3/2012	MAH	EPA 505	
Potassium	7.69	mg/L	0.01	10/11/2012	ETL	EPA 200.7	
Selenium	ND	mg/L	0.001	10/11/2012	ETL	EPA 200.8	
Hexachlorobenzene	ND	ug/L	0.1	10/12/2012	EMP	EPA 525.2	
Silica (as SiO ₂)	79.4	mg/L	0.1	10/11/2012	ETL	EPA 200.7	
Silicon	37.1	mg/L	0.1	10/11/2012	ETL	EPA 200.7	
Silver	ND	mg/L	0.001	10/11/2012	ETL	EPA 200.8	
Sodium	50.5	mg/L	0.1	10/11/2012	ETL	EPA 200.7	
TDS	232	mg/L	10	10/2/2012	JTT	SM 2540C	
TSS	ND	mg/L	1	10/2/2012	ETL	SM 2540D	
Sulfate	4.22	mg/L	0.1	9/28/2012	JTT	EPA 300.0	
Thallium	ND	mg/L	0.001	10/11/2012	ETL	EPA 200.8	
TOC	0.471	mg/L	0.1	10/1/2012	JWC	SM 5310B	
1,1,1-Trichloroethane	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
1,1,2-Trichloroethane	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
1,1-Dichloroethene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
1,2,4-Trichlorobenzene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
1,2-Dichlorobenzene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
1,2-Dichloroethane	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
1,2-Dichloropropane	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
1,4-Dichlorobenzene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Benzene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Carbon Tetrachloride	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Chlorobenzene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
cis-1,2-dichloroethene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Ethylbenzene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Methylene chloride	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Styrene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Tetrachloroethene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Toluene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Total Xylene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: GSI WATER SOLUTIONS INC
Address: 8019 W. QUINAULT AVE
KENNEWICK, WA 99336
Attn: JON TRAVIS

Batch #: 120928047
Project Name: BOISE

Analytical Results Report

Sample Number 120928047-001 **Sampling Date** 9/27/2012 **Date/Time Received** 9/28/2012 11:20 A
Client Sample ID C2-OBS2-REC-FINAL **Sampling Time** 3:30 PM
Matrix Drinking Water **Sample Location**
Comments RADIOLOGICAL ANALYSES PERFORMED BY PACE ANALYTICAL, GREENSBURG PA

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
trans-1,2-Dichloroethene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Trichloroethene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Vinyl Chloride	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Zinc	0.0112	mg/L	0.001	10/11/2012	ETL	EPA 200.8	

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: GSI WATER SOLUTIONS INC
Address: 8019 W. QUINAULT AVE
KENNEWICK, WA 99336
Attn: JON TRAVIS

Batch #: 120928047
Project Name: BOISE

Analytical Results Report

Sample Number	120928047-002	Sampling Date	9/27/2012	Date/Time Received	9/28/2012 11:20 A
Client Sample ID	C2-ASR5-REC-FINAL	Sampling Time	2:30 PM		
Matrix	Drinking Water	Sample Location			
Comments	RADIOLOGICAL ANALYSES PERFORMED BY PACE ANALYTICAL, GREENSBURG PA				

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Alkalinity	117	mg CaCO ₃ /L	2	10/2/2012	ETL	SM2320B	
Aluminum	ND	mg/L	0.01	10/11/2012	ETL	EPA 200.7	
Antimony	ND	mg/L	0.001	10/11/2012	ETL	EPA 200.8	
Arsenic	ND	mg/L	0.001	10/11/2012	ETL	EPA 200.8	
Barium	0.00925	mg/L	0.001	10/11/2012	ETL	EPA 200.8	
Beryllium	ND	mg/L	0.0003	10/11/2012	ETL	EPA 200.8	
Bicarbonate	117	mg CaCO ₃ /L	2	10/2/2012	ETL	SM2320B	
Cadmium	ND	mg/L	0.001	10/11/2012	ETL	EPA 200.8	
Carbonate	ND	mg CaCO ₃ /L	5	10/2/2012	ETL	SM2320B	
Chloride	17.6	mg/L	0.1	9/28/2012	JTT	EPA 300.0	
Chromium	0.00120	mg/L	0.001	10/11/2012	ETL	EPA 200.8	
Copper	ND	mg/L	0.001	10/11/2012	ETL	EPA 200.8	
Dissolved Iron	ND	mg/L	0.01	10/8/2012	ETL	EPA 200.7	
Dissolved Manganese	ND	mg/L	0.01	10/8/2012	ETL	EPA 200.7	
1,2-Dibromoethane (EDB)	ND	ug/L	0.01	10/2/2012	MAH	EPA 504.1	
Fluoride	3.25	mg/L	0.1	9/28/2012	JTT	EPA 300.0	
Gross Alpha	0.217 +/- 0.432	pCi/L	0.753	10/8/2012	SUB	EPA 900.0	
Gross Beta	5.92 +/- 0.554	pCi/L	0.707	10/8/2012	SUB	EPA 900.0	
Calcium	3.09	mg/L	0.1	10/11/2012	ETL	EPA 200.7	
Hardness	9.72	mg/L	1	10/11/2012	ETL	EPA 200.7	
Magnesium	0.484	mg/L	0.1	10/11/2012	ETL	EPA 200.7	
2,4,5-TP (Silvex)	ND	ug/L	0.1	10/5/2012	MAH	EPA 515.3	
2,4-D	ND	ug/L	0.1	10/5/2012	MAH	EPA 515.3	
Iron	ND	mg/L	0.01	10/11/2012	ETL	EPA 200.7	
Lead	ND	mg/L	0.001	10/11/2012	ETL	EPA 200.8	
Manganese	ND	mg/L	0.01	10/11/2012	ETL	EPA 200.7	
Mercury-ICPMS	ND	mg/L	0.0001	10/11/2012	ETL	EPA 200.8	
Nickel	ND	mg/L	0.001	10/11/2012	ETL	EPA 200.8	
NO ₃ /N	ND	mg/L	0.1	9/28/2012	JTT	EPA 300.0	
NO ₃ /N+NO ₂ /N	ND	mg/L	0.1	9/28/2012	JTT	EPA 300.0	
NO ₂ /N	ND	mg/L	0.1	9/28/2012	JTT	EPA 300.0	
4,4-DDD	ND	ug/L	0.1	10/3/2012	MAH	EPA 505	
4,4-DDE	ND	ug/L	0.1	10/3/2012	MAH	EPA 505	
4,4-DDT	ND	ug/L	0.1	10/3/2012	MAH	EPA 505	
Chlordane	ND	ug/L	0.2	10/3/2012	MAH	EPA 505	
Dieldrin	ND	ug/L	0.1	10/3/2012	MAH	EPA 505	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: GSI WATER SOLUTIONS INC
Address: 8019 W. QUINAULT AVE
KENNEWICK, WA 99336
Attn: JON TRAVIS

Batch #: 120928047
Project Name: BOISE

Analytical Results Report

Sample Number	120928047-002	Sampling Date	9/27/2012	Date/Time Received	9/28/2012 11:20 A
Client Sample ID	C2-ASR5-REC-FINAL	Sampling Time	2:30 PM		
Matrix	Drinking Water	Sample Location			
Comments	RADIOLOGICAL ANALYSES PERFORMED BY PACE ANALYTICAL, GREENSBURG PA				

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Endrin	ND	ug/L	0.01	10/3/2012	MAH	EPA 505	
Heptachlor epoxide	ND	ug/L	0.02	10/3/2012	MAH	EPA 505	
PCBs	ND	µg/L	0.5	10/3/2012	MAH	EPA 505	
Toxaphene	ND	ug/L	1	10/3/2012	MAH	EPA 505	
Potassium	6.62	mg/L	0.01	10/11/2012	ETL	EPA 200.7	
Selenium	ND	mg/L	0.001	10/11/2012	ETL	EPA 200.8	
Hexachlorobenzene	ND	ug/L	0.1	10/12/2012	EMP	EPA 525.2	
Silica (as SiO ₂)	76.4	mg/L	0.1	10/11/2012	ETL	EPA 200.7	
Silicon	35.7	mg/L	0.1	10/11/2012	ETL	EPA 200.7	
Silver	ND	mg/L	0.001	10/11/2012	ETL	EPA 200.8	
Sodium	47.5	mg/L	0.1	10/11/2012	ETL	EPA 200.7	
TDS	213	mg/L	10	10/2/2012	JTT	SM 2540C	
TSS	ND	mg/L	1	10/2/2012	ETL	SM 2540D	
Sulfate	4.58	mg/L	0.1	9/28/2012	JTT	EPA 300.0	
Thallium	ND	mg/L	0.001	10/11/2012	ETL	EPA 200.8	
TOC	0.456	mg/L	0.1	10/1/2012	JWC	SM 5310B	
1,1,1-Trichloroethane	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
1,1,2-Trichloroethane	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
1,1-Dichloroethene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
1,2,4-Trichlorobenzene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
1,2-Dichlorobenzene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
1,2-Dichloroethane	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
1,2-Dichloropropane	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
1,4-Dichlorobenzene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Benzene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Carbon Tetrachloride	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Chlorobenzene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
cis-1,2-dichloroethene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Ethylbenzene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Methylene chloride	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Styrene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Tetrachloroethene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Toluene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Total Xylene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
trans-1,2-Dichloroethene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Trichloroethene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT: CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT: Cert0095

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: GSI WATER SOLUTIONS INC
Address: 8019 W. QUINAULT AVE
KENNEWICK, WA 99336
Attn: JON TRAVIS

Batch #: 120928047
Project Name: BOISE

Analytical Results Report

Sample Number	120928047-002	Sampling Date	9/27/2012	Date/Time Received	9/28/2012 11:20 A
Client Sample ID	C2-ASR5-REC-FINAL	Sampling Time	2:30 PM		
Matrix	Drinking Water	Sample Location			
Comments	RADIOLOGICAL ANALYSES PERFORMED BY PACE ANALYTICAL, GREENSBURG PA				

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Vinyl Chloride	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Zinc	0.00122	mg/L	0.001	10/11/2012	ETL	EPA 200.8	

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: GSI WATER SOLUTIONS INC
Address: 8019 W. QUINAULT AVE
KENNEWICK, WA 99336
Attn: JON TRAVIS

Batch #: 120928047
Project Name: BOISE

Analytical Results Report

Sample Number 120928047-003 **Sampling Date** 9/27/2012 **Date/Time Received** 9/28/2012 11:20 A
Client Sample ID TRIP BLANK OBS2 **Sampling Time**
Matrix Drinking Water **Sample Location**
Comments RADIOLOGICAL ANALYSES PERFORMED BY PACE ANALYTICAL, GREENSBURG PA

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
1,1,1-Trichloroethane	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
1,1,2-Trichloroethane	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
1,1-Dichloroethene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
1,2,4-Trichlorobenzene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
1,2-Dichlorobenzene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
1,2-Dichloroethane	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
1,2-Dichloropropane	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
1,4-Dichlorobenzene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Benzene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Carbon Tetrachloride	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Chlorobenzene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
cis-1,2-dichloroethene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Ethylbenzene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Methylene chloride	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Styrene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Tetrachloroethene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Toluene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Total Xylene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
trans-1,2-Dichloroethene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Trichloroethene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Vinyl Chloride	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: GSI WATER SOLUTIONS INC
Address: 8019 W. QUINAULT AVE
KENNEWICK, WA 99336
Attn: JON TRAVIS

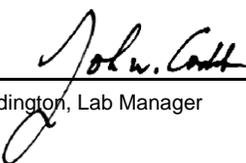
Batch #: 120928047
Project Name: BOISE

Analytical Results Report

Sample Number	120928047-004	Sampling Date	9/27/2012	Date/Time Received	9/28/2012 11:20 A
Client Sample ID	TRIP BLANK ASR5	Sampling Time			
Matrix	Drinking Water	Sample Location			
Comments	RADIOLOGICAL ANALYSES PERFORMED BY PACE ANALYTICAL, GREENSBURG PA				

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
1,1,1-Trichloroethane	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
1,1,2-Trichloroethane	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
1,1-Dichloroethene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
1,2,4-Trichlorobenzene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
1,2-Dichlorobenzene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
1,2-Dichloroethane	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
1,2-Dichloropropane	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
1,4-Dichlorobenzene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Benzene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Carbon Tetrachloride	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Chlorobenzene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
cis-1,2-dichloroethene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Ethylbenzene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Methylene chloride	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Styrene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Tetrachloroethene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Toluene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Total Xylene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
trans-1,2-Dichloroethene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Trichloroethene	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	
Vinyl Chloride	ND	µg/L	0.5	10/4/2012	SAT	EPA 524.2	

Authorized Signature


John Coddington, Lab Manager

MCL EPA's Maximum Contaminant Level
ND Not Detected
PQL Practical Quantitation Limit

This report shall not be reproduced except in full, without the written approval of the laboratory.
The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Login Report

Customer Name: GSI WATER SOLUTIONS INC

Order ID: 120928047

8019 W. QUINAULT AVE

Order Date: 9/28/2012

KENNEWICK

WA

99336

Contact Name: JON TRAVIS

Project Name: BOISE

Comment:

Sample #: 120928047-001 **Customer Sample #:** C2-OBS2-REC-FINAL

Recv'd:

Collector:

Date Collected: 9/27/2012

Quantity: 16

Matrix: Drinking Water

Date Received: 9/28/2012 11:20:00 A

Comment:

Test	Lab	Method	Due Date	Priority
ALKALINITY	M	SM2320B	10/10/2012	<u>Normal (6-10 Days)</u>
ALUMINUM ICP	M	EPA 200.7	10/10/2012	<u>Normal (6-10 Days)</u>
ANTIMONY	M	EPA 200.8	10/10/2012	<u>Normal (6-10 Days)</u>
ARSENIC	M	EPA 200.8	10/10/2012	<u>Normal (6-10 Days)</u>
BARIIUM	M	EPA 200.8	10/10/2012	<u>Normal (6-10 Days)</u>
BERYLLIUM	M	EPA 200.8	10/10/2012	<u>Normal (6-10 Days)</u>
BICARBONATE	M	SM2320B	10/10/2012	<u>Normal (6-10 Days)</u>
CADMIUM	M	EPA 200.8	10/10/2012	<u>Normal (6-10 Days)</u>
CARBONATE	M	SM2320B	10/10/2012	<u>Normal (6-10 Days)</u>
CHLORIDE	M	EPA 300.0	10/10/2012	<u>Normal (6-10 Days)</u>
CHROMIUM	M	EPA 200.8	10/10/2012	<u>Normal (6-10 Days)</u>
COPPER	M	EPA 200.8	10/10/2012	<u>Normal (6-10 Days)</u>
DISSOLVED IRON BY ICP	M	EPA 200.7	10/10/2012	<u>Normal (6-10 Days)</u>
DISSOLVED MANGANESE BY ICP	M	EPA 200.7	10/10/2012	<u>Normal (6-10 Days)</u>
EDB 504.1	M	EPA 504.1	10/10/2012	<u>Normal (6-10 Days)</u>
FLUORIDE	M	EPA 300.0	10/10/2012	<u>Normal (6-10 Days)</u>
GROSS ALPHA		EPA 900.0	10/10/2012	<u>Normal (6-10 Days)</u>
GROSS BETA		EPA 900.0	10/10/2012	<u>Normal (6-10 Days)</u>
HARDNESS by EPA 200.7	M	EPA 200.7	10/10/2012	<u>Normal (6-10 Days)</u>
HERBICIDES 515.3	M	EPA 515.3	10/10/2012	<u>Normal (6-10 Days)</u>
IRON ICP	M	EPA 200.7	10/10/2012	<u>Normal (6-10 Days)</u>
LEAD	M	EPA 200.8	10/10/2012	<u>Normal (6-10 Days)</u>
MANGANESE ICP	M	EPA 200.7	10/10/2012	<u>Normal (6-10 Days)</u>

Customer Name: GSI WATER SOLUTIONS INC
 8019 W. QUINAULT AVE
 KENNEWICK WA 99336

Order ID: 120928047
Order Date: 9/28/2012

Contact Name: JON TRAVIS

Project Name: BOISE

Comment:

MERCURY-ICPMS	M	EPA 200.8	10/10/2012	<u>Normal (6-10 Days)</u>
NICKEL	M	EPA 200.8	10/10/2012	<u>Normal (6-10 Days)</u>
NITRATE/N	M	EPA 300.0	10/10/2012	<u>Normal (6-10 Days)</u>
NITRATE+ NITRITE AS N	M	EPA 300.0	10/10/2012	<u>Normal (6-10 Days)</u>
NITRITE/N	M	EPA 300.0	10/10/2012	<u>Normal (6-10 Days)</u>
PESTICIDES 505	M	EPA 505	10/10/2012	<u>Normal (6-10 Days)</u>
POTASSIUM ICP	M	EPA 200.7	10/10/2012	<u>Normal (6-10 Days)</u>
SELENIUM	M	EPA 200.8	10/10/2012	<u>Normal (6-10 Days)</u>
SEMIVOLATILES 525.2	M	EPA 525.2	10/10/2012	<u>Normal (6-10 Days)</u>
SILICON ICP	M	EPA 200.7	10/10/2012	<u>Normal (6-10 Days)</u>
SILVER	M	EPA 200.8	10/10/2012	<u>Normal (6-10 Days)</u>
SODIUM ICP	M	EPA 200.7	10/10/2012	<u>Normal (6-10 Days)</u>
SOLIDS - TDS	M	SM 2540C	10/10/2012	<u>Normal (6-10 Days)</u>
SOLIDS - TSS	M	SM 2540D	10/10/2012	<u>Normal (6-10 Days)</u>
SULFATE	M	EPA 300.0	10/10/2012	<u>Normal (6-10 Days)</u>
THALLIUM	M	EPA 200.8	10/10/2012	<u>Normal (6-10 Days)</u>
TOC - MOSC	M	SM 5310B	10/10/2012	<u>Normal (6-10 Days)</u>
VOLATILES 524.2	M	EPA 524.2	10/10/2012	<u>Normal (6-10 Days)</u>
ZINC	M	EPA 200.8	10/10/2012	<u>Normal (6-10 Days)</u>

Sample #: 120928047-002 **Customer Sample #:** C2-ASR5-REC-FINAL

Recv'd: **Collector:** **Date Collected:** 9/27/2012
Quantity: 16 **Matrix:** Drinking Water **Date Received:** 9/28/2012 11:20:00 A

Comment:

Test	Lab	Method	Due Date	Priority
ALKALINITY	M	SM2320B	10/10/2012	<u>Normal (6-10 Days)</u>
ALUMINUM ICP	M	EPA 200.7	10/10/2012	<u>Normal (6-10 Days)</u>
ANTIMONY	M	EPA 200.8	10/10/2012	<u>Normal (6-10 Days)</u>
ARSENIC	M	EPA 200.8	10/10/2012	<u>Normal (6-10 Days)</u>
BARIUM	M	EPA 200.8	10/10/2012	<u>Normal (6-10 Days)</u>
BERYLLIUM	M	EPA 200.8	10/10/2012	<u>Normal (6-10 Days)</u>
BICARBONATE	M	SM2320B	10/10/2012	<u>Normal (6-10 Days)</u>
CADMIUM	M	EPA 200.8	10/10/2012	<u>Normal (6-10 Days)</u>
CARBONATE	M	SM2320B	10/10/2012	<u>Normal (6-10 Days)</u>
CHLORIDE	M	EPA 300.0	10/10/2012	<u>Normal (6-10 Days)</u>
CHROMIUM	M	EPA 200.8	10/10/2012	<u>Normal (6-10 Days)</u>

Customer Name: GSI WATER SOLUTIONS INC
8019 W. QUINAULT AVE
KENNEWICK WA 99336

Order ID: 120928047
Order Date: 9/28/2012

Contact Name: JON TRAVIS

Project Name: BOISE

Comment:

COPPER	M	EPA 200.8	10/10/2012	<u>Normal (6-10 Days)</u>
DISSOLVED IRON BY ICP	M	EPA 200.7	10/10/2012	<u>Normal (6-10 Days)</u>
DISSOLVED MANGANESE BY ICP	M	EPA 200.7	10/10/2012	<u>Normal (6-10 Days)</u>
EDB 504.1	M	EPA 504.1	10/10/2012	<u>Normal (6-10 Days)</u>
FLUORIDE	M	EPA 300.0	10/10/2012	<u>Normal (6-10 Days)</u>
GROSS ALPHA		EPA 900.0	10/10/2012	<u>Normal (6-10 Days)</u>
GROSS BETA		EPA 900.0	10/10/2012	<u>Normal (6-10 Days)</u>
HARDNESS by EPA 200.7	M	EPA 200.7	10/10/2012	<u>Normal (6-10 Days)</u>
HERBICIDES 515.3	M	EPA 515.3	10/10/2012	<u>Normal (6-10 Days)</u>
IRON ICP	M	EPA 200.7	10/10/2012	<u>Normal (6-10 Days)</u>
LEAD	M	EPA 200.8	10/10/2012	<u>Normal (6-10 Days)</u>
MANGANESE ICP	M	EPA 200.7	10/10/2012	<u>Normal (6-10 Days)</u>
MERCURY-ICPMS	M	EPA 200.8	10/10/2012	<u>Normal (6-10 Days)</u>
NICKEL	M	EPA 200.8	10/10/2012	<u>Normal (6-10 Days)</u>
NITRATE/N	M	EPA 300.0	10/10/2012	<u>Normal (6-10 Days)</u>
NITRATE+ NITRITE AS N	M	EPA 300.0	10/10/2012	<u>Normal (6-10 Days)</u>
NITRITE/N	M	EPA 300.0	10/10/2012	<u>Normal (6-10 Days)</u>
PESTICIDES 505	M	EPA 505	10/10/2012	<u>Normal (6-10 Days)</u>
POTASSIUM ICP	M	EPA 200.7	10/10/2012	<u>Normal (6-10 Days)</u>
SELENIUM	M	EPA 200.8	10/10/2012	<u>Normal (6-10 Days)</u>
SEMIVOLATILES 525.2	M	EPA 525.2	10/10/2012	<u>Normal (6-10 Days)</u>
SILICON ICP	M	EPA 200.7	10/10/2012	<u>Normal (6-10 Days)</u>
SILVER	M	EPA 200.8	10/10/2012	<u>Normal (6-10 Days)</u>
SODIUM ICP	M	EPA 200.7	10/10/2012	<u>Normal (6-10 Days)</u>
SOLIDS - TDS	M	SM 2540C	10/10/2012	<u>Normal (6-10 Days)</u>
SOLIDS - TSS	M	SM 2540D	10/10/2012	<u>Normal (6-10 Days)</u>
SULFATE	M	EPA 300.0	10/10/2012	<u>Normal (6-10 Days)</u>
THALLIUM	M	EPA 200.8	10/10/2012	<u>Normal (6-10 Days)</u>
TOC - MOSC	M	SM 5310B	10/10/2012	<u>Normal (6-10 Days)</u>
VOLATILES 524.2	M	EPA 524.2	10/10/2012	<u>Normal (6-10 Days)</u>
ZINC	M	EPA 200.8	10/10/2012	<u>Normal (6-10 Days)</u>

Customer Name: GSI WATER SOLUTIONS INC
8019 W. QUINAULT AVE
KENNEWICK WA 99336

Order ID: 120928047
Order Date: 9/28/2012

Contact Name: JON TRAVIS

Project Name: BOISE

Comment:

Sample #: 120928047-003 **Customer Sample #:** TRIP BLANK OBS2

Recv'd: **Collector:** **Date Collected:** 9/27/2012
Quantity: 1 **Matrix:** Drinking Water **Date Received:** 9/28/2012 11:20:00 A

Comment:

Test	Lab	Method	Due Date	Priority
VOLATILES 524.2	M	EPA 524.2	10/10/2012	<u>Normal (6-10 Days)</u>

Sample #: 120928047-004 **Customer Sample #:** TRIP BLANK ASR5

Recv'd: **Collector:** **Date Collected:** 9/27/2012
Quantity: 1 **Matrix:** Drinking Water **Date Received:** 9/28/2012 11:20:00 A

Comment:

Test	Lab	Method	Due Date	Priority
VOLATILES 524.2	M	EPA 524.2	10/10/2012	<u>Normal (6-10 Days)</u>

SAMPLE CONDITION RECORD

Samples received in a cooler?	Yes
Samples received intact?	Yes
What is the temperature inside the cooler?	6.0
Samples received with a COC?	Yes
Samples received within holding time?	Yes
Are all sample bottles properly preserved?	Yes
Are VOC samples free of headspace?	Yes
Is there a trip blank to accompany VOC samples?	Yes
Labels and chain agree?	Yes



1282 Alturas Drive, Moscow ID 83843 (208) 883-2839 FAX 882-9246
 504 E Sprague Ste D, Spokane WA 99202 (509) 838-3999 FAX 838-4433

Chain of Custody Record

120928 047 **GSIW** Last Due 10/10/2012
 1st SAMP 9/27/2012 1st RCVD 9/28/2012
 BOISE

Company Name: **GSI Water Solutions, Inc.** Project Manager: **JON TRAVIS**
 Address: **8019 W Quinault Ave., Suite 201** Project Name & #: **BOISE**
 City: **Kennewick** State: **WA** Zip: **99336** Email Address: **JTRAVIS@GSIWS.COM**
 Phone: **(509) 735-7135** Purchase Order #: **222.004.008**
 Fax: **(509) 735-7067** Sampler Name & phone: **JON 509-979-0332**

Please refer to our normal turn around times at:
<http://www.anateklabs.com/services/guidelines/reporting.asp>
 Normal *All rush order requests must be prior approved. Phone
 Next Day* Mail
 2nd Day* Fax
 Other* Email

Provide Sample Description **List Analytes Requested** **Note Special Instructions/Comments**

Lab ID	Sample Identification	Sampling Date/Time	Matrix	Preservative	# of Containers	Sample Volume	SEE ATTACHED TABLE								
1	C2-0852-REC-FINAL	9/27/12 1530	W		16		X								
2	C2A8R5-REC-FINAL	9/27/12 1530	W				X								
3	TRIP BLANK 0852														
4	TRIP BLANK A8R5														

****SEE ATTACHED****
 are 525 Sample from 0852 was destroyed in transit BT
 SEE ATTACHED TABLE FOR ANALYTES
 MALS
 Bads -> 2 Pice
 I will send you - ice packs
 to you ask back

Project Name: **BT** Signature: **[Signature]** Company: **GSI** Date: **9/28/12** Time: **1630**
 Relinquished by: **JT Travis**
 Received by: **BT Travis** Signature: **[Signature]** Company: **Anatek** Date: **9/28/12** Time: **1130**
 Relinquished by: **[Signature]**
 Received by: **[Signature]**
 Relinquished by: **[Signature]**
 Received by: **[Signature]**

Inspection Checklist
 Received intact? (N)
 Labels & Chains Agree? (N)
 Containers Sealed? (N)
 VOC Head Space? (N)
 Iced Yes (N)
 Temp (C) **6.0**
 Preservative: **Asst. 55**
 Date & Time: **BT** **11:30**
 Inspected By: **9/28/12 11:30**

Table 3
ASR Water Quality Analyte List
Boise Paper ASR Project

Group	Analyte	Lowest Regulatory Standard	Units	Regulatory Criteria	MRL
C = Geochemical	Bicarbonate	None	mg/L	None	5
	Calcium	None	mg/L	None	0.1
	Carbonate	None	mg/L	None	5
	Chloride	250	mg/L	GQC, SMCL	0.1
	Hardness (as CaCO3)	None	mg/L	None	10
	Magnesium	None	mg/L	None	0.1
	Nitrate as N	10	mg/L	GQC, MCL	0.1
	Nitrite as N	1	mg/L	MCL	0.1
	Total Nitrate-Nitrite	10	mg/L	GQC, MCL	0.1
	Potassium	None	mg/L	None	0.1
	Silica	None	mg/L	None	0.1
	Sodium	None	mg/L	None	0.1
	Sulfate	250	mg/L	GQC, SMCL	0.1
	Fluoride	2	mg/L	SMCL	0.1
	Total Alkalinity	None	mg/L	None	5
	Total Dissolved Solid	500	mg/L	GQC, SMCL	10
	Total Organic Carbon	None	mg/L	None	0.5
Total Suspended Solids (TSS)	None	mg/L	None	1	
D = Metals	Aluminum	0.05 - 0.2	mg/L	SMCL	0.01
	Antimony	0.006	mg/L	MCL	0.001
	Arsenic	0.00005	mg/L	GQC	0.001
	Barium	1	mg/L	GQC	0.001
	Beryllium	0.004	mg/L	MCL	0.001
	Cadmium	0.005	mg/L	MCL	0.001

Table 3
ASR Water Quality Analyte List
Boise Paper ASR Project

Group	Analyte	Lowest Regulatory Standard	Units	Regulatory Criteria	MRL
✓	Chromium	0.05	mg/L	GQC	0.001
✓	Copper	1	mg/L	GQC, SMCL	0.001
✓	Iron (Total)	None	mg/L	None	0.01
✓	Iron (Dissolved)	0.3	mg/L	GQC, SMCL	0.01
✓	Lead	0.015	mg/L	MCL	0.001
✓	Manganese (Total)	None	mg/L	None	0.001
✓	Manganese (Dissolved)	0.05	mg/L	GQC, SMCL	0.001
✓	Mercury	0.002	mg/L	GQC, MCL	0.0001
✓	Nickel	None	mg/L	None	0.001
✓	Selenium	0.01	mg/L	GQC	0.001
✓	Silver	0.05	mg/L	GQC	0.001
✓	Thallium	0.002	mg/L	MCL	0.001
✓	Zinc	5	mg/L	GQC, SMCL	0.001
D = Radionuclides					
	Combined Radium 226/228 ¹	5	pCi/L	GQC, MCL	1
	Uranium ¹	0.03	mg/L	MCL	0.001
✓	Gross Alpha	15	pCi/L	GQC	1
	Beta/Photon emitters ¹	4	mrem/yr	MCL	1
✓	Gross Beta	50	pCi/L	GQC	1
	Radon ¹	None	pCi/L	None	1
D = Regulated Synthetic Organic Compounds (SOCs) and Pesticides					
✓	2,4,5-TP (Silvex)	0.01	mg/L	GQC	0.0001
✓	2,4-D	0.07	mg/L	MCL	0.0001
✓	Chlordane	0.00006	mg/L	GQC	0.0004

Table 3
ASR Water Quality Analyte List
Boise Paper ASR Project

Group	Analyte	Lowest Regulatory Standard	Units	Regulatory Criteria	MRL
/	4,4,4 DDT	None	mg/L	None	0.00001
/	4,4,4 -DDE	None	mg/L	None	0.0001
/	4,4,4 DDD	None	mg/L	None	0.0001
/	t-DDT	None	mg/L	None	0.0001
/	Ethylene Dibromide (EDB)	0.000001	mg/L	GQC	0.000001
/	Endrin	0.0002	mg/L	GQC	0.00002
/	Dieldrin	0.000005	mg/L	GQC	0.0002
/	Heptachlor Epoxide	0.000009	mg/L	GQC	0.00004
/	Hexachlorobenzene (HCB)	0.00005	mg/L	GQC	0.0002
/	Total Polychlorinated Biphenyls (PCBs)	0.00001	mg/L	GQC	0.0005
/	Toxaphene	0.00008	mg/L	GQC	0.002
D = Volatile Organic Compounds (VOCs)					
/	1,1,1-Trichloroethane	0.2	mg/L	GQC, MCL	0.0005
/	1,1,2-Trichloroethane	0.005	mg/L	MCL	0.0005
/	1,1-Dichloroethylene	0.007	mg/L	MCL	0.0005
/	1,2,4-Trichlorobenzene	0.07	mg/L	MCL	0.0005
/	1,2-Dichlorobenzene (o)	0.6	mg/L	MCL	0.0005
/	1,2-Dichloroethane (EDC)	0.0005	mg/L	GQC	0.0005
/	1,2-Dichloropropane	0.0006	mg/L	GQC	0.0005
/	1,4-Dichlorobenzene (p)	0.004	mg/L	GQC	0.0005
/	Benzene	0.001	mg/L	GQC	0.0005
/	Carbon Tetrachloride	0.0003	mg/L	GQC	0.0005
/	Chlorobenzene (monochlorobenzene)	0.1	mg/L	MCL	0.0005
/	cis-1,2-Dichloroethylene	0.07	mg/L	MCL	0.0005

Table 3
ASR Water Quality Analyte List
Boise Paper ASR Project

Group	Analyte	Lowest Regulatory Standard	Units	Regulatory Criteria	MRL
✓	Ethylbenzene	0.7	mg/L	MCL	0.0005
✓	Dichloromethane (methylene chloride)	0.005	mg/L	GQC, MCL	0.0005
✓	Styrene	0.1	mg/L	MCL	0.0005
✓	Tetrachloroethylene	0.0008	mg/L	GQC	0.0005
✓	Toluene	1	mg/L	MCL	0.0005
✓	trans-1,2-Dichloroethylene	0.1	mg/L	MCL	0.0005
✓	Trichloroethylene	0.003	mg/L	GQC	0.0005
✓	Vinyl chloride	0.0002	mg/L	GQC	0.0005
✓	Total Xylenes	10	mg/L	MCL	0.01

NOTE

mg/L = milligram per liter
MRL = Method Reporting Limit from Anelek Laboratories
ND = Not detected at concentrations greater than the MDL
NT = Analyte not tested
MCL = Federal maximum contaminant level for drinking water
SMCL = Federal secondary maximum contaminant levels for drinking water
GQC = Washington Groundwater Quality Criteria (WAC 173-200-040)
Samples are unfiltered unless noted (i.e., dissolved)
1 = These compounds would be analyzed if Gross Alpha or Beta exceed an MCL.



