Project Completion Report for Shallow Aquifer Recharge Testing at the Hall-Wentland Site, Umatilla County, Oregon and Walla Walla County, Washington

Prepared for:

Walla Walla County Watershed Planning Department,
Washington Department of Ecology,
Walla Walla River Irrigation District,
and
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GSI Water Solutions, Inc.

1020 N. Center Pkwy, Suite F Kennewick, WA 99336 P: 509.735.7135 F: 509.735.7067 info@gsiwatersolutions.com www.gsiwatersolutions.com

Summary

This report presents the results of the second season of shallow aquifer recharge (SAR) testing at the Hall-Wentland Site which began on December 22, 2006 and ended on April 15, 2007. Testing at the Site is permitted under a Limited License granted by the Oregon Water Resources Department to Walla Walla River Irrigation District. SAR testing utilized water in the East Little Walla Walla River, a portion of which was diverted towards the Site via Wells Ditch. As in the first season, water was not diverted from the Walla Walla River for the project. An estimated 190 to 250 acre-feet of water was diverted from Wells Ditch towards the Site. Most of this water was delivered to the Site in the last 6 weeks of the test season. Increased flow to the Site followed reconfiguration of the diversion weir that resulted in a reduction in fish screen plugging which repeatedly reduced flow to the Site.

Based on data collected before, during, and after testing, water levels in on-site monitoring wells began to rise within a few hours after the start of testing. Down gradient effects extended several miles north, at least as far north as well MC-3, and may extend all the way to the Walla Walla River. Water table rise in response to testing is interpreted to have extended at least 0.5 miles up gradient. Based on the field and basic water quality parameters measured to-date, SAR testing at the Site are interpreted to have had no negative effect on groundwater quality in the Site area. This data does suggest a high degree of hydraulic continuity between local surface and groundwater, with surface water bodies in the immediate Site area, generally loosing water to the underlying shallow alluvial aquifer system. A few synthetic organic compounds (SOC's) were detected intermittently before and during the test. However, the timing of these detections suggests that they were not caused by the test activity and the measured concentrations represent background concentrations related to off site activities.

Contents

Appendices

1.0 INTRODUCTION

Shallow aquifer recharge (SAR) is one of several water resource management strategies being explored by water resources stakeholders in the Walla Walla Basin of southeastern Washington and northeastern Oregon (Figure 1). One of the locations where SAR is being tested is known as the Hall-Wentland Site (H-W Site). The H-W Site is located in the SE ¼, NE ¼, Section 14, T6N, R35E, on private property south of Stateline Road in Oregon (Figures 1 and 2).

SAR testing at the H-W Site is being done under Oregon Water Resources Department (OWRD) Limited License 915 issued to Walla Walla River Irrigation District (WWRID) in the fall of 2005. The H-W Site SAR work is being funded by Washington Department of Ecology (Ecology) through grants awarded to the Walla Walla County (Washington) Watershed Planning Department. Work described in this report was done under Grant No. G0600312. SAR testing done at the H-W Site under Limited License 915 can be conducted seasonally (with several stipulations and conditions) between November and April of the succeeding calendar year. This license expires in April 2010.

Under Limited License 915, the first SAR test season at the H-W Site began in early March 2006 and ended in mid-April 2006. The results of this first test season are described in Kennedy/Jenks (2006). That report also describes background conditions interpreted for the H-W Site prior to the start of testing in early 2006, H-W Site physical conditions, and the regulatory constraints under which testing can be conducted. That information will not be repeated in this report. Instead, this report focuses on describing the results of the recently completed second test season, which started in late December 2006 and ended in mid-April 2007. Topics and information presented in this report include the following:

- A timeline listing the major events associated with the 2006/2007 recharge season.
- Site modifications and changes relative to the first test season.
- Rates and volumes of water delivered to the H-W Site from the source water, which was, as is in the first season, ambient flow from the East Little Walla Walla River (ELWW) delivered to the H-W Site via Wells Ditch. For the second test season water was not diverted from the mainstem of the Walla Walla River for testing.
- Alluvial aquifer water levels, before, during, and after the second test season.
- Results of groundwater and surface water quality monitoring before, during, and after the second test season.
- Comparisons between conditions observed in the first and second test seasons.
- Summary and recommendations.

In addition, this report is accompanied by appendices that contain data and information collected during the course of the 2006/2007 test season. These appendices are as

follows:

- Appendix A. Field notes.
- Appendix B. Water quality data.
- Appendix C. A copy of an independently produced strategy report entitled: *Hall-Wentland Recharge Project Long-Term Implementation Strategy*. This strategy report, produced by Fountainhead for Walla Walla County (the County), is included herein per GSI Water Resources, Inc. (GSI) contract with the County. Our inclusion of the Fountainhead report in no way implies or warrants agreement with, or an endorsement of, the Fountainhead report by GSI.

For the second recharge season the Walla Walla County Watershed Planning Department contracted to GSI (formerly Groundwater Solutions, Inc.) to conduct testing, compile data, interpret test results, and prepare this report. Because the Limited License holder for this project is WWRID, GSI worked with Walla Walla County staff and WWRID staff (and stakeholders), to make sure both parties were satisfied with test operations, monitoring, and activities. The project team included:

- Kevin Lindsey, Ph.D., L.Hg. (GSI) – project manager and hydrogeologist (Washington).
- Terry Tolan, R.G. (GSI) – hydrogeologist (Oregon).
- Jon Travis (GSI) – geologic and report production support.
- John Fazio, PE (Fazio Engineering) – project engineer.
- Tom Page (Independent land owner) – Site operator and local point of contact.

The basic site layout for the 2006/2007 test season was very similar to that of the preceding test season (Figure 3).

2.0 2006/2007 TIMELINE

The project timeline presented here lists the main project activities and actions for the 2006 through 2007 recharge season. Notes and documents describing many of these actions and events are attached to this report in the Appendix A.

- 03 October 2006; Initial water quality sampling event. Field and basic groundwater parameters collected. Results in Appendix B.
- 31 October 2006; Water quality sampling event. Field, basic, and synthetic organic compound (SOC) parameters collected for both groundwater and source water. Results in Appendix B.
- Late November 2006; Small ramp flumes installed at the Wells Ditch diversion

and in the branch ditch leading onto the H-W Site. Gated culverts installed in the pump sump pit on the H-W Site.

- 01 December 2006; Transducers installed in the ramp flumes.
- 06 December 2006; Project team met with Oregon Department of Fish and Wildlife (ODFW) staff on-site to get approval of the fish screen planned for use during testing. Approval granted.
- 21 December 2006; Second test season begins.
- 27 December 2006; Water quality sampling event. Field and basic parameters collected. Results in Appendix B.
- January and February, 2007; Test ongoing, but fish screen repeatedly plugged by fine suspended solids and vegetation. Site visited every 1 to 2 days to clean screen. Flow to H-W Site commonly less than 0.4 cubic feet per second (cfs).
- 02 March 2007; Reinstall weir boards (and associated transducer) in the Wells Ditch diversion structure for the H-W Site. This was done to collect weir flow data to compare to ramp flume data at the request of OWRD staff.
- March and early April, 2007; Test ongoing with weir boards installed. Fish screen plugging significantly reduced and flow to site generally exceeds 0.7 cfs.
- 12 April 2007; Water quality sampling event. Field, basic, and SOC parameters collected. Results in Appendix B.
- 15 April 2007; Test season ends. Fish screen and weir boards used to control the test are removed. Wells Ditch and branch ditch return to normal irrigators use.
- 7 May 2007; Post-test water quality sampling. Field and basic parameters collected. Results in Appendix B.
- Late June; Second season report prepared.

3.0 ON-SITE WORK

Work done on-site for the 2006-2007 test season focused primarily on changing the physical layout of the way water was delivered to the H-W Site and how flow through the delivery system was measured. This work was done to address several of the recommendations in the report written describing the results of the first test season (Kennedy/Jenks, 2006). This on-site work included: (1) installing a ramp flume at the Wells Ditch diversion, (2) replacing the branch ditch weir with a ramp flume, and (3) installing gated culverts in the pump sump pit on-site. Each of these modifications is described further below.

3.1 Diversion Ramp Flume

In the first test season the volume of water diverted from Wells Ditch was measured using a 3-foot rectangular weir, staff gauge, and transducer (Figure 4). However, to function properly, water needed to be backed up against the weir to generate the approximately one-foot drop required for proper functioning of the weir. This resulted in some water spilling out of Wells Ditch upstream of the weir, inundating a small portion (several hundred square feet) of pasture adjacent to Wells Ditch. For the second test season the project team decided to attempt to reduce or eliminate this ponded water by replacing the measurement weir with a calibrated, 3.5 cfs EZFlow ® portable ramp flume.

The ramp flume (and an associated transducer) was installed in the branch ditch which transports water to the H-W Test site immediately downstream of the Wells Ditch diversion structure and fish screen (Figure 5). With ramp flume installed, several boards were removed from the weir, eliminating the back up of water above the diversion structure and removing the spill over out of Wells Ditch. Unfortunately, with the removal of the weir boards we found that the fish screen rapidly plugged with suspended organic debris. We surmised that this was because, with the boards gone, the Wells Ditch gradient was high enough above the fish screen to deliver fine suspended debris to the fish screen, thus plugging it. In this configuration the fish screen needed to be manually cleaned every 1 to 2 days. Flow through the screen and to the H-W Site, when the fish screen was plugged, generally was less than 0.4 cfs.

During preparation for the 2006-2007 recharge season, OWRD staff requested that at some point during the season we collect water level data and calculate flow concurrently for both the weir and the ramp flume. Doing this required reinstallation of the weir boards. The concurrent operation of the weir and flume was done between 02 March 2007 and 19 March 2007. With this configuration, even though some water spilled out of Wells Ditch up stream of the weir, we observed that fine debris settled out of the water column before it reached the fish screen.

3.2 On-Site Ramp Flume

For the first test season, flow and volume delivered to the H-W Site was measured using a rectangular 3-foot weir, the on-site weir (Figure 6), similar to that installed at the Wells Ditch diversion. Flow measurements collected using the on-site weir generally were found to be unsatisfactory because the gradient across it was so low that water commonly back-flooded across it, inundating it and generating water levels in the weir not representative of actual flow conditions (Kennedy/Jenks, 2006). For the 2006/2007 test season we attempted to address this by installing a Nu-Way 3.5 cfs EZFlow ® portable ramp flume in place of the rectangular weir (Figure 7).

In conjunction with installation of the on-site ramp flume, the ditch down stream of it was cleaned by removing vegetation and mud. This was done in an attempt to increase the gradient between the flume and the pump sump pit and get water level measurements and flow measurements more indicative of actual flow conditions than we were able to collect in the first test season.

3.3 Gated Culverts

In the first test season water was diverted onto the H-W Site from the delivery ditch and/or the pump sump pit via breaks manually dug into the ditch and pit bank. Water was allowed to flow freely through these breaks onto the H-W Site. For the 2006/2007 test season two gated culverts were installed in the edge of the pump sump pit. One culvert leads from the pit onto the Hall pasture, the other from the pit onto the Wentland alfalfa field (Figure 8). Flow into either, or both, portions of the H-W Site was then controlled by opening and closing the culvert gates. For the 2006/2007 we estimate that over 75 percent of the total water delivered to the H-W Site was directed onto the Wentland alfalfa field.

4.0 WATER VOLUME USED IN 2006/2007 TEST SEASON

The water volume delivered to the H-W Site during the 2006/2007 test season was calculated from the staff gauge readings and transducer data collected at the two ramp flumes. Transducer data also was collected from the existing rectangular Wells Ditch diversion weir between 02 March 2007 and 19 March 2007, in the same way it was done for the previous seasons testing (Kennedy/Jenks 2006). Hydrographs for the two ramp flumes are shown on Figure 9.

Transducer data for the two ramp flumes was calibrated to the "0" flow mark on both ramp flumes by using a correction factor. For the Wells Ditch diversion ramp flume the correction was done by subtracting 4.62 inches from transducer measured water depth data. The on-site ramp flume correction was done by subtracting 0.93 inches from transducer water depth data. Following the correction for water depth, transducer data was converted to flow using the equation for the flumes:

$$Q = 0.07106\ (h)^{1.615}$$

where,

Q = flow in cfs,

and

h = depth of water (in inches) across the ramp flume measurement sill.

Based on the calculations described above approximately 253 acre-feet of water was diverted from Wells Ditch to the branch ditch (Figure 10). Average calculated instantaneous flow through the Wells Ditch diversion ramp flume, before installing the weir boards, was 0.80 cfs. Average calculated instantaneous flow through the ramp flume, after installing the weir boards on 02 March 2007 was 1.60 cfs.

Calculated flow through the diversion ramp flume was checked against calculated flow through the Wells Ditch diversion weir during the period of 02 March 2007 to 19 March 2007. Hydrographs for this event are shown in Figure 11. For this period a total of approximately 34.4 acre-feet of water is calculated to have flowed through the weir with

a calculated average instantaneous flow of approximately 1.0 cfs. The total flow volume calculated for the diversion flume over this same period was approximately 44.6 acre-feet with a calculated average instantaneous flow of approximately 1.8 cfs.

Total flow for the entire test period through the on-site ramp flume was calculated to be approximately 97.0 acre-feet (Figure 10). The calculated instantaneous average flow through the on-site ramp flume before installing the weir boards was 0.24 cfs. After installing the weir boards it is calculated to have been approximately 0.74 cfs.

Clearly there are some discrepancies in calculated flow data through the diversion ramp flume when compared to the diversion weir and when compared to the on-site ramp flume. Calculated instantaneous flow through the diversion ramp flume averages 0.4 cfs higher than those calculated for the weir. Total calculated flow through both structures was approximately 22 percent higher in the ramp flume. Comparing flow data from the diversion ramp flume to the on-site ramp flume, one again sees a significant difference between calculated total flows. Based on the calculated flows, we see an apparent loss in total calculated flow in the branch ditch of approximately 60 percent.

Other observations relevant to better understanding calculated flows onto the H-W Site during the 2006/2007 recharge season include the following:

- The differences between the diversion weir and the diversion ramp flume are greatest at higher flows, and generally decrease as flows decrease.

- During operations, the water surface above (up stream) of the weir, where the transducer was installed was generally less turbulent than the water surface above the ramp flume, where that transducer was installed.

- Similar turbulent conditions were observed when comparing the two ramp flumes. Flow through the diversion ramp flume generally was more turbulent than through the on-site ramp flume.

- Flow surges through the diversion flume were common when it was cleaned. These flow surges may have, at least on some occasions, generated calculated flows higher than normal.

Given these observations, determining the volume of water diverted from Wells Ditch towards the Site proved to be more problematic than anticipated. The volume diverted to the Site could be as high as approximately 253 acre-feet, as calculated from the diversion flume data. Alternatively, it could have been as low as 195 acre-feet (or less) based on the overestimation possibly associated with the diversion ramp flume when that data is compared to flow calculations generated from diversion weir data. In addition, the volume of water actually arriving at the Site appears to be open to question. If flow calculated through the on-site flume is accurate (e.g., 97 acre-feet), over 50 percent of the water diverted from Wells Ditch was lost to the ground through seepage from the branch ditch. Visual observations suggest this flow loss is unlikely and that data collection problems were encountered with the on-site flume during the 2006/2007 recharge season, just as they were with the previous season. This problem is likely due to the low gradient in the branch ditch and the difficulty in having the unimpeded flow through the measurement structure needed to collect representative water depth data for calculating flow.

5.0 WATER LEVELS IN ALLUVIAL AQUIFER

As was done in the previous season we tracked water levels in on-site monitoring wells HW-1, HW-2, and HW-3 and 14 off-site water supply wells. Water levels in the monitoring wells were collected using a digital transducer, in the off-site wells using an e-tape.

5.1 Transducer Data from Monitoring Wells

Water level data collected from each of the three monitoring wells is summarized below and shown in Figure 12. This summary generally focuses on water levels observed before, during, and after testing.

Water level in well HW-1, at the north end of and down gradient of the Site, generally declined in the three months prior to the start of testing, reaching a low of approximately 735.5 feet above mean sea level (amsl) just prior to the start of testing. It then rose to its first high of approximately 736.2 feet on 10 January 2007. Water level in the well declined during most of February but began to rise again after 02 March 2007, the day the weir boards at the diversion were installed. On 15 April 2007, the day of the test shutdown, HW-1 had a water level of approximately 738.1 feet, which continued to rise to a high of approximately 739.2 feet on 19 April 2007. Water levels begin to fall after 19 April 2007 and continued to fall until the end of data collection 04 May 2007. The final water level measurement is above the pretest level.

Water level in well HW-2, positioned up gradient of the Site, experience more and greater fluctuation than either HW-1 or HW-3. Because of problems with the transducer, data collection in HW-2 began approximately one month before the start of testing. During that time water level fluctuated between approximately 748 and 749.8 feet amsl. Within less than 1 day of the start of testing on 22 December 2007, water level rose from a pre-test low of 747.9 feet amsl to a high of approximately 753.3 feet amsl on 30 December 2007. Like HW-1, water level remained relatively stable in January 2007 before falling in February. After installing the weir boards 02 March 2007 at the diversion, water level in well HW-2 began to rise, reaching a high of approximately 757.9 feet one day after the end of the test. Water levels begin to fall after 16 April 2007 and continued to fall until the end of data collection on 04 May 2007. The final post test water level was still higher than any pretest level.

Well HW-3 is, like HW-1, located down gradient of the Site and it displayed water level changes similar to those seen in HW-1. In the several months prior to the start of testing water level in HW-3 generally fell, reaching a pre-test low on 22 December 2007 of approximately 732.8 feet amsl. It then rose to its first high of approximately 735.5 feet on 10 January 2007. Water levels fell during most of February but began to rise again after the weir boards were installed at the diversion on 02 March 2007. On the day of the test shutdown HW-3 had a water level of approximately 735.9 feet. Water level continued to rise to a high of approximately 736.5 feet on 19 April 2007. Water levels began to fall after 19 April 2007 until the end of data collection 04 May 2007. The final water level is still above pre-test levels.