SHIPPING ADDRESS: BIOVIR LABORATORIES, INC., 685 STONE ROAD, UNIT 6, BENICIA, CALIFORNIA 94510
 1-800-GIARDIA (442-7342), FAX: 707-747-1751
 Business Hours: Monday through Friday - 8:30 AM to 5:00 PM

215-1
 GSI002

* Required Fields

5.5°C

*CLIENT/COMPANY NAME:

Jon Travis-GSI
 8019 W Quinlan St Ave Suite 201
 Kennewick WA 99336
 TELEPHONE# 509 979 0332 FAX#

*DATE OF SAMPLING:

2/9/12

PURCHASE ORDER/SUBCONTRACT ORDER #:

Boise

*NAME OF SAMPLER: (Please print)

Jon Travis

*PLEASE CHECK APPROPRIATE BOX FOR MATRIX OR FILL IN "OTHER".
 MATRIX: Drinking Water Wastewater Biosolid OTHER: Raw Surface
 Regulatory Drinking Water Sample(s) Yes No
 CA DHS Contact Person and Phone Number (if regulatory):

*SAMPLE ID	*TIME	VOLUME	TREATMENT	SAMPLING LOCATION	*ANALYSIS REQUESTED
ASB5-C1-Rec	1530	250mL	None	port near wellhead	St E. Coli/Fecal Coliform SM922-3 Total Coliform SM922-1

*RELINQUISHED BY (SIGNED)	*DATE/TIME	RECEIVED BY (SIGNED)	DATE/TIME
	16:30 2/9/12		2/10/12 9:00



685 Stone Road, Unit 6 • Benicia, CA 94510 • (707) 747-5906 • 1-800-GIARDIA • FAX (707) 747-1751 • WEB: www.biovir.com

REPORT NO.: 120215
PAGE NO.: 1 of 2
CLIENT: GSI Water Solutions
ADDRESS: 1020 N Center Parkway, Suite F
Kennewick, WA 99336
CLIENT NO: GSI002 CLIENT PO: Boise

ASSAY RESULTS:

Test: Coliform, Total & E.coli Method: SM9223

BioVir #	Sample ID	Site	Analyte	Result	Units
120215-001	ASR5-C1-Rec	Port near wellhead	E. coli	<1	MPN/100ml
Collector: Jon Travis CollectDate 2/9/2012 CollectTime: 3:30:00 PM					
ReceiveDate 2/10/2012 9:00:00 AM Matrix: Raw Water Temp 5.5					
Volume: 250 mL Analysis Start Date: 2/10/12 Analysis Start Time: 1020					
Analyst: JTruscott Analysis End: 2/13/2012					
Comment					
120215-001	ASR5-C1-Rec	Port near wellhead	Test Results Meet All Requirements of NELAC	YES	
Collector: Jon Travis CollectDate 2/9/2012 CollectTime: 3:30:00 PM					
ReceiveDate 2/10/2012 9:00:00 AM Matrix: Raw Water Temp 5.5					
Volume: 250 mL Analysis Start Date: 2/10/12 Analysis Start Time: 1020					
Analyst: JTruscott Analysis End: 2/13/2012					
Comment					
120215-001	ASR5-C1-Rec	Port near wellhead	Total Coliform	Not Reported	MPN/100ml
Collector: Jon Travis CollectDate 2/9/2012 CollectTime: 3:30:00 PM					
ReceiveDate 2/10/2012 9:00:00 AM Matrix: Raw Water Temp 5.5					
Volume: 250 mL Analysis Start Date: Analysis Start Time:					
Analyst: JTruscott Analysis End: 2/13/2012					
Comment					

Test: Coliform, Total & Fecal Method: SM9221B

BioVir #	Sample ID	Site	Analyte	Result	Units
----------	-----------	------	---------	--------	-------

REPORT NO.: 120215
PAGE NO.: 2 of 2
CLIENT: GSI Water Solutions
ADDRESS 1020 N Center Parkway, Suite F
 Kennewick, WA 99336
CLIENT NO GSI002 **CLIENT PO:** Boise

ASSAY RESULTS:

Test: Coliform, Total & Fecal Method: SM9221B

BioVir #	Sample ID	Site	Analyte	Result	Units
120215-001	ASR5-C1-Rec	Port near wellhead	Fecal Coliform	<20	MPN/100ml
Collector: Jon Travis CollectDate 2/9/2012 CollectTime: 3:30:00 PM ReceiveDate 2/10/2012 9:00:00 AM Matrix: Raw Water Temp 5.5 Volume: 250 mL Analysis Start Date: 2/10/12 Analysis Start Time: 1015 Analyst: JTruscott Analysis End: 2/13/2012 Comment					
120215-001	ASR5-C1-Rec	Port near wellhead	Test Results Meet All Requirements of NELAC	YES	
Collector: Jon Travis CollectDate 2/9/2012 CollectTime: 3:30:00 PM ReceiveDate 2/10/2012 9:00:00 AM Matrix: Raw Water Temp 5.5 Volume: 250 mL Analysis Start Date: 2/10/12 Analysis Start Time: 1015 Analyst: JTruscott Analysis End: 2/13/2012 Comment					
120215-001	ASR5-C1-Rec	Port near wellhead	Total Coliform	<20	MPN/100ml
Collector: Jon Travis CollectDate 2/9/2012 CollectTime: 3:30:00 PM ReceiveDate 2/10/2012 9:00:00 AM Matrix: Raw Water Temp 5.5 Volume: 250 mL Analysis Start Date: 2/10/12 Analysis Start Time: 1015 Analyst: JTruscott Analysis End: 2/13/2012 Comment					

SAMPLE EVALUATION PERFORMANCE CRITERIA: The precise rates of recovery of organisms from environmental samples cannot be determined. BioVir Laboratories has analyzed your sample(s) in accordance with the method described with each analyte above, however, due to inherent limitations of these methods organisms may avoid detection. For additional information regarding the limitations of the method(s) referred to above please call us at 1-800-GIARDIA.

COMPANY IS NOT AN INSURER: BioVir Laboratories is not an insurer or guarantor of the quality and/or purity of water, wastewater, biosolid or other material from which the sample was taken. BioVir offers no express or implied warranties whatsoever concerning the quality or purity of any water, wastewater, biosolid or other material which is ultimately consumed, distributed, applied or disposed.

MAINTENANCE OF RECORDS: BioVir Laboratories, Inc. shall maintain records pertaining to the historical reconstruction of client's data for a minimum of five years from the date of issuance of the final report. Records may be destroyed after that date unless a written client's request for records transfer is received by BioVir which requests otherwise. Records transfer or storage charges may apply after the 5 year period. THIS REPORT SHALL NOT BE REPRODUCED, EXCEPT IN FULL, WITHOUT THE WRITTEN APPROVAL OF BIOVIR LABORATORIES, INC.

2/24/2012

Date:



Signature

Quality Checked dcelio



**TOTAL CULTURABLE VIRUS
ENTERIC VIRUS ASSAY
SAMPLE DATA SHEET**

LAB USE ONLY:	
LIMS #:	868-1
Client #:	GST002
Date Rec'd:	6/27/12
Time Rec'd:	9:35
Temp Rec'd:	6.9°C

(Please fill out completely and return white copy to BioVir with the sample.)
Phone: 1-800-GIARDIA Fax: 707-747-1751 WEB: www.biovir.com

Note: Please print clearly using waterproof ink

NAME AND ADDRESS OF WATER COMPANY OR UTILITY: GSI Water Solutions	SAMPLE DATE: 6/26/12	
	SAMPLE TIME: 1300	
NAME OF SAMPLER: Jon Travis	pH: 8.9 pH (adjusted): 7.5 avg	Water Temp (C): 26.06
SAMPLE SOURCE: Well Shed	TREATMENT CHARACTERISTICS (Check One): Raw Drinking Water <input checked="" type="checkbox"/> Treated Drinking Water <input type="checkbox"/>	
SAMPLE LOCATION: Recovery Source Port	Wastewater <input type="checkbox"/> Filtered Wastewater <input type="checkbox"/>	
SAMPLE VOLUME: (Meter # 18000012) Meter Start: 2846.7 Meter Stop: 2907.0	DECHLORINATION/ DISINFECTANT NEUTRALIZATION (If Treated Water): Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Total Volume: 60.3 Gallons _____ Liters	TURBIDITY (NTU): Turbidity Begin: 1.2 Turbidity End: 1.0	

Client ID: C2-ASR5-STORAGE50	P.O. #: 222.004.008
------------------------------	---------------------

ASSAY REQUESTED: Please check one of the following	
<input type="checkbox"/>	Total Culturable Virus Assay, MPN - (EPA, ICR 600/R-95/178)
<input type="checkbox"/>	Pre Filter Cartridge - M19R10A
<input checked="" type="checkbox"/>	Enteric Virus Assay, PFU - (SM 18th; 9510 - BioVir Modification)

COMMENTS:

RELINQUISHED BY: Jon Travis	DATE / TIME: 6/26/12 1500
RECEIVED BY: <i>Jmc</i>	DATE / TIME: 6/27/12 9:35

SHIPPING ADDRESS: BIOVIR LABORATORIES, INC., 685 STONE ROAD, UNIT 6, BENICIA, CALIFORNIA 94510
WHITE = BIOVIR COPY YELLOW = CUSTOMER COPY



685 Stone Road, Unit 6 • Benicia, CA 94510 • (707) 747-5906 • 1-800-GIARDIA • FAX (707) 747-1751 • WEB: www.biovir.com

REPORT NO.: 120868
PAGE NO.: 1 of 3
CLIENT: GSI Water Solutions
ADDRESS: 1020 N Center Parkway, Suite F
Kennewick, WA 99336
CLIENT NO GSI002 CLIENT PO: 222.004.008

ASSAY RESULTS:

Test: Coliform, Total & E.coli Method: SM9223

BioVir #	Sample ID	Site	Analyte	Result	Units
120868-002	C2-ASR5-Stor50	ASR5	E. coli	<1	MPN/100ml
Collector: Jon Travis CollectDate 6/26/2012 CollectTime: 1:00:00 PM ReceiveDate 6/27/2012 9:35:00 AM Matrix: Raw Water Temp 6.9 Volume: 250 mL Analysis Start Date: 6/27/12 Analysis Start Time: 1030 Analyst: JTruscott Analysis End: 6/28/2012 Comment					
120868-002	C2-ASR5-Stor50	ASR5	Test Results Meet All Requirements of NELAC	YES	
Collector: Jon Travis CollectDate 6/26/2012 CollectTime: 1:00:00 PM ReceiveDate 6/27/2012 9:35:00 AM Matrix: Raw Water Temp 6.9 Volume: 250 mL Analysis Start Date: 6/27/12 Analysis Start Time: 1030 Analyst: JTruscott Analysis End: 6/28/2012 Comment					
120868-002	C2-ASR5-Stor50	ASR5	Total Coliform	Not Reported	MPN/100ml
Collector: Jon Travis CollectDate 6/26/2012 CollectTime: 1:00:00 PM ReceiveDate 6/27/2012 9:35:00 AM Matrix: Raw Water Temp 6.9 Volume: 250 mL Analysis Start Date: Analysis Start Time: Analyst: JTruscott Analysis End: 6/28/2012 Comment					

Test: Coliform, Total & Fecal Method: SM9221B

BioVir #	Sample ID	Site	Analyte	Result	Units
----------	-----------	------	---------	--------	-------

REPORT NO.: 120868
PAGE NO.: 2 of 3
CLIENT: GSI Water Solutions
ADDRESS: 1020 N Center Parkway, Suite F
 Kennewick, WA 99336
CLIENT NO: GSI002 **CLIENT PO:** 222.004.008

ASSAY RESULTS:

Test: Coliform, Total & Fecal Method: SM9221B

BioVir #	Sample ID	Site	Analyte	Result	Units
120868-002	C2-ASR5-Stor50	ASR5	Fecal Coliform	<2	MPN/100ml
Collector: Jon Travis CollectDate 6/26/2012 CollectTime: 1:00:00 PM ReceiveDate 6/27/2012 9:35:00 AM Matrix: Raw Water Temp 6.9 Volume: 250 mL Analysis Start Date: 6/27/12 Analysis Start Time: 1027 Analyst: JTruscott Analysis End: 6/29/2012 Comment					
120868-002	C2-ASR5-Stor50	ASR5	Test Results Meet All Requirements of NELAC	YES	
Collector: Jon Travis CollectDate 6/26/2012 CollectTime: 1:00:00 PM ReceiveDate 6/27/2012 9:35:00 AM Matrix: Raw Water Temp 6.9 Volume: 250 mL Analysis Start Date: 6/27/12 Analysis Start Time: 1027 Analyst: JTruscott Analysis End: 6/29/2012 Comment					
120868-002	C2-ASR5-Stor50	ASR5	Total Coliform	<2	MPN/100ml
Collector: Jon Travis CollectDate 6/26/2012 CollectTime: 1:00:00 PM ReceiveDate 6/27/2012 9:35:00 AM Matrix: Raw Water Temp 6.9 Volume: 250 mL Analysis Start Date: 6/27/12 Analysis Start Time: 1027 Analyst: JTruscott Analysis End: 6/29/2012 Comment					

Test: Enteric Virus Method: SM9510 - Modified

BioVir #	Sample ID	Site	Analyte	Result	Units
120868-001	C2-ASR5-Storage50	Well Shed	Enteric Virus	<0.009	pfu/L
Collector: Jon Travis CollectDate 6/26/2012 CollectTime: 1:00:00 PM ReceiveDate 6/27/2012 9:35:00 AM Matrix: Raw Water Temp 6.9 Volume: 228 L Analysis Start Date: 6/27/12 Analysis Start Time: 1305 Analyst: ValLog Analysis End: 7/12/2012 Comment Recovery Source Port					

REPORT NO.: 120868
PAGE NO.: 3 of 3
CLIENT: GSI Water Solutions
ADDRESS 1020 N Center Parkway, Suite F
Kennewick, WA 99336
CLIENT NO GSI002 **CLIENT PO:** 222.004.008

ASSAY RESULTS:

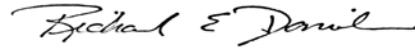
SAMPLE EVALUATION PERFORMANCE CRITERIA: The precise rates of recovery of organisms from environmental samples cannot be determined. BioVir Laboratories has analyzed your sample(s) in accordance with the method described with each analyte above, however, due to inherent limitations of these methods organisms may avoid detection. For additional information regarding the limitations of the method(s) referred to above please call us at 1-800-GIARDIA.

COMPANY IS NOT AN INSURER: BioVir Laboratories is not an insurer or guarantor of the quality and/or purity of water, wastewater, biosolid or other material from which the sample was taken. BioVir offers no express or implied warranties whatsoever concerning the quality or purity of any water, wastewater, biosolid or other material which is ultimately consumed, distributed, applied or disposed.

MAINTENANCE OF RECORDS: BioVir Laboratories, Inc. shall maintain records pertaining to the historical reconstruction of client's data for a minimum of five years from the date of issuance of the final report. Records may be destroyed after that date unless a written client's request for records transfer is received by BioVir which requests otherwise. Records transfer or storage charges may apply after the 5 year period. **THIS REPORT SHALL NOT BE REPRODUCED, EXCEPT IN FULL, WITHOUT THE WRITTEN APPROVAL OF BIOVIR LABORATORIES, INC.**

7/20/2012

Date:



Signature

Quality
Checked

DBA



**TOTAL CULTURABLE VIRUS
ENTERIC VIRUS ASSAY
SAMPLE DATA SHEET**

LAB USE ONLY:

LIMS #: 155-1
 Client #: GSI002
 Date Rec'd: 1/31/12
 Time Rec'd: 8:05
 Temp Rec'd: 6.5°C

(Please fill out completely and return white copy to BioVir with the sample.)
 Phone: 1-800-GIARDIA Fax: 707-747-1751 WEB: www.biovir.com

Note: Please print clearly using waterproof ink

NAME AND ADDRESS OF WATER COMPANY OR UTILITY: <u>GSI Water Solutions 8019 W Quinault Ave, Ste 201 Kennewick, WA 99336</u>		SAMPLE DATE: <u>1/30/2012</u>	
		SAMPLE TIME: <u>12:55 - 14:35</u>	
NAME OF SAMPLER: <u>Jon Travis</u>		pH: <u>9.04</u>	Water Temp (C): <u>26.21</u>
SAMPLE SOURCE: <u>ASR-5 @ port ~ 10' from Well</u>		TREATMENT CHARACTERISTICS (Check One): Raw Drinking Water <input checked="" type="checkbox"/> Treated Drinking Water <input type="checkbox"/> Wastewater <input type="checkbox"/> Filtered Wastewater <input type="checkbox"/>	
SAMPLE LOCATION: <u>Boise Wallula</u>		DECHLORINATION/ DISINFECTANT NEUTRALIZATION (If Treated Water): Yes <input checked="" type="checkbox"/>	
SAMPLE VOLUME: (Meter # <u>19005540</u>) Meter Start: <u>1007203.0</u> Meter Stop: <u>1007277.6</u>		TURBIDITY (NTU): Turbidity Begin: <u>6NTU</u> Turbidity End: <u>6NTU</u>	
Total Volume: <u>74.6</u> Gallons <u>277.6</u> Liters			

Client ID: <u>GSI Water Solutions</u>	P.O. #: <u>BOISE</u>
---------------------------------------	----------------------

ASSAY REQUESTED: Please check one of the following	
<input type="checkbox"/>	Total Culturable Virus Assay, MPN - (EPA, ICR 600/R-95/178)
<input type="checkbox"/>	Pre Filter Cartridge - M19R10A
<input checked="" type="checkbox"/>	Enteric Virus Assay, PFU - (SM 18th; 9510 - BioVir Modification)

Volume
282.4L

COMMENTS:

RELINQUISHED BY: <u>[Signature]</u>	DATE / TIME: <u>1/30/2012 15:30</u>
RECEIVED BY: <u>[Signature]</u>	DATE / TIME: <u>1/31/12 8:05</u>

SHIPPING ADDRESS: BIOVIR LABORATORIES, INC., 685 STONE ROAD, UNIT 6, BENICIA, CALIFORNIA 94510
 WHITE = BIOVIR COPY YELLOW = CUSTOMER COPY



685 Stone Road, Unit 6 • Benicia, CA 94510 • (707) 747-5906 • 1-800-GIARDIA • FAX (707) 747-1751 • WEB: www.biovir.com

REPORT NO.: 120155
PAGE NO.: 1 of 3
CLIENT: GSI Water Solutions
ADDRESS 1020 N Center Parkway, Suite F
Kennewick, WA 99336
CLIENT NO GSI002 **CLIENT PO:** Boise

ASSAY RESULTS:

Test: Coliform, Total **Method: SM9221B**

BioVir #	Sample ID	Site	Analyte	Result	Units
120155-002	ASR5 BAC-BASE	10 ft from well	Test Results Meet All Requirements of NELAC	YES	
Collector: Jon Travis CollectDate 1/30/2012 CollectTime: 2:30:00 PM					
ReceiveDate 1/31/2012 8:05:00 AM Matrix: Drinking Water Temp 6.5					
Volume: 250 mL Analysis Start Date: Analysis Start Time:					
Analyst: Analysis End:					
Comment					

120155-002	ASR5 BAC-BASE	10 ft from well	Total Coliform	Not Entered	MPN/100ml
Collector: Jon Travis CollectDate 1/30/2012 CollectTime: 2:30:00 PM					
ReceiveDate 1/31/2012 8:05:00 AM Matrix: Drinking Water Temp 6.5					
Volume: 250 mL Analysis Start Date: Analysis Start Time:					
Analyst: Analysis End:					
Comment					

Test: Coliform, Total & E.coli **Method: SM9223**

BioVir #	Sample ID	Site	Analyte	Result	Units
120155-002	ASR5 BAC-BASE	10 ft from well	E. coli	Absent	P/A per 100 ml
Collector: Jon Travis CollectDate 1/30/2012 CollectTime: 2:30:00 PM					
ReceiveDate 1/31/2012 8:05:00 AM Matrix: Drinking Water Temp 6.5					
Volume: 250 mL Analysis Start Date: 1/30/12 Analysis Start Time: 1023					
Analyst: JTruscott Analysis End: 2/2/2012					
Comment					

REPORT NO.: 120155
PAGE NO.: 3 of 3
CLIENT: GSI Water Solutions
ADDRESS 1020 N Center Parkway, Suite F
Kennewick, WA 99336
CLIENT NO GSI002 **CLIENT PO:** Boise

ASSAY RESULTS:

SAMPLE EVALUATION PERFORMANCE CRITERIA: The precise rates of recovery of organisms from environmental samples cannot be determined. BioVir Laboratories has analyzed your sample(s) in accordance with the method described with each analyte above, however, due to inherent limitations of these methods organisms may avoid detection. For additional information regarding the limitations of the method(s) referred to above please call us at 1-800-GIARDIA.

COMPANY IS NOT AN INSURER: BioVir Laboratories is not an insurer or guarantor of the quality and/or purity of water, wastewater, biosolid or other material from which the sample was taken. BioVir offers no express or implied warranties whatsoever concerning the quality or purity of any water, wastewater, biosolid or other material which is ultimately consumed, distributed, applied or disposed.

MAINTENANCE OF RECORDS: BioVir Laboratories, Inc. shall maintain records pertaining to the historical reconstruction of client's data for a minimum of five years from the date of issuance of the final report. Records may be destroyed after that date unless a written client's request for records transfer is received by BioVir which requests otherwise. Records transfer or storage charges may apply after the 5 year period. **THIS REPORT SHALL NOT BE REPRODUCED, EXCEPT IN FULL, WITHOUT THE WRITTEN APPROVAL OF BIOVIR LABORATORIES, INC.**

2/24/2012

Date:



Signature

Quality
Checked

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: GSI WATER SOLUTIONS INC
Address: 8019 W. QUINAULT AVE
KENNEWICK, WA 99336
Attn: JON TRAVIS

Batch #: 120201036
Project Name: BOISE ASR PROJECT

Analytical Results Report

Sample Number 120201036-001 **Sampling Date** 1/31/2012 **Date/Time Received** 2/1/2012 10:54 AM
Client Sample ID BOISE-ASR5-BASE **Sampling Time** 2:00 PM
Matrix Drinking Water **Sample Location**
Comments RADIOLOGICAL ANALYSIS PERFORMED BY PACE ANALYTICAL GREENSBURG PA

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Alkalinity	123	mg/L	2	2/2/2012	JTT	SM2320B	
Aluminum	ND	mg/L	0.01	2/10/2012	ETL	EPA 200.7	
Antimony	ND	mg/L	0.001	2/7/2012	JTT	EPA 200.8	
Arsenic	ND	mg/L	0.001	2/7/2012	JTT	EPA 200.8	
Barium	0.0129	mg/L	0.001	2/7/2012	JTT	EPA 200.8	
Beryllium	ND	mg/L	0.001	2/7/2012	JTT	EPA 200.8	
Bicarbonate	123	mg/L	2	2/2/2012	JTT	SM2320B	
Cadmium	ND	mg/L	0.001	2/7/2012	JTT	EPA 200.8	
Carbonate	ND	mg/L	5	2/2/2012	JTT	SM2320B	
Chloride	19.6	mg/L	0.1	2/1/2012	JTT	EPA 300.0	
Chromium	ND	mg/L	0.001	2/2/2012	JTT	EPA 200.8	
Copper	ND	mg/L	0.001	2/7/2012	JTT	EPA 200.8	
Dissolved Iron	ND	mg/L	0.01	2/10/2012	ETL	EPA 200.7	
Dissolved Manganese	ND	mg/L	0.01	2/10/2012	ETL	EPA 200.7	
1,2-Dibromoethane (EDB)	ND	ug/L	0.02	2/2/2012	SAT	EPA 504.1	
Fluoride	3.47	mg/L	0.1	2/2/2012	JTT	EPA 300.0	
Gross Alpha	0.390 +/- 1.17	pCi/L	2.86	2/13/2012	SUB	EPA 900.0	
Gross Beta	5.56 +/- 1.21	pCi/L	1.63	2/13/2012	SUB	EPA 900.0	
Calcium	2.21	mg/L	0.1	2/10/2012	ETL	EPA 200.7	
Hardness	6.03	mg/L	1	2/10/2012	ETL	EPA 200.7	
Magnesium	0.122	mg/L	0.1	2/10/2012	ETL	EPA 200.7	
2,4,5-TP (Silvex)	ND	ug/L	0.1	2/4/2012	SAT	EPA 515.3	
2,4-D	ND	ug/L	0.1	2/4/2012	SAT	EPA 515.3	
Iron	ND	mg/L	0.01	2/10/2012	ETL	EPA 200.7	
Lead	ND	mg/L	0.001	2/7/2012	JTT	EPA 200.8	
Manganese	ND	mg/L	0.01	2/10/2012	ETL	EPA 200.7	
Mercury-ICPMS	ND	mg/L	0.0001	2/7/2012	JTT	EPA 200.8	
Nickel	ND	mg/L	0.001	2/7/2012	JTT	EPA 200.8	
NO3/N	ND	mg/L	0.1	2/1/2012	JTT	EPA 300.0	
NO3/N+NO2/N	ND	mg/L	0.1	2/1/2012	JTT	EPA 300.0	
NO2/N	ND	mg/L	0.1	2/1/2012	JTT	EPA 300.0	
4,4-DDD	ND	ug/L	0.1	2/6/2012	MAH	EPA 505	
4,4-DDE	ND	ug/L	0.1	2/6/2012	MAH	EPA 505	
4,4-DDT	ND	ug/L	0.1	2/6/2012	MAH	EPA 505	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C585; MT:Cert0095

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: GSI WATER SOLUTIONS INC
Address: 8019 W. QUINAULT AVE
KENNEWICK, WA 99336
Attn: JON TRAVIS

Batch #: 120201036
Project Name: BOISE ASR PROJECT

Analytical Results Report

Sample Number	120201036-001	Sampling Date	1/31/2012	Date/Time Received	2/1/2012	10:54 AM
Client Sample ID	BOISE-ASR5-BASE	Sampling Time	2:00 PM			
Matrix	Drinking Water	Sample Location				
Comments	RADIOLOGICAL ANALYSIS PERFORMED BY PACE ANALYTICAL GREENSBURG PA					

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Chlordane	ND	ug/L	0.4	2/6/2012	MAH	EPA 505	
Dieldrin	ND	ug/L	0.2	2/6/2012	MAH	EPA 505	
Endrin	ND	ug/L	0.02	2/6/2012	MAH	EPA 505	
Heptachlor epoxide	ND	ug/L	0.04	2/6/2012	MAH	EPA 505	
PCBs	ND	µg/L	0.5	2/6/2012	MAH	EPA 505	
Toxaphene	ND	ug/L	2	2/6/2012	MAH	EPA 505	
Potassium	8.47	mg/L	0.01	2/10/2012	ETL	EPA 200.7	
Selenium	ND	mg/L	0.001	2/7/2012	JTT	EPA 200.8	
Hexachlorobenzene	ND	ug/L	0.2	2/6/2012	EMP	EPA 525.2	
Silica (as SiO2)	77.5	mg/L	0.1	2/10/2012	ETL	EPA 200.7	
Silicon	36.2	mg/L	0.1	2/10/2012	ETL	EPA 200.7	
Silver	ND	mg/L	0.001	2/7/2012	JTT	EPA 200.8	
Sodium	51.7	mg/L	0.1	2/10/2012	ETL	EPA 200.7	
TDS	253	mg/L	10	2/7/2012	ETL	SM 2540C	
TSS	ND	mg/L	1	2/6/2012	JTT	SM 2540D	
Sulfate	0.474	mg/L	0.1	2/1/2012	JTT	EPA 300.0	
Thallium	ND	mg/L	0.001	2/7/2012	JTT	EPA 200.8	
TOC	0.378	mg/L	0.1	2/9/2012	JWC	SM 5310B	
1,1,1-Trichloroethane	ND	µg/L	0.5	2/7/2012	SAT	EPA 524.2	
1,1,2-Trichloroethane	ND	µg/L	0.5	2/7/2012	SAT	EPA 524.2	
1,1-Dichloroethene	ND	µg/L	0.5	2/7/2012	SAT	EPA 524.2	
1,2,4-Trichlorobenzene	ND	µg/L	0.5	2/7/2012	SAT	EPA 524.2	
1,2-Dichlorobenzene	ND	µg/L	0.5	2/7/2012	SAT	EPA 524.2	
1,2-Dichloroethane	ND	µg/L	0.5	2/7/2012	SAT	EPA 524.2	
1,2-Dichloropropane	ND	µg/L	0.5	2/7/2012	SAT	EPA 524.2	
1,4-Dichlorobenzene	ND	µg/L	0.5	2/7/2012	SAT	EPA 524.2	
Benzene	ND	µg/L	0.5	2/7/2012	SAT	EPA 524.2	
Carbon Tetrachloride	ND	µg/L	0.5	2/7/2012	SAT	EPA 524.2	
Chlorobenzene	ND	µg/L	0.5	2/7/2012	SAT	EPA 524.2	
cis-1,2-dichloroethene	ND	µg/L	0.5	2/7/2012	SAT	EPA 524.2	
Ethylbenzene	ND	µg/L	0.5	2/7/2012	SAT	EPA 524.2	
Methylene chloride	ND	µg/L	0.5	2/7/2012	SAT	EPA 524.2	
Styrene	ND	µg/L	0.5	2/7/2012	SAT	EPA 524.2	
Tetrachloroethene	ND	µg/L	0.5	2/7/2012	SAT	EPA 524.2	
Toluene	0.50	µg/L	0.5	2/7/2012	SAT	EPA 524.2	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C585; MT:Cert0095