All three monitoring wells display water level changes interpreted to be in response to testing. All wells appear to show a response to the pretest shutdown of Wells Ditch and

the branch ditch, a rise corresponding to the start of testing, and a decline in response to the shutdown of the test. Monitoring well water levels also showed a response to the decrease in branch ditch flow during February 2007, due to plugging of the fish screen until 02 March 2007 when weir boards were installed at the Wells Ditch diversion.

5.2 Manually Measured Water Supply Wells

Manually measured water levels were collected from 14 wells on a monthly to weekly basis (Figure 13). Water level data was collected from wells MC-1 through MC-10 during the first and the second (2006/2007) recharge seasons. Three new wells, designated MC-11, MC-12, and MC-13, were added to the manually measured wells for the 2006/2007 recharge season. Wells MC-11, MC-12, and MC-13 are located west of the H-W Site along Stateline Road (Figure 2), generally in a down gradient to cross gradient orientation with respect to groundwater flow in the H-W Site area. Of the other wells, MC-10 is located up gradient of the H-W Site and wells MC-1 through MC-6 are located down gradient from the H-W Site. Wells MC-7, MC-8, and MC-9 are located near the H-W Site, with MC-7 and MC-9 generally transverse gradient to the H-W Site and MC-8 essentially on-site.

Based on the water level data collected for the 2006/2007 recharge season, the off-site manually measured wells generally appear to fall into three basic groups. Water levels displayed by the manually measured wells are shown on Figure 13, and summarized below:

- The first group of wells (MC-1, MC-2, MC-7, MC-9, and MC-10) displays two water level highs, early and late in testing, separated by decreased water levels during the mid-test period. The two peaks generally occur early in testing, in January 2007, and late in testing, in March/April 2007. These peaks are separated by a drop in water levels, centered on February 2007, which generally corresponds to the period during the test when flow to the site was lowest because of fish screen plugging. Water levels in all of the wells in this group fell soon after the end of testing in mid-April.

- Another group of wells consists of the three wells located west of the H-W Site, MC-11, MC-12, and MC-13, and one well north of the H-W Site, MC-4. The highest water levels recorded in these wells appear late in, or soon after the end of, the test season. All of these wells seem to display relatively stable water levels for the month following the end of testing.

- The final group of wells, which includes MC-3, MC-5, MC-6, and MC-8, show late and post-test water level highs, similar to all the MC wells, followed by a drop in water level. However, the data for these wells is notable in that they all lack data for January 2007, limiting our ability to determine if the early test water level high followed by the mid-test water level decrease (as seen in wells MC-1, MC-2, MC-7, MC-9, and MC-10), occurred in this group of wells.

Based on the data collected during the 2006/2007 test season, it is possible that all the manually measured wells responded to the test. All of the wells show high water levels at, or following, the end of the test, and most of them show water level decreases following the end of testing. These level changes could reflect the spread and subsequent collapse of the groundwater mound generated by the test. In addition, at

least 5 of the wells show water level increases followed by decreases early in the test which could reflect the start of testing, followed by decreased recharge during the period when flow to the Site was restricted by repeated fish screen plugging.

Three of the four wells that showed relatively stable water levels following the end of testing, MC-11, MC-12, and MC-13, might also be seeing influences other than the test. These could include: (1) seepage from nearby Walsh Creek sustaining water level in the aquifer and/or (2) increased flow through lower Wells Ditch following the end of testing sustaining these higher levels and postponing or stopping a post-test water level drop. The cause of apparent stable post-test water level in well MC-4, which is located down gradient of the H-W Site and is near wells that show post-test water level decreases, is unknown.

6.0 WATER QUALITY

6.1 Field and Basic Water Quality

Field and basic water quality data was collected twice prior to testing from the three monitoring wells, HW-1, HW-2, and HW-3. The first sampling event was on 03 October 2007 and the second was on 31 October 2007. The branch ditch was sampled once prior to testing on October 31. This was done to better characterize background water quality conditions prior to testing. Water quality data was also collected from the three monitoring wells and surface water during testing and after testing. Samples were collected on 27 December 2007 following the beginning of testing, on 11 April 2007 before the end of testing, and on 07 May 2007 following the end of testing. Sample analysis results are shown in Table 1, summarized below, and included in Appendix B.

Pre-test field pH for source water was 7.33. Pre-test up gradient groundwater ranged from 5.95 to 6.24 and down gradient groundwater ranged between 6.23 and 6.84. During testing source water pH increased as the test continued. Up gradient groundwater ranged from 6.79 to 6.96 during testing, increasing as testing continued. Down gradient groundwater during testing had a pH ranging from 6.57 to 6.96, which generally increased as testing continued. Following the end of testing pH fell in source water, but continued to increase in the wells.

Pre-test field electrical conductivity (EC) for source water was 1370 micro Siemens per centimeter (mS/cm). In pre-test groundwater, both up and down gradient, EC was between 1430 and 1570 mS/cm. During testing EC in source water increased following the start of testing and decreased later in the test. Up gradient groundwater EC generally decreased during the course of testing. Down gradient groundwater showed little change from pretest levels and was relatively unchanged over the course of testing. Following the end of testing all wells show a decline in electrical conductivity and while source water did not change.

Nitrate-N in source water prior to testing was 0.870 milligrams per liter (mg/l). Concentrations in pre-test groundwater ranged from 0.470 to 0.910 mg/l. During testing nitrate-N concentration in source water first increased then decreased to below pre-test levels later in testing. Nitrate-N in all monitoring wells generally increased slightly over

the course of testing. Following the end of testing, nitrate-N increased in all wells and source water.

Nitrite-N concentrations were below the minimum detection limit (MDL) of 0.0023 mg/l during pre-test sampling events in both the monitoring wells and surface water. During and following testing nitrite-N concentrations were at, or below, the MDL.

Hardness in pre-test source water was 53.6 mg/l. Concentrations in pre-test up gradient groundwater were approximately 63.0 mg/l and down gradient groundwater ranged from 59.4 to 67.9 mg/l. Hardness increased at all sampling locations following the start of testing, ranging from 87.20 to 98.70 mg/l. Later in the testing season hardness concentration fell at all sampling locations and following testing it continued to fall.

Total dissolved solids (TDS) concentration in pre-test source water was 92 mg/l. There was relatively no difference between up and down gradient TDS concentrations in pre-test groundwater, with all values ranging from approximately 100 to 130 mg/l. TDS in source water and groundwater remained relatively unchanged following the start of testing. Following testing TDS in all wells and surface water fell with up gradient groundwater showing the greatest decline.

Chloride concentration in pre-test source water was 2.190 mg/l. In groundwater pre-test chloride concentrations were at, or below, the MDL of 0.297 mg/l for the 03 October 2007 sampling event. Chloride concentrations increased in wells HW-1 and HW-2 but stayed at, or below, the MDL in HW-3 in the 31 October 2007 pre-test sampling event. Following the start of testing chloride concentrations in source water and well HW-1 fell to, or below, the MDL. Concentrations in well HW-2 fell from 1.900 to 0.600 mg/l following the start of testing, and in HW-3 rose from at or below the MDL to 2.800 mg/l. Following testing chloride increased in well HW-1 and source water and decreased in wells HW-2 and HW-3.

Pre-test soluble reactive phosphorus (SRP) concentration in source water was 0.150 mg/l. In groundwater, pre-test SRP was lowest in well HW-3. The highest pre-test groundwater SRP was measured in well HW-2 in the second pretest sampling event (31 October 2007). Following the start of testing SRP increased in source water from 0.150 to 0.250 mg/l, but fell in both up and down gradient wells.

For all sampling event chemical oxygen demand (COD) was almost always at, or below, the MDL of 8.0 mg/l. The one exception was seen in source water which had a COD of 15 mg/l in the 11 April 2007 sampling event.

For the 2006/2007 season, source water and groundwater generally appear to show similar field and basic water quality conditions. Parameter concentrations generally increased and decreased together, although not always by the same amount. These data generally suggest surface water and groundwater throughout the vicinity of the Site display a high degree of continuity. Given the depth to groundwater described earlier, this continuity generally is restricted to surface water bodies leaking into and recharging the shallow alluvial aquifer.

6.2 SOC Water Quality

Samples for SOC analysis were collected during the 31 October 2006 and 11 April 2007 sampling events. Analysis results are provided in Table 2 and both sampling events are summarized as follows:

- No SOC's were detected in surface water.

- Two SOC's, di-n-butyl phthalate and dimethyl phthalate, were detected in pre-test groundwater analysis (31 October 2007). Dimethyl phthalate was detected in well HW-3 at a concentration of 3 micrograms per liter (ug/l) and di-n-butyl phthalate was detected in up gradient well HW-2 and down gradient well HW-3 at concentrations of 1.1 ug/L and 0.9 ug/L respectively.

    - Di-n-butyl phthalate and dimethyl phthalate are manufactured chemicals commonly used in plastic, paint, glue, and other household products.

- During testing (11 April 2007) di-n-butyl phthalate was again detected, this time in all three monitoring wells at concentrations of 0.7 ug/l, 0.5 ug/l, and 0.6 ug/l in wells HW-1, HW-2, and HW-3, respectively.

- Malathion also was detected during testing (11 April 2007) in all three monitoring wells at concentrations of 0.4 ug/l in HW-1, 0.3 ug/l in HW-2, and 0.4 ug/l in HW-3.