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: GSI WATER SOLUTIONS INC
Address: 8019 W. QUINAULT AVE
KENNEWICK, WA 99336
Attn: JON TRAVIS

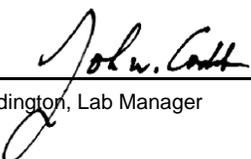
Batch #: 120201036
Project Name: BOISE ASR PROJECT

Analytical Results Report

Sample Number	120201036-001	Sampling Date	1/31/2012	Date/Time Received	2/1/2012	10:54 AM
Client Sample ID	BOISE-ASR5-BASE	Sampling Time	2:00 PM			
Matrix	Drinking Water	Sample Location				
Comments	RADIOLOGICAL ANALYSIS PERFORMED BY PACE ANALYTICAL GREENSBURG PA					

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Total Xylene	ND	µg/L	0.5	2/7/2012	SAT	EPA 524.2	
trans-1,2-Dichloroethene	ND	µg/L	0.5	2/7/2012	SAT	EPA 524.2	
Trichloroethene	ND	µg/L	0.5	2/7/2012	SAT	EPA 524.2	
Vinyl Chloride	ND	µg/L	0.5	2/7/2012	SAT	EPA 524.2	
Zinc	0.00216	mg/L	0.001	2/7/2012	JTT	EPA 200.8	

Authorized Signature



John Coddington, Lab Manager

MCL EPA's Maximum Contaminant Level
ND Not Detected
PQL Practical Quantitation Limit

This report shall not be reproduced except in full, without the written approval of the laboratory.
The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Login Report

Customer Name: GSI WATER SOLUTIONS INC

Order ID: 120201036

8019 W. QUINAULT AVE

Order Date: 2/1/2012

KENNEWICK

WA

99336

Contact Name: JON TRAVIS

Project Name: BOISE ASR PROJECT

Comment:

Sample #: 120201036-001 **Customer Sample #:** BOISE-ASR5-BASE

Recv'd:

Collector: JON

Date Collected: 1/31/2012

Quantity: 17

Matrix: Drinking Water

Date Received: 2/1/2012 10:54:00 A

Comment:

Test	Lab	Method	Due Date	Priority
ALKALINITY	M	SM2320B	2/13/2012	<u>Normal (6-10 Days)</u>
ALUMINUM ICP	M	EPA 200.7	2/13/2012	<u>Normal (6-10 Days)</u>
ANTIMONY	M	EPA 200.8	2/13/2012	<u>Normal (6-10 Days)</u>
ARSENIC	M	EPA 200.8	2/13/2012	<u>Normal (6-10 Days)</u>
BARIUM	M	EPA 200.8	2/13/2012	<u>Normal (6-10 Days)</u>
BERYLLIUM	M	EPA 200.8	2/13/2012	<u>Normal (6-10 Days)</u>
BICARBONATE	M	SM2320B	2/13/2012	<u>Normal (6-10 Days)</u>
CADMIUM	M	EPA 200.8	2/13/2012	<u>Normal (6-10 Days)</u>
CARBONATE	M	SM2320B	2/13/2012	<u>Normal (6-10 Days)</u>
CHLORIDE	M	EPA 300.0	2/13/2012	<u>Normal (6-10 Days)</u>
CHROMIUM	M	EPA 200.8	2/13/2012	<u>Normal (6-10 Days)</u>
COPPER	M	EPA 200.8	2/13/2012	<u>Normal (6-10 Days)</u>
DISSOLVED IRON BY ICP	M	EPA 200.7	2/13/2012	<u>Normal (6-10 Days)</u>
DISSOLVED MANGANESE BY ICP	M	EPA 200.7	2/13/2012	<u>Normal (6-10 Days)</u>
EDB 504.1	M	EPA 504.1	2/13/2012	<u>Normal (6-10 Days)</u>
FLUORIDE	M	EPA 300.0	2/13/2012	<u>Normal (6-10 Days)</u>
GROSS ALPHA		EPA 900.0	2/13/2012	<u>Normal (6-10 Days)</u>
GROSS BETA		EPA 900.0	2/13/2012	<u>Normal (6-10 Days)</u>
HARDNESS by EPA 200.7	M	EPA 200.7	2/13/2012	<u>Normal (6-10 Days)</u>
HERBICIDES 515.3	M	EPA 515.3	2/13/2012	<u>Normal (6-10 Days)</u>
IRON ICP	M	EPA 200.7	2/13/2012	<u>Normal (6-10 Days)</u>
LEAD	M	EPA 200.8	2/13/2012	<u>Normal (6-10 Days)</u>
MANGANESE ICP	M	EPA 200.7	2/13/2012	<u>Normal (6-10 Days)</u>

Customer Name: GSI WATER SOLUTIONS INC
 8019 W. QUINAULT AVE
 KENNEWICK WA 99336

Order ID: 120201036
Order Date: 2/1/2012

Contact Name: JON TRAVIS

Project Name: BOISE ASR PROJECT

Comment:

MERCURY-ICPMS	M	EPA 200.8	2/13/2012	<u>Normal (6-10 Days)</u>
NICKEL	M	EPA 200.8	2/13/2012	<u>Normal (6-10 Days)</u>
NITRATE/N	M	EPA 300.0	2/13/2012	<u>Normal (6-10 Days)</u>
NITRATE+ NITRITE AS N	M	EPA 300.0	2/13/2012	<u>Normal (6-10 Days)</u>
NITRITE/N	M	EPA 300.0	2/13/2012	<u>Normal (6-10 Days)</u>
PESTICIDES 505	M	EPA 505	2/13/2012	<u>Normal (6-10 Days)</u>
POTASSIUM ICP	M	EPA 200.7	2/13/2012	<u>Normal (6-10 Days)</u>
SELENIUM	M	EPA 200.8	2/13/2012	<u>Normal (6-10 Days)</u>
SEMIVOLATILES 525.2	M	EPA 525.2	2/13/2012	<u>Normal (6-10 Days)</u>
SILICON ICP	M	EPA 200.7	2/13/2012	<u>Normal (6-10 Days)</u>
SILVER	M	EPA 200.8	2/13/2012	<u>Normal (6-10 Days)</u>
SODIUM ICP	M	EPA 200.7	2/13/2012	<u>Normal (6-10 Days)</u>
SOLIDS - TDS	M	SM 2540C	2/13/2012	<u>Normal (6-10 Days)</u>
SOLIDS - TSS	M	SM 2540D	2/13/2012	<u>Normal (6-10 Days)</u>
SULFATE	M	EPA 300.0	2/13/2012	<u>Normal (6-10 Days)</u>
THALLIUM	M	EPA 200.8	2/13/2012	<u>Normal (6-10 Days)</u>
TOC - MOSC	M	SM 5310B	2/13/2012	<u>Normal (6-10 Days)</u>
VOLATILES 524.2	M	EPA 524.2	2/13/2012	<u>Normal (6-10 Days)</u>
ZINC	M	EPA 200.8	2/13/2012	<u>Normal (6-10 Days)</u>

Sample #: 120201036-001A **Customer Sample #:** BOISE-ASR5-BASEA

Recv'd: **Collector:** JON **Date Collected:** 1/31/2012
Quantity: 17 **Matrix:** Drinking Water **Date Received:** 2/1/2012 10:54:00 A

Comment:

Test	Lab	Method	Due Date	Priority
EDB 504.1		EPA 504.1	2/13/2012	<u>Normal (6-10 Days)</u>

Customer Name: GSI WATER SOLUTIONS INC
8019 W. QUINAULT AVE
KENNEWICK WA 99336

Order ID: 120201036
Order Date: 2/1/2012

Contact Name: JON TRAVIS

Project Name: BOISE ASR PROJECT

Comment:

SAMPLE CONDITION RECORD

Samples received in a cooler?	Yes
Samples received intact?	Yes
What is the temperature inside the cooler?	6.0
Samples received with a COC?	Yes
Samples received within holding time?	Yes
Are all sample bottles properly preserved?	Yes
Are VOC samples free of headspace?	Yes
Is there a trip blank to accompany VOC samples?	No
Labels and chain agree?	Yes



ANATEK LABS, INC - Multi-state Certified, NI
 1282 Alturas Drive, Moscow ID 83843 (208)883-2839 FAX 883-2839
 504 E Sprague Ste D, Spokane WA 99202 (509)838-3999 FAX 838-3999

120201 036 GSIW Last Due **2/13/2012**
 1st SAMP 1/31/2012 1st RCVD 2/1/2012
BOISE ASR PROJECT

Washington Chain of Custody - Drinking Water Analysis

WATER SYSTEM	N/A	Water System #	WA
SEND REPORT TO	Jon Travis	Phone Number	509-979-0332
ADDRESS	8019 W Quinault Ave Ste 201	Fax Number	---
CITY STATE ZIP	Kennecock WA 99336	County	---

Sample Type	Sample Purpose	Date & Time Collected	1/31/12 1400
<input type="checkbox"/> Before (B)	<input type="checkbox"/> Compliance (C)	Sampler Name:	Jon Travis
<input type="checkbox"/> After (A)	<input type="checkbox"/> Investigative (I)	Sampler Signature:	BOISE-ASR 5-Base
<input type="checkbox"/> Unknown (U)	<input type="checkbox"/> Other Purpose (B)		

DOH Source # (Check one and fill in where necessary)	Receiving Check List
<input type="checkbox"/> Single Well Source Number: _____	<input checked="" type="checkbox"/> Received Intact <input type="checkbox"/> No Headspace
<input type="checkbox"/> Flowing Distribution (92)	<input checked="" type="checkbox"/> Labels & Chains Agree <input type="checkbox"/> Temp: 60
<input type="checkbox"/> Standing Distribution (93) (Lead/Copper Distribution)	<input type="checkbox"/> Ice/Ice-Packs Present: Y
<input type="checkbox"/> Composite Sampling (95) List source #'s _____	<input type="checkbox"/> Custody Seals Present: N
<input type="checkbox"/> Blended Sample (96) List source #'s _____	<input checked="" type="checkbox"/> Preservatives: 55 bottles HEL

IOCs	VOCS & DBPs	SOCs	Other (specify):
<input type="checkbox"/> Lead / Copper	<input checked="" type="checkbox"/> VOC (VOC1) 5	<input type="checkbox"/> Phase II SOC	SEE MURS
<input type="checkbox"/> Lead / Arsenic	<input type="checkbox"/> THM	<input checked="" type="checkbox"/> Semivolatiles (PEST1)	Attachment
<input type="checkbox"/> Nitrate	<input type="checkbox"/> HAA5	<input type="checkbox"/> Herbicides (HERB1)	* * *
<input type="checkbox"/> Nitrite	<input checked="" type="checkbox"/> TOC 2	<input type="checkbox"/> Carbamates (INSECT1)	Geo Chem 1
<input type="checkbox"/> Washington Complete IOC	RADS	<input checked="" type="checkbox"/> Pesticides (PEST1)	Metals 1
<input type="checkbox"/> Asbestos	<input checked="" type="checkbox"/> Gross Alpha 1	<input type="checkbox"/> FEDB	17 count
	<input type="checkbox"/> Gross Beta	<input type="checkbox"/> Phase V SOC	
	<input checked="" type="checkbox"/> RAD 226	<input type="checkbox"/> Diquat	
	<input checked="" type="checkbox"/> RAD 228	<input type="checkbox"/> Endothall	
	<input checked="" type="checkbox"/> RAD 228	<input type="checkbox"/> Glyphosate	
		<input type="checkbox"/> Dioxin	

Customer Signature	Received By
<i>[Signature]</i>	BT Feder
Shipping/Delivery Date	Date Received
1/31/12	2-1-12 10:54

Payment due with samples unless credit has been established.

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: GSI WATER SOLUTIONS INC
Address: 8019 W. QUINAULT AVE
KENNEWICK, WA 99336
Attn: KEVIN LINDSEY

Batch #: 120210021
Project Name: BOISE ASR 222.004.008

Analytical Results Report

Sample Number	120210021-001	Sampling Date	2/9/2012	Date/Time Received	2/10/2012 12:00 PM
Client Sample ID	ASR5-C1-REC	Sampling Time	10:00 PM		
Matrix	Drinking Water	Sample Location			
Comments	Radiological analysis performed by Pace Analytical, Greensburg PA				

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Alkalinity	120	mg/L	2	2/17/2012	KFG	SM2320B	
Aluminum	0.0114	mg/L	0.01	2/15/2012	ETL	EPA 200.7	
Antimony	ND	mg/L	0.001	2/17/2012	ETL	EPA 200.8	
Arsenic	0.00149	mg/L	0.001	2/17/2012	ETL	EPA 200.8	
Barium	0.0233	mg/L	0.001	2/17/2012	ETL	EPA 200.8	
Beryllium	ND	mg/L	0.001	2/17/2012	ETL	EPA 200.8	
Bicarbonate	120	mg/L	2	2/17/2012	KFG	SM2320B	
Cadmium	ND	mg/L	0.001	2/17/2012	ETL	EPA 200.8	
Carbonate	ND	mg/L	5	2/17/2012	KFG	SM2320B	
Chloride	19.2	mg/L	0.1	2/10/2012	JTT	EPA 300.0	
Chromium	ND	mg/L	0.001	2/17/2012	ETL	EPA 200.8	
Copper	ND	mg/L	0.001	2/17/2012	ETL	EPA 200.8	
Dissolved Iron	ND	mg/L	0.01	2/20/2012	ETL	EPA 200.7	
Dissolved Manganese	ND	mg/L	0.01	2/20/2012	ETL	EPA 200.7	
1,2-Dibromoethane (EDB)	ND	ug/L	0.02	2/14/2012	SAT	EPA 504.1	
Fluoride	3.11	mg/L	0.1	2/10/2012	JTT	EPA 300.0	
Gross Alpha	0.219 +/- 1.15	pCi/L	2.97	3/13/2012	JWC	EPA 900.0	
Gross Beta	7.16 +/- 1.41	pCi/L	1.98	3/13/2012	JWC	EPA 900.0	
Calcium	3.87	mg/L	0.1	2/15/2012	ETL	EPA 200.7	
Hardness	11.9	mg/L	1	2/15/2012	ETL	EPA 200.7	
Magnesium	0.537	mg/L	0.1	2/15/2012	ETL	EPA 200.7	
2,4,5-TP (Silvex)	ND	ug/L	0.1	2/16/2012	SAT	EPA 515.3	
2,4-D	ND	ug/L	0.1	2/16/2012	SAT	EPA 515.3	
Iron	ND	mg/L	0.01	2/15/2012	ETL	EPA 200.7	
Lead	ND	mg/L	0.001	2/17/2012	ETL	EPA 200.8	
Manganese	ND	mg/L	0.01	2/15/2012	ETL	EPA 200.7	
Mercury-ICPMS	ND	mg/L	0.0001	2/17/2012	ETL	EPA 200.8	
Nickel	ND	mg/L	0.001	2/17/2012	ETL	EPA 200.8	
NO3/N	ND	mg/L	0.1	2/10/2012	JTT	EPA 300.0	
NO3/N+NO2/N	ND	mg/L	0.1	2/10/2012	JTT	EPA 300.0	
NO2/N	ND	mg/L	0.1	2/10/2012	JTT	EPA 300.0	
4,4-DDD	ND	ug/L	0.1	2/16/2012	MAH	EPA 505	
4,4-DDE	ND	ug/L	0.1	2/16/2012	MAH	EPA 505	
4,4-DDT	ND	ug/L	0.1	2/16/2012	MAH	EPA 505	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C585; MT:Cert0095

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: GSI WATER SOLUTIONS INC
Address: 8019 W. QUINAULT AVE
KENNEWICK, WA 99336
Attn: KEVIN LINDSEY

Batch #: 120210021
Project Name: BOISE ASR 222.004.008

Analytical Results Report

Sample Number	120210021-001	Sampling Date	2/9/2012	Date/Time Received	2/10/2012 12:00 PM
Client Sample ID	ASR5-C1-REC	Sampling Time	10:00 PM		
Matrix	Drinking Water	Sample Location			
Comments	Radiological analysis performed by Pace Analytical, Greensburg PA				

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Chlordane	ND	ug/L	0.4	2/16/2012	MAH	EPA 505	
Dieldrin	ND	ug/L	0.2	2/16/2012	MAH	EPA 505	
Endrin	ND	ug/L	0.02	2/16/2012	MAH	EPA 505	
Heptachlor epoxide	ND	ug/L	0.04	2/16/2012	MAH	EPA 505	
PCBs	ND	µg/L	0.5	2/16/2012	MAH	EPA 505	
Toxaphene	ND	ug/L	2	2/16/2012	MAH	EPA 505	
Potassium	7.34	mg/L	0.01	2/15/2012	ETL	EPA 200.7	
Selenium	0.00311	mg/L	0.001	2/17/2012	ETL	EPA 200.8	
Hexachlorobenzene	ND	ug/L	0.2	2/16/2012	EMP	EPA 525.2	
Silica (as SiO2)	80.5	mg/L	0.1	2/15/2012	ETL	EPA 200.7	
Silicon	37.6	mg/L	0.1	2/15/2012	ETL	EPA 200.7	
Silver	ND	mg/L	0.001	2/17/2012	ETL	EPA 200.8	
Sodium	44.9	mg/L	0.1	2/15/2012	ETL	EPA 200.7	
TDS	269	mg/L	10	2/13/2012	JTT	SM 2540C	
TSS	ND	mg/L	1	2/15/2012	ETL	SM 2540D	
Sulfate	2.64	mg/L	0.1	2/10/2012	JTT	EPA 300.0	
Thallium	ND	mg/L	0.001	2/17/2012	ETL	EPA 200.8	
TOC	0.411	mg/L	0.1	2/14/2012	JWC	SM 5310B	
1,1,1-Trichloroethane	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,1,2-Trichloroethane	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,1-Dichloroethene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,2,4-Trichlorobenzene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,2-Dichlorobenzene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,2-Dichloroethane	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,2-Dichloropropane	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,4-Dichlorobenzene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Benzene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Carbon Tetrachloride	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Chlorobenzene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
cis-1,2-dichloroethene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Ethylbenzene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Methylene chloride	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Styrene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Tetrachloroethene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Toluene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT: CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; CA: Cert2632; ID:WA00169; WA:C585; MT: Cert0095

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: GSI WATER SOLUTIONS INC
Address: 8019 W. QUINAULT AVE
KENNEWICK, WA 99336
Attn: KEVIN LINDSEY

Batch #: 120210021
Project Name: BOISE ASR 222.004.008

Analytical Results Report

Sample Number	120210021-001	Sampling Date	2/9/2012	Date/Time Received	2/10/2012 12:00 PM		
Client Sample ID	ASR5-C1-REC	Sampling Time	10:00 PM				
Matrix	Drinking Water	Sample Location					
Comments	Radiological analysis performed by Pace Analytical, Greensburg PA						
Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Total Xylene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
trans-1,2-Dichloroethene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Trichloroethene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Vinyl Chloride	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Zinc	0.00142	mg/L	0.001	2/17/2012	ETL	EPA 200.8	

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: GSI WATER SOLUTIONS INC
Address: 8019 W. QUINAULT AVE
KENNEWICK, WA 99336
Attn: KEVIN LINDSEY

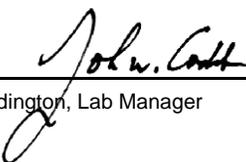
Batch #: 120210021
Project Name: BOISE ASR 222.004.008

Analytical Results Report

Sample Number	120210021-002	Sampling Date	2/9/2012	Date/Time Received	2/10/2012 12:00 PM
Client Sample ID	TRIP BLANK	Sampling Time			
Matrix	Drinking Water	Sample Location			
Comments					

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
1,1,1-Trichloroethane	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,1,2-Trichloroethane	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,1-Dichloroethene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,2,4-Trichlorobenzene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,2-Dichlorobenzene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,2-Dichloroethane	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,2-Dichloropropane	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,4-Dichlorobenzene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Benzene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Carbon Tetrachloride	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Chlorobenzene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
cis-1,2-dichloroethene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Ethylbenzene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Methylene chloride	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Styrene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Tetrachloroethene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Toluene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Total Xylene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
trans-1,2-Dichloroethene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Trichloroethene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Vinyl Chloride	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	

Authorized Signature


John Coddington, Lab Manager

MCL EPA's Maximum Contaminant Level
ND Not Detected
PQL Practical Quantitation Limit

This report shall not be reproduced except in full, without the written approval of the laboratory.
The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C585; MT:Cert0095

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Login Report

Customer Name: GSI WATER SOLUTIONS INC

Order ID: 120210021

8019 W. QUINAULT AVE

Order Date: 2/10/2012

KENNEWICK

WA

99336

Contact Name: KEVIN LINDSEY

Project Name: BOISE ASR 222.004.008

Comment:

Sample #: 120210021-001 **Customer Sample #:** ASR5-C1-REC

Recv'd:

Collector: JON

Date Collected: 2/9/2012

Quantity: 17

Matrix: Drinking Water

Date Received: 2/10/2012 12:00:00 P

Comment:

Test	Lab	Method	Due Date	Priority
ALKALINITY	M	SM2320B	2/22/2012	<u>Normal (6-10 Days)</u>
ALUMINUM ICP	M	EPA 200.7	2/22/2012	<u>Normal (6-10 Days)</u>
ANTIMONY	M	EPA 200.8	2/22/2012	<u>Normal (6-10 Days)</u>
ARSENIC	M	EPA 200.8	2/22/2012	<u>Normal (6-10 Days)</u>
BARIIUM	M	EPA 200.8	2/22/2012	<u>Normal (6-10 Days)</u>
BERYLLIUM	M	EPA 200.8	2/22/2012	<u>Normal (6-10 Days)</u>
BICARBONATE	M	SM2320B	2/22/2012	<u>Normal (6-10 Days)</u>
CADMIUM	M	EPA 200.8	2/22/2012	<u>Normal (6-10 Days)</u>
CARBONATE	M	SM2320B	2/22/2012	<u>Normal (6-10 Days)</u>
CHLORIDE	M	EPA 300.0	2/22/2012	<u>Normal (6-10 Days)</u>
CHROMIUM	M	EPA 200.8	2/22/2012	<u>Normal (6-10 Days)</u>
COPPER	M	EPA 200.8	2/22/2012	<u>Normal (6-10 Days)</u>
DISSOLVED IRON BY ICP	M	EPA 200.7	2/22/2012	<u>Normal (6-10 Days)</u>
DISSOLVED MANGANESE BY ICP	M	EPA 200.7	2/22/2012	<u>Normal (6-10 Days)</u>
EDB 504.1	M	EPA 504.1	2/22/2012	<u>Normal (6-10 Days)</u>
FLUORIDE	M	EPA 300.0	2/22/2012	<u>Normal (6-10 Days)</u>
GROSS ALPHA		EPA 900.0	2/22/2012	<u>Normal (6-10 Days)</u>
GROSS BETA		EPA 900.0	2/22/2012	<u>Normal (6-10 Days)</u>
HARDNESS by EPA 200.7	M	EPA 200.7	2/22/2012	<u>Normal (6-10 Days)</u>
HERBICIDES 515.3	M	EPA 515.3	2/22/2012	<u>Normal (6-10 Days)</u>
IRON ICP	M	EPA 200.7	2/22/2012	<u>Normal (6-10 Days)</u>
LEAD	M	EPA 200.8	2/22/2012	<u>Normal (6-10 Days)</u>
MANGANESE ICP	M	EPA 200.7	2/22/2012	<u>Normal (6-10 Days)</u>

Customer Name: GSI WATER SOLUTIONS INC
 8019 W. QUINAULT AVE
 KENNEWICK WA 99336

Order ID: 120210021
 Order Date: 2/10/2012

Contact Name: KEVIN LINDSEY

Project Name: BOISE ASR 222.004.008

Comment:

MERCURY-ICPMS	M	EPA 200.8	2/22/2012	<u>Normal (6-10 Days)</u>
NICKEL	M	EPA 200.8	2/22/2012	<u>Normal (6-10 Days)</u>
NITRATE/N	M	EPA 300.0	2/22/2012	<u>Normal (6-10 Days)</u>
NITRATE+ NITRITE AS N	M	EPA 300.0	2/22/2012	<u>Normal (6-10 Days)</u>
NITRITE/N	M	EPA 300.0	2/22/2012	<u>Normal (6-10 Days)</u>
PESTICIDES 505	M	EPA 505	2/22/2012	<u>Normal (6-10 Days)</u>
POTASSIUM ICP	M	EPA 200.7	2/22/2012	<u>Normal (6-10 Days)</u>
SELENIUM	M	EPA 200.8	2/22/2012	<u>Normal (6-10 Days)</u>
SEMIVOLATILES 525.2	M	EPA 525.2	2/22/2012	<u>Normal (6-10 Days)</u>
SILICON ICP	M	EPA 200.7	2/22/2012	<u>Normal (6-10 Days)</u>
SILVER	M	EPA 200.8	2/22/2012	<u>Normal (6-10 Days)</u>
SODIUM ICP	M	EPA 200.7	2/22/2012	<u>Normal (6-10 Days)</u>
SOLIDS - TDS	M	SM 2540C	2/22/2012	<u>Normal (6-10 Days)</u>
SOLIDS - TSS	M	SM 2540D	2/22/2012	<u>Normal (6-10 Days)</u>
SULFATE	M	EPA 300.0	2/22/2012	<u>Normal (6-10 Days)</u>
THALLIUM	M	EPA 200.8	2/22/2012	<u>Normal (6-10 Days)</u>
TOC - MOSC	M	SM 5310B	2/22/2012	<u>Normal (6-10 Days)</u>
VOLATILES 524.2	M	EPA 524.2	2/22/2012	<u>Normal (6-10 Days)</u>
ZINC	M	EPA 200.8	2/22/2012	<u>Normal (6-10 Days)</u>

Sample #: 120210021-002 Customer Sample #: TRIP BLANK

Recv'd: Collector: JON Date Collected: 2/9/2012
 Quantity: 1 Matrix: Drinking Water Date Received: 2/10/2012 12:00:00 P

Comment:

Test	Lab	Method	Due Date	Priority
VOLATILES 524.2	M	EPA 524.2	2/22/2012	<u>Normal (6-10 Days)</u>

Customer Name: GSI WATER SOLUTIONS INC
8019 W. QUINAULT AVE
KENNEWICK WA 99336

Order ID: 120210021
Order Date: 2/10/2012

Contact Name: KEVIN LINDSEY

Project Name: BOISE ASR 222.004.008

Comment:

SAMPLE CONDITION RECORD

Samples received in a cooler?	Yes
Samples received intact?	Yes
What is the temperature inside the cooler?	5.9
Samples received with a COC?	Yes
Samples received within holding time?	Yes
Are all sample bottles properly preserved?	Yes
Are VOC samples free of headspace?	Yes
Is there a trip blank to accompany VOC samples?	Yes
Labels and chain agree?	Yes

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: GSI WATER SOLUTIONS INC
Address: 8019 W. QUINAULT AVE
KENNEWICK, WA 99336
Attn: JON TRAVIS

Batch #: 120814029
Project Name: BOISE

Analytical Results Report

Sample Number 120814029-001 **Sampling Date** 8/9/2012 **Date/Time Received** 8/14/2012 11:50 AM
Client Sample ID ASR5-BOH **Sampling Time** 3:30 PM
Matrix Drinking Water **Sample Location**
Comments

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Alkalinity	106	mg CaCO3/L	2	8/17/2012	KFG	SM2320B	
Aluminum	ND	mg/L	0.01	8/23/2012	ETL	EPA 200.7	
Antimony	ND	mg/L	0.001	8/24/2012	JTT	EPA 200.8	
Arsenic	0.00184	mg/L	0.001	8/24/2012	JTT	EPA 200.8	
Barium	0.0251	mg/L	0.001	8/24/2012	JTT	EPA 200.8	
Beryllium	ND	mg/L	0.0003	8/24/2012	JTT	EPA 200.8	
Bicarbonate	106	mg CaCO3/L	2	8/17/2012	KFG	SM2320B	
Cadmium	ND	mg/L	0.001	8/24/2012	JTT	EPA 200.8	
Carbonate	ND	mg CaCO3/L	5	8/17/2012	KFG	SM2320B	
Chloride	14.0	mg/L	0.1	8/23/2012	JTT	EPA 300.0	
Chromium	ND	mg/L	0.001	8/24/2012	JTT	EPA 200.8	
Copper	ND	mg/L	0.001	8/24/2012	JTT	EPA 200.8	
Dissolved Iron	ND	mg/L	0.01	8/22/2012	ETL	EPA 200.7	
Dissolved Manganese	ND	mg/L	0.01	8/22/2012	ETL	EPA 200.7	
Fluoride	2.64	mg/L	0.1	8/23/2012	JTT	EPA 300.0	
Calcium	8.31	mg/L	0.1	8/22/2012	ETL	EPA 200.7	
Hardness	27.2	mg/L	1	8/22/2012	ETL	EPA 200.7	
Magnesium	1.57	mg/L	0.1	8/22/2012	ETL	EPA 200.7	
Iron	ND	mg/L	0.01	8/22/2012	ETL	EPA 200.7	
Lead	ND	mg/L	0.001	8/24/2012	JTT	EPA 200.8	
Manganese	0.0104	mg/L	0.01	8/22/2012	ETL	EPA 200.7	
Mercury-ICPMS	ND	mg/L	0.0001	8/24/2012	JTT	EPA 200.8	

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: GSI WATER SOLUTIONS INC
Address: 8019 W. QUINAULT AVE
KENNEWICK, WA 99336
Attn: JON TRAVIS

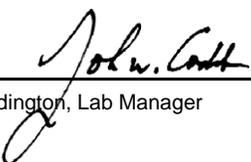
Batch #: 120814029
Project Name: BOISE

Analytical Results Report

Sample Number 120814029-001 **Sampling Date** 8/9/2012 **Date/Time Received** 8/14/2012 11:50 AM
Client Sample ID ASR5-BOH **Sampling Time** 3:30 PM
Matrix Drinking Water **Sample Location**
Comments

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Nickel	ND	mg/L	0.001	8/24/2012	JTT	EPA 200.8	
Potassium	6.31	mg/L	0.01	8/22/2012	ETL	EPA 200.7	
Selenium	ND	mg/L	0.001	8/24/2012	JTT	EPA 200.8	
Silica (as SiO ₂)	55.6	mg/L	0.1	8/22/2012	ETL	EPA 200.7	
Silicon	26.0	mg/L	0.1	8/22/2012	ETL	EPA 200.7	
Silver	ND	mg/L	0.001	8/24/2012	JTT	EPA 200.8	
Sodium	37.0	mg/L	0.1	8/22/2012	ETL	EPA 200.7	
TDS	216	mg/L	10	8/20/2012	JTT	SM 2540C	
TSS	ND	mg/L	1	8/16/2012	JTT	SM 2540D	
Sulfate	7.15	mg/L	0.1	8/23/2012	JTT	EPA 300.0	
Thallium	ND	mg/L	0.001	8/24/2012	JTT	EPA 200.8	
Zinc	ND	mg/L	0.001	8/24/2012	JTT	EPA 200.8	

Authorized Signature


John Coddington, Lab Manager

MCL EPA's Maximum Contaminant Level
ND Not Detected
PQL Practical Quantitation Limit

This report shall not be reproduced except in full, without the written approval of the laboratory.
The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Login Report