    - Malathion is a general use pesticide commonly used in mosquito control.

The SOC data is interpreted to indicate a very small number of these compounds are found in local groundwater. However, inconsistent occurrence, both temporally and spatially, and low concentrations suggest the detections represent intermittent background conditions and that Site operation has an extremely low potential to contribute to the presence of these compounds in groundwater as a result of testing.

7.0 FIRST AND SECOND TEST SEASON COMPARISONS

This section presents a simple qualitative comparison between data collected and observations made during the first test season (spring 2006) and the recently completed second season (winter/spring 2006/2007). In particular:

- The second aquifer recharge season was able to begin much earlier than the first season.

- During the first season most water was delivered to the Hall portion of the H-W Site, during the second season most water was delivered to the Wentland portion of the Site.

- Water level in the first season in HW-1 and HW-3 experienced maximum rises of approximately 9 feet and 2.5 feet, respectively (Figure 14). During the second

season water level rose approximately 2.5 feet and 2.0 feet in wells HW-1 and HW-3, respectively.

- Water levels observed in HW-2 for the second season are similar to those seen during the first season. At the start of both seasons the water level began to rise within a few hours of the start of testing. Water levels in HW-2 during both test seasons show larger responses than the other wells. It also responded quickly to the end of testing, with water level dropping soon after the end of the tests.

- Water level changes measured in the first season and the just completed second season in off-site wells MC-1 through MC-10 continue to suggest the effects of recharge can be seen some distance form the Site, and that shallow alluvial aquifer water level does rise in response to recharge at the Site. These water level rises do appear to migrate to the north along the valley of McEvoy Spring Creek. The rise in water level seen in MC-10 suggests that propagation of recharge effects extend at least 0.5 miles up gradient in both seasons.

- Both field and basic water quality constituents for source water and groundwater during the second season appear to be much like the first season. There were concentration fluctuations in many constituents, but no discernable trends that occur, other than the apparent close degree of hydrologic continuity between surface water and groundwater suggested by similar chemistry and changes.

- SOC's in both seasons saw intermittent detections of phthalates. This suggests phthalates may be present as part of the general background groundwater chemistry. Malathion was detected this season, but not last season.

8.0 SUMMARY AND RECOMMENDATIONS

8.1 Summary

This report presented the results of the second season of shallow aquifer recharge testing at the Hall-Wentland Site. Testing was done to continue to evaluate the feasibility of using SAR to help restore depleted shallow sediment aquifer groundwater levels and improve flow in spring creeks and streams. Testing at the Hall-Wentland Site is permitted under a Limited License granted by the Oregon Water Resources Department. The license authorizes testing for a total of five years, and specifies a recharge season each year extending from November of one calendar year to April of the following year.

The test event discussed in this report began on 22 December 2006 and ended on 15 April 2007. SAR testing utilized ambient stream flow in the East Little Walla Walla River. Water was diverted from this stream to the H-W Site via Wells Ditch. Calculating the total water flow diverted to the H-W Site proved to be more problematic than anticipated. Based on the data collected for the just completed recharge season, between approximately 250 and 190 acre-feet of water probably was diverted from Wells Ditch towards the Site. However, based on the on-site ramp flume measurements, as little as

approximately 100 acre-feet may have reached the Site. The reasons for these discrepancies are not clear, but may include inaccurate measurements at the diversion ramp flume, problems similar to those encountered in the previous season which were related to low gradients through the measurement structures resulting in impeded flow and collection of inaccurate data, and/or repeated plugging of the fish screen. Low gradients are also interpreted to have contributed to repeated fish screen plugging in the 2006/2006 recharge season.

We started the test season with several weir boards removed from the diversion structure for the Site. Unfortunately, with the boards removed, stream gradient through the ditch was high enough to carry suspended debris up to, lodge against, and plug the fish screen. The boards were reinstalled on March 2, 2007, at which point ponding occurred and stream gradient above the weir decreased, allowing debris to fall out of suspension before reaching the screen. With this, flow through the diversion increased.

The shallow aquifer beneath the Site did respond to SAR testing by rising approximately 8.8 feet in HW-2 during testing. Based on data collected during testing, water levels in on-site monitoring wells began to rise within a few hours after the start of testing. We do not know exactly how far the water table response extends from the Site. Based on data collected at well MC-10 effects extend approximately 0.5 miles up gradient of the Site. Down gradient effects extend through the off-site wells at least as far north as MC-3, if not all the way to MC-1, MC-2, and the Walla Walla River. Following the end of testing water levels continued to rise a few days, before beginning to fall. At the end of data collection on 04 May 2007, 6 days short of a full month after testing ended, water levels were still above pre-test levels in December 2006.

Based on the field and basic water quality parameters measured to-date, SAR activities at the H-W Site are interpreted to have had no negative effect on groundwater quality in the Site area. This data does suggest a high degree of hydraulic continuity between local surface and groundwater, with surface water bodies in the immediate H-W Site area, generally loosing water to the underlying shallow alluvial aquifer system. A few SOC's were detected intermittently before and during the test. However, the timing of these detections suggests that they were not caused by the test activity and the measured concentrations represent background concentrations related to off site activities.

8.2 Recommendations

Based on the results of the second test season described in this report, we have several recommendations for changes to Site operation and testing for the 2007/2008 and 2008/2009 recharge seasons. These include:

- Install and instrument 3 new shallow aquifer monitoring wells near the Site. One of these wells should be located east of the Site. A second well should be located to the south, up gradient of the Site, if a suitable location can be found. The third well should either be placed to the east of the Site or further down gradient than the existing down gradient shallow aquifer monitoring wells.

- Conduct one or more infiltration tests on the Site to better constrain on-site infiltration rates as another way to get at the amount of water delivered to the Site.

- Install fiber optic transducers in at least 2 of the off site manually measured water wells to collect better off site water level data.

- Add additional water wells to the manually measured water well network, possibly further up gradient.

- Discontinue use of the diversion flume, returning to using the weir structure to measure flow and calculate water volume diverted from Wells Ditch towards the Site.

- Conduct an aquifer test in at least one of the existing off-site wells. If done, the selected well should be open to the majority of the Mio-Pliocene upper coarse unit, be accessible for the installation of a digital transducer, and be as close to the H-W Site as we can get. Such a test would require the cooperation of the well owner. This test would generate aquifer property data currently lacking.

- Revisit with Oregon Department of Fish and Wildlife staff the need for a fish screen at the Site. If that agency still requires one, we recommend replacing the fish screen used in the first 2 seasons with one that is self-cleaning.

- Following the end of the 2007/2008 recharge season, prepare an interim report outlining basic work activities and results for that season. Following the end of the 2008/2009 recharge season prepare a final report will focus on summarizing all data collected since the beginning of the project, analyze test performance, and make recommendations for future operations.

Longer term recommendations, all requiring additional funding. These include:

- Expand the size and capacity of the ELWW and Wells Ditch system.

- Address WWRID concerns (with physical structures and/or regulatory exclusions) regarding false fish attraction issues to the introduction of Walla Walla River water to the ELWW and Wells ditch system.

9.0 REFERENCES CITED

Kennedy/Jenks, 2006, Results of the First Season of Shallow Aquifer Recharge Testing at the Hall-Wentland Site, Umatilla County, Oregon and Walla Walla County, Washington. Consultants report prepared for HDR, Inc., 23 June 2006, 35 p., 5 tables, 34 figures, 4 Appendices.

Tables

MDL -->							0.084		0.0023	0.11	21.1		0.297		0.0433		8.0			
Sample ID	**Date**	**Lab No.**	**pH**	**Temp. C**	**Electrical Conductivity (mS/cm)**	**Turbidity (NTU)**	**NO_3-N (mg/L)**		**NO_2-N (mg/L)**	**Hardness (mg/L)**	**TDS (mg/L)**		**Cl (mg/L)**		**Soluble Reactive Phosphorous (mg/L)**		**COD (mg/L)**	**Total Coliform (per 100ml)**	**E-Coli (per 100ml)**
Surface	2/2/2006	80603	7.29	10.0	1027	14.40	0.206		0.0300	50.42	100.0		18.700		0.197		14	present	present
Surface	2/22/2006	80884	7.21	9.5	1044	10.80	0.620			48.90	108.0		6.200		0.146		23	present	present
Surface	3/3/2006	81009	6.94	9.7	1144	26.50	0.940	<	0.0023		160.0	<	0.297	<	0.043		820	present	present
Surface	4/12/2006	81717	7.29	14.9	1300	16.10	0.610	<	0.0023	51.50	66.0		6.000		0.100		14	present	present
Surface	10/31/2006	85494	7.33	8.7	1370	27.40	0.870	<	0.0023	53.60	92.0		2.190		0.150	<	8		present
Surface	12/27/2006	86255	7.42	6.8	1530	8.36	1.130	<	0.0023	89.80	92.0	<	0.297		0.250	<	8	absent	
Surface	4/11/2007	87722	8.89	14.9	1100	5.68	0.290	<	0.0023	55.00	92.5		2.500		0.06		15	present	present
Surface	5/7/2007	88149	8.59	15.9	1100	6.51	0.600	<	0.0023	38.60	50.0		4.500		0.090	<	8	present	present