Customer Name: GSI WATER SOLUTIONS INC

Order ID: 120814029

8019 W. QUINAULT AVE

Order Date: 8/14/2012

KENNEWICK

WA

99336

Contact Name: JON TRAVIS

Project Name: BOISE

Comment:

Sample #: 120814029-001 **Customer Sample #:** ASR5-BOH

Recv'd:

Collector: JON

Date Collected: 8/9/2012

Quantity: 2

Matrix: Drinking Water

Date Received: 8/14/2012 11:50:05 A

Comment:

Test	Lab	Method	Due Date	Priority
ALKALINITY	M	SM2320B	8/24/2012	<u>Normal (6-10 Days)</u>
ALUMINUM ICP	M	EPA 200.7	8/24/2012	<u>Normal (6-10 Days)</u>
ANTIMONY	M	EPA 200.8	8/24/2012	<u>Normal (6-10 Days)</u>
ARSENIC	M	EPA 200.8	8/24/2012	<u>Normal (6-10 Days)</u>
BARIUM	M	EPA 200.8	8/24/2012	<u>Normal (6-10 Days)</u>
BERYLLIUM	M	EPA 200.8	8/24/2012	<u>Normal (6-10 Days)</u>
BICARBONATE	M	SM2320B	8/24/2012	<u>Normal (6-10 Days)</u>
CADMIUM	M	EPA 200.8	8/24/2012	<u>Normal (6-10 Days)</u>
CARBONATE	M	SM2320B	8/24/2012	<u>Normal (6-10 Days)</u>
CHLORIDE	M	EPA 300.0	8/24/2012	<u>Normal (6-10 Days)</u>
CHROMIUM	M	EPA 200.8	8/24/2012	<u>Normal (6-10 Days)</u>
COPPER	M	EPA 200.8	8/24/2012	<u>Normal (6-10 Days)</u>
DISSOLVED IRON BY ICP	M	EPA 200.7	8/24/2012	<u>Normal (6-10 Days)</u>
DISSOLVED MANGANESE BY ICP	M	EPA 200.7	8/24/2012	<u>Normal (6-10 Days)</u>
FLUORIDE	M	EPA 300.0	8/24/2012	<u>Normal (6-10 Days)</u>
HARDNESS by EPA 200.7	M	EPA 200.7	8/24/2012	<u>Normal (6-10 Days)</u>
IRON ICP	M	EPA 200.7	8/24/2012	<u>Normal (6-10 Days)</u>
LEAD	M	EPA 200.8	8/24/2012	<u>Normal (6-10 Days)</u>
MANGANESE ICP	M	EPA 200.7	8/24/2012	<u>Normal (6-10 Days)</u>
MERCURY-ICPMS	M	EPA 200.8	8/24/2012	<u>Normal (6-10 Days)</u>
NICKEL	M	EPA 200.8	8/24/2012	<u>Normal (6-10 Days)</u>
POTASSIUM ICP	M	EPA 200.7	8/24/2012	<u>Normal (6-10 Days)</u>
SELENIUM	M	EPA 200.8	8/24/2012	<u>Normal (6-10 Days)</u>

Customer Name: GSI WATER SOLUTIONS INC
8019 W. QUINAULT AVE
KENNEWICK WA 99336

Order ID: 120814029
Order Date: 8/14/2012

Contact Name: JON TRAVIS

Project Name: BOISE

Comment:

SILICON ICP	M	EPA 200.7	8/24/2012	<u>Normal (6-10 Days)</u>
SILVER	M	EPA 200.8	8/24/2012	<u>Normal (6-10 Days)</u>
SODIUM ICP	M	EPA 200.7	8/24/2012	<u>Normal (6-10 Days)</u>
SOLIDS - TDS	M	SM 2540C	8/24/2012	<u>Normal (6-10 Days)</u>
SOLIDS - TSS	M	SM 2540D	8/24/2012	<u>Normal (6-10 Days)</u>
SULFATE	M	EPA 300.0	8/24/2012	<u>Normal (6-10 Days)</u>
THALLIUM	M	EPA 200.8	8/24/2012	<u>Normal (6-10 Days)</u>
ZINC	M	EPA 200.8	8/24/2012	<u>Normal (6-10 Days)</u>

SAMPLE CONDITION RECORD

Samples received in a cooler?	Yes
Samples received intact?	Yes
What is the temperature inside the cooler?	1.0
Samples received with a COC?	Yes
Samples received within holding time?	Yes
Are all sample bottles properly preserved?	Yes
Are VOC samples free of headspace?	N/A
Is there a trip blank to accompany VOC samples?	N/A
Labels and chain agree?	Yes

Boise Paper ASR Project

Geochemical	Analyte	Lowest Regulatory Standard	Units	Regulatory Criteria	MRL	Analysis Method	QA/QC Frequency and Limits									
							Surrogate	Frequency	Lab. Control Duplicate	Matrix Spike	Matrix Spike Duplicate	Lab. Control Sample	Lab. Control Sample			
	Bicarbonate	None	mg/L	None	5	SM 2320B	N/A	120	20	120	50-120	120	20	120	90-110	N/A
	Calcium	None	mg/L	None	5	EPA 200.8	N/A	120	20	120	60-120	120	20	120	90-110	N/A
	Carbonate	None	mg/L	None	5	SM 230B	N/A	120	20	120	60-120	120	20	120	90-110	N/A
	Chloride	250	mg/L	GQC, SMCL	0.1	EPA 300.0	N/A	120	20	120	60-120	120	20	120	90-110	N/A
	Hardness (as CaCO3)	None	mg/L	None	10	SM 230B	N/A	120	20	120	60-120	120	20	120	90-110	N/A
	Magnesium	None	mg/L	None	0.1	EPA 200.8	N/A	120	20	120	60-120	120	20	120	90-110	N/A
	Nitrate	10	mg/L	GQC, MCL	0.1	EPA 300.0	N/A	120	20	120	60-120	120	20	120	90-110	N/A
	Nitrite	10	mg/L	GQC, MCL	0.1	EPA 300.0	N/A	120	20	120	60-120	120	20	120	90-110	N/A
	Phosphate	10	mg/L	GQC, MCL	0.1	EPA 300.0	N/A	120	20	120	60-120	120	20	120	90-110	N/A
	Potassium	None	mg/L	None	0.1	EPA 200.8	N/A	120	20	120	70-130	120	20	120	85-115	N/A
	Silica	None	mg/L	None	0.1	EPA 200.8	N/A	120	20	120	70-130	120	20	120	85-115	N/A
	Sodium	None	mg/L	None	0.1	SM 3111B	N/A	120	20	120	60-120	120	20	120	90-110	N/A
	Sulfate	250	mg/L	GQC, SMCL	0.1	EPA 300.0	N/A	120	20	120	60-120	120	20	120	90-110	N/A
	Total Alkalinity	None	mg/L	None	5	SM 2320B	N/A	120	20	120	60-120	120	20	120	90-110	N/A
	Total Dissolved Solids	None	mg/L	GQC, SMCL	0.5	EPA 160.1	N/A	120	20	120	60-120	120	20	120	90-110	N/A
	Total Organic Carbon	None	mg/L	None	1	SM 5310C	N/A	120	20	120	60-120	120	20	120	90-110	N/A
	Total Suspended Solids (TSS)	0.05 - 0.2	mg/L	None	0.01	EPA 160.2	N/A	120	20	120	60-120	120	20	120	90-110	N/A
	Aluminum	0.005	mg/L	MCL	0.001	EPA 200.8	N/A	120	20	120	70-130	120	20	120	85-115	N/A
	Arsenic	0.00005	mg/L	GQC	0.001	EPA 200.8	N/A	120	20	120	70-130	120	20	120	85-115	N/A
	Barium	1	mg/L	GQC	0.001	EPA 200.8	N/A	120	20	120	70-130	120	20	120	85-115	N/A
	Cadmium	0.004	mg/L	MCL	0.001	EPA 200.8	N/A	120	20	120	70-130	120	20	120	85-115	N/A
	Cerium	0.005	mg/L	MCL	0.001	EPA 200.8	N/A	120	20	120	70-130	120	20	120	85-115	N/A
	Chromium	0.05	mg/L	GQC	0.001	EPA 200.8	N/A	120	20	120	70-130	120	20	120	85-115	N/A
	Copper	1	mg/L	GQC, SMCL	0.001	EPA 200.8	N/A	120	20	120	70-130	120	20	120	85-115	N/A
	Iron (Total)	None	mg/L	None	0.01	EPA 200.8	N/A	120	20	120	70-130	120	20	120	85-115	N/A
	Iron (Dissolved)	0.3	mg/L	GQC, SMCL	0.01	EPA 200.8	N/A	120	20	120	70-130	120	20	120	85-115	N/A
	Lead	0.015	mg/L	MCL	0.001	EPA 200.8	N/A	120	20	120	70-130	120	20	120	85-115	N/A
	Manganese (Total)	None	mg/L	None	0.001	EPA 200.8	N/A	120	20	120	70-130	120	20	120	85-115	N/A
	Manganese (Dissolved)	0.05	mg/L	GQC, SMCL	0.001	EPA 200.8	N/A	120	20	120	70-130	120	20	120	85-115	N/A
	Mercury	0.002	mg/L	GQC, MCL	0.0001	EPA 200.8	N/A	120	20	120	70-130	120	20	120	85-115	N/A
	Nickel	None	mg/L	None	0.001	EPA 200.8	N/A	120	20	120	70-130	120	20	120	85-115	N/A
	Selenium	0.01	mg/L	GQC	0.001	EPA 200.8	N/A	120	20	120	70-130	120	20	120	85-115	N/A
	Silver	0.05	mg/L	GQC	0.001	EPA 200.8	N/A	120	20	120	70-130	120	20	120	85-115	N/A
	Thallium	0.002	mg/L	MCL	0.001	EPA 200.8	N/A	120	20	120	70-130	120	20	120	85-115	N/A
	Zinc	5	mg/L	GQC, SMCL	0.001	EPA 200.8	N/A	120	20	120	70-130	120	20	120	85-115	N/A



**TOTAL CULTURABLE VIRUS
ENTERIC VIRUS ASSAY
SAMPLE DATA SHEET**

LAB USE ONLY:	
LIMS #:	_____
Client #:	_____
Date Rec'd:	_____
Time Rec'd:	_____
Temp Rec'd:	_____

(Please fill out completely and return white copy to BioVir with the sample.)
Phone: 1-800-GIARDIA Fax: 707-747-1751 WEB: www.biovir.com

Note: Please print clearly using waterproof ink

NAME AND ADDRESS OF WATER COMPANY OR UTILITY: GSI Water Solutions	SAMPLE DATE:	
	SAMPLE TIME:	
NAME OF SAMPLER: Jon Travis	pH: pH (adjusted):	Water Temp (C):
SAMPLE SOURCE: Well Shed	TREATMENT CHARACTERISTICS (Check One): Raw Drinking Water <input checked="" type="checkbox"/> Treated Drinking Water <input type="checkbox"/>	
SAMPLE LOCATION: Injection Source Port	Wastewater <input type="checkbox"/> Filtered Wastewater <input type="checkbox"/>	
SAMPLE VOLUME: (Meter # _____) Meter Start: _____ Meter Stop: _____	DECHLORINATION/ DISINFECTANT NEUTRALIZATION (If Treated Water): Yes _____ No _____	
Total Volume: _____ Gallons _____ Liters	TURBIDITY (NTU): Turbidity Begin: _____ Turbidity End: _____	

Client ID: C2-ASR5-REC1	P.O. #: 222.004.008
-------------------------	---------------------

ASSAY REQUESTED: Please check one of the following	
<input type="checkbox"/>	Total Culturable Virus Assay, MPN - (EPA, ICR 600/R-95/178)
<input type="checkbox"/>	Pre Filter Cartridge - M19R10A
<input checked="" type="checkbox"/>	Enteric Virus Assay, PFU - (SM 18th; 9510 - BioVir Modification)

COMMENTS:

RELINQUISHED BY: Jon Travis	DATE / TIME:
RECEIVED BY:	DATE / TIME:

SHIPPING ADDRESS: BIOVIR LABORATORIES, INC., 685 STONE ROAD, UNIT 6, BENICIA, CALIFORNIA 94510
WHITE = BIOVIR COPY YELLOW = CUSTOMER COPY

Final - Report Number: 764199

BOISE PAPER DIVISION

31831 W HWY 12

WALLULA WA 99363 USA

Sold To: 0001004706 **Ship To:** 0002052528

Representative: Aeren P Huckleberry

Sample Number

NW077057

Date Sampled

Date Received

21-Nov-2012

Date Completed

29-Nov-2012

Date Authorized

29-Nov-2012

Water Analysis

This sample was analyzed as received, the results being as follows:

Sampling point: Aquifer Filter Outlet

Water

Other Analytes	Test Method	Total
PolyDADMAC		<10 µg/L

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: GSI WATER SOLUTIONS INC
Address: 8019 W. QUINAULT AVE
KENNEWICK, WA 99336
Attn: KEVIN LINDSEY

Batch #: 120208012
Project Name: BOISE ASR 222.004.008

Analytical Results Report

Sample Number 120208012-001 **Sampling Date** 2/7/2012 **Date/Time Received** 2/8/2012 10:21 AM
Client Sample ID SOURCEF-C1-INJECT **Sampling Time** 3:15 PM
Matrix Drinking Water **Sample Location**
Comments RADIOLOGICAL ANALYSIS PERFORMED BY PACE ANALYTICAL GREENSBURG PA

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Alkalinity	71.8	mg/L	2	2/8/2012	KFG	SM2320B	
Aluminum	ND	mg/L	0.01	2/10/2012	ETL	EPA 200.7	
Antimony	ND	mg/L	0.001	2/17/2012	ETL	EPA 200.8	
Arsenic	ND	mg/L	0.001	2/17/2012	ETL	EPA 200.8	
Barium	0.0294	mg/L	0.001	2/17/2012	ETL	EPA 200.8	
Beryllium	ND	mg/L	0.001	2/17/2012	ETL	EPA 200.8	
Bicarbonate	71.8	mg/L	2	2/8/2012	KFG	SM2320B	
Cadmium	ND	mg/L	0.001	2/17/2012	ETL	EPA 200.8	
Carbonate	ND	mg/L	5	2/8/2012	KFG	SM2320B	
Chloride	4.15	mg/L	0.1	2/8/2012	ETL	EPA 300.0	
Chromium	ND	mg/L	0.001	2/17/2012	ETL	EPA 200.8	
Copper	ND	mg/L	0.001	2/17/2012	ETL	EPA 200.8	
Dissolved Iron	ND	mg/L	0.01	2/10/2012	ETL	EPA 200.7	
Dissolved Manganese	0.0431	mg/L	0.01	2/10/2012	ETL	EPA 200.7	
1,2-Dibromoethane (EDB)	ND	ug/L	0.02	2/14/2012	SAT	EPA 504.1	
Fluoride	ND	mg/L	0.1	2/8/2012	ETL	EPA 300.0	
Gross Alpha	0.144 +/- 0.984	pCi/L	2.61	2/17/2012	SUB	EPA 900.0	
Gross Beta	-0.524 +/- 0.856	pCi/L	2.27	2/17/2012	SUB	EPA 900.0	
Calcium	18.6	mg/L	0.1	2/10/2012	ETL	EPA 200.7	
Hardness	66.8	mg/L	1	2/10/2012	ETL	EPA 200.7	
Magnesium	4.93	mg/L	0.1	2/10/2012	ETL	EPA 200.7	
2,4,5-TP (Silvex)	ND	ug/L	0.1	2/10/2012	SAT	EPA 515.3	
2,4-D	ND	ug/L	0.1	2/10/2012	SAT	EPA 515.3	
Iron	ND	mg/L	0.01	2/10/2012	ETL	EPA 200.7	
Lead	ND	mg/L	0.001	2/17/2012	ETL	EPA 200.8	
Manganese	0.0432	mg/L	0.01	2/10/2012	ETL	EPA 200.7	
Mercury-ICPMS	ND	mg/L	0.0001	2/17/2012	ETL	EPA 200.8	
Nickel	ND	mg/L	0.001	2/17/2012	ETL	EPA 200.8	
NO3/N	0.210	mg/L	0.1	2/8/2012	ETL	EPA 300.0	
NO3/N+NO2/N	0.210	mg/L	0.1	2/8/2012	ETL	EPA 300.0	
NO2/N	ND	mg/L	0.1	2/8/2012	ETL	EPA 300.0	
4,4-DDD	ND	ug/L	0.1	2/16/2012	MAH	EPA 505	
4,4-DDE	ND	ug/L	0.1	2/16/2012	MAH	EPA 505	
4,4-DDT	ND	ug/L	0.1	2/16/2012	MAH	EPA 505	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C585; MT:Cert0095

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: GSI WATER SOLUTIONS INC
Address: 8019 W. QUINAULT AVE
KENNEWICK, WA 99336
Attn: KEVIN LINDSEY

Batch #: 120208012
Project Name: BOISE ASR 222.004.008

Analytical Results Report

Sample Number	120208012-001	Sampling Date	2/7/2012	Date/Time Received	2/8/2012 10:21 AM
Client Sample ID	SOURCEF-C1-INJECT	Sampling Time	3:15 PM		
Matrix	Drinking Water	Sample Location			
Comments	RADIOLOGICAL ANALYSIS PERFORMED BY PACE ANALYTICAL GREENSBURG PA				

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Chlordane	ND	ug/L	0.4	2/16/2012	MAH	EPA 505	
Dieldrin	ND	ug/L	0.2	2/16/2012	MAH	EPA 505	
Endrin	ND	ug/L	0.02	2/16/2012	MAH	EPA 505	
Heptachlor epoxide	ND	ug/L	0.04	2/16/2012	MAH	EPA 505	
PCBs	ND	µg/L	0.5	2/16/2012	MAH	EPA 505	
Toxaphene	ND	ug/L	2	2/16/2012	MAH	EPA 505	
Potassium	0.860	mg/L	0.01	2/10/2012	ETL	EPA 200.7	
Selenium	0.00133	mg/L	0.001	2/17/2012	ETL	EPA 200.8	
Hexachlorobenzene	ND	ug/L	0.2	2/16/2012	EMP	EPA 525.2	
Silica (as SiO2)	6.59	mg/L	0.1	2/10/2012	ETL	EPA 200.7	
Silicon	3.08	mg/L	0.1	2/10/2012	ETL	EPA 200.7	
Silver	ND	mg/L	0.001	2/17/2012	ETL	EPA 200.8	
Sodium	5.09	mg/L	0.1	2/10/2012	ETL	EPA 200.7	
TDS	118	mg/L	10	2/13/2012	JTT	SM 2540C	
TSS	ND	mg/L	1	2/9/2012	ETL	SM 2540D	
Sulfate	13.1	mg/L	0.1	2/8/2012	ETL	EPA 300.0	
Thallium	ND	mg/L	0.001	2/17/2012	ETL	EPA 200.8	
TOC	1.24	mg/L	0.1	2/9/2012	JWC	SM 5310B	
1,1,1-Trichloroethane	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,1,2-Trichloroethane	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,1-Dichloroethene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,2,4-Trichlorobenzene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,2-Dichlorobenzene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,2-Dichloroethane	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,2-Dichloropropane	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,4-Dichlorobenzene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Benzene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Carbon Tetrachloride	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Chlorobenzene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
cis-1,2-dichloroethene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Ethylbenzene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Methylene chloride	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Styrene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Tetrachloroethene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Toluene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C585; MT:Cert0095

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: GSI WATER SOLUTIONS INC
Address: 8019 W. QUINAULT AVE
KENNEWICK, WA 99336
Attn: KEVIN LINDSEY

Batch #: 120208012
Project Name: BOISE ASR 222.004.008

Analytical Results Report

Sample Number	120208012-001	Sampling Date	2/7/2012	Date/Time Received	2/8/2012	10:21 AM	
Client Sample ID	SOURCEF-C1-INJECT	Sampling Time	3:15 PM				
Matrix	Drinking Water	Sample Location					
Comments	RADIOLOGICAL ANALYSIS PERFORMED BY PACE ANALYTICAL GREENSBURG PA						
Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Total Xylene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
trans-1,2-Dichloroethene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Trichloroethene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Vinyl Chloride	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Zinc	0.00429	mg/L	0.001	2/17/2012	ETL	EPA 200.8	

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: GSI WATER SOLUTIONS INC
Address: 8019 W. QUINAULT AVE
KENNEWICK, WA 99336
Attn: KEVIN LINDSEY

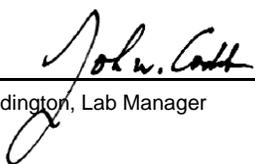
Batch #: 120208012
Project Name: BOISE ASR 222.004.008

Analytical Results Report

Sample Number	120208012-002	Sampling Date	2/7/2012	Date/Time Received	2/8/2012 10:21 AM
Client Sample ID	Trip Blank	Sampling Time			
Matrix	Drinking Water	Sample Location			
Comments					

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
1,1,1-Trichloroethane	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,1,2-Trichloroethane	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,1-Dichloroethene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,2,4-Trichlorobenzene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,2-Dichlorobenzene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,2-Dichloroethane	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,2-Dichloropropane	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,4-Dichlorobenzene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Benzene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Carbon Tetrachloride	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Chlorobenzene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
cis-1,2-dichloroethene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Ethylbenzene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Methylene chloride	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Styrene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Tetrachloroethene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Toluene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Total Xylene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
trans-1,2-Dichloroethene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Trichloroethene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Vinyl Chloride	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	

Authorized Signature


John Coddington, Lab Manager

H1 Sample analysis performed past holding time.
MCL EPA's Maximum Contaminant Level
ND Not Detected
PQL Practical Quantitation Limit

This report shall not be reproduced except in full, without the written approval of the laboratory.
The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C585; MT:Cert0095

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Login Report

Customer Name: GSI WATER SOLUTIONS INC

Order ID: 120208012

8019 W. QUINAULT AVE

Order Date: 2/8/2012

KENNEWICK

WA

99336

Contact Name: KEVIN LINDSEY

Project Name: BOISE ASR 222.004.008

Comment:

Sample #: 120208012-001 **Customer Sample #:** SOURCEF-C1-INJECT

Recv'd:

Collector: JON

Date Collected: 2/7/2012

Quantity: 17

Matrix: Drinking Water

Date Received: 2/8/2012 10:21:00 A

Comment:

Test	Lab	Method	Due Date	Priority
ALKALINITY	M	SM2320B	2/20/2012	<u>Normal (6-10 Days)</u>
ALUMINUM ICP	M	EPA 200.7	2/20/2012	<u>Normal (6-10 Days)</u>
ANTIMONY	M	EPA 200.8	2/20/2012	<u>Normal (6-10 Days)</u>
ARSENIC	M	EPA 200.8	2/20/2012	<u>Normal (6-10 Days)</u>
BARIUM	M	EPA 200.8	2/20/2012	<u>Normal (6-10 Days)</u>
BERYLLIUM	M	EPA 200.8	2/20/2012	<u>Normal (6-10 Days)</u>
BICARBONATE	M	SM2320B	2/20/2012	<u>Normal (6-10 Days)</u>
CADMIUM	M	EPA 200.8	2/20/2012	<u>Normal (6-10 Days)</u>
CARBONATE	M	SM2320B	2/20/2012	<u>Normal (6-10 Days)</u>
CHLORIDE	M	EPA 300.0	2/20/2012	<u>Normal (6-10 Days)</u>
CHROMIUM	M	EPA 200.8	2/20/2012	<u>Normal (6-10 Days)</u>
COPPER	M	EPA 200.8	2/20/2012	<u>Normal (6-10 Days)</u>
DISSOLVED IRON BY ICP	M	EPA 200.7	2/20/2012	<u>Normal (6-10 Days)</u>
DISSOLVED MANGANESE BY ICP	M	EPA 200.7	2/20/2012	<u>Normal (6-10 Days)</u>
EDB 504.1	M	EPA 504.1	2/20/2012	<u>Normal (6-10 Days)</u>
FLUORIDE	M	EPA 300.0	2/20/2012	<u>Normal (6-10 Days)</u>
GROSS ALPHA		EPA 900.0	2/20/2012	<u>Normal (6-10 Days)</u>
GROSS BETA		EPA 900.0	2/20/2012	<u>Normal (6-10 Days)</u>
HARDNESS by EPA 200.7	M	EPA 200.7	2/20/2012	<u>Normal (6-10 Days)</u>
HERBICIDES 515.3	M	EPA 515.3	2/20/2012	<u>Normal (6-10 Days)</u>
IRON ICP	M	EPA 200.7	2/20/2012	<u>Normal (6-10 Days)</u>
LEAD	M	EPA 200.8	2/20/2012	<u>Normal (6-10 Days)</u>
MANGANESE ICP	M	EPA 200.7	2/20/2012	<u>Normal (6-10 Days)</u>

Customer Name: GSI WATER SOLUTIONS INC
 8019 W. QUINAULT AVE
 KENNEWICK WA 99336

Order ID: 120208012
Order Date: 2/8/2012

Contact Name: KEVIN LINDSEY

Project Name: BOISE ASR 222.004.008

Comment:

MERCURY-ICPMS	M	EPA 200.8	2/20/2012	<u>Normal (6-10 Days)</u>
NICKEL	M	EPA 200.8	2/20/2012	<u>Normal (6-10 Days)</u>
NITRATE/N	M	EPA 300.0	2/20/2012	<u>Normal (6-10 Days)</u>
NITRATE+ NITRITE AS N	M	EPA 300.0	2/20/2012	<u>Normal (6-10 Days)</u>
NITRITE/N	M	EPA 300.0	2/20/2012	<u>Normal (6-10 Days)</u>
PESTICIDES 505	M	EPA 505	2/20/2012	<u>Normal (6-10 Days)</u>
POTASSIUM ICP	M	EPA 200.7	2/20/2012	<u>Normal (6-10 Days)</u>
SELENIUM	M	EPA 200.8	2/20/2012	<u>Normal (6-10 Days)</u>
SEMIVOLATILES 525.2	M	EPA 525.2	2/20/2012	<u>Normal (6-10 Days)</u>
SILICON ICP	M	EPA 200.7	2/20/2012	<u>Normal (6-10 Days)</u>
SILVER	M	EPA 200.8	2/20/2012	<u>Normal (6-10 Days)</u>
SODIUM ICP	M	EPA 200.7	2/20/2012	<u>Normal (6-10 Days)</u>
SOLIDS - TDS	M	SM 2540C	2/20/2012	<u>Normal (6-10 Days)</u>
SOLIDS - TSS	M	SM 2540D	2/20/2012	<u>Normal (6-10 Days)</u>
SULFATE	M	EPA 300.0	2/20/2012	<u>Normal (6-10 Days)</u>
THALLIUM	M	EPA 200.8	2/20/2012	<u>Normal (6-10 Days)</u>
TOC - MOSC	M	SM 5310B	2/20/2012	<u>Normal (6-10 Days)</u>
VOLATILES 524.2	M	EPA 524.2	2/20/2012	<u>Normal (6-10 Days)</u>
ZINC	M	EPA 200.8	2/20/2012	<u>Normal (6-10 Days)</u>

Sample #: 120208012-002 **Customer Sample #:** Trip Blank

Recv'd: **Collector:** JON **Date Collected:** 2/7/2012
Quantity: 1 **Matrix:** Drinking Water **Date Received:** 2/8/2012 10:21:00 A

Comment:

Test	Lab	Method	Due Date	Priority
VOLATILES 524.2	M	EPA 524.2	2/20/2012	<u>Normal (6-10 Days)</u>

Customer Name: GSI WATER SOLUTIONS INC
8019 W. QUINAULT AVE
KENNEWICK WA 99336

Order ID: 120208012
Order Date: 2/8/2012

Contact Name: KEVIN LINDSEY

Project Name: BOISE ASR 222.004.008

Comment:

SAMPLE CONDITION RECORD

Samples received in a cooler?	Yes
Samples received intact?	Yes
What is the temperature inside the cooler?	1.0
Samples received with a COC?	Yes
Samples received within holding time?	Yes
Are all sample bottles properly preserved?	Yes
Are VOC samples free of headspace?	N/A
Is there a trip blank to accompany VOC samples?	N/A
Labels and chain agree?	Yes

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: GSI WATER SOLUTIONS INC
Address: 8019 W. QUINAULT AVE
KENNEWICK, WA 99336
Attn: JON TRAVIS

Batch #: 120801030
Project Name: BOISE

Analytical Results Report

Sample Number 120801030-001 **Sampling Date** 7/31/2012 **Date/Time Received** 8/1/2012 10:50 AM
Client Sample ID C2-OBS2-REC1 **Sampling Time** 1:30 PM
Matrix Drinking Water **Sample Location**
Comments

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Alkalinity	44.1	mg CaCO3/L	2	8/1/2012	ETL	SM2320B	
Aluminum	ND	mg/L	0.01	8/7/2012	ETL	EPA 200.7	
Antimony	ND	mg/L	0.001	8/13/2012	JTT	EPA 200.8	
Arsenic	ND	mg/L	0.001	8/13/2012	JTT	EPA 200.8	
Barium	0.0124	mg/L	0.001	8/13/2012	JTT	EPA 200.8	
Beryllium	ND	mg/L	0.0003	8/13/2012	JTT	EPA 200.8	
Bicarbonate	44.1	mg CaCO3/L	2	8/1/2012	ETL	SM2320B	
Cadmium	ND	mg/L	0.001	8/13/2012	JTT	EPA 200.8	
Carbonate	ND	mg CaCO3/L	5	8/1/2012	ETL	SM2320B	
Chloride	14.3	mg/L	0.1	8/1/2012	JTT	EPA 300.0	
Chromium	ND	mg/L	0.001	8/13/2012	JTT	EPA 200.8	
Copper	ND	mg/L	0.001	8/13/2012	JTT	EPA 200.8	
Dissolved Iron	ND	mg/L	0.01	8/7/2012	ETL	EPA 200.7	
Dissolved Manganese	ND	mg/L	0.01	8/7/2012	ETL	EPA 200.7	
Fluoride	3.23	mg/L	0.1	8/1/2012	JTT	EPA 300.0	
Calcium	2.31	mg/L	0.1	8/7/2012	ETL	EPA 200.7	
Hardness	6.22	mg/L	1	8/7/2012	ETL	EPA 200.7	
Magnesium	0.109	mg/L	0.1	8/7/2012	ETL	EPA 200.7	
Iron	0.0149	mg/L	0.01	8/7/2012	ETL	EPA 200.7	
Lead	ND	mg/L	0.001	8/13/2012	JTT	EPA 200.8	
Manganese	ND	mg/L	0.01	8/7/2012	ETL	EPA 200.7	
Mercury-ICPMS	ND	mg/L	0.0001	8/13/2012	JTT	EPA 200.8	
Nickel	ND	mg/L	0.001	8/13/2012	JTT	EPA 200.8	
NO3/N	ND	mg/L	0.1	8/1/2012	JTT	EPA 300.0	
NO3/N+NO2/N	ND	mg/L	0.1	8/1/2012	JTT	EPA 300.0	
NO2/N	ND	mg/L	0.1	8/1/2012	JTT	EPA 300.0	
Potassium	8.27	mg/L	0.01	8/7/2012	ETL	EPA 200.7	
Selenium	ND	mg/L	0.001	8/13/2012	JTT	EPA 200.8	
Silica (as SiO2)	82.0	mg/L	0.1	8/7/2012	ETL	EPA 200.7	
Silicon	38.3	mg/L	0.1	8/7/2012	ETL	EPA 200.7	
Silver	ND	mg/L	0.001	8/13/2012	JTT	EPA 200.8	
Sodium	52.7	mg/L	0.1	8/7/2012	ETL	EPA 200.7	
TDS	358	mg/L	10	8/7/2012	JTT	SM 2540C	
TSS	ND	mg/L	1	8/2/2012	ETL	SM 2540D	

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: GSI WATER SOLUTIONS INC
Address: 8019 W. QUINAULT AVE
KENNEWICK, WA 99336
Attn: JON TRAVIS

Batch #: 120801030
Project Name: BOISE

Analytical Results Report

Sample Number	120801030-001	Sampling Date	7/31/2012	Date/Time Received	8/1/2012	10:50 AM	
Client Sample ID	C2-OBS2-REC1	Sampling Time	1:30 PM				
Matrix	Drinking Water	Sample Location					
Comments							
Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Sulfate	4.69	mg/L	0.1	8/1/2012	JTT	EPA 300.0	
Thallium	ND	mg/L	0.001	8/13/2012	JTT	EPA 200.8	
TOC	0.650	mg/L	0.1	8/7/2012	JWC	SM 5310B	
Zinc	ND	mg/L	0.001	8/13/2012	JTT	EPA 200.8	

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: GSI WATER SOLUTIONS INC
Address: 8019 W. QUINAULT AVE
KENNEWICK, WA 99336
Attn: JON TRAVIS

Batch #: 120801030
Project Name: BOISE

Analytical Results Report

Sample Number 120801030-002 **Sampling Date** 7/31/2012 **Date/Time Received** 8/1/2012 10:50 AM
Client Sample ID C2-ASR5-REC1 **Sampling Time** 2:30 PM
Matrix Drinking Water **Sample Location**
Comments

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Alkalinity	40.2	mg CaCO3/L	2	8/1/2012	ETL	SM2320B	
Aluminum	0.0119	mg/L	0.01	8/7/2012	ETL	EPA 200.7	
Antimony	ND	mg/L	0.001	8/13/2012	JTT	EPA 200.8	
Arsenic	ND	mg/L	0.001	8/13/2012	JTT	EPA 200.8	
Barium	0.0108	mg/L	0.001	8/13/2012	JTT	EPA 200.8	
Beryllium	ND	mg/L	0.0003	8/13/2012	JTT	EPA 200.8	
Bicarbonate	40.2	mg CaCO3/L	2	8/1/2012	ETL	SM2320B	
Cadmium	ND	mg/L	0.001	8/13/2012	JTT	EPA 200.8	
Carbonate	ND	mg CaCO3/L	5	8/1/2012	ETL	SM2320B	
Chloride	14.6	mg/L	0.1	8/1/2012	JTT	EPA 300.0	
Chromium	ND	mg/L	0.001	8/13/2012	JTT	EPA 200.8	
Copper	ND	mg/L	0.001	8/13/2012	JTT	EPA 200.8	
Dissolved Iron	ND	mg/L	0.01	8/7/2012	ETL	EPA 200.7	
Dissolved Manganese	ND	mg/L	0.01	8/7/2012	ETL	EPA 200.7	
Fluoride	3.18	mg/L	0.1	8/1/2012	JTT	EPA 300.0	
Calcium	4.34	mg/L	0.1	8/7/2012	ETL	EPA 200.7	
Hardness	14.4	mg/L	1	8/7/2012	ETL	EPA 200.7	
Magnesium	0.851	mg/L	0.1	8/7/2012	ETL	EPA 200.7	
Iron	ND	mg/L	0.01	8/7/2012	ETL	EPA 200.7	
Lead	ND	mg/L	0.001	8/13/2012	JTT	EPA 200.8	
Manganese	ND	mg/L	0.01	8/7/2012	ETL	EPA 200.7	
Mercury-ICPMS	ND	mg/L	0.0001	8/13/2012	JTT	EPA 200.8	
Nickel	ND	mg/L	0.001	8/13/2012	JTT	EPA 200.8	
NO3/N	ND	mg/L	0.1	8/1/2012	JTT	EPA 300.0	
NO3/N+NO2/N	ND	mg/L	0.1	8/1/2012	JTT	EPA 300.0	
NO2/N	ND	mg/L	0.1	8/1/2012	JTT	EPA 300.0	
Potassium	6.28	mg/L	0.01	8/7/2012	ETL	EPA 200.7	
Selenium	ND	mg/L	0.001	8/13/2012	JTT	EPA 200.8	
Silica (as SiO2)	74.9	mg/L	0.1	8/7/2012	ETL	EPA 200.7	
Silicon	35.0	mg/L	0.1	8/7/2012	ETL	EPA 200.7	
Silver	ND	mg/L	0.001	8/13/2012	JTT	EPA 200.8	
Sodium	48.6	mg/L	0.1	8/7/2012	ETL	EPA 200.7	
TDS	268	mg/L	10	8/7/2012	JTT	SM 2540C	
TSS	ND	mg/L	1	8/2/2012	ETL	SM 2540D	
Sulfate	5.06	mg/L	0.1	8/1/2012	JTT	EPA 300.0	

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

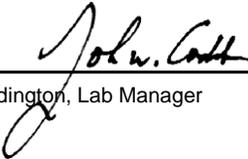
Client: GSI WATER SOLUTIONS INC
Address: 8019 W. QUINAULT AVE
KENNEWICK, WA 99336
Attn: JON TRAVIS

Batch #: 120801030
Project Name: BOISE

Analytical Results Report

Sample Number	120801030-002	Sampling Date	7/31/2012	Date/Time Received	8/1/2012	10:50 AM	
Client Sample ID	C2-ASR5-REC1	Sampling Time	2:30 PM				
Matrix	Drinking Water	Sample Location					
Comments							
Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Thallium	ND	mg/L	0.001	8/13/2012	JTT	EPA 200.8	
TOC	0.644	mg/L	0.1	8/7/2012	JWC	SM 5310B	
Zinc	0.00342	mg/L	0.001	8/13/2012	JTT	EPA 200.8	

Authorized Signature



John Coddington, Lab Manager

MCL EPA's Maximum Contaminant Level
ND Not Detected
PQL Practical Quantitation Limit

This report shall not be reproduced except in full, without the written approval of the laboratory.
The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Login Report

Customer Name: GSI WATER SOLUTIONS INC

Order ID: 120801030

8019 W. QUINAULT AVE

Order Date: 8/1/2012

KENNEWICK

WA

99336

Contact Name: JON TRAVIS

Project Name: BOISE

Comment:

Sample #: 120801030-001 **Customer Sample #:** C2-OBS2-REC1

Recv'd:

Collector: JON

Date Collected: 7/31/2012

Quantity: 3

Matrix: Drinking Water

Date Received: 8/1/2012 10:50:00 A

Comment:

Test	Lab	Method	Due Date	Priority
ALKALINITY	M	SM2320B	8/13/2012	<u>Normal (6-10 Days)</u>
ALUMINUM ICP	M	EPA 200.7	8/13/2012	<u>Normal (6-10 Days)</u>
ANTIMONY	M	EPA 200.8	8/13/2012	<u>Normal (6-10 Days)</u>
ARSENIC	M	EPA 200.8	8/13/2012	<u>Normal (6-10 Days)</u>
BARIUM	M	EPA 200.8	8/13/2012	<u>Normal (6-10 Days)</u>
BERYLLIUM	M	EPA 200.8	8/13/2012	<u>Normal (6-10 Days)</u>
BICARBONATE	M	SM2320B	8/13/2012	<u>Normal (6-10 Days)</u>
CADMIUM	M	EPA 200.8	8/13/2012	<u>Normal (6-10 Days)</u>
CARBONATE	M	SM2320B	8/13/2012	<u>Normal (6-10 Days)</u>
CHLORIDE	M	EPA 300.0	8/13/2012	<u>Normal (6-10 Days)</u>
CHROMIUM	M	EPA 200.8	8/13/2012	<u>Normal (6-10 Days)</u>
COPPER	M	EPA 200.8	8/13/2012	<u>Normal (6-10 Days)</u>
DISSOLVED IRON BY ICP	M	EPA 200.7	8/13/2012	<u>Normal (6-10 Days)</u>
DISSOLVED MANGANESE BY ICP	M	EPA 200.7	8/13/2012	<u>Normal (6-10 Days)</u>
FLUORIDE	M	EPA 300.0	8/13/2012	<u>Normal (6-10 Days)</u>
HARDNESS by EPA 200.7	M	EPA 200.7	8/13/2012	<u>Normal (6-10 Days)</u>
IRON ICP	M	EPA 200.7	8/13/2012	<u>Normal (6-10 Days)</u>
LEAD	M	EPA 200.8	8/13/2012	<u>Normal (6-10 Days)</u>
MANGANESE ICP	M	EPA 200.7	8/13/2012	<u>Normal (6-10 Days)</u>
MERCURY-ICPMS	M	EPA 200.8	8/13/2012	<u>Normal (6-10 Days)</u>
NICKEL	M	EPA 200.8	8/13/2012	<u>Normal (6-10 Days)</u>
NITRATE/N	M	EPA 300.0	8/13/2012	<u>Normal (6-10 Days)</u>
NITRATE+ NITRITE AS N	M	EPA 300.0	8/13/2012	<u>Normal (6-10 Days)</u>

Customer Name: GSI WATER SOLUTIONS INC
 8019 W. QUINAULT AVE
 KENNEWICK WA 99336

Order ID: 120801030
Order Date: 8/1/2012

Contact Name: JON TRAVIS

Project Name: BOISE

Comment:

NITRITE/N	M	EPA 300.0	8/13/2012	<u>Normal (6-10 Days)</u>
POTASSIUM ICP	M	EPA 200.7	8/13/2012	<u>Normal (6-10 Days)</u>
SELENIUM	M	EPA 200.8	8/13/2012	<u>Normal (6-10 Days)</u>
SILICON ICP	M	EPA 200.7	8/13/2012	<u>Normal (6-10 Days)</u>
SILVER	M	EPA 200.8	8/13/2012	<u>Normal (6-10 Days)</u>
SODIUM ICP	M	EPA 200.7	8/13/2012	<u>Normal (6-10 Days)</u>
SOLIDS - TDS	M	SM 2540C	8/13/2012	<u>Normal (6-10 Days)</u>
SOLIDS - TSS	M	SM 2540D	8/13/2012	<u>Normal (6-10 Days)</u>
SULFATE	M	EPA 300.0	8/13/2012	<u>Normal (6-10 Days)</u>
THALLIUM	M	EPA 200.8	8/13/2012	<u>Normal (6-10 Days)</u>
TOC - MOSC	M	SM 5310B	8/13/2012	<u>Normal (6-10 Days)</u>
ZINC	M	EPA 200.8	8/13/2012	<u>Normal (6-10 Days)</u>

Sample #: 120801030-002 **Customer Sample #:** C2-ASR5-REC1

Recv'd: **Collector:** JON **Date Collected:** 7/31/2012
Quantity: 3 **Matrix:** Drinking Water **Date Received:** 8/1/2012 10:50:00 A

Comment:

Test	Lab	Method	Due Date	Priority
ALKALINITY	M	SM2320B	8/13/2012	<u>Normal (6-10 Days)</u>
ALUMINUM ICP	M	EPA 200.7	8/13/2012	<u>Normal (6-10 Days)</u>
ANTIMONY	M	EPA 200.8	8/13/2012	<u>Normal (6-10 Days)</u>
ARSENIC	M	EPA 200.8	8/13/2012	<u>Normal (6-10 Days)</u>
BARIUM	M	EPA 200.8	8/13/2012	<u>Normal (6-10 Days)</u>
BERYLLIUM	M	EPA 200.8	8/13/2012	<u>Normal (6-10 Days)</u>
BICARBONATE	M	SM2320B	8/13/2012	<u>Normal (6-10 Days)</u>
CADMIUM	M	EPA 200.8	8/13/2012	<u>Normal (6-10 Days)</u>
CARBONATE	M	SM2320B	8/13/2012	<u>Normal (6-10 Days)</u>
CHLORIDE	M	EPA 300.0	8/13/2012	<u>Normal (6-10 Days)</u>
CHROMIUM	M	EPA 200.8	8/13/2012	<u>Normal (6-10 Days)</u>
COPPER	M	EPA 200.8	8/13/2012	<u>Normal (6-10 Days)</u>
DISSOLVED IRON BY ICP	M	EPA 200.7	8/13/2012	<u>Normal (6-10 Days)</u>
DISSOLVED MANGANESE BY ICP	M	EPA 200.7	8/13/2012	<u>Normal (6-10 Days)</u>
FLUORIDE	M	EPA 300.0	8/13/2012	<u>Normal (6-10 Days)</u>
HARDNESS by EPA 200.7	M	EPA 200.7	8/13/2012	<u>Normal (6-10 Days)</u>
IRON ICP	M	EPA 200.7	8/13/2012	<u>Normal (6-10 Days)</u>
LEAD	M	EPA 200.8	8/13/2012	<u>Normal (6-10 Days)</u>

Customer Name: GSI WATER SOLUTIONS INC
8019 W. QUINAULT AVE
KENNEWICK WA 99336

Order ID: 120801030
Order Date: 8/1/2012

Contact Name: JON TRAVIS

Project Name: BOISE

Comment:

MANGANESE ICP	M	EPA 200.7	8/13/2012	<u>Normal (6-10 Days)</u>
MERCURY-ICPMS	M	EPA 200.8	8/13/2012	<u>Normal (6-10 Days)</u>
NICKEL	M	EPA 200.8	8/13/2012	<u>Normal (6-10 Days)</u>
NITRATE/N	M	EPA 300.0	8/13/2012	<u>Normal (6-10 Days)</u>
NITRATE+ NITRITE AS N	M	EPA 300.0	8/13/2012	<u>Normal (6-10 Days)</u>
NITRITE/N	M	EPA 300.0	8/13/2012	<u>Normal (6-10 Days)</u>
POTASSIUM ICP	M	EPA 200.7	8/13/2012	<u>Normal (6-10 Days)</u>
SELENIUM	M	EPA 200.8	8/13/2012	<u>Normal (6-10 Days)</u>
SILICON ICP	M	EPA 200.7	8/13/2012	<u>Normal (6-10 Days)</u>
SILVER	M	EPA 200.8	8/13/2012	<u>Normal (6-10 Days)</u>
SODIUM ICP	M	EPA 200.7	8/13/2012	<u>Normal (6-10 Days)</u>
SOLIDS - TDS	M	SM 2540C	8/13/2012	<u>Normal (6-10 Days)</u>
SOLIDS - TSS	M	SM 2540D	8/13/2012	<u>Normal (6-10 Days)</u>
SULFATE	M	EPA 300.0	8/13/2012	<u>Normal (6-10 Days)</u>
THALLIUM	M	EPA 200.8	8/13/2012	<u>Normal (6-10 Days)</u>
TOC - MOSC	M	SM 5310B	8/13/2012	<u>Normal (6-10 Days)</u>
ZINC	M	EPA 200.8	8/13/2012	<u>Normal (6-10 Days)</u>

SAMPLE CONDITION RECORD

Samples received in a cooler?	Yes
Samples received intact?	Yes
What is the temperature inside the cooler?	3.8
Samples received with a COC?	Yes
Samples received within holding time?	Yes
Are all sample bottles properly preserved?	Yes
Are VOC samples free of headspace?	N/A
Is there a trip blank to accompany VOC samples?	N/A
Labels and chain agree?	Yes



**TOTAL CULTURABLE VIRUS
ENTERIC VIRUS ASSAY
SAMPLE DATA SHEET**

(Please fill out completely and return white copy to BioVir with the sample.)
Phone: 1-800-GIARDIA Fax: 707-747-1751 WEB: www.biovir.com

LAB USE ONLY:	
LIMS #:	1082-1
Client #:	GSE002
Date Rec'd:	8/10/12
Time Rec'd:	9:20
Temp Rec'd:	6.5°C

Note: Please print clearly using waterproof ink

NAME AND ADDRESS OF WATER COMPANY OR UTILITY: GSI Water Solutions	SAMPLE DATE: 8/9/12	
	SAMPLE TIME: 1500	
NAME OF SAMPLER: Jon Travis	pH: 8.99	Water Temp (C): 26.36
SAMPLE SOURCE: Well Shed	pH (adjusted):	TREATMENT CHARACTERISTICS (Check One): Raw Drinking Water <input checked="" type="checkbox"/> Treated Drinking Water <input type="checkbox"/> Wastewater <input type="checkbox"/> Filtered Wastewater <input type="checkbox"/>
SAMPLE LOCATION: Injection Source Port		
SAMPLE VOLUME: (Meter # 97901143) Meter Start: 21555.1 Meter Stop: 21613.5	DECHLORINATION/ DISINFECTANT NEUTRALIZATION (If Treated Water): Yes _____ No _____	
Total Volume: 58.4 Gallons _____ Liters	TURBIDITY (NTU): Turbidity Begin: 1 Turbidity End: 1	

Client ID: C2-ASR5-REC1	P.O. #: 222.004.008
-------------------------	---------------------

ASSAY REQUESTED: Please check one of the following	
<input type="checkbox"/>	Total Culturable Virus Assay, MPN - (EPA, ICR 600/R-95/178)
<input type="checkbox"/>	Pre Filter Cartridge - M19R10A
<input checked="" type="checkbox"/>	Enteric Virus Assay, PFU - (SM 18th; 9510 - BioVir Modification)

COMMENTS: See email smc

RELINQUISHED BY: Jon Travis <i>[Signature]</i>	DATE / TIME: 8/9/12 1600
RECEIVED BY: <i>[Signature]</i>	DATE / TIME: 8/10/12 9:20

SHIPPING ADDRESS: BIOVIR LABORATORIES, INC., 685 STONE ROAD, UNIT 6, BENICIA, CALIFORNIA 94510
WHITE = BIOVIR COPY YELLOW = CUSTOMER COPY



685 Stone Road, Unit 6 • Benicia, CA 94510 • (707) 747-5906 • 1-800-GIARDIA • FAX (707) 747-1751 • WEB: www.biovir.com

REPORT NO.: 121082
PAGE NO.: 1 of 3
CLIENT: GSI Water Solutions
ADDRESS 1020 N Center Parkway, Suite F
Kennewick, WA 99336
CLIENT NO GSI002 **CLIENT PO:** 222.004.008

ASSAY RESULTS:

Test: Coliform, Total & E.coli Method: SM9223

BioVir #	Sample ID	Site	Analyte	Result	Units
121082-002	C2-ASR5-REC1		E. coli	<1	MPN/100ml

Collector: Jon Travis CollectDate 8/9/2012 CollectTime: 3:30:00 PM
ReceiveDate 8/10/2012 9:20:00 AM Matrix: Raw Water Temp 6.5
Volume: 250 mL Analysis Start Date: 8/10/12 Analysis Start Time: 1015
Analyst: JTruscott Analysis End: 8/11/2012
Comment ASR5

121082-002	C2-ASR5-REC1		Test Results Meet All Requirements of NELAC	YES	
------------	--------------	--	--	------------	--

Collector: Jon Travis CollectDate 8/9/2012 CollectTime: 3:30:00 PM
ReceiveDate 8/10/2012 9:20:00 AM Matrix: Raw Water Temp 6.5
Volume: 250 mL Analysis Start Date: 8/10/12 Analysis Start Time: 1015
Analyst: JTruscott Analysis End: 8/11/2012
Comment ASR5

121082-002	C2-ASR5-REC1		Total Coliform	Not Reported	MPN/100ml
------------	--------------	--	-----------------------	---------------------	------------------

Collector: Jon Travis CollectDate 8/9/2012 CollectTime: 3:30:00 PM
ReceiveDate 8/10/2012 9:20:00 AM Matrix: Raw Water Temp 6.5
Volume: 250 mL Analysis Start Date: 8/10/12 Analysis Start Time: 1015
Analyst: JTruscott Analysis End: 8/11/2012
Comment ASR5

Test: Coliform, Total & Fecal Method: SM9221B

BioVir #	Sample ID	Site	Analyte	Result	Units
----------	-----------	------	---------	--------	-------

REPORT NO.: 121082
PAGE NO.: 2 of 3
CLIENT: GSI Water Solutions
ADDRESS 1020 N Center Parkway, Suite F
 Kennewick, WA 99336
CLIENT NO GSI002 **CLIENT PO:** 222.004.008

ASSAY RESULTS:

Test: Coliform, Total & Fecal Method: SM9221B

BioVir #	Sample ID	Site	Analyte	Result	Units
121082-002	C2-ASR5-REC1		Fecal Coliform	<2	MPN/100ml
Collector: Jon Travis CollectDate 8/9/2012 CollectTime: 3:30:00 PM ReceiveDate 8/10/2012 9:20:00 AM Matrix: Raw Water Temp 6.5 Volume: 250 mL Analysis Start Date: 8/10/12 Analysis Start Time: 1012 Analyst: JTruscott Analysis End: 8/12/2012 Comment ASR5					
121082-002	C2-ASR5-REC1		Test Results Meet All Requirements of NELAC	YES	
Collector: Jon Travis CollectDate 8/9/2012 CollectTime: 3:30:00 PM ReceiveDate 8/10/2012 9:20:00 AM Matrix: Raw Water Temp 6.5 Volume: 250 mL Analysis Start Date: 8/10/12 Analysis Start Time: 1012 Analyst: JTruscott Analysis End: 8/12/2012 Comment ASR5					
121082-002	C2-ASR5-REC1		Total Coliform	<2	MPN/100ml
Collector: Jon Travis CollectDate 8/9/2012 CollectTime: 3:30:00 PM ReceiveDate 8/10/2012 9:20:00 AM Matrix: Raw Water Temp 6.5 Volume: 250 mL Analysis Start Date: 8/10/12 Analysis Start Time: 1012 Analyst: JTruscott Analysis End: 8/12/2012 Comment ASR5					

Test: Enteric Virus Method: SM9510 - Modified

BioVir #	Sample ID	Site	Analyte	Result	Units
121082-001	C2-ASR5-REC1	Well Shed	Enteric Virus	<0.009	pfu/L
Collector: Jon Travis CollectDate 8/9/2012 CollectTime: 3:00:00 PM ReceiveDate 8/10/2012 9:20:00 AM Matrix: Raw Water Temp 6.5 Volume: 221 L Analysis Start Date: 8/10/12 Analysis Start Time: 0955 Analyst: ValLog Analysis End: 8/23/2012 Comment See e-mail for final adjusted pH 6.9. Injection Source Port					

REPORT NO.: 121082
PAGE NO.: 3 of 3
CLIENT: GSI Water Solutions
ADDRESS 1020 N Center Parkway, Suite F
Kennewick, WA 99336
CLIENT NO GSI002 **CLIENT PO:** 222.004.008

ASSAY RESULTS:

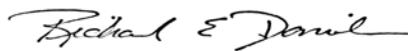
SAMPLE EVALUATION PERFORMANCE CRITERIA: The precise rates of recovery of organisms from environmental samples cannot be determined. BioVir Laboratories has analyzed your sample(s) in accordance with the method described with each analyte above, however, due to inherent limitations of these methods organisms may avoid detection. For additional information regarding the limitations of the method(s) referred to above please call us at 1-800-GIARDIA.

COMPANY IS NOT AN INSURER: BioVir Laboratories is not an insurer or guarantor of the quality and/or purity of water, wastewater, biosolid or other material from which the sample was taken. BioVir offers no express or implied warranties whatsoever concerning the quality or purity of any water, wastewater, biosolid or other material which is ultimately consumed, distributed, applied or disposed.

MAINTENANCE OF RECORDS: BioVir Laboratories, Inc. shall maintain records pertaining to the historical reconstruction of client's data for a minimum of five years from the date of issuance of the final report. Records may be destroyed after that date unless a written client's request for records transfer is received by BioVir which requests otherwise. Records transfer or storage charges may apply after the 5 year period. **THIS REPORT SHALL NOT BE REPRODUCED, EXCEPT IN FULL, WITHOUT THE WRITTEN APPROVAL OF BIOVIR LABORATORIES, INC.**

8/31/2012

Date:



Signature

Quality
Checked

DCelio



**TOTAL CULTURABLE VIRUS
ENTERIC VIRUS ASSAY
SAMPLE DATA SHEET**

(Please fill out completely and return white copy to BioVir with the sample.)
Phone: 1-800-GIARDIA Fax: 707-747-1751 WEB: www.biovir.com

LAB USE ONLY:	
LIMS #:	1100-1
Client #:	GSI 002
Date Rec'd:	8-14-12
Time Rec'd:	0931
Temp Rec'd:	7.7°C

*wet
+ ice
gel*

Note: Please print clearly using waterproof ink

NAME AND ADDRESS OF WATER COMPANY OR UTILITY: GSI Water Solutions		SAMPLE DATE: 8/13/12	
		SAMPLE TIME: 1200	
NAME OF SAMPLER: Jon Travis		pH: 8.83	Water Temp (C):
		pH (adjusted): 7.18	26.13
SAMPLE SOURCE: OBS 2		TREATMENT CHARACTERISTICS (Check One):	
		Raw Drinking Water <input checked="" type="checkbox"/>	
		Treated Drinking Water <input type="checkbox"/>	
SAMPLE LOCATION: Injection Source Port		Wastewater <input type="checkbox"/>	
		Filtered Wastewater <input type="checkbox"/>	
SAMPLE VOLUME: (Meter # 97901143) Meter Start: 217126 Meter Stop: 21771.1		DECHLORINATION/ DISINFECTANT NEUTRALIZATION (If Treated Water): Yes No	
Total Volume: 58.5 Gallons _____ Liters		TURBIDITY (NTU):	
		Turbidity Begin: 1 Turbidity End: 1	

Client ID: C2-OBS2-REC1	P.O. #: 222.004.008
-------------------------	---------------------

ASSAY REQUESTED: Please check one of the following	
<input type="checkbox"/>	Total Culturable Virus Assay, MPN - (EPA, ICR 600/R-95/178)
<input type="checkbox"/>	Pre Filter Cartridge - M19R10A
<input checked="" type="checkbox"/>	Enteric Virus Assay, PFU - (SM 18th; 9510 - BioVir Modification)

COMMENTS:

RELINQUISHED BY: Jon Travis	DATE / TIME: 8/13/12 1330
RECEIVED BY: <i>Jmc</i>	DATE / TIME: 8/14/12 9:35

SHIPPING ADDRESS: BIOVIR LABORATORIES, INC., 685 STONE ROAD, UNIT 6, BENICIA, CALIFORNIA 94510
WHITE = BIOVIR COPY YELLOW = CUSTOMER COPY



685 Stone Road, Unit 6 • Benicia, CA 94510 • (707) 747-5906 • 1-800-GIARDIA • FAX (707) 747-1751 • WEB: www.biovir.com

REPORT NO.: 121100
PAGE NO.: 1 of 3
CLIENT: GSI Water Solutions
ADDRESS 1020 N Center Parkway, Suite F
Kennewick, WA 99336
CLIENT NO GSI002 **CLIENT PO:** 222.004.008

ASSAY RESULTS:

Test: Coliform, Total & E.coli Method: SM9223

BioVir #	Sample ID	Site	Analyte	Result	Units
121100-002	C2-OBS2-REC1		E. coli	<1	MPN/100ml

Collector: Jon Travis CollectDate 8/13/2012 CollectTime: 12:00:00 PM
ReceiveDate 8/14/2012 9:35:00 AM Matrix: Raw Water Temp 7.7
Volume: 250 mL Analysis Start Date: 8/14/12 Analysis Start Time: 1028
Analyst: MPeaslee Analysis End: 8/16/2012
Comment

121100-002	C2-OBS2-REC1		Test Results Meet All Requirements of NELAC	YES	
------------	--------------	--	--	------------	--

Collector: Jon Travis CollectDate 8/13/2012 CollectTime: 12:00:00 PM
ReceiveDate 8/14/2012 9:35:00 AM Matrix: Raw Water Temp 7.7
Volume: 250 mL Analysis Start Date: 8/14/12 Analysis Start Time: 1028
Analyst: MPeaslee Analysis End: 8/16/2012
Comment

121100-002	C2-OBS2-REC1		Total Coliform	Not Reported	MPN/100ml
------------	--------------	--	-----------------------	---------------------	------------------

Collector: Jon Travis CollectDate 8/13/2012 CollectTime: 12:00:00 PM
ReceiveDate 8/14/2012 9:35:00 AM Matrix: Raw Water Temp 7.7
Volume: 250 mL Analysis Start Date: Analysis Start Time:
Analyst: MPeaslee Analysis End: 8/16/2012
Comment

Test: Coliform, Total & Fecal Method: SM9221B

BioVir #	Sample ID	Site	Analyte	Result	Units
----------	-----------	------	---------	--------	-------

REPORT NO.: 121100
PAGE NO.: 2 of 3
CLIENT: GSI Water Solutions
ADDRESS: 1020 N Center Parkway, Suite F
 Kennewick, WA 99336
CLIENT NO: GSI002 **CLIENT PO:** 222.004.008

ASSAY RESULTS:

Test: Coliform, Total & Fecal Method: SM9221B

BioVir #	Sample ID	Site	Analyte	Result	Units
121100-002	C2-OBS2-REC1		Fecal Coliform	<2	MPN/100ml
Collector: Jon Travis CollectDate 8/13/2012 CollectTime: 12:00:00 PM ReceiveDate 8/14/2012 9:35:00 AM Matrix: Raw Water Temp 7.7 Volume: 250 mL Analysis Start Date: 8/14/12 Analysis Start Time: 1026 Analyst: MPeaslee Analysis End: 8/15/2012 Comment					
121100-002	C2-OBS2-REC1		Test Results Meet All Requirements of NELAC	YES	
Collector: Jon Travis CollectDate 8/13/2012 CollectTime: 12:00:00 PM ReceiveDate 8/14/2012 9:35:00 AM Matrix: Raw Water Temp 7.7 Volume: 250 mL Analysis Start Date: 8/14/12 Analysis Start Time: 1026 Analyst: MPeaslee Analysis End: 8/15/2012 Comment					
121100-002	C2-OBS2-REC1		Total Coliform	<2	MPN/100ml
Collector: Jon Travis CollectDate 8/13/2012 CollectTime: 12:00:00 PM ReceiveDate 8/14/2012 9:35:00 AM Matrix: Raw Water Temp 7.7 Volume: 250 mL Analysis Start Date: 8/14/12 Analysis Start Time: 1026 Analyst: MPeaslee Analysis End: 8/15/2012 Comment					

Test: Enteric Virus Method: SM9510 - Modified

BioVir #	Sample ID	Site	Analyte	Result	Units
121100-001	C2-OBS2-REC1	OBS-2	Enteric Virus	<0.009	pfu/L
Collector: Jon Travis CollectDate 8/13/2012 CollectTime: 12:00:00 PM ReceiveDate 8/14/2012 9:35:00 AM Matrix: Raw Water Temp 7.7 Volume: 221.4 L Analysis Start Date: 8/14/12 Analysis Start Time: 1205 Analyst: ValLog Analysis End: 8/30/2012 Comment					

REPORT NO.: 121100
PAGE NO.: 3 of 3
CLIENT: GSI Water Solutions
ADDRESS 1020 N Center Parkway, Suite F
Kennewick, WA 99336
CLIENT NO GSI002 **CLIENT PO:** 222.004.008

ASSAY RESULTS:

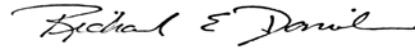
SAMPLE EVALUATION PERFORMANCE CRITERIA: The precise rates of recovery of organisms from environmental samples cannot be determined. BioVir Laboratories has analyzed your sample(s) in accordance with the method described with each analyte above, however, due to inherent limitations of these methods organisms may avoid detection. For additional information regarding the limitations of the method(s) referred to above please call us at 1-800-GIARDIA.