Sample ID	**Date**	**Lab No.**	**pH**	**Temp. C**	**Electrical Conductivity (mS/cm)**	**Turbidity (NTU)**	**NO_3-N (mg/L)**		**NO_2-N (mg/L)**	**Hardness (mg/L)**	**TDS (mg/L)**		**Cl (mg/L)**		**Soluble Reactive Phosphorous (mg/L)**		**COD (mg/L)**	**Total Coliform (per 100ml)**	**E-Coli (per 100ml)**
HW-1	2/2/2006	80600	6.67	10.3	1120	0.10	0.566		0.0200	57.75	110.0		25.000		0.224	<	8	absent	absent
HW-1	2/22/2006	80881	6.48	7.0	1000	0.34	1.690			55.00	98.0		9.400		0.139		9	present	present
HW-1	3/2/2006	81006	6.59	12.2	1178	0.15	0.680		0.0500	58.90	170.0		5.000		0.100		404	absent	absent
HW-1	3/9/2006	81156	6.62	11.3	1142	0.13	1.210	<	0.0023	62.00	112.0		5.000	<	0.043	<	8	absent	absent
HW-1	4/12/2006	81714	6.39	9.8	1400	0.12	1.420	<	0.0023	60.10	72.0		5.000		0.170	<	8	present	present
HW-1	5/10/2006	82240	6.55	12.0	1413	0.10	0.990	<	0.0020	59.30	116.0	<	0.200		0.150	<	10	absent	absent
HW-1	10/3/2006	85052	6.43	12.8	1440	0.50	0.750	<	0.0023	62.80	136.0	<	0.297		0.11	<	8	absent	
HW-1	10/31/2006	85491	6.84	12.2	1560	0.23	0.910	<	0.0023	64.40	108.0		2.100		0.13	<	8		absent
HW-1	12/27/2006	86252	6.57	12.1	1590	0.13	0.710	<	0.0023	90.00	108.0	<	0.297		0.12	<	8	absent	
HW-1	4/11/2007	87719	6.90	12.9	1540	0.12	0.800	<	0.0023	83.30	115.0		0.500		0.090	<	8	absent	absent
HW-1	5/7/2007	88146	7.32	13.3	1520	0.89	1.140	<	0.0023	56.70	76.7		5.000		0.130	<	8	present	absent

Sample ID	**Date**	**Lab No.**	**pH**	**Temp. C**	**Electrical Conductivity (mS/cm)**	**Turbidity (NTU)**	**NO_3-N (mg/L)**		**NO_2-N (mg/L)**	**Hardness (mg/L)**	**TDS (mg/L)**		**Cl (mg/L)**		**Soluble Reactive Phosphorous (mg/L)**		**COD (mg/L)**	**Total Coliform (per 100ml)**	**E-Coli (per 100ml)**
HW-2	2/2/2006	80601	6.60	14.0	1434	6.82	0.390		0.0210	72.41	126.0		25.000		0.208	<	8	present	absent
HW-2	2/22/2006	80882	6.60	13.1	1441	1.23	0.930			77.00	128.0		7.800		0.114		19	present	absent
HW-2	3/3/2006	81007	6.74	12.8	1506	0.02	0.720		0.0500	77.50	166.0		5.000		0.100		743	absent	absent
HW-2	3/9/2006	81157	6.78	12.5	1470	0.71	0.950	<	0.0023	82.00	126.0	<	0.297	<	0.043	<	8	absent	absent
HW-2	4/12/2006	81715	6.30	13.4	1400	12.50	1.690	<	0.0023	63.00	82.0		5.000		0.120	<	8	present	present
HW-2	5/10/2006	82241	6.65	13.4	1708	4.53	1.710	<	0.0020	71.90	132.0	<	0.200		0.130	<	10	present	present
HW-2	10/3/2006	85053	5.95	18.0	1450	0.61	0.470	<	0.0023	63.10	130.0	<	0.297		0.090	<	8	absent	
HW-2	10/31/2006	85492	6.24	15.1	1570	2.23	0.740	<	0.0023	62.90	114.0		1.900		0.200	<	8		absent
HW-2	12/27/2006	86253	6.79	14.4	1370	4.12	0.780	<	0.0023	87.20	90.0		0.600		0.130	<	8	present	
HW-2	4/11/2007	87720	6.96	11.3	1370	0.83	0.810	<	0.0023	69.00	108.0		2.700		0.050	<	8	present	absent
HW-2	5/7/2007	88147	7.02	10.8	1360	1.67	0.850	<	0.0023	48.70	53.3		1.500		0.120	<	8	present	present

Sample ID	**Date**	**Lab No.**	**pH**	**Temp. C**	**Electrical Conductivity (mS/cm)**	**Turbidity (NTU)**	**NO_3-N (mg/L)**		**NO_2-N (mg/L)**	**Hardness (mg/L)**	**TDS (mg/L)**		**Cl (mg/L)**		**Soluble Reactive Phosphorous (mg/L)**		**COD (mg/L)**	**Total Coliform (per 100ml)**	**E-Coli (per 100ml)**
HW-3	2/2/2006	80602	6.53	12.4	1193	0.16	0.391		0.0170	60.38	108.0		31.200		0.083	<	8	absent	absent
HW-3	2/22/2006	80883	6.64	12.3	1181	0.14	0.900			62.70	106.0		15.600		0.107		14	absent	absent
HW-3	3/3/2006	81008	6.48	13.0	1223	0.12	0.700	<	0.0023	60.80	158.0	<	0.297	<	0.043		615	absent	absent
HW-3	3/9/2006	81158	6.86	12.4	1178	0.20	0.920	<	0.0023	64.00	96.0		8.000	<	0.043		13	absent	absent
HW-3	4/12/2006	81716	6.52	13.2	1500	0.05	1.020	<	0.0023	62.60	88.0		5.000		0.100	<	8	absent	absent
HW-3	5/10/2006	82242	6.45	13.2	1447	16.90	1.020	<	0.0020	62.20	144.0	<	0.297		0.160	<	10	present	present
HW-3	10/3/2006	85054	6.32	13.2	1430	0.20	0.700	<	0.0023	67.90	122.0	<	0.297		0.080	<	8	absent	
HW-3	10/31/2006	85493	6.76	12.7	1430	3.17	0.760	<	0.0023	59.40	98.0	<	0.297		0.090	<	8		absent
HW-3	12/27/2006	86254	6.8	12.5	1470	2.44	1.120	<	0.0023	98.70	94.0		2.800		0.060	<	8	absent	
HW-3	4/11/2007	87721	6.96	13.1	1490	0.27	0.870	<	0.0023	78.90	105.0		3.000	<	0.043	<	8	absent	absent
HW-3	5/7/2007	88148	7.07	13.2	1480	0.11	1.160	<	0.0023	56.80	76.7		2.000		0.07	<	8	absent	absent

Table 1. Field and basic water quality results for the first and second recharge seasons.

Date	10/31/2006	10/31/2006	10/31/2006	10/31/2006
Well ID	HW-1	HW-2	HW-3	Surface
Chemical				
Carbamates in Drinking water				
Carbofuran	ND	ND	ND	ND
Oxymal	ND	ND	ND	ND
3-Hydroxycabofuran	ND	ND	ND	ND
Aldicarb	ND	ND	ND	ND
Aldicarb sulfone	ND	ND	ND	ND
Aldicarb sulfoxide	ND	ND	ND	ND
Carbaryl	ND	ND	ND	ND
Methomyl	ND	ND	ND	ND
Propoxur (Baygon)	ND	ND	ND	ND
Methiocarb	ND	ND	ND	ND
Synthetic Organic Compounds				
Endrin	ND	ND	ND	ND
Lindane (BHC-Gamma)	ND	ND	ND	ND
Methoxychlor	ND	ND	ND	ND
Alachlor	ND	ND	ND	ND
Atrazine	ND	ND	ND	ND
Benzo(a)pyrene	ND	ND	ND	ND
Chlordane Technical	ND	ND	ND	ND
Di(ethylhexyl)-Adipate	ND	ND	ND	ND
Di(ethylhexyl)-phthalate	ND	ND	ND	ND
Heptachlor	ND	ND	ND	ND
Heptachlor Epoxide A&B	ND	ND	ND	ND
Hexachlorobenzene	ND	ND	ND	ND
Hexachlorocyclo-Pentadiene	ND	ND	ND	ND
Simazine	ND	ND	ND	ND
Aldrin	ND	ND	ND	ND
Butachlor	ND	ND	ND	ND
Dieldrin	ND	ND	ND	ND
Metolachlor	ND	ND	ND	ND
Metribuzin	ND	ND	ND	ND
Propachlor	ND	ND	ND	ND
Bromacil	ND	ND	ND	ND
Prometon	ND	ND	ND	ND
Terbacil	ND	ND	ND	ND
Diazinon	ND	ND	ND	ND
EPTC	ND	ND	ND	ND
4,4-DDD	ND	ND	ND	ND
4,4-DDE	ND	ND	ND	ND
4,4-DDT	ND	ND	ND	ND
Cyanazine	ND	ND	ND	ND
Malathion	ND	ND	ND	ND
Trifluralin	ND	ND	ND	ND
Napthalene	ND	ND	ND	ND
Fluorene	ND	ND	ND	ND
Acenaphthylene	ND	ND	ND	ND
Acenaphthene	ND	ND	ND	ND
Anthracene	ND	ND	ND	ND
Benz(A)anthracene	ND	ND	ND	ND
Benzo(B)fluoranthene	ND	ND	ND	ND
Benzo(G,H,I)peryene	ND	ND	ND	ND
Benzo(K)fluoranthene	ND	ND	ND	ND
Chrysene	ND	ND	ND	ND
Dibenzo(A,H)anthracene	ND	ND	ND	ND
Fluoranthene	ND	ND	ND	ND
Indeno(1,2,3-CD)pyrene	ND	ND	ND	ND
Phenanthrene	ND	ND	ND	ND
Pyrene	ND	ND	ND	ND
Benzyl Butyl Phthalate	ND	ND	ND	ND
Di-N-Butyl Phthalate	ND	**1.1BQ**	**0.9**	ND
Diethyl Phthalate	ND	ND	ND	ND
Dimethyl Phthalate	ND	ND	**3**	ND
Toxaphene	ND	ND	ND	ND
Aroclor 1221	ND	ND	ND	ND
Aroclor 1232	ND	ND	ND	ND
Aroclor 1242	ND	ND	ND	ND
Aroclor 1248	ND	ND	ND	ND
Aroclor 1254	ND	ND	ND	ND
Aroclor 1260	ND	ND	ND	ND
Aroclor 1016	ND	ND	ND	ND
Herbicides in Drinking Water				
2,4-D	ND	ND	ND	ND
2,4,5-TP (Silvex)	ND	ND	ND	ND
Pentachlorophenol	ND	ND	ND	ND
Dalapon	ND	ND	ND	ND
Dinoseb	ND	ND	ND	ND
Picloram	ND	ND	ND	ND
Dicamba	ND	ND	ND	ND
2,4 DB	ND	ND	ND	ND
2,4,5 T	ND	ND	ND	ND
Bentazon	ND	ND	ND	ND
Dichlorprop	ND	ND	ND	ND
Actiflorfin	ND	ND	ND	ND
Dacthal (DCPA)	ND	ND	ND	ND
3,5-Dichlorobenzoic Acid	ND	ND	ND	ND
Velpar (hexazinone)	ND	ND	ND	ND
Bronate (bromoxynil)	ND	ND	ND	ND
Gramoxone (paraquat)	ND	ND	ND	ND

Table 2. SOC results for the 2006/2007 recharge season.

Date	4/11/2007	4/11/2007	4/11/2007	4/11/2007
Well ID	HW-1	HW-2	HW-3	Surface
Chemical				
Carbamates in Drinking water				
Carbofuran	ND	ND	ND	ND
Oxymal	ND	ND	ND	ND
3-Hydroxycabofuran	ND	ND	ND	ND
Aldicarb	ND	ND	ND	ND
Aldicarb sulfone	ND	ND	ND	ND
Aldicarb sulfoxide	ND	ND	ND	ND
Carbaryl	ND	ND	ND	ND
Methomyl	ND	ND	ND	ND
Propoxur (Baygon)	ND	ND	ND	ND
Methiocarb	ND	ND	ND	ND
Synthetic Organic Compounds				
Endrin	ND	ND	ND	ND
Lindane (BHC-Gamma)	ND	ND	ND	ND
Methoxychlor	ND	ND	ND	ND
Alachlor	ND	ND	ND	ND
Atrazine	ND	ND	ND	ND
Benzo(a)pyrene	ND	ND	ND	ND
Chlordane Technical	ND	ND	ND	ND
Di(ethylhexyl)-Adipate	ND	ND	ND	ND
Di(ethylhexyl)-phthalate	ND	ND	ND	ND
Heptachlor	ND	ND	ND	ND
Heptachlor Epoxide A&B	ND	ND	ND	ND
Hexachlorobenzene	ND	ND	ND	ND
Hexachlorocyclo-Pentadiene	ND	ND	ND	ND
Simazine	ND	ND	ND	ND
Aldrin	ND	ND	ND	ND
Butachlor	ND	ND	ND	ND
Dieldrin	ND	ND	ND	ND
Metolachlor	ND	ND	ND	ND
Metribuzin	ND	ND	ND	ND
Propachlor	ND	ND	ND	ND
Bromacil	ND	ND	ND	ND
Prometon	ND	ND	ND	ND
Terbacil	ND	ND	ND	ND
Diazinon	ND	ND	ND	ND
EPTC	ND	ND	ND	ND
4,4-DDD	ND	ND	ND	ND
4,4-DDE	ND	ND	ND	ND
4,4-DDT	ND	ND	ND	ND
Cyanazine	ND	ND	ND	ND
Malathion	**0.4**	**0.3**	**0.4**	ND
Trifluralin	ND	ND	ND	ND
Napthalene	ND	ND	ND	ND
Fluorene	ND	ND	ND	ND
Acenaphthylene	ND	ND	ND	ND
Acenaphthene	ND	ND	ND	ND
Anthracene	ND	ND	ND	ND
Benz(A)anthracene	ND	ND	ND	ND
Benzo(B)fluoranthene	ND	ND	ND	ND
Benzo(G,H,I)peryene	ND	ND	ND	ND
Benzo(K)fluoranthene	ND	ND	ND	ND
Chrysene	ND	ND	ND	ND
Dibenzo(A,H)anthracene	ND	ND	ND	ND
Fluoranthene	ND	ND	ND	ND
Indeno(1,2,3-CD)pyrene	ND	ND	ND	ND
Phenanthrene	ND	ND	ND	ND
Pyrene	ND	ND	ND	ND
Benzyl Butyl Phthalate	ND	ND	ND	ND
Di-N-Butyl Phthalate	**0.7**	**0.5KK**	**0.6**	ND
Diethyl Phthalate	ND	ND	ND	ND
Dimethyl Phthalate	ND	ND	ND	ND
Toxaphene	ND	ND	ND	ND
Aroclor 1221	ND	ND	ND	ND
Aroclor 1232	ND	ND	ND	ND
Aroclor 1242	ND	ND	ND	ND
Aroclor 1248	ND	ND	ND	ND
Aroclor 1254	ND	ND	ND	ND
Aroclor 1260	ND	ND	ND	ND
Aroclor 1016	ND	ND	ND	ND
Herbicides in Drinking Water				
2,4-D	ND	ND	ND	ND
2,4,5-TP (Silvex)	ND	ND	ND	ND
Pentachlorophenol	ND	ND	ND	ND
Dalapon	ND	ND	ND	ND
Dinoseb	ND	ND	ND	ND
Picloram	ND	ND	ND	ND
Dicamba	ND	ND	ND	ND
2,4 DB	ND	ND	ND	ND
2,4,5 T	ND	ND	ND	ND
Bentazon	ND	ND	ND	ND
Dichlorprop	ND	ND	ND	ND
Actiflorfin	ND	ND	ND	ND
Dacthal (DCPA)	ND	ND	ND	ND
3,5-Dichlorobenzoic Acid	ND	ND	ND	ND
Velpar (hexazinone)	ND	ND	ND	ND
Bronate (bromoxynil)	ND	ND	ND	ND
Gramoxone (paraquat)	ND	ND	ND	ND

Table 2 (continued)