COMPANY IS NOT AN INSURER: BioVir Laboratories is not an insurer or guarantor of the quality and/or purity of water, wastewater, biosolid or other material from which the sample was taken. BioVir offers no express or implied warranties whatsoever concerning the quality or purity of any water, wastewater, biosolid or other material which is ultimately consumed, distributed, applied or disposed.

MAINTENANCE OF RECORDS: BioVir Laboratories, Inc. shall maintain records pertaining to the historical reconstruction of client's data for a minimum of five years from the date of issuance of the final report. Records may be destroyed after that date unless a written client's request for records transfer is received by BioVir which requests otherwise. Records transfer or storage charges may apply after the 5 year period. **THIS REPORT SHALL NOT BE REPRODUCED, EXCEPT IN FULL, WITHOUT THE WRITTEN APPROVAL OF BIOVIR LABORATORIES, INC.**

9/6/2012

Date:



Signature

Quality
Checked

DCelio



**TOTAL CULTURABLE VIRUS
ENTERIC VIRUS ASSAY
SAMPLE DATA SHEET**

LAB USE ONLY:	
LIMS #:	876-1
Client #:	GSI 002
Date Rec'd:	6/28/12
Time Rec'd:	9:31
Temp Rec'd:	7.2°C

(Please fill out completely and return white copy to BioVir with the sample.)
Phone: 1-800-GIARDIA Fax: 707-747-1751 WEB: www.biovir.com

Note: Please print clearly using waterproof ink

NAME AND ADDRESS OF WATER COMPANY OR UTILITY: GSI Water Solutions		SAMPLE DATE: 6/27/12
		SAMPLE TIME: 1400
NAME OF SAMPLER: Jon Travis	pH: 9.24	Water Temp (C): 25°C
	pH (adjusted): 7.5 a/s	
SAMPLE SOURCE: Well Shed CBS 2	TREATMENT CHARACTERISTICS (Check One):	
	Raw Drinking Water	<input checked="" type="checkbox"/>
	Treated Drinking Water	<input type="checkbox"/>
SAMPLE LOCATION: OBS2 Port	Wastewater	<input type="checkbox"/>
	Filtered Wastewater	<input type="checkbox"/>
SAMPLE VOLUME: (Meter # 18000012) Meter Start: 2995.3 Meter Stop: 3055.6	DECHLORINATION/ DISINFECTANT NEUTRALIZATION (If Treated Water): Yes _____ No <u> </u>	
Total Volume: 60.3 Gallons _____ Liters	TURBIDITY (NTU): Turbidity Begin: 1 Turbidity End: 1.1	

Client ID: C2-OBS2-STORAGE50	P.O. #: 222.004.008
------------------------------	---------------------

ASSAY REQUESTED: Please check one of the following	
<input type="checkbox"/>	Total Culturable Virus Assay, MPN - (EPA, ICR 600/R-95/178)
<input type="checkbox"/>	Pre Filter Cartridge - M19R10A
<input checked="" type="checkbox"/>	Enteric Virus Assay, PFU - (SM 18th; 9510 - BioVir Modification)

COMMENTS:

RELINQUISHED BY: Jon Travis	DATE / TIME: 6/27/12 1600
RECEIVED BY: <i>Jmc</i>	DATE / TIME: 6/28/12 9:31

SHIPPING ADDRESS: BIOVIR LABORATORIES, INC., 685 STONE ROAD, UNIT 6, BENICIA, CALIFORNIA 94510
WHITE = BIOVIR COPY YELLOW = CUSTOMER COPY



685 Stone Road, Unit 6 • Benicia, CA 94510 • (707) 747-5906 • 1-800-GIARDIA • FAX (707) 747-1751 • WEB: www.biovir.com

REPORT NO.: 120876
PAGE NO.: 1 of 3
CLIENT: GSI Water Solutions
ADDRESS 1020 N Center Parkway, Suite F
Kennewick, WA 99336
CLIENT NO GSI002 **CLIENT PO:** 222.004.008

ASSAY RESULTS:

Test: Coliform, Total & E.coli Method: SM9223

BioVir #	Sample ID	Site	Analyte	Result	Units
120876-002	C2-OBS2-Stor50	OBS2	E. coli	<1	MPN/100ml

Collector: Jon Travis CollectDate 6/27/2012 CollectTime: 2:00:00 PM
ReceiveDate 6/28/2012 9:31:00 AM Matrix: Raw Water Temp 7.2
Volume: 250 mL Analysis Start Date: 6/28/12 Analysis Start Time: 1120
Analyst: JTruscott Analysis End: 6/29/2012

Comment

120876-002	C2-OBS2-Stor50	OBS2	Test Results Meet All Requirements of NELAC	YES	
------------	----------------	------	--	------------	--

Collector: Jon Travis CollectDate 6/27/2012 CollectTime: 2:00:00 PM
ReceiveDate 6/28/2012 9:31:00 AM Matrix: Raw Water Temp 7.2
Volume: 250 mL Analysis Start Date: 6/28/12 Analysis Start Time: 1120
Analyst: JTruscott Analysis End: 6/29/2012

Comment

120876-002	C2-OBS2-Stor50	OBS2	Total Coliform	Not Reported	MPN/100ml
------------	----------------	------	-----------------------	---------------------	------------------

Collector: Jon Travis CollectDate 6/27/2012 CollectTime: 2:00:00 PM
ReceiveDate 6/28/2012 9:31:00 AM Matrix: Raw Water Temp 7.2
Volume: 250 mL Analysis Start Date: Analysis Start Time:
Analyst: JTruscott Analysis End: 6/29/2012

Comment

Test: Coliform, Total & Fecal Method: SM9221B

BioVir #	Sample ID	Site	Analyte	Result	Units
----------	-----------	------	---------	--------	-------

REPORT NO.: 120876
PAGE NO.: 2 of 3
CLIENT: GSI Water Solutions
ADDRESS 1020 N Center Parkway, Suite F
 Kennewick, WA 99336
CLIENT NO GSI002 **CLIENT PO:** 222.004.008

ASSAY RESULTS:

Test: Coliform, Total & Fecal Method: SM9221B

BioVir #	Sample ID	Site	Analyte	Result	Units
120876-002	C2-OBS2-Stor50	OBS2	Fecal Coliform	<2	MPN/100ml
Collector: Jon Travis CollectDate 6/27/2012 CollectTime: 2:00:00 PM ReceiveDate 6/28/2012 9:31:00 AM Matrix: Raw Water Temp 7.2 Volume: 250 mL Analysis Start Date: 6/28/12 Analysis Start Time: 1123 Analyst: JTruscott Analysis End: 6/30/2012 Comment					

120876-002	C2-OBS2-Stor50	OBS2	Test Results Meet All Requirements of NELAC	YES	
Collector: Jon Travis CollectDate 6/27/2012 CollectTime: 2:00:00 PM ReceiveDate 6/28/2012 9:31:00 AM Matrix: Raw Water Temp 7.2 Volume: 250 mL Analysis Start Date: 6/28/12 Analysis Start Time: 1123 Analyst: JTruscott Analysis End: 6/30/2012 Comment					

120876-002	C2-OBS2-Stor50	OBS2	Total Coliform	<2	MPN/100ml
Collector: Jon Travis CollectDate 6/27/2012 CollectTime: 2:00:00 PM ReceiveDate 6/28/2012 9:31:00 AM Matrix: Raw Water Temp 7.2 Volume: 250 mL Analysis Start Date: 6/28/12 Analysis Start Time: 1123 Analyst: JTruscott Analysis End: 6/30/2012 Comment					

Test: Enteric Virus Method: SM9510 - Modified

BioVir #	Sample ID	Site	Analyte	Result	Units
120876-001	C2-OBS2-Storage50	OBS2 Port	Enteric Virus	<0.009	pfu/L
Collector: Jon Travis CollectDate 6/27/2012 CollectTime: 2:00:00 PM ReceiveDate 6/28/2012 9:31:00 AM Matrix: Raw Water Temp 7.2 Volume: 228.2 L Analysis Start Date: 6/28/12 Analysis Start Time: 1230 Analyst: ValLog Analysis End: 7/12/2012 Comment					

REPORT NO.: 120876
PAGE NO.: 3 of 3
CLIENT: GSI Water Solutions
ADDRESS 1020 N Center Parkway, Suite F
Kennewick, WA 99336
CLIENT NO GSI002 **CLIENT PO:** 222.004.008

ASSAY RESULTS:

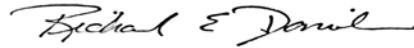
SAMPLE EVALUATION PERFORMANCE CRITERIA: The precise rates of recovery of organisms from environmental samples cannot be determined. BioVir Laboratories has analyzed your sample(s) in accordance with the method described with each analyte above, however, due to inherent limitations of these methods organisms may avoid detection. For additional information regarding the limitations of the method(s) referred to above please call us at 1-800-GIARDIA.

COMPANY IS NOT AN INSURER: BioVir Laboratories is not an insurer or guarantor of the quality and/or purity of water, wastewater, biosolid or other material from which the sample was taken. BioVir offers no express or implied warranties whatsoever concerning the quality or purity of any water, wastewater, biosolid or other material which is ultimately consumed, distributed, applied or disposed.

MAINTENANCE OF RECORDS: BioVir Laboratories, Inc. shall maintain records pertaining to the historical reconstruction of client's data for a minimum of five years from the date of issuance of the final report. Records may be destroyed after that date unless a written client's request for records transfer is received by BioVir which requests otherwise. Records transfer or storage charges may apply after the 5 year period. **THIS REPORT SHALL NOT BE REPRODUCED, EXCEPT IN FULL, WITHOUT THE WRITTEN APPROVAL OF BIOVIR LABORATORIES, INC.**

7/20/2012

Date:



Signature

Quality
Checked

DBA



GIARDIA / CRYPTOSPORIDIUM / MPA ASSAY SAMPLE DATA SHEET

(Please fill out applicable areas, sign and return to BioVir with the sample.)
Phone: 1-800-GIARDIA Fax: 707-747-1751 WEB: www.biovir.com

LAB USE ONLY:

LIMS #: 156-1-2
Client #: GSI002
Date Rec'd: 2/2/12
Time Rec'd: 8:10
Temp Rec'd: 8.00C

Note: Please print clearly using waterproof ink

COMPANY NAME & ADDRESS: <u>GSI Water Solutions</u> <u>7019 W Quanzult Suite 201</u> <u>Kennecook WA 99336</u> Contact Name: <u>Jon Travis</u> Tel: <u>509 979 0322</u>		SAMPLE DATE: <u>2/1/12</u>	SAMPLE TIME: <u>12:00</u>
NAME OF SAMPLER: <u>Jon Travis</u>		Water Temp (C): <u>25.14</u>	Turbidity (NTU): <u>1 NTU</u>
SAMPLE SOURCE: <u>OBS-2</u>		TREATMENT CHARACTERISTICS (Check One): Raw Surface Water <input type="checkbox"/> Treated Drinking Water <input type="checkbox"/> Treated Wastewater <input type="checkbox"/> Wastewater <input type="checkbox"/> Ground Water <input checked="" type="checkbox"/> Other: _____	
SAMPLE LOCATION: <u>OBS-2</u>		DECHLORINATION/ DISINFECTANT NEUTRALIZATION (If Treated Water): Yes _____ No _____	
SAMPLE DESCRIPTION (MPA)		SAMPLE DESCRIPTION (G/C)	
SAMPLE VOLUME: (Meter # <u>97901136</u>) Meter Start: <u>19133.2</u> Meter Stop: <u>19788.6</u> Total Volume: <u>55.4</u> Gallons _____ Liters		Regular Grab Sample <input checked="" type="checkbox"/> Matrix Spike Grab <input type="checkbox"/> Regular Filtered Sample <input type="checkbox"/> Matrix Spike Grab / Matrix Spike Filter Pair (>10 L Sample) <input type="checkbox"/> Filtered Volume: _____ Liters Grab Volume: _____ Liters	

Client Sample ID: <u>OBS 2 - Base</u>	P.O. #: <u>Boise</u>
---------------------------------------	----------------------

ASSAY REQUESTED: Please check one of the following	
METHOD 1623: Cryptosporidium and Giardia (EPA 821-R-01-025)	
<input type="checkbox"/>	REGULAR SAMPLE
<input type="checkbox"/>	MATRIX SPIKE SAMPLE
METHOD 1622: Cryptosporidium Only (EPA 821-R-01-026)	
<input type="checkbox"/>	REGULAR SAMPLE
<input type="checkbox"/>	MATRIX SPIKE SAMPLE
MICROSCOPIC PARTICULATE ANALYSIS (MPA)	
<input type="checkbox"/>	MPA WITH GIARDIA/CRYPTO BY FLUORESCENCE ASSAY (FA) (EPA 910/9-92-029 & 821-R-01-025)
<input type="checkbox"/>	MPA WITHOUT FLUORESCENCE ASSAY (EPA 910/9-92-029)

COMMENTS: SM 9221 Total Coliform PH 9.03
2 SM 9223 E. Coli
1 Enteric Virus PFU

RELINQUISHED BY: <u>[Signature]</u>	DATE / TIME: <u>2/1/12 1600</u>
RECEIVED BY: <u>[Signature]</u>	DATE / TIME: <u>2/2/12 8:10</u>

SHIPPING ADDRESS: BIOVIR LABORATORIES, INC., 685 STONE ROAD, UNIT 6, BENICIA, CALIFORNIA 94510



GIARDIA / CRYPTOSPORIDIUM / MPA ASSAY SAMPLE DATA SHEET

(Please fill out applicable areas, sign and return to BioVir with the sample.)
Phone: 1-800-GIARDIA Fax: 707-747-1751 WEB: www.biovir.com

LAB USE ONLY:
LIMS #: 156-3.4
Client #: GSI002
Date Rec'd: 2/2/12
Time Rec'd: 8:10
Temp Rec'd: 8.0°C

Note: Please print clearly using waterproof ink

COMPANY NAME & ADDRESS: <u>GSI Water Solutions</u> <u>8019 W Quinalt Ave Suite 201</u> <u>Kennecook WA 99336</u> Contact Name: <u>Jon Travis</u> Tel: <u>509 979 0332</u>		SAMPLE DATE: <u>2/1/12</u>	SAMPLE TIME: <u>14 29</u>
NAME OF SAMPLER: <u>Jon Travis</u>		Water Temp (C): <u>4.64</u>	Turbidity (NTU): <u>0.98</u>
SAMPLE SOURCE: <u>Raw Source water</u>		TREATMENT CHARACTERISTICS (Check One): Raw Surface Water <input checked="" type="checkbox"/> Treated Drinking Water <input type="checkbox"/> Treated Wastewater <input type="checkbox"/> Wastewater <input type="checkbox"/> Ground Water <input type="checkbox"/> Other: _____	
SAMPLE LOCATION: <u>Sample port in treatment build</u>		DECHLORINATION/ DISINFECTANT NEUTRALIZATION (If Treated Water): Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
SAMPLE DESCRIPTION (MPA) <u>P</u>		SAMPLE DESCRIPTION (G/C)	
SAMPLE VOLUME: (Meter # <u>19005571</u>) Meter Start: <u>5300.0</u> Meter Stop: <u>5356.0</u> Total Volume: <u>56</u> Gallons _____ Liters		Regular Grab Sample <input checked="" type="checkbox"/> Matrix Spike Grab <input type="checkbox"/> Regular Filtered Sample <input type="checkbox"/> Matrix Spike Grab / Matrix Spike Filter Pair (>10 L Sample) <input type="checkbox"/> Filtered Volume: _____ Liters Grab Volume: _____ Liters	

Client Sample ID: <u>Source - Raw - Base</u>	P.O. #: <u>Boise</u>
--	----------------------

ASSAY REQUESTED: Please check one of the following	
METHOD 1623: Cryptosporidium and Giardia (EPA 821-R-01-025)	
<input type="checkbox"/>	REGULAR SAMPLE
<input type="checkbox"/>	MATRIX SPIKE SAMPLE
METHOD 1622: Cryptosporidium Only (EPA 821-R-01-026)	
<input type="checkbox"/>	REGULAR SAMPLE
<input type="checkbox"/>	MATRIX SPIKE SAMPLE
MICROSCOPIC PARTICULATE ANALYSIS (MPA)	
<input type="checkbox"/>	MPA WITH GIARDIA/CRYPTO BY FLUORESCENCE ASSAY (FA) (EPA 910/9-92-029 & 821-R-01-025)
<input type="checkbox"/>	MPA WITHOUT FLUORESCENCE ASSAY (EPA 910/9-92-029)

COMMENTS: SM 9221 total Coliform sample time-14:27
④ SM 9223 EColi
③ Enteric Virus PFU

RELINQUISHED BY: <u>Jon Travis</u>	DATE / TIME: <u>2/1/12 1600</u>
RECEIVED BY: <u>Jon</u>	DATE / TIME: <u>2/2/12 8:10</u>

SHIPPING ADDRESS: BIOVIR LABORATORIES, INC., 685 STONE ROAD, UNIT 6, BENICIA, CALIFORNIA 94510



685 Stone Road, Unit 6 • Benicia, CA 94510 • (707) 747-5906 • 1-800-GIARDIA • FAX (707) 747-1751 • WEB: www.biovir.com

REPORT NO.: 120156
PAGE NO.: 1 of 4
CLIENT: GSI Water Solutions
ADDRESS 1020 N Center Parkway, Suite F
Kennewick, WA 99336
CLIENT NO GSI002 **CLIENT PO:** Boise

ASSAY RESULTS:

Test: Coliform, Total **Method: SM9221B**

BioVir #	Sample ID	Site	Analyte	Result	Units
120156-002	OBS 2-Boise	OBS-2	Test Results Meet All Requirements of NELAC	YES	
Collector: Jon Travis CollectDate 2/1/2012 CollectTime: 12:00:00 PM ReceiveDate 2/2/2012 8:10:00 AM Matrix: Raw Water Temp 8.0 Volume: 250 mL Analysis Start Date: 2/2/12 Analysis Start Time: 0945 Analyst: JTruscott Analysis End: 2/6/2012 Comment Groundwater.					
120156-002	OBS 2-Boise	OBS-2	Total Coliform	<1.1	MPN/100ml
Collector: Jon Travis CollectDate 2/1/2012 CollectTime: 12:00:00 PM ReceiveDate 2/2/2012 8:10:00 AM Matrix: Raw Water Temp 8.0 Volume: 250 mL Analysis Start Date: 2/2/12 Analysis Start Time: 0945 Analyst: JTruscott Analysis End: 2/6/2012 Comment Groundwater.					
120156-004	Source-Raw-Base	Sample port in treatment building	Test Results Meet All Requirements of NELAC	YES	
Collector: Jon Travis CollectDate 2/1/2012 CollectTime: 2:27:00 PM ReceiveDate 2/2/2012 8:10:00 AM Matrix: Raw Water Temp 8.0 Volume: 250 mL Analysis Start Date: 2/2/12 Analysis Start Time: 0945 Analyst: JTruscott Analysis End: 2/6/2012 Comment Sample time from sample label.					

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: GSI WATER SOLUTIONS INC
Address: 8019 W. QUINAULT AVE
KENNEWICK, WA 99336
Attn: KEVIN LINDSEY

Batch #: 120207006
Project Name: BOISE ASR 222.004.008

Analytical Results Report

Sample Number	120207006-001	Sampling Date	2/6/2012	Date/Time Received	2/7/2012 10:17 AM
Client Sample ID	OB52-BASE	Sampling Time	12:00 PM		
Matrix	Drinking Water	Sample Location			
Comments	RADIOLOGICAL ANALYSIS PERFORMED BY PACE ANALYTICAL GREENSBURG PA				

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Alkalinity	119	mg/L	2	2/8/2012	KFG	SM2320B	
Aluminum	0.0125	mg/L	0.01	2/10/2012	ETL	EPA 200.7	
Antimony	ND	mg/L	0.001	2/17/2012	ETL	EPA 200.8	
Arsenic	ND	mg/L	0.001	2/17/2012	ETL	EPA 200.8	
Barium	0.0144	mg/L	0.001	2/17/2012	ETL	EPA 200.8	
Beryllium	ND	mg/L	0.001	2/17/2012	ETL	EPA 200.8	
Bicarbonate	119	mg/L	2	2/8/2012	KFG	SM2320B	
Cadmium	ND	mg/L	0.001	2/17/2012	ETL	EPA 200.8	
Carbonate	ND	mg/L	5	2/8/2012	KFG	SM2320B	
Chloride	21.4	mg/L	0.1	2/7/2012	JTT	EPA 300.0	
Chromium	ND	mg/L	0.001	2/17/2012	ETL	EPA 200.8	
Copper	ND	mg/L	0.001	2/17/2012	ETL	EPA 200.8	
Dissolved Iron	ND	mg/L	0.01	2/10/2012	ETL	EPA 200.7	
Dissolved Manganese	ND	mg/L	0.01	2/10/2012	ETL	EPA 200.7	
1,2-Dibromoethane (EDB)	ND	ug/L	0.02	2/14/2012	SAT	EPA 504.1	
Fluoride	3.51	mg/L	0.1	2/7/2012	JTT	EPA 300.0	
Gross Alpha	-0.185 +/- 0.852	pCi/L	2.79	2/17/2012	SUB	EPA 900.0	
Gross Beta	6.13 +/- 1.45	pCi/L	1.95	2/17/2012	SUB	EPA 900.0	
Calcium	2.11	mg/L	0.1	2/10/2012	ETL	EPA 200.7	
Hardness	5.28	mg/L	1	2/10/2012	ETL	EPA 200.7	
Magnesium	ND	mg/L	0.1	2/10/2012	ETL	EPA 200.7	
2,4,5-TP (Silvex)	ND	ug/L	0.1	2/10/2012	SAT	EPA 515.3	
2,4-D	ND	ug/L	0.1	2/10/2012	SAT	EPA 515.3	
Iron	0.0118	mg/L	0.01	2/10/2012	ETL	EPA 200.7	
Lead	ND	mg/L	0.001	2/17/2012	ETL	EPA 200.8	
Manganese	ND	mg/L	0.01	2/10/2012	ETL	EPA 200.7	
Mercury-ICPMS	ND	mg/L	0.0001	2/17/2012	ETL	EPA 200.8	
Nickel	ND	mg/L	0.001	2/17/2012	ETL	EPA 200.8	
NO3/N	ND	mg/L	0.1	2/7/2012	JTT	EPA 300.0	
NO3/N+NO2/N	ND	mg/L	0.1	2/7/2012	JTT	EPA 300.0	
NO2/N	ND	mg/L	0.1	2/7/2012	JTT	EPA 300.0	
4,4-DDD	ND	ug/L	0.1	2/16/2012	MAH	EPA 505	
4,4-DDE	ND	ug/L	0.1	2/16/2012	MAH	EPA 505	
4,4-DDT	ND	ug/L	0.1	2/16/2012	MAH	EPA 505	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C585; MT:Cert0095

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: GSI WATER SOLUTIONS INC
Address: 8019 W. QUINAULT AVE
KENNEWICK, WA 99336
Attn: KEVIN LINDSEY

Batch #: 120207006
Project Name: BOISE ASR 222.004.008

Analytical Results Report

Sample Number	120207006-001	Sampling Date	2/6/2012	Date/Time Received	2/7/2012	10:17 AM
Client Sample ID	OB52-BASE	Sampling Time	12:00 PM			
Matrix	Drinking Water	Sample Location				
Comments	RADIOLOGICAL ANALYSIS PERFORMED BY PACE ANALYTICAL GREENSBURG PA					

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Chlordane	ND	ug/L	0.4	2/16/2012	MAH	EPA 505	
Dieldrin	ND	ug/L	0.2	2/16/2012	MAH	EPA 505	
Endrin	ND	ug/L	0.02	2/16/2012	MAH	EPA 505	
Heptachlor epoxide	ND	ug/L	0.04	2/16/2012	MAH	EPA 505	
PCBs	ND	µg/L	0.5	2/16/2012	MAH	EPA 505	
Toxaphene	ND	ug/L	2	2/16/2012	MAH	EPA 505	
Potassium	7.37	mg/L	0.01	2/10/2012	ETL	EPA 200.7	
Selenium	0.00867	mg/L	0.001	2/17/2012	ETL	EPA 200.8	
Hexachlorobenzene	ND	ug/L	0.2	2/16/2012	EMP	EPA 525.2	
Silica (as SiO ₂)	77.0	mg/L	0.1	2/10/2012	ETL	EPA 200.7	
Silicon	36.0	mg/L	0.1	2/10/2012	ETL	EPA 200.7	
Silver	ND	mg/L	0.001	2/17/2012	ETL	EPA 200.8	
Sodium	46.5	mg/L	0.1	2/10/2012	ETL	EPA 200.7	
TDS	266	mg/L	10	2/13/2012	JTT	SM 2540C	
TSS	ND	mg/L	1	2/9/2012	ETL	SM 2540D	
Sulfate	ND	mg/L	0.1	2/7/2012	JTT	EPA 300.0	
Thallium	ND	mg/L	0.001	2/17/2012	ETL	EPA 200.8	
TOC	0.681	mg/L	0.1	2/9/2012	JWC	SM 5310B	
1,1,1-Trichloroethane	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,1,2-Trichloroethane	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,1-Dichloroethene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,2,4-Trichlorobenzene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,2-Dichlorobenzene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,2-Dichloroethane	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,2-Dichloropropane	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,4-Dichlorobenzene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Benzene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Carbon Tetrachloride	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Chlorobenzene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
cis-1,2-dichloroethene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Ethylbenzene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Methylene chloride	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Styrene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Tetrachloroethene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Toluene	0.69	µg/L	0.5	2/13/2012	TGT	EPA 524.2	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C585; MT:Cert0095

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: GSI WATER SOLUTIONS INC
Address: 8019 W. QUINAULT AVE
KENNEWICK, WA 99336
Attn: KEVIN LINDSEY

Batch #: 120207006
Project Name: BOISE ASR 222.004.008

Analytical Results Report

Sample Number	120207006-001	Sampling Date	2/6/2012	Date/Time Received	2/7/2012	10:17 AM	
Client Sample ID	OB52-BASE	Sampling Time	12:00 PM				
Matrix	Drinking Water	Sample Location					
Comments	RADIOLOGICAL ANALYSIS PERFORMED BY PACE ANALYTICAL GREENSBURG PA						
Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Total Xylene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
trans-1,2-Dichloroethene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Trichloroethene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Vinyl Chloride	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Zinc	0.00118	mg/L	0.001	2/17/2012	ETL	EPA 200.8	

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: GSI WATER SOLUTIONS INC
Address: 8019 W. QUINAULT AVE
KENNEWICK, WA 99336
Attn: KEVIN LINDSEY

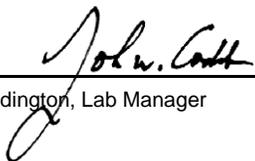
Batch #: 120207006
Project Name: BOISE ASR 222.004.008

Analytical Results Report

Sample Number	120207006-002	Sampling Date	2/6/2012	Date/Time Received	2/7/2012 10:17 AM
Client Sample ID	TRIP BLANK	Sampling Time			
Matrix	Drinking Water	Sample Location			
Comments					

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
1,1,1-Trichloroethane	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,1,2-Trichloroethane	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,1-Dichloroethene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,2,4-Trichlorobenzene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,2-Dichlorobenzene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,2-Dichloroethane	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,2-Dichloropropane	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
1,4-Dichlorobenzene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Benzene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Carbon Tetrachloride	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Chlorobenzene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
cis-1,2-dichloroethene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Ethylbenzene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Methylene chloride	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Styrene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Tetrachloroethene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Toluene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Total Xylene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
trans-1,2-Dichloroethene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Trichloroethene	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	
Vinyl Chloride	ND	µg/L	0.5	2/13/2012	TGT	EPA 524.2	

Authorized Signature


John Coddington, Lab Manager

H1 Sample analysis performed past holding time.
MCL EPA's Maximum Contaminant Level
ND Not Detected
PQL Practical Quantitation Limit

This report shall not be reproduced except in full, without the written approval of the laboratory.
The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C585; MT:Cert0095

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Login Report

Customer Name: GSI WATER SOLUTIONS INC

Order ID: 120207006

8019 W. QUINAULT AVE

Order Date: 2/7/2012

KENNEWICK WA 99336

Contact Name: KEVIN LINDSEY

Project Name: BOISE ASR 222.004.008

Comment:

Sample #: 120207006-001 **Customer Sample #:** OB52-BASE

Recv'd:

Collector: JON

Date Collected: 2/6/2012

Quantity: 17

Matrix: Drinking Water

Date Received: 2/7/2012 10:17:00 A

Comment:

Test	Lab	Method	Due Date	Priority
ALKALINITY	M	SM2320B	2/17/2012	<u>Normal (6-10 Days)</u>
ALUMINUM ICP	M	EPA 200.7	2/17/2012	<u>Normal (6-10 Days)</u>
ANTIMONY	M	EPA 200.8	2/17/2012	<u>Normal (6-10 Days)</u>
ARSENIC	M	EPA 200.8	2/17/2012	<u>Normal (6-10 Days)</u>
BARIIUM	M	EPA 200.8	2/17/2012	<u>Normal (6-10 Days)</u>
BERYLLIUM	M	EPA 200.8	2/17/2012	<u>Normal (6-10 Days)</u>
BICARBONATE	M	SM2320B	2/17/2012	<u>Normal (6-10 Days)</u>
CADMIUM	M	EPA 200.8	2/17/2012	<u>Normal (6-10 Days)</u>
CARBONATE	M	SM2320B	2/17/2012	<u>Normal (6-10 Days)</u>
CHLORIDE	M	EPA 300.0	2/17/2012	<u>Normal (6-10 Days)</u>
CHROMIUM	M	EPA 200.8	2/17/2012	<u>Normal (6-10 Days)</u>
COPPER	M	EPA 200.8	2/17/2012	<u>Normal (6-10 Days)</u>
DISSOLVED IRON BY ICP	M	EPA 200.7	2/17/2012	<u>Normal (6-10 Days)</u>
DISSOLVED MANGANESE BY ICP	M	EPA 200.7	2/17/2012	<u>Normal (6-10 Days)</u>
EDB 504.1	M	EPA 504.1	2/17/2012	<u>Normal (6-10 Days)</u>
FLUORIDE	M	EPA 300.0	2/17/2012	<u>Normal (6-10 Days)</u>
GROSS ALPHA		EPA 900.0	2/17/2012	<u>Normal (6-10 Days)</u>
GROSS BETA		EPA 900.0	2/17/2012	<u>Normal (6-10 Days)</u>
HARDNESS by EPA 200.7	M	EPA 200.7	2/17/2012	<u>Normal (6-10 Days)</u>
HERBICIDES 515.3	M	EPA 515.3	2/17/2012	<u>Normal (6-10 Days)</u>
IRON ICP	M	EPA 200.7	2/17/2012	<u>Normal (6-10 Days)</u>
LEAD	M	EPA 200.8	2/17/2012	<u>Normal (6-10 Days)</u>
MANGANESE ICP	M	EPA 200.7	2/17/2012	<u>Normal (6-10 Days)</u>

Customer Name: GSI WATER SOLUTIONS INC
 8019 W. QUINAULT AVE
 KENNEWICK WA 99336

Order ID: 120207006
Order Date: 2/7/2012

Contact Name: KEVIN LINDSEY

Project Name: BOISE ASR 222.004.008

Comment:

MERCURY-ICPMS	M	EPA 200.8	2/17/2012	<u>Normal (6-10 Days)</u>
NICKEL	M	EPA 200.8	2/17/2012	<u>Normal (6-10 Days)</u>
NITRATE/N	M	EPA 300.0	2/17/2012	<u>Normal (6-10 Days)</u>
NITRATE+ NITRITE AS N	M	EPA 300.0	2/17/2012	<u>Normal (6-10 Days)</u>
NITRITE/N	M	EPA 300.0	2/17/2012	<u>Normal (6-10 Days)</u>
PESTICIDES 505	M	EPA 505	2/17/2012	<u>Normal (6-10 Days)</u>
POTASSIUM ICP	M	EPA 200.7	2/17/2012	<u>Normal (6-10 Days)</u>
SELENIUM	M	EPA 200.8	2/17/2012	<u>Normal (6-10 Days)</u>
SEMIVOLATILES 525.2	M	EPA 525.2	2/17/2012	<u>Normal (6-10 Days)</u>
SILICON ICP	M	EPA 200.7	2/17/2012	<u>Normal (6-10 Days)</u>
SILVER	M	EPA 200.8	2/17/2012	<u>Normal (6-10 Days)</u>
SODIUM ICP	M	EPA 200.7	2/17/2012	<u>Normal (6-10 Days)</u>
SOLIDS - TDS	M	SM 2540C	2/17/2012	<u>Normal (6-10 Days)</u>
SOLIDS - TSS	M	SM 2540D	2/17/2012	<u>Normal (6-10 Days)</u>
SULFATE	M	EPA 300.0	2/17/2012	<u>Normal (6-10 Days)</u>
THALLIUM	M	EPA 200.8	2/17/2012	<u>Normal (6-10 Days)</u>
TOC - MOSC	M	SM 5310B	2/17/2012	<u>Normal (6-10 Days)</u>
VOLATILES 524.2	M	EPA 524.2	2/17/2012	<u>Normal (6-10 Days)</u>
ZINC	M	EPA 200.8	2/17/2012	<u>Normal (6-10 Days)</u>

Sample #: 120207006-002 **Customer Sample #:** TRIP BLANK

Recv'd: **Collector:** JON **Date Collected:** 2/6/2012
Quantity: 1 **Matrix:** Drinking Water **Date Received:** 2/7/2012 10:17:00 A

Comment:

Test	Lab	Method	Due Date	Priority
VOLATILES 524.2	M	EPA 524.2	2/17/2012	<u>Normal (6-10 Days)</u>

Customer Name: GSI WATER SOLUTIONS INC
8019 W. QUINAULT AVE
KENNEWICK WA 99336

Order ID: 120207006
Order Date: 2/7/2012

Contact Name: KEVIN LINDSEY

Project Name: BOISE ASR 222.004.008

Comment:

SAMPLE CONDITION RECORD

Samples received in a cooler?	Yes
Samples received intact?	Yes
What is the temperature inside the cooler?	2.4
Samples received with a COC?	Yes
Samples received within holding time?	Yes
Are all sample bottles properly preserved?	Yes
Are VOC samples free of headspace?	Yes
Is there a trip blank to accompany VOC samples?	Yes
Labels and chain agree?	Yes



SAMPLE DATA SHEET

SHIPPING ADDRESS: BIOVIR LABORATORIES, INC., 685 STONE ROAD, UNIT 6, BENICIA, CALIFORNIA 94510

1-800-GIARDIA (442-7342), FAX: 707-747-1751

Business Hours: Monday through Friday - 8:30 AM to 5:00 PM

205-1-2
GSI002
* Required Fields 8.6°C

*CLIENT/COMPANY NAME:

GST
8019 W Quince St Ave Ste 201
Kearnsville WA 99336

*DATE OF SAMPLING:

2/7/12

PURCHASE ORDER/SUBCONTRACT ORDER #:

B0152

*NAME OF SAMPLER: (Please print)

Jon Travis

*PLEASE CHECK APPROPRIATE BOX FOR MATRIX OR FILL IN "OTHER".
MATRIX: Drinking Water Wastewater Biosolid OTHER: Raw water
Regulatory Drinking Water Sample(s) Yes No
CA DHS Contact Person and Phone Number (if regulatory):

*SAMPLE ID	*TIME	VOLUME	TREATMENT	SAMPLING LOCATION	*ANALYSIS REQUESTED
Source F - C1 - Inject R20		100ml		Raw treatment	SM9221 SM9223
Source R - C1 - Inject R2:00		100ml		Raw	SM9221 SM9223

*RELINQUISHED BY (SIGNED)	*DATE/TIME	RECEIVED BY (SIGNED)	DATE/TIME
	2/7/12 1630		2/8/12 7:45



685 Stone Road, Unit 6 • Benicia, CA 94510 • (707) 747-5906 • 1-800-GIARDIA • FAX (707) 747-1751 • WEB: www.biovir.com

REPORT NO.: 120205
PAGE NO.: 1 of 3
CLIENT: GSI Water Solutions
ADDRESS 1020 N Center Parkway, Suite F
Kennewick, WA 99336
CLIENT NO GSI002 **CLIENT PO:** Boise

ASSAY RESULTS:

Test: Coliform, Total, Fecal & E.coli Method: SM9221B

BioVir #	Sample ID	Site	Analyte	Result	Units
120205-001	Source F-C1-Inject	Treatment	E. coli	2	MPN/100ml
Collector: Jon Travis CollectDate 2/7/2012 CollectTime: 12:20:00 PM					
ReceiveDate 2/8/2012 7:45:00 AM Matrix: Raw Water Temp 8.6					
Volume: 100 mL Analysis Start Date: 2/8/12 Analysis Start Time: 1130					
Analyst: JTruscott Analysis End: 2/13/2012					
Comment Per Jon Travis, TC, FC, EC. method SM 9221F (MTF).					
120205-001	Source F-C1-Inject	Treatment	Fecal Coliform	2	MPN/100ml
Collector: Jon Travis CollectDate 2/7/2012 CollectTime: 12:20:00 PM					
ReceiveDate 2/8/2012 7:45:00 AM Matrix: Raw Water Temp 8.6					
Volume: 100 mL Analysis Start Date: 2/8/12 Analysis Start Time: 1130					
Analyst: JTruscott Analysis End: 2/13/2012					
Comment Per Jon Travis, TC, FC, EC. method SM 9221F (MTF).					
120205-001	Source F-C1-Inject	Treatment	Test Results Meet All Requirements of NELAC	YES	
Collector: Jon Travis CollectDate 2/7/2012 CollectTime: 12:20:00 PM					
ReceiveDate 2/8/2012 7:45:00 AM Matrix: Raw Water Temp 8.6					
Volume: 100 mL Analysis Start Date: 2/8/12 Analysis Start Time: 1130					
Analyst: JTruscott Analysis End: 2/13/2012					
Comment Per Jon Travis, TC, FC, EC. method SM 9221F (MTF).					
120205-001	Source F-C1-Inject	Treatment	Total Coliform	4	MPN/100ml
Collector: Jon Travis CollectDate 2/7/2012 CollectTime: 12:20:00 PM					
ReceiveDate 2/8/2012 7:45:00 AM Matrix: Raw Water Temp 8.6					
Volume: 100 mL Analysis Start Date: 2/8/12 Analysis Start Time: 1130					
Analyst: JTruscott Analysis End: 2/13/2012					
Comment Per Jon Travis, TC, FC, EC. method SM 9221F (MTF).					

REPORT NO.: 120205
PAGE NO.: 2 of 3
CLIENT: GSI Water Solutions
ADDRESS 1020 N Center Parkway, Suite F
 Kennewick, WA 99336
CLIENT NO GSI002 **CLIENT PO:** Boise

ASSAY RESULTS:

Test: Coliform, Total, Fecal & E.coli Method: SM9221B

BioVir #	Sample ID	Site	Analyte	Result	Units
120205-002	Source R-C1-Inject	Raw	E. coli	<2	MPN/100ml
Collector: Jon Travis CollectDate 2/7/2012 CollectTime: 12:00:00 PM ReceiveDate 2/8/2012 7:45:00 AM Matrix: Raw Water Temp 8.6 Volume: 100 mL Analysis Start Date: 2/8/12 Analysis Start Time: 1130 Analyst: JTruscott Analysis End: 2/13/2012 Comment Per Jon Travis, TC, FC, EC method SM 9221F (MTF)					
120205-002	Source R-C1-Inject	Raw	Fecal Coliform	<2	MPN/100ml
Collector: Jon Travis CollectDate 2/7/2012 CollectTime: 12:00:00 PM ReceiveDate 2/8/2012 7:45:00 AM Matrix: Raw Water Temp 8.6 Volume: 100 mL Analysis Start Date: 2/8/12 Analysis Start Time: 1130 Analyst: JTruscott Analysis End: 2/13/2012 Comment Per Jon Travis, TC, FC, EC method SM 9221F (MTF)					
120205-002	Source R-C1-Inject	Raw	Test Results Meet All Requirements of NELAC	YES	
Collector: Jon Travis CollectDate 2/7/2012 CollectTime: 12:00:00 PM ReceiveDate 2/8/2012 7:45:00 AM Matrix: Raw Water Temp 8.6 Volume: 100 mL Analysis Start Date: 2/8/12 Analysis Start Time: 1130 Analyst: JTruscott Analysis End: 2/13/2012 Comment Per Jon Travis, TC, FC, EC method SM 9221F (MTF)					
120205-002	Source R-C1-Inject	Raw	Total Coliform	2	MPN/100ml
Collector: Jon Travis CollectDate 2/7/2012 CollectTime: 12:00:00 PM ReceiveDate 2/8/2012 7:45:00 AM Matrix: Raw Water Temp 8.6 Volume: 100 mL Analysis Start Date: 2/8/12 Analysis Start Time: 1130 Analyst: JTruscott Analysis End: 2/13/2012 Comment Per Jon Travis, TC, FC, EC method SM 9221F (MTF)					

REPORT NO.: 120205
PAGE NO.: 3 of 3
CLIENT: GSI Water Solutions
ADDRESS 1020 N Center Parkway, Suite F
Kennewick, WA 99336
CLIENT NO GSI002 **CLIENT PO:** Boise

ASSAY RESULTS:

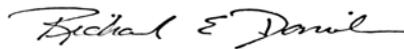
SAMPLE EVALUATION PERFORMANCE CRITERIA: The precise rates of recovery of organisms from environmental samples cannot be determined. BioVir Laboratories has analyzed your sample(s) in accordance with the method described with each analyte above, however, due to inherent limitations of these methods organisms may avoid detection. For additional information regarding the limitations of the method(s) referred to above please call us at 1-800-GIARDIA.

COMPANY IS NOT AN INSURER: BioVir Laboratories is not an insurer or guarantor of the quality and/or purity of water, wastewater, biosolid or other material from which the sample was taken. BioVir offers no express or implied warranties whatsoever concerning the quality or purity of any water, wastewater, biosolid or other material which is ultimately consumed, distributed, applied or disposed.

MAINTENANCE OF RECORDS: BioVir Laboratories, Inc. shall maintain records pertaining to the historical reconstruction of client's data for a minimum of five years from the date of issuance of the final report. Records may be destroyed after that date unless a written client's request for records transfer is received by BioVir which requests otherwise. Records transfer or storage charges may apply after the 5 year period. **THIS REPORT SHALL NOT BE REPRODUCED, EXCEPT IN FULL, WITHOUT THE WRITTEN APPROVAL OF BIOVIR LABORATORIES, INC.**

2/24/2012

Date:



Signature

Quality
Checked

dcelio



**TOTAL CULTURABLE VIRUS
ENTERIC VIRUS ASSAY
SAMPLE DATA SHEET**

LAB USE ONLY:

LIMS #: 280-1
 Client #: GSI002
 Date Rec'd: 2/28/12
 Time Rec'd: 9:45
 Temp Rec'd: 7.1°C

(Please fill out completely and return white copy to BioVir with the sample.)
 Phone: 1-800-GIARDIA Fax: 707-747-1751 WEB: www.biovir.com

Note: Please print clearly using waterproof ink

NAME AND ADDRESS OF WATER COMPANY OR UTILITY: <u>GSI Water Solutions</u> <u>8019 W Quinault Ave. Suite 201</u> <u>Kennewick WA 99336</u>		SAMPLE DATE: <u>2/27/12</u>	
		SAMPLE TIME: <u>11:50</u>	
NAME OF SAMPLER: <u>Jon Travis</u>		pH: <u>7.90</u>	Water Temp (C): <u>4.87</u>
		pH (adjusted):	
SAMPLE SOURCE: <u>Raw River Water</u>		TREATMENT CHARACTERISTICS (Check One):	
		Raw Drinking Water <input checked="" type="checkbox"/>	
		Treated Drinking Water <input type="checkbox"/>	
SAMPLE LOCATION: <u>Filter Shed</u>		Wastewater <input type="checkbox"/>	
		Filtered Wastewater <input type="checkbox"/>	
SAMPLE VOLUME: (Meter # <u>97901136</u>)		DECHLORINATION/ DISINFECTANT NEUTRALIZATION	
Meter Start: 0014790 <u>19811</u> Meter Stop: <u>19864</u> 19764		(If Treated Water):	
		Yes No	
Total Volume: <u>53</u> Gallons _____ Liters		TURBIDITY (NTU): <u>5.3</u> <u>5.3</u>	
		Turbidity Begin: 0.152 Turbidity End:	

Client ID: <u>R source - C2 - 1%</u>	P.O. #: <u>Boise</u>
--------------------------------------	----------------------

ASSAY REQUESTED: Please check one of the following	
<input type="checkbox"/>	Total Culturable Virus Assay, MPN - (EPA, ICR 600/R-95/178)
<input type="checkbox"/>	Pre Filter Cartridge - M19R10A
<input checked="" type="checkbox"/>	Enteric Virus Assay, PFU - (SM 18th; 9510 - BioVir Modification)

COMMENTS:

RELINQUISHED BY: <u>[Signature]</u>	DATE / TIME: <u>2/27/12 1600</u>
RECEIVED BY: <u>[Signature]</u>	DATE / TIME: <u>2/28/12 9:45</u>

SHIPPING ADDRESS: BIOVIR LABORATORIES, INC., 685 STONE ROAD, UNIT 6, BENICIA, CALIFORNIA 94510
 WHITE = BIOVIR COPY YELLOW = CUSTOMER COPY



**TOTAL CULTURABLE VIRUS
ENTERIC VIRUS ASSAY
SAMPLE DATA SHEET**

LAB USE ONLY:

LIMS #: 280-2
 Client #: GST002
 Date Rec'd: 2/28/12
 Time Rec'd: 9:45
 Temp Rec'd: 7.1°C

(Please fill out completely and return white copy to BioVir with the sample.)
 Phone: 1-800-GIARDIA Fax: 707-747-1751 WEB: www.biovir.com

Note: Please print clearly using waterproof ink

NAME AND ADDRESS OF WATER COMPANY OR UTILITY: <u>GSI Water Solutions</u> <u>8019 W Quinault Ave Suite 201</u> <u>Kennewick WA 99336</u>		SAMPLE DATE: <u>2/27/12</u>	
		SAMPLE TIME: <u>14:10</u>	
NAME OF SAMPLER: <u>Jon Travis</u>		pH: <u>7.92</u>	Water Temp (C): <u>4.53</u>
		pH (adjusted):	
SAMPLE SOURCE: <u>Filtered Raw Water</u>		TREATMENT CHARACTERISTICS (Check One):	
		Raw Drinking Water <input checked="" type="checkbox"/>	
		Treated Drinking Water <input type="checkbox"/>	
SAMPLE LOCATION: <u>Well Shed</u>		Wastewater <input type="checkbox"/>	
		Filtered Wastewater <input type="checkbox"/>	
SAMPLE VOLUME: (Meter # <u>19005540</u>) <u>01007300</u> Meter Start: <u>01007274</u> Meter Stop: <u>01007358</u>		DECHLORINATION/ DISINFECTANT NEUTRALIZATION (If Treated Water): Yes _____ No _____	
Total Volume: <u>58</u> Gallons _____ Liters		TURBIDITY (NTU): Turbidity Begin: <u>0.17</u> Turbidity End: <u>0.17</u>	

Client ID: <u>F source - C2-1%</u>	P.O. #: <u>Boise</u>
------------------------------------	----------------------

ASSAY REQUESTED: Please check one of the following	
<input type="checkbox"/>	Total Culturable Virus Assay, MPN - (EPA, ICR 600/R-95/178)
<input type="checkbox"/>	Pre Filter Cartridge - M19R10A
<input checked="" type="checkbox"/>	Enteric Virus Assay, PFU - (SM 18th; 9510 - BioVir Modification)

COMMENTS:

RELINQUISHED BY: <u>[Signature]</u>	DATE / TIME: <u>2/27/12 1600</u>
RECEIVED BY: <u>[Signature]</u>	DATE / TIME: <u>2/28/12 9:45</u>

SHIPPING ADDRESS: BIOVIR LABORATORIES, INC., 685 STONE ROAD, UNIT 6, BENICIA, CALIFORNIA 94510
 WHITE = BIOVIR COPY YELLOW = CUSTOMER COPY



SAMPLE DATA SHEET
 SHIPPING ADDRESS: BIOVIR LABORATORIES, INC., 685 STONE ROAD, UNIT 6, BENICIA, CALIFORNIA 94510
 1-800-GIARDIA (442-7342), FAX: 707-747-1751
 Business Hours: Monday through Friday - 8:30 AM to 5:00 PM

280-3-4
 GST1002
 * Required Fields 7.10c

*CLIENT/COMPANY NAME: **GSI**
 8019 W Quince St Ave Suite 201
 Kennewick WA 99336
 TELEPHONE# 509-979-0332 FAX#
 *NAME OF SAMPLER: (Please print) **Jon Travis**

*DATE OF SAMPLING: **2/27/12**
 PURCHASE ORDER/SUBCONTRACT ORDER #: **Boise**

*PLEASE CHECK APPROPRIATE BOX FOR MATRIX OR FILL IN "OTHER".
 MATRIX: Drinking Water Wastewater Biosolid OTHER: Surface
 Regulatory Drinking Water Sample(s) Yes No
 CA DHS Contact Person and Phone Number (if regulatory):

*SAMPLE ID	*TIME	VOLUME	TREATMENT	SAMPLING LOCATION	*ANALYSIS REQUESTED
3) Resource - C2 - 1/6	12:00	250 mL	Ø	Filter Stud	Fecal Coliform / E.coli SM9223 Total Coliform SM9221
4) Esouca - C2 - 1/6	14:20	250	Ø	Well Shud	Fecal Coliform / E.coli SM9223 Total Coliform SM9221

*RELINQUISHED BY (SIGNED)	*DATE/TIME	RECEIVED BY (SIGNED)	DATE/TIME
<i>[Signature]</i>	2/27/12 1600	<i>[Signature]</i>	2/28/12 9:45



685 Stone Road, Unit 6 • Benicia, CA 94510 • (707) 747-5906 • 1-800-GIARDIA • FAX (707) 747-1751 • WEB: www.biovir.com

REPORT NO.: 120280
PAGE NO.: 1 of 4
CLIENT: GSI Water Solutions
ADDRESS 1020 N Center Parkway, Suite F
Kennewick, WA 99336
CLIENT NO GSI002 **CLIENT PO:** Boise

ASSAY RESULTS:

Test: Coliform, Total & E.coli Method: SM9223

BioVir #	Sample ID	Site	Analyte	Result	Units
120280-003	R source-C2-1%	Filter Shed	E. coli	4.1	MPN/100ml
Collector: Jon Travis CollectDate 2/27/2012 CollectTime: 12:00:00 PM ReceiveDate 2/28/2012 9:45:00 AM Matrix: Raw Water Temp 7.1 Volume: 250 mL Analysis Start Date: 2/28/12 Analysis Start Time: 1118 Analyst: JTruscott Analysis End: 2/29/2012 Comment FC method incorrect on COC					
120280-003	R source-C2-1%	Filter Shed	Test Results Meet All Requirements of NELAC	YES	
Collector: Jon Travis CollectDate 2/27/2012 CollectTime: 12:00:00 PM ReceiveDate 2/28/2012 9:45:00 AM Matrix: Raw Water Temp 7.1 Volume: 250 mL Analysis Start Date: 2/28/12 Analysis Start Time: 1118 Analyst: JTruscott Analysis End: 2/29/2012 Comment FC method incorrect on COC					
120280-003	R source-C2-1%	Filter Shed	Total Coliform	Not Reported	
Collector: Jon Travis CollectDate 2/27/2012 CollectTime: 12:00:00 PM ReceiveDate 2/28/2012 9:45:00 AM Matrix: Raw Water Temp 7.1 Volume: 250 mL Analysis Start Date: Analysis Start Time: Analyst: JTruscott Analysis End: 2/29/2012 Comment FC method incorrect on COC					
120280-004	F source-C2-1%	Well Shed	E. coli	1.0	MPN/100ml
Collector: Jon Travis CollectDate 2/27/2012 CollectTime: 2:20:00 PM ReceiveDate 2/28/2012 9:45:00 AM Matrix: Raw Water Temp 7.1 Volume: 250 mL Analysis Start Date: 2/28/12 Analysis Start Time: 1118 Analyst: JTruscott Analysis End: 2/29/2012 Comment FC method incorrect on COC					

REPORT NO.: 120280
PAGE NO.: 2 of 4
CLIENT: GSI Water Solutions
ADDRESS 1020 N Center Parkway, Suite F
 Kennewick, WA 99336
CLIENT NO GSI002 **CLIENT PO:** Boise

ASSAY RESULTS:

Test: Coliform, Total & E.coli Method: SM9223

BioVir #	Sample ID	Site	Analyte	Result	Units
120280-004	F source-C2-1%	Well Shed	Test Results Meet All Requirements of NELAC	YES	
Collector: Jon Travis CollectDate 2/27/2012 CollectTime: 2:20:00 PM ReceiveDate 2/28/2012 9:45:00 AM Matrix: Raw Water Temp 7.1 Volume: 250 mL Analysis Start Date: 2/28/12 Analysis Start Time: 1118 Analyst: JTruscott Analysis End: 2/29/2012 Comment FC method incorrect on COC					

120280-004	F source-C2-1%	Well Shed	Total Coliform	Not Reported	MPN/100ml
Collector: Jon Travis CollectDate 2/27/2012 CollectTime: 2:20:00 PM ReceiveDate 2/28/2012 9:45:00 AM Matrix: Raw Water Temp 7.1 Volume: 250 mL Analysis Start Date: Analysis Start Time: Analyst: JTruscott Analysis End: 2/29/2012 Comment FC method incorrect on COC					

Test: Coliform, Total & Fecal Method: SM9221B

BioVir #	Sample ID	Site	Analyte	Result	Units
120280-003	R source-C2-1%	Filter Shed	Fecal Coliform	8	MPN/100ml
Collector: Jon Travis CollectDate 2/27/2012 CollectTime: 12:00:00 PM ReceiveDate 2/28/2012 9:45:00 AM Matrix: Raw Water Temp 7.1 Volume: 250 mL Analysis Start Date: 2/28/12 Analysis Start Time: 1113 Analyst: JTruscott Analysis End: 3/12/2012 Comment FC method incorrect on COC					

120280-003	R source-C2-1%	Filter Shed	Test Results Meet All Requirements of NELAC	YES	
Collector: Jon Travis CollectDate 2/27/2012 CollectTime: 12:00:00 PM ReceiveDate 2/28/2012 9:45:00 AM Matrix: Raw Water Temp 7.1 Volume: 250 mL Analysis Start Date: 2/28/12 Analysis Start Time: 1113 Analyst: JTruscott Analysis End: 3/12/2012 Comment FC method incorrect on COC					

REPORT NO.: 120280
PAGE NO.: 3 of 4
CLIENT: GSI Water Solutions
ADDRESS 1020 N Center Parkway, Suite F
 Kennewick, WA 99336
CLIENT NO GSI002 **CLIENT PO:** Boise

ASSAY RESULTS:

Test: Coliform, Total & Fecal Method: SM9221B

BioVir #	Sample ID	Site	Analyte	Result	Units
120280-003	R source-C2-1%	Filter Shed	Total Coliform	13	MPN/100ml
Collector: Jon Travis CollectDate 2/27/2012 CollectTime: 12:00:00 PM ReceiveDate 2/28/2012 9:45:00 AM Matrix: Raw Water Temp 7.1 Volume: 250 mL Analysis Start Date: 2/28/12 Analysis Start Time: 1113 Analyst: JTruscott Analysis End: 3/12/2012 Comment FC method incorrect on COC					
120280-004	F source-C2-1%	Well Shed	Fecal Coliform	<2	MPN/100ml
Collector: Jon Travis CollectDate 2/27/2012 CollectTime: 2:20:00 PM ReceiveDate 2/28/2012 9:45:00 AM Matrix: Raw Water Temp 7.1 Volume: 250 mL Analysis Start Date: 2/28/12 Analysis Start Time: 1113 Analyst: JTruscott Analysis End: 3/12/2012 Comment FC method incorrect on COC					
120280-004	F source-C2-1%	Well Shed	Test Results Meet All Requirements of NELAC	YES	
Collector: Jon Travis CollectDate 2/27/2012 CollectTime: 2:20:00 PM ReceiveDate 2/28/2012 9:45:00 AM Matrix: Raw Water Temp 7.1 Volume: 250 mL Analysis Start Date: 2/28/12 Analysis Start Time: 1113 Analyst: JTruscott Analysis End: 3/12/2012 Comment FC method incorrect on COC					
120280-004	F source-C2-1%	Well Shed	Total Coliform	2	MPN/100ml
Collector: Jon Travis CollectDate 2/27/2012 CollectTime: 2:20:00 PM ReceiveDate 2/28/2012 9:45:00 AM Matrix: Raw Water Temp 7.1 Volume: 250 mL Analysis Start Date: 2/28/12 Analysis Start Time: 1113 Analyst: JTruscott Analysis End: 3/12/2012 Comment FC method incorrect on COC					

Test: Enteric Virus Method: SM9510 - Modified

BioVir #	Sample ID	Site	Analyte	Result	Units
----------	-----------	------	---------	--------	-------



685 Stone Road, Unit 6 • Benicia, CA 94510 • (707) 747-5906 • 1-800-GIARDIA • FAX (707) 747-1751 • WEB: www.biovir.com

REPORT NO.: 120710
PAGE NO.: 1 of 5
CLIENT: GSI Water Solutions
ADDRESS 1020 N Center Parkway, Suite F
Kennewick, WA 99336
CLIENT NO GSI002 **CLIENT PO:** 222.004.008

ASSAY RESULTS:

Test: Coliform, Total & E.coli Method: SM9223

BioVir #	Sample ID	Site	Analyte	Result	Units
120710-001	C2-Rsource-100	Intake Shed	E. coli	6.3	MPN/100ml
Collector: Jon Travis CollectDate 5/22/2012 CollectTime: 12:30:00 PM					
ReceiveDate 5/23/2012 8:45:00 AM Matrix: Raw Water Temp 5.0					
Volume: 250 mL Analysis Start Date: 5/23/12 Analysis Start Time: 1159					
Analyst: JTruscott Analysis End: 5/29/2012					
Comment Sample date from label, not listed on COC. Client contacted to verify sample time. Per Jon Travis sample time is 12:30.					
120710-001	C2-Rsource-100	Intake Shed	Test Results Meet All Requirements of NELAC	YES	
Collector: Jon Travis CollectDate 5/22/2012 CollectTime: 12:30:00 PM					
ReceiveDate 5/23/2012 8:45:00 AM Matrix: Raw Water Temp 5.0					
Volume: 250 mL Analysis Start Date: 5/23/12 Analysis Start Time: 1159					
Analyst: JTruscott Analysis End: 5/29/2012					
Comment Sample date from label, not listed on COC. Client contacted to verify sample time. Per Jon Travis sample time is 12:30.					
120710-001	C2-Rsource-100	Intake Shed	Total Coliform	Not Reported	MPN/100ml
Collector: Jon Travis CollectDate 5/22/2012 CollectTime: 12:30:00 PM					
ReceiveDate 5/23/2012 8:45:00 AM Matrix: Raw Water Temp 5.0					
Volume: 250 mL Analysis Start Date: 5/23/12 Analysis Start Time: 1159					
Analyst: JTruscott Analysis End: 5/29/2012					
Comment Sample date from label, not listed on COC. Client contacted to verify sample time. Per Jon Travis sample time is 12:30.					

REPORT NO.: 120710
PAGE NO.: 2 of 5
CLIENT: GSI Water Solutions
ADDRESS 1020 N Center Parkway, Suite F
 Kennewick, WA 99336
CLIENT NO GSI002 **CLIENT PO:** 222.004.008

ASSAY RESULTS:

Test: Coliform, Total & E.coli Method: SM9223

BioVir #	Sample ID	Site	Analyte	Result	Units
120710-002	C2-Fsource-100	Injection Shed	E. coli	1.0	MPN/100ml
Collector: Jon Travis CollectDate 5/22/2012 CollectTime: 3:00:00 PM ReceiveDate 5/23/2012 8:45:00 AM Matrix: Raw Water Temp 6.4 Volume: 250 mL Analysis Start Date: 5/23/12 Analysis Start Time: 1159 Analyst: JTruscott Analysis End: 5/29/2012 Comment Sample date from label, not listed on COC.					
120710-002	C2-Fsource-100	Injection Shed	Test Results Meet All Requirements of NELAC	YES	
Collector: Jon Travis CollectDate 5/22/2012 CollectTime: 3:00:00 PM ReceiveDate 5/23/2012 8:45:00 AM Matrix: Raw Water Temp 6.4 Volume: 250 mL Analysis Start Date: 5/23/12 Analysis Start Time: 1159 Analyst: JTruscott Analysis End: 5/29/2012 Comment Sample date from label, not listed on COC.					
120710-002	C2-Fsource-100	Injection Shed	Total Coliform	Not Reported	MPN/100ml
Collector: Jon Travis CollectDate 5/22/2012 CollectTime: 3:00:00 PM ReceiveDate 5/23/2012 8:45:00 AM Matrix: Raw Water Temp 6.4 Volume: 250 mL Analysis Start Date: 5/23/12 Analysis Start Time: 1159 Analyst: JTruscott Analysis End: 5/29/2012 Comment Sample date from label, not listed on COC.					

Test: Coliform, Total & Fecal Method: SM9221B

BioVir #	Sample ID	Site	Analyte	Result	Units
120710-001	C2-Rsource-100	Intake Shed	Fecal Coliform	4	MPN/100ml
Collector: Jon Travis CollectDate 5/22/2012 CollectTime: 12:30:00 PM ReceiveDate 5/23/2012 8:45:00 AM Matrix: Raw Water Temp 5.0 Volume: 250 mL Analysis Start Date: 5/23/12 Analysis Start Time: 1141 Analyst: MPeaslee Analysis End: 5/27/2012 Comment Sample date from label, not listed on COC. Client contacted to verify sample time. Per Jon Travis sample time is 12:30.					

REPORT NO.: 120710
PAGE NO.: 3 of 5
CLIENT: GSI Water Solutions
ADDRESS 1020 N Center Parkway, Suite F
 Kennewick, WA 99336
CLIENT NO GSI002 **CLIENT PO:** 222.004.008

ASSAY RESULTS:

Test: Coliform, Total & Fecal Method: SM9221B

BioVir #	Sample ID	Site	Analyte	Result	Units
120710-001	C2-Rsource-100	Intake Shed	Test Results Meet All Requirements of NELAC	YES	
Collector: Jon Travis CollectDate 5/22/2012 CollectTime: 12:30:00 PM ReceiveDate 5/23/2012 8:45:00 AM Matrix: Raw Water Temp 5.0 Volume: 250 mL Analysis Start Date: 5/23/12 Analysis Start Time: 1141 Analyst: MPeaslee Analysis End: 5/27/2012 Comment Sample date from label, not listed on COC. Client contacted to verify sample time. Per Jon Travis sample time is 12:30.					
120710-001	C2-Rsource-100	Intake Shed	Total Coliform	50	MPN/100ml
Collector: Jon Travis CollectDate 5/22/2012 CollectTime: 12:30:00 PM ReceiveDate 5/23/2012 8:45:00 AM Matrix: Raw Water Temp 5.0 Volume: 250 mL Analysis Start Date: 5/23/12 Analysis Start Time: 1141 Analyst: MPeaslee Analysis End: 5/27/2012 Comment Sample date from label, not listed on COC. Client contacted to verify sample time. Per Jon Travis sample time is 12:30.					
120710-002	C2-Fsource-100	Injection Shed	Fecal Coliform	7	MPN/100ml
Collector: Jon Travis CollectDate 5/22/2012 CollectTime: 3:00:00 PM ReceiveDate 5/23/2012 8:45:00 AM Matrix: Raw Water Temp 6.4 Volume: 250 mL Analysis Start Date: 5/23/12 Analysis Start Time: 1141 Analyst: MPeaslee Analysis End: 5/27/2012 Comment Sample date from label, not listed on COC.					
120710-002	C2-Fsource-100	Injection Shed	Test Results Meet All Requirements of NELAC	YES	
Collector: Jon Travis CollectDate 5/22/2012 CollectTime: 3:00:00 PM ReceiveDate 5/23/2012 8:45:00 AM Matrix: Raw Water Temp 6.4 Volume: 250 mL Analysis Start Date: 5/23/12 Analysis Start Time: 1141 Analyst: MPeaslee Analysis End: 5/27/2012 Comment Sample date from label, not listed on COC.					

REPORT NO.: 120710
PAGE NO.: 4 of 5
CLIENT: GSI Water Solutions
ADDRESS 1020 N Center Parkway, Suite F
 Kennewick, WA 99336
CLIENT NO GSI002 **CLIENT PO:** 222.004.008

ASSAY RESULTS:

Test: Coliform, Total & Fecal Method: SM9221B

BioVir #	Sample ID	Site	Analyte	Result	Units
120710-002	C2-Fsource-100	Injection Shed	Total Coliform	17	MPN/100ml
Collector: Jon Travis		CollectDate 5/22/2012	CollectTime: 3:00:00 PM		
ReceiveDate 5/23/2012 8:45:00 AM		Matrix: Raw Water	Temp 6.4		
Volume: 250 mL		Analysis Start Date: 5/23/12	Analysis Start Time: 1141		
Analyst: MPeaslee		Analysis End: 5/27/2012			
Comment Sample date from label, not listed on COC.					

Test: Enteric Virus Method: SM9510 - Modified

BioVir #	Sample ID	Site	Analyte	Result	Units
120710-003	C2-Fsource-100	Well Shed	Enteric Virus	< 0.01	pfu/L
Collector: Jon Travis		CollectDate 5/22/2012	CollectTime: 3:00:00 PM		
ReceiveDate 5/23/2012 8:45:00 AM		Matrix: Raw Water	Temp 6.4		
Volume: 218 L		Analysis Start Date: 5/23/12	Analysis Start Time: 1140		
Analyst: ValentinaL		Analysis End: 6/8/2012			
Comment					
120710-004	C2-Rsource-100	Intake Shed	Enteric Virus	< 0.01	pfu/L
Collector: Jon Travis		CollectDate 5/22/2012	CollectTime: 12:30:00 PM		
ReceiveDate 5/23/2012 8:45:00 AM		Matrix: Raw Water	Temp 5.0		
Volume: 217.6 L		Analysis Start Date: 5/23/12	Analysis Start Time: 1205		
Analyst: ValentinaL		Analysis End: 6/8/2012			
Comment					

REPORT NO.: 120710
PAGE NO.: 5 of 5
CLIENT: GSI Water Solutions
ADDRESS 1020 N Center Parkway, Suite F
Kennewick, WA 99336
CLIENT NO GSI002 **CLIENT PO:** 222.004.008

ASSAY RESULTS:

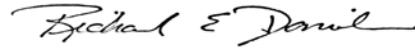
SAMPLE EVALUATION PERFORMANCE CRITERIA: The precise rates of recovery of organisms from environmental samples cannot be determined. BioVir Laboratories has analyzed your sample(s) in accordance with the method described with each analyte above, however, due to inherent limitations of these methods organisms may avoid detection. For additional information regarding the limitations of the method(s) referred to above please call us at 1-800-GIARDIA.

COMPANY IS NOT AN INSURER: BioVir Laboratories is not an insurer or guarantor of the quality and/or purity of water, wastewater, biosolid or other material from which the sample was taken. BioVir offers no express or implied warranties whatsoever concerning the quality or purity of any water, wastewater, biosolid or other material which is ultimately consumed, distributed, applied or disposed.

MAINTENANCE OF RECORDS: BioVir Laboratories, Inc. shall maintain records pertaining to the historical reconstruction of client's data for a minimum of five years from the date of issuance of the final report. Records may be destroyed after that date unless a written client's request for records transfer is received by BioVir which requests otherwise. Records transfer or storage charges may apply after the 5 year period. **THIS REPORT SHALL NOT BE REPRODUCED, EXCEPT IN FULL, WITHOUT THE WRITTEN APPROVAL OF BIOVIR LABORATORIES, INC.**

6/19/2012

Date:



Signature

Quality
Checked



**TOTAL CULTURABLE VIRUS
ENTERIC VIRUS ASSAY
SAMPLE DATA SHEET**

LAB USE ONLY:

LIMS #: 549-1
 Client #: GST002
 Date Rec'd: 4/19/12
 Time Rec'd: 9:40
 Temp Rec'd: 9.1°C

(Please fill out completely and return white copy to BioVir with the sample.)
 Phone: 1-800-GIARDIA Fax: 707-747-1751 WEB: www.biovir.com

Note: Please print clearly using waterproof ink

NAME AND ADDRESS OF WATER COMPANY OR UTILITY: <u>GSI</u> <u>8019 W Quinault Ave Ste 201</u> <u>Kennebick WA 99836</u>		SAMPLE DATE: <u>4/18/12</u>
NAME OF SAMPLER: <u>Jon Travis</u>		SAMPLE TIME: <u>1240</u>
SAMPLE SOURCE: <u>Raw river water</u>	pH: <u>7.93</u>	Water Temp (C): <u>8.07</u>
SAMPLE LOCATION: <u>Intake shed</u>	pH (adjusted): <u>---</u>	TREATMENT CHARACTERISTICS (Check One): Raw Drinking Water <input checked="" type="checkbox"/> Treated Drinking Water <input type="checkbox"/> Wastewater <input type="checkbox"/> Filtered Wastewater <input type="checkbox"/>
SAMPLE VOLUME: (Meter # <u>97901136</u>) Meter Start: <u>20781.0</u> Meter Stop: <u>20842.0</u>	DECHLORINATION/ DISINFECTANT NEUTRALIZATION (If Treated Water): Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Total Volume: <u>61</u> Gallons _____ Liters	TURBIDITY (NTU): Turbidity Begin: <u>2.03</u> Turbidity End: <u>3.03</u>	

Client ID: <u>C2-RSource-50%</u>	P.O. #: <u>Boise</u>
----------------------------------	----------------------

ASSAY REQUESTED: Please check one of the following	
<input type="checkbox"/>	Total Culturable Virus Assay, MPN - (EPA, ICR 600/F)
<input type="checkbox"/>	Pre Filter Cartridge - M19R10A
<input checked="" type="checkbox"/>	Enteric Virus Assay, PFU - (SM 18th; 9510 - BioVir M)

OK
230.9 L
(flushed 20 Gal 1st)

COMMENTS:

RELINQUISHED BY: <u>[Signature]</u>	DATE / TIME: <u>4/18/12 16:30</u>
RECEIVED BY: <u>Jon</u>	DATE / TIME: <u>4/19/12 9:40</u>

SHIPPING ADDRESS: BIOVIR LABORATORIES, INC., 685 STONE ROAD, UNIT 6, BENICIA, CALIFORNIA 94510
 WHITE = BIOVIR COPY YELLOW = CUSTOMER COPY



**TOTAL CULTURABLE VIRUS
ENTERIC VIRUS ASSAY
SAMPLE DATA SHEET**

(Please fill out completely and return white copy to BioVir with the sample.)
Phone: 1-800-GIARDIA Fax: 707-747-1751 WEB: www.biovir.com

LAB USE ONLY:	
LIMS #:	549-2
Client #:	GSI002
Date Rec'd:	4/19/12
Time Rec'd:	9:40
Temp Rec'd:	9.0c

Note: Please print clearly using waterproof ink

NAME AND ADDRESS OF WATER COMPANY OR UTILITY:	SAMPLE DATE:	4/18/12	
	SAMPLE TIME:	1400	
NAME OF SAMPLER:	pH:	7.98	Water Temp (C):
Travis Hammond	pH (adjusted):		11.02
SAMPLE SOURCE:	TREATMENT CHARACTERISTICS (Check One):		
Raw Injection	Raw Drinking Water	<input checked="" type="checkbox"/>	
	Treated Drinking Water	<input type="checkbox"/>	
SAMPLE LOCATION:	Wastewater	<input type="checkbox"/>	
Injection SHED	Filtered Wastewater	<input type="checkbox"/>	
SAMPLE VOLUME: (Meter # 97301470 9790136)	DECHLORINATION/ DISINFECTANT NEUTRALIZATION (If Treated Water):		
Meter Start: 10176.5 20842.0	Meter Stop:	20920.0	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Total Volume: 57 Gallons _____ Liters	TURBIDITY (NTU):		
	Turbidity Begin:	3.03	Turbidity End: 3.03

Client ID: C2-Fsource-50%	P.O. #: Boise
---------------------------	---------------

ASSAY REQUESTED: Please check one of the following	
<input type="checkbox"/>	Total Culturable Virus Assay, MPN - (EPA, ICR 600/R-95/178)
<input type="checkbox"/>	Pre Filter Cartridge - M19R10A
<input checked="" type="checkbox"/>	Enteric Virus Assay, PFU - (SM 18th; 9510 - BioVir Modification)

COMMENTS:

RELINQUISHED BY: Travis Hammond	DATE / TIME: 4/18/12 1630
RECEIVED BY: Jmc	DATE / TIME: 4/19/12 9:40

SHIPPING ADDRESS: BIOVIR LABORATORIES, INC., 685 STONE ROAD, UNIT 6, BENICIA, CALIFORNIA 94510
WHITE = BIOVIR COPY YELLOW = CUSTOMER COPY



SHIPPING ADDRESS: BIOVIR LABORATORIES, INC., 685 STONE ROAD, UNIT 6, BENICIA, CALIFORNIA 94510
 1-800-GIARDIA (442-7342), FAX: 707-747-1751
 Business Hours: Monday through Friday - 8:30 AM to 5:00 PM

SAMPLE DATA SHEET
 GST002 549-3-4
 * Required Fields 9.10c

*CLIENT/COMPANY NAME: **GSI**
 8019 W Quinault Ave Suite 201
 Kennewick WA 99336
 TELEPHONE# 509 979 0332 FAX#
 *NAME OF SAMPLER: (Please print) **Jon Travis**

*DATE OF SAMPLING: **4/18/12**
 PURCHASE ORDER/SUBCONTRACT ORDER #: **Boise**

*PLEASE CHECK APPROPRIATE BOX FOR MATRIX OR FILL IN "OTHER".
 MATRIX: Drinking Water Wastewater Biosolid OTHER: _____
 Regulatory Drinking Water Sample(s) Yes No
 CA DHS Contact Person and Phone Number (if regulatory):

*SAMPLE ID	*TIME	VOLUME	TREATMENT	SAMPLING LOCATION	*ANALYSIS REQUESTED
3 C2-Resource 50%	1306	250mL	Ø	intake stud	SM 9221 Total Coliform Fecal Coliform
4 C2-Source - 50%	1400	250mL	Ø	injection stud	SM 9221 Total Coliform Fecal Coliform SM 9223 E. Coli

*RELINQUISHED BY (SIGNED) Jon Travis	*DATE/TIME 4/18/12 1630	RECEIVED BY (SIGNED) Jmc	DATE/TIME 4/19/12 9:40
--	-----------------------------------	------------------------------------	----------------------------------



685 Stone Road, Unit 6 • Benicia, CA 94510 • (707) 747-5906 • 1-800-GIARDIA • FAX (707) 747-1751 • WEB: www.biovir.com

REPORT NO.: 120549
PAGE NO.: 1 of 4
CLIENT: GSI Water Solutions
ADDRESS 1020 N Center Parkway, Suite F
Kennewick, WA 99336
CLIENT NO GSI002 **CLIENT PO:** Boise

ASSAY RESULTS:

Test: Coliform, Total & E.coli **Method:**

BioVir #	Sample ID	Site	Analyte	Result	Units
120549-003	C 2-R Source 50%		E. coli	<1.0	MPN/100ml
Collector: Jon Travis CollectDate 4/18/2012 CollectTime: 1:06:00 PM ReceiveDate 4/19/2012 9:40:00 AM Matrix: Drinking Water Temp 9.1 Volume: 250 mL Analysis Start Date: 4/19/12 Analysis Start Time: 1315 Analyst: JTruscott Analysis End: 4/23/2012 Comment					
120549-003	C 2-R Source 50%		Test Results Meet All Requirements of NELAC	YES	
Collector: Jon Travis CollectDate 4/18/2012 CollectTime: 1:06:00 PM ReceiveDate 4/19/2012 9:40:00 AM Matrix: Drinking Water Temp 9.1 Volume: 250 mL Analysis Start Date: 4/19/12 Analysis Start Time: 1315 Analyst: JTruscott Analysis End: 4/23/2012 Comment					
120549-003	C 2-R Source 50%		Total Coliform	Not Reported	MPN/100ml
Collector: Jon Travis CollectDate 4/18/2012 CollectTime: 1:06:00 PM ReceiveDate 4/19/2012 9:40:00 AM Matrix: Drinking Water Temp 9.1 Volume: 250 mL Analysis Start Date: Analysis Start Time: Analyst: JTruscott Analysis End: 4/23/2012 Comment					
120549-004	C 2-F Source-50%		E. coli	<1.0	MPN/100ml
Collector: Jon Travis CollectDate 4/18/2012 CollectTime: 2:00:00 PM ReceiveDate 4/19/2012 9:40:00 AM Matrix: Drinking Water Temp 9.1 Volume: 250 mL Analysis Start Date: 4/19/12 Analysis Start Time: 1315 Analyst: JTruscott Analysis End: 4/23/2012 Comment					

REPORT NO.: 120549
PAGE NO.: 2 of 4
CLIENT: GSI Water Solutions
ADDRESS 1020 N Center Parkway, Suite F
 Kennewick, WA 99336
CLIENT NO GSI002 **CLIENT PO:** Boise

ASSAY RESULTS:

Test: Coliform, Total & E.coli Method:

BioVir #	Sample ID	Site	Analyte	Result	Units
120549-004	C 2-F Source-50%		Test Results Meet All Requirements of NELAC	YES	
Collector: Jon Travis CollectDate 4/18/2012 CollectTime: 2:00:00 PM ReceiveDate 4/19/2012 9:40:00 AM Matrix: Drinking Water Temp 9.1 Volume: 250 mL Analysis Start Date: 4/19/12 Analysis Start Time: 1315 Analyst: JTruscott Analysis End: 4/23/2012 Comment					

120549-004	C 2-F Source-50%		Total Coliform	Not Reported	MPN/100ml
Collector: Jon Travis CollectDate 4/18/2012 CollectTime: 2:00:00 PM ReceiveDate 4/19/2012 9:40:00 AM Matrix: Drinking Water Temp 9.1 Volume: 250 mL Analysis Start Date: Analysis Start Time: Analyst: JTruscott Analysis End: 4/23/2012 Comment					

Test: Coliform, Total & Fecal Method: SM9221B

BioVir #	Sample ID	Site	Analyte	Result	Units
120549-003	C 2-R Source 50%		Fecal Coliform	3.6	MPN/100ml
Collector: Jon Travis CollectDate 4/18/2012 CollectTime: 1:06:00 PM ReceiveDate 4/19/2012 9:40:00 AM Matrix: Drinking Water Temp 9.1 Volume: 250 mL Analysis Start Date: 4/19/12 Analysis Start Time: 1325 Analyst: JTruscott Analysis End: 4/23/2012 Comment					

120549-003	C 2-R Source 50%		Test Results Meet All Requirements of NELAC	YES	
Collector: Jon Travis CollectDate 4/18/2012 CollectTime: 1:06:00 PM ReceiveDate 4/19/2012 9:40:00 AM Matrix: Drinking Water Temp 9.1 Volume: 250 mL Analysis Start Date: 4/19/12 Analysis Start Time: 1325 Analyst: JTruscott Analysis End: 4/23/2012 Comment					

REPORT NO.: 120549
PAGE NO.: 3 of 4
CLIENT: GSI Water Solutions
ADDRESS 1020 N Center Parkway, Suite F
 Kennewick, WA 99336
CLIENT NO GSI002 **CLIENT PO:** Boise

ASSAY RESULTS:

Test: Coliform, Total & Fecal Method: SM9221B

BioVir #	Sample ID	Site	Analyte	Result	Units
120549-003	C 2-R Source 50%		Total Coliform	6.9	MPN/100ml
Collector: Jon Travis CollectDate 4/18/2012 CollectTime: 1:06:00 PM ReceiveDate 4/19/2012 9:40:00 AM Matrix: Drinking Water Temp 9.1 Volume: 250 mL Analysis Start Date: 4/19/12 Analysis Start Time: 1325 Analyst: JTruscott Analysis End: 4/23/2012 Comment					
120549-004	C 2-F Source-50%		Fecal Coliform	<1.1	MPN/100ml
Collector: Jon Travis CollectDate 4/18/2012 CollectTime: 2:00:00 PM ReceiveDate 4/19/2012 9:40:00 AM Matrix: Drinking Water Temp 9.1 Volume: 250 mL Analysis Start Date: 4/19/12 Analysis Start Time: 1325 Analyst: JTruscott Analysis End: 4/23/2012 Comment					
120549-004	C 2-F Source-50%		Test Results Meet All Requirements of NELAC	YES	
Collector: Jon Travis CollectDate 4/18/2012 CollectTime: 2:00:00 PM ReceiveDate 4/19/2012 9:40:00 AM Matrix: Drinking Water Temp 9.1 Volume: 250 mL Analysis Start Date: 4/19/12 Analysis Start Time: 1325 Analyst: JTruscott Analysis End: 4/23/2012 Comment					
120549-004	C 2-F Source-50%		Total Coliform	<1.1	MPN/100ml
Collector: Jon Travis CollectDate 4/18/2012 CollectTime: 2:00:00 PM ReceiveDate 4/19/2012 9:40:00 AM Matrix: Drinking Water Temp 9.1 Volume: 250 mL Analysis Start Date: 4/19/12 Analysis Start Time: 1325 Analyst: JTruscott Analysis End: 4/23/2012 Comment					

Test: Enteric Virus Method: SM9510 - Modified

BioVir #	Sample ID	Site	Analyte	Result	Units
----------	-----------	------	---------	--------	-------

REPORT NO.: 120549
PAGE NO.: 4 of 4
CLIENT: GSI Water Solutions
ADDRESS 1020 N Center Parkway, Suite F
 Kennewick, WA 99336
CLIENT NO GSI002 **CLIENT PO:** Boise

ASSAY RESULTS:

Test: Enteric Virus Method: SM9510 - Modified

BioVir #	Sample ID	Site	Analyte	Result	Units
120549-001	C2-Rsource-50%	Raw River Water	Enteric Virus	< 0.01	pfu/L
Collector: Jon Travis CollectDate 4/18/2012 CollectTime: 12:40:00 PM ReceiveDate 4/19/2012 9:40:00 AM Matrix: Drinking Water Temp 9.1 Volume: 230.9 L Analysis Start Date: 4/19/12 Analysis Start Time: 1050 Analyst: ValentinaL Analysis End: 5/3/2012 Comment					
120549-002	C2-Fsource-50%	Raw Injection	Enteric Virus	< 0.01	pfu/L
Collector: Travis Hammond CollectDate 4/18/2012 CollectTime: 2:00:00 PM ReceiveDate 4/19/2012 9:40:00 AM Matrix: Drinking Water Temp 9.1 Volume: 215.8 L Analysis Start Date: 4/19/12 Analysis Start Time: 1120 Analyst: ValentinaL Analysis End: 5/3/2012 Comment Client used same meter as sample #1; according to readings, calculations, volume is inaccurate by 21 gals or 80 L. Client contacted to verify. Per Jon Travis, no longer has copy of readings but verified 57 gallons.					

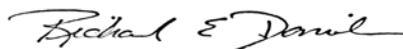
SAMPLE EVALUATION PERFORMANCE CRITERIA: The precise rates of recovery of organisms from environmental samples cannot be determined. BioVir Laboratories has analyzed your sample(s) in accordance with the method described with each analyte above, however, due to inherent limitations of these methods organisms may avoid detection. For additional information regarding the limitations of the method(s) referred to above please call us at 1-800-GIARDIA.

COMPANY IS NOT AN INSURER: BioVir Laboratories is not an insurer or guarantor of the quality and/or purity of water, wastewater, biosolid or other material from which the sample was taken. BioVir offers no express or implied warranties whatsoever concerning the quality or purity of any water, wastewater, biosolid or other material which is ultimately consumed, distributed, applied or disposed.

MAINTENANCE OF RECORDS: BioVir Laboratories, Inc. shall maintain records pertaining to the historical reconstruction of client's data for a minimum of five years from the date of issuance of the final report. Records may be destroyed after that date unless a written client's request for records transfer is received by BioVir which requests otherwise. Records transfer or storage charges may apply after the 5 year period. THIS REPORT SHALL NOT BE REPRODUCED, EXCEPT IN FULL, WITHOUT THE WRITTEN APPROVAL OF BIOVIR LABORATORIES, INC.

5/11/2012

Date:



Signature

Quality Checked

Appendix C

Supplemental Thermal Information

Attachment C - Supplemental Information

This section provides greater detail regarding the properties of water that likely influenced the water level measurements and the observed performance of the ASR-5 well during aquifer testing.

Density of Water and Temperature

Table 3.1 shows scientifically tested and accepted measurements of the density of water at various temperatures. Whole degrees are listed down the left hand side of the table, while tenths of a degree are listed across the top. To find the density of water at 5.4 °C, you would first find the whole degree by searching down the left hand column until you reach '5'. Then you would slide across that row until you reach the column labeled '0.4'. For example, the density of water at 5.4 °C is 0.999957 g/mL.

Density of Water and Total Dissolved Solids (TDS)

Values for the density of water with variations in temperature and TDS concentrations are shown in Table 3.2. Calculating density variability due to total dissolved solids (TDS) can be estimated a number of methods, but we used calculated estimates by taking the density of water at the temperature of interest and adding the additional weight of the TDS concentration for example Cycle 1 source water:

Pure Water at 4.5 celcius = . 0.999972 g/mL (from Table 3.1 above)

TDS = 100 ppm or mg/L = 1.0×10^{-4} g/ml

Source water density @ 4.5 C and 100 ppm = 1.000072 g/mL

Groundwater in the aquifer (26.5 C and 250 ppm) would be approximately 0.996899 g/ml or approximately 0.003173 g/mL less than the colder, denser source water.

For a pressure transducer installed at 550 feet in the ASR well (i.e. 520 feet or approximately 20,668 liters of standing water) this would represent 65.5 Kg or 29.75 lbs difference in the weight of water above the transducer. This represents approximately 0.34 feet of difference between a column of source water and a column of groundwater at equivalent hydraulic heads. The standing equivalent of source water is lower than native groundwater in the source ASR well. Not coincidentally, the water level was observed to decrease during the start of injection at ASR-5 by approximately 0.5 feet, within the accuracy and precision of the transducer.

Viscosity of Water with Temperature

Dynamic (or absolute viscosity) and kinematic viscosity of water are both dependent on temperature and can effect aquifer and well hydraulic repsonse. Table 3-3 shows both standard international (SI) units and british gravitational system units (BG).

Table 3-1. Density of Pure Water (g/mL) vs. Temperature (°C)
 (from Handbook of Chemistry and Physics, 53rd Edition)

Temperature (Celcius degrees)	Temperature in 0.1 Celcius degrees						
	0	0.1	0.2	0.3	0.4	0.5	0.6
0	0.999841	0.999847	0.999854	0.99986	0.999866	0.999872	0.999878
1	0.9999	0.999905	0.999909	0.999914	0.999918	0.999923	0.999927
2	0.999941	0.999944	0.999947	0.99995	0.999953	0.999955	0.999958
3	0.999965	0.999967	0.999968	0.999969	0.99997	0.999971	0.999972
4	0.999973	0.999973	0.999973	0.999972	0.999972	0.999972	0.99997
5	0.999965	0.999963	0.999961	0.999959	0.999957	0.999955	0.999952
6	0.999941	0.999938	0.999935	0.999931	0.999927	0.999924	0.99992
7	0.999902	0.999898	0.999893	0.999888	0.999883	0.999877	0.999872
8	0.999849	0.999843	0.999837	0.99983	0.999824	0.999817	0.99981
9	0.999781	0.999774	0.999766	0.999758	0.999751	0.999742	0.999734
10	0.9997	0.999691	0.999682	0.999673	0.999664	0.999654	0.999645
11	0.999605	0.999595	0.999585	0.999574	0.999564	0.999553	0.999542
12	0.999498	0.999486	0.999475	0.999463	0.999451	0.999439	0.999427
13	0.999377	0.999364	0.999352	0.999339	0.999326	0.999312	0.999299
14	0.999244	0.99923	0.999216	0.999202	0.999188	0.999173	0.999159
15	0.999099	0.999084	0.999069	0.999054	0.999038	0.999023	0.999007
16	0.998943	0.998926	0.99891	0.998893	0.998877	0.99886	0.998843
17	0.998774	0.998757	0.998739	0.998722	0.998704	0.998686	0.998668
18	0.998595	0.998576	0.998558	0.998539	0.99852	0.998501	0.998482
19	0.998405	0.998385	0.998365	0.998345	0.998325	0.998305	0.998285
20	0.998203	0.998183	0.998162	0.998141	0.99812	0.998099	0.998078
21	0.997992	0.99797	0.997948	0.997926	0.997904	0.997882	0.99786
22	0.99777	0.997747	0.997724	0.997701	0.997678	0.997655	0.997632
23	0.997538	0.997514	0.99749	0.997466	0.997442	0.997418	0.997394
24	0.997296	0.997271	0.997246	0.997221	0.997196	0.997171	0.997146
25	0.997044	0.997018	0.996992	0.996967	0.996941	0.996914	0.996888
26	0.996783	0.996756	0.996729	0.996703	0.996676	0.996649	0.996621
27	0.996512	0.996485	0.996457	0.996429	0.996401	0.996373	0.996345
28	0.996232	0.996204	0.996175	0.996147	0.996118	0.996089	0.99606
29	0.995944	0.995914	0.995885	0.995855	0.995826	0.995796	0.995766
30	0.995646	0.995616	0.995586	0.995555	0.995525	0.995494	0.995464

Notes:

Density values in grams per milliliter (g/mL)
 Temperature in degrees Celcius

0.7	0.8	0.9
0.999884	0.999889	0.999895
0.99993	0.999934	0.999938
0.99996	0.999962	0.999964
0.999972	0.999973	0.999973
0.999969	0.999968	0.999966
0.99995	0.999947	0.999944
0.999916	0.999911	0.999907
0.999866	0.999861	0.999855
0.999803	0.999796	0.999789
0.999726	0.999717	0.999709
0.999635	0.999625	0.999615
0.999531	0.99952	0.999509
0.999415	0.999402	0.99939
0.999285	0.999272	0.999258
0.999144	0.999129	0.999114
0.998991	0.998975	0.998959
0.998826	0.998809	0.998792
0.99865	0.998632	0.998613
0.998463	0.998444	0.998424
0.998265	0.998244	0.998224
0.998056	0.998035	0.998013
0.997837	0.997815	0.997792
0.997608	0.997585	0.997561
0.997369	0.997345	0.99732
0.99712	0.997095	0.997069
0.996862	0.996836	0.996809
0.996594	0.996567	0.99654
0.996317	0.996289	0.996261
0.996031	0.996002	0.995973
0.995736	0.995706	0.995676
0.995433	0.995402	0.995371

Table 3.2. Water Density (in grams/liter)at Various Total Dissolved Solids and

Temperature Celcius	Pure Water	Total Dissolved Solids Ccntration (in ppm)			
		100	125	150	200
4.5	0.999972	1.000072	1.000097	1.000122	1.000172
5.5	0.999955	1.000055	1.00008	1.000105	1.000155
6.5	0.999924	1.000024	1.000049	1.000074	1.000124
7.5	0.999877	0.999977	1.000002	1.000027	1.000077
8.5	0.999817	0.999917	0.999942	0.999967	1.000017
9.5	0.999742	0.999842	0.999867	0.999892	0.999942
10.5	0.999654	0.999754	0.999779	0.999804	0.999854
11.5	0.999553	0.999653	0.999678	0.999703	0.999753
12.5	0.999439	0.999539	0.999564	0.999589	0.999639
13.5	0.999312	0.999412	0.999437	0.999462	0.999512
14.5	0.999173	0.999273	0.999298	0.999323	0.999373
15.5	0.999023	0.999123	0.999148	0.999173	0.999223
16.5	0.99886	0.99896	0.998985	0.99901	0.99906
17.5	0.998686	0.998786	0.998811	0.998836	0.998886
18.5	0.998501	0.998601	0.998626	0.998651	0.998701
19.5	0.998305	0.998405	0.99843	0.998455	0.998505
20.5	0.998099	0.998199	0.998224	0.998249	0.998299
21.5	0.997882	0.997982	0.998007	0.998032	0.998082
22.5	0.997655	0.997755	0.99778	0.997805	0.997855
23.5	0.997418	0.997518	0.997543	0.997568	0.997618
24.5	0.997171	0.997271	0.997296	0.997321	0.997371
25.5	0.996914	0.997014	0.997039	0.997064	0.997114
26.5	0.996649	0.996749	0.996774	0.996799	0.996849

Notes:

Temperatures

)
250
1.000222
1.000205
1.000174
1.000127
1.000067
0.999992
0.999904
0.999803
0.999689
0.999562
0.999423
0.999273
0.99911
0.998936
0.998751
0.998555
0.998349
0.998132
0.997905
0.997668
0.997421
0.997164
0.996899

Table 3.3. Dynamic or Absolute Viscosity of Water at Various Temperatures

British Gravitational Units	
Temperature (Fahrenheit)	Dynamic Viscosity (lb _f s/ft ²) × 10 ⁻⁵
32	3.732
40	3.228
50	2.73
60	2.344
70	2.034
80	1.791
90	1.5
100	1.423

Standard International Units	
Temperature (Celsius)	Dynamic Viscosity (N s/m ²) × 10 ⁻⁶
0	1.787
5	1.519
10	1.307
20	1.002
30	0.798
40	0.653
50	0.547
60	0.467
70	0.404
80	0.355
90	0.315
100	0.282

Notes:

1 Newton s/m² = 1 Pascal s = 10 poise = 1,000 milliPa s

1 m²/s = 1 × 10⁴ cm²/s = 1 × 10⁴ stokes = 1 × 10⁶ centistokes