Figures

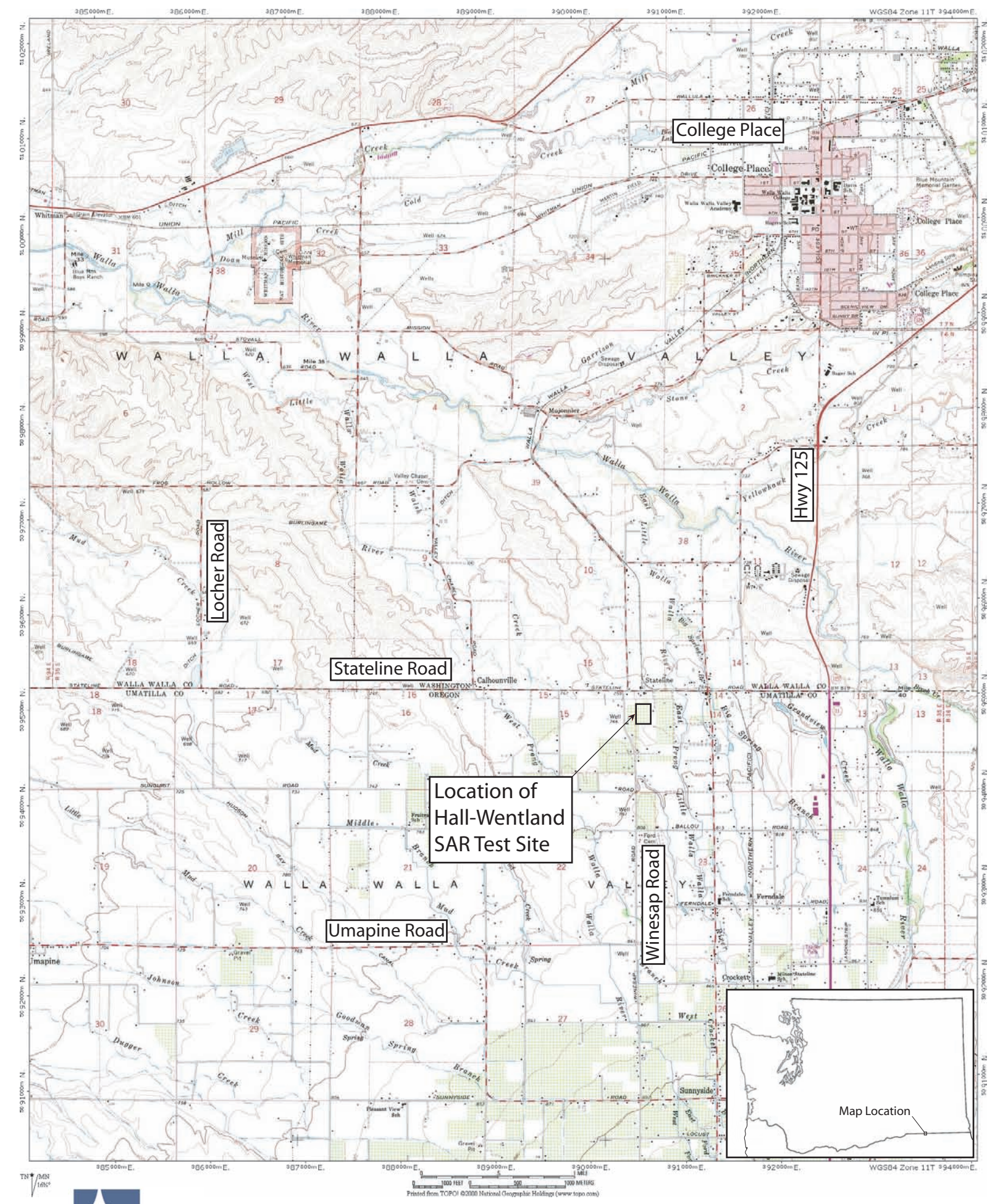

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Figure 1. Area and regional setting.

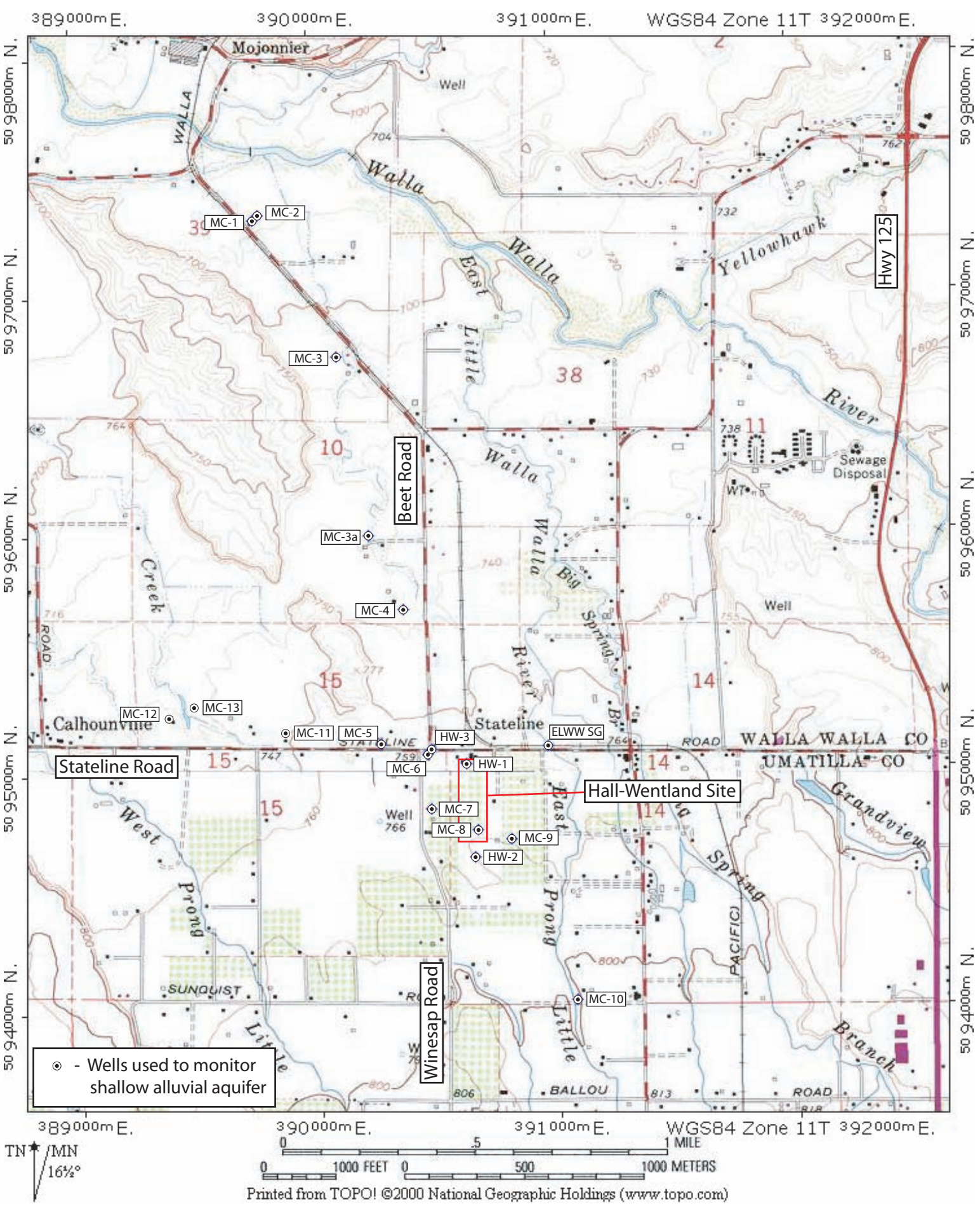

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Figure 2. Local setting, including location of off-site wells used for water level monitoring and onsite wells used for water level and water quality monitoring.

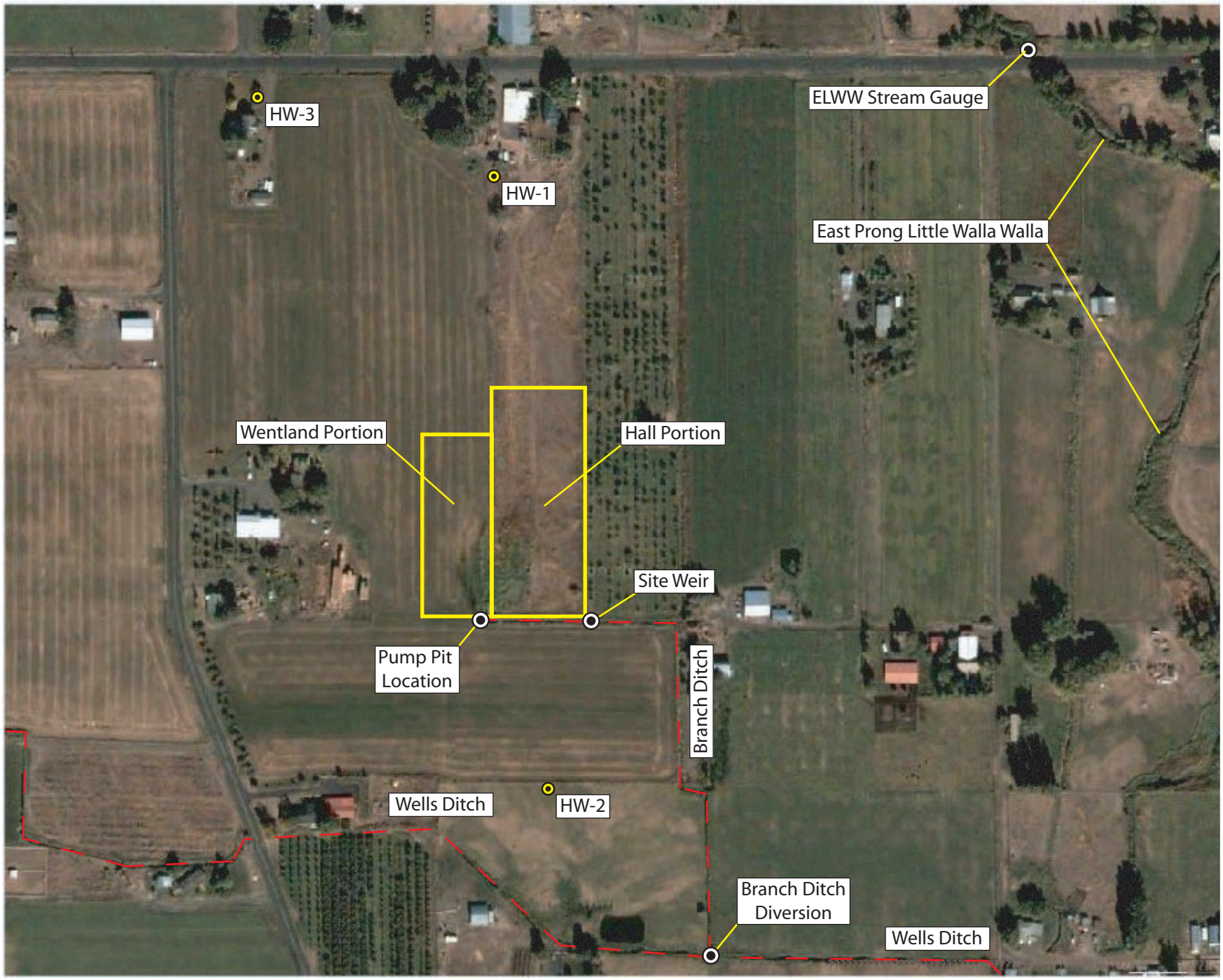

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Figure 3. Local setting, showing ditches, site boundaries, and location of water quality monitoring wells.

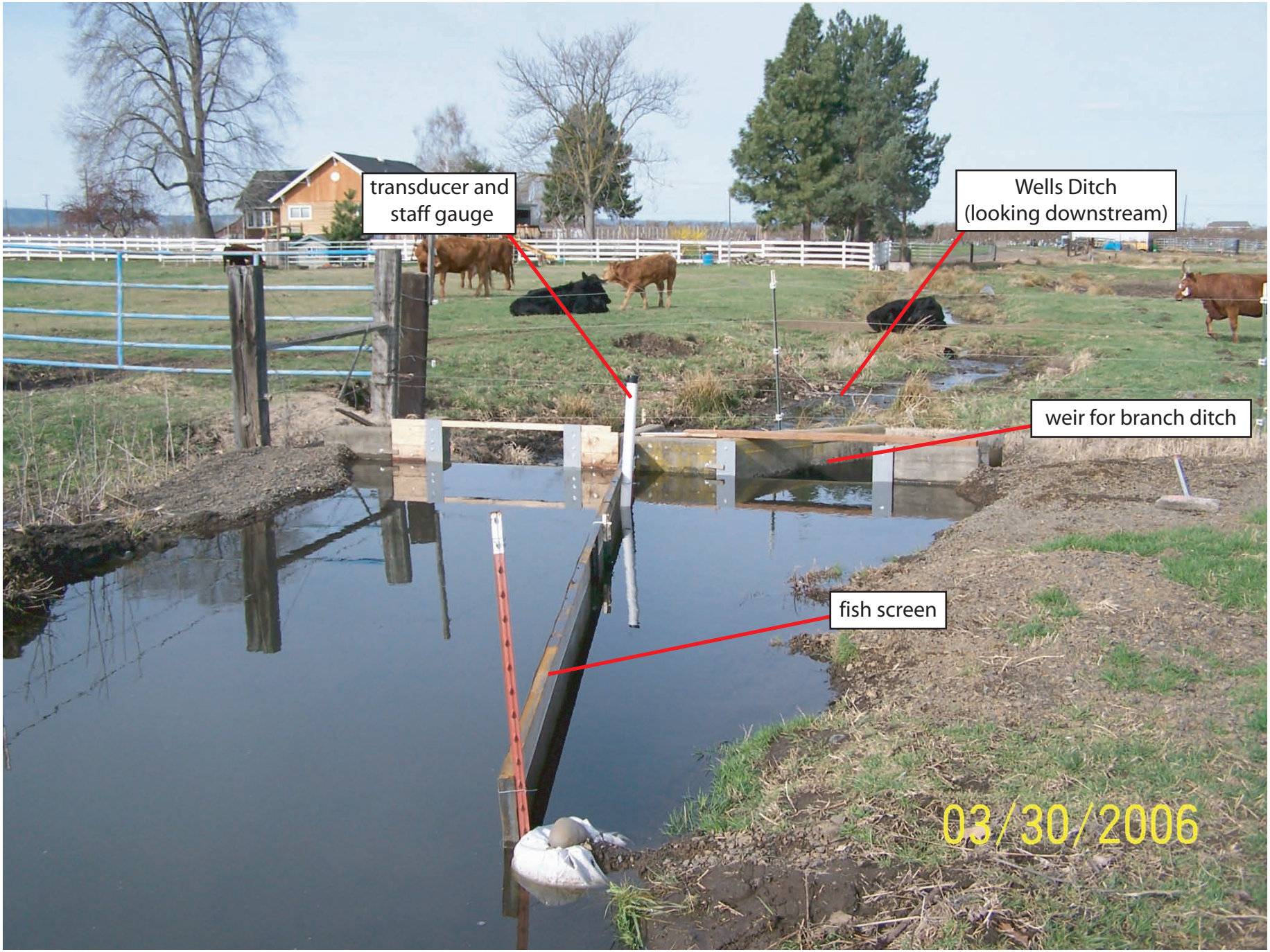

Figure 4. Photograph of the fish screen at the branch ditch diversion off Wells Ditch. This configuration shows weir installed.

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Figure 5. Photograph of branch ditch ramp flume just below the diversion off Wells Ditch.

Figure 6. Photograph of the on-site branch ditch measurement weir used during the 2006 recharge season. Notice the small drop across the weir.

GSI Water Solutions, Inc.

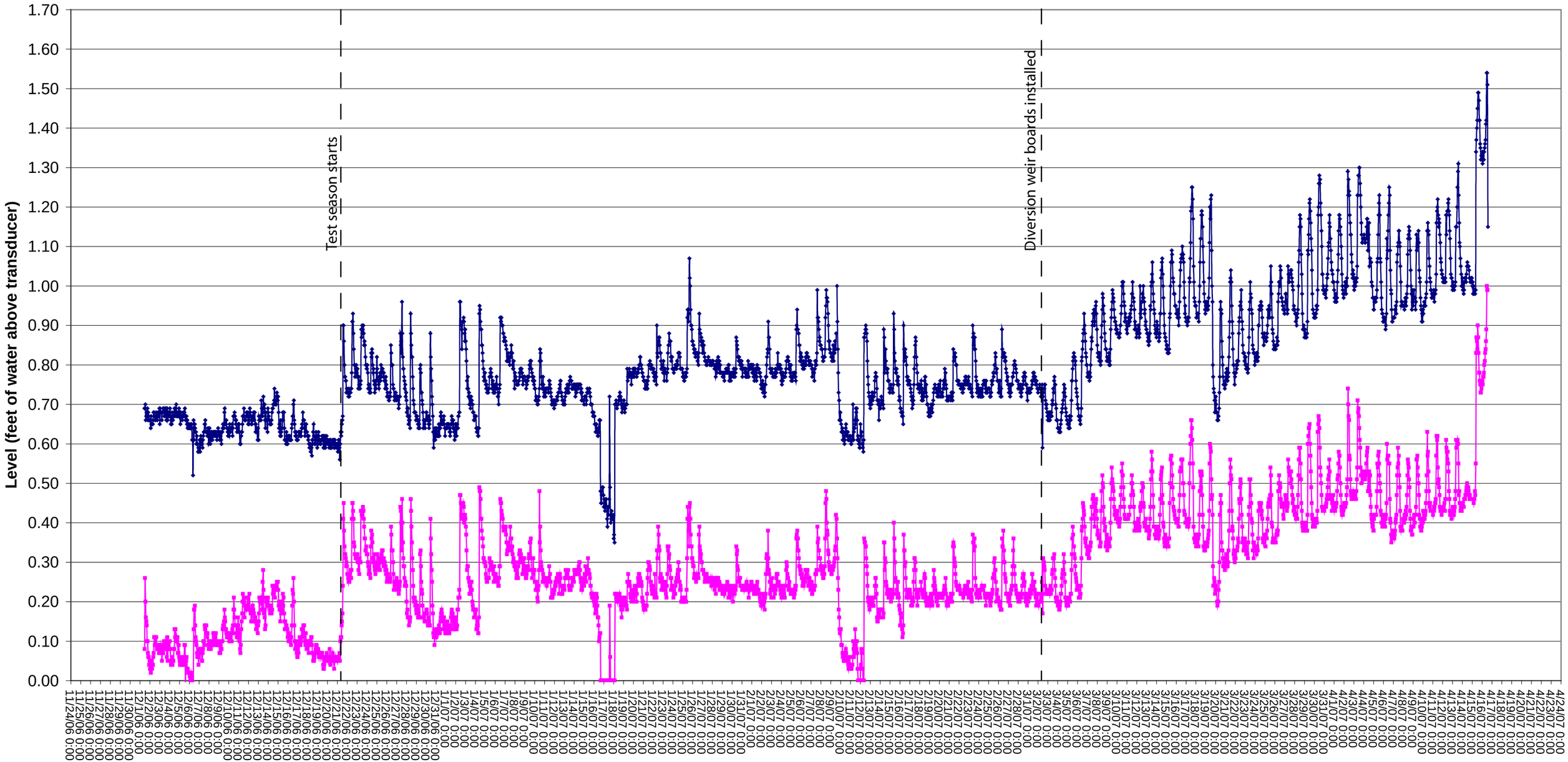
Figure 7. Photograph of the on-site ramp flume that replaced the on-site weir for the 2006/2007 recharge season. View is towards the Site.

GSI Water Solutions, Inc.

GSI Water Solutions, Inc.

Figure 8. Photograph of the gated culvert used to control flow from the pump sump pit to the Hall portion of the Site.

Hall-Wentland Surface Water Monitoring



Water Solutions, Inc.

Figure 9. Hydrographs for the two ramp flumes showing water levels recorded during the 2006/2007 recharge season.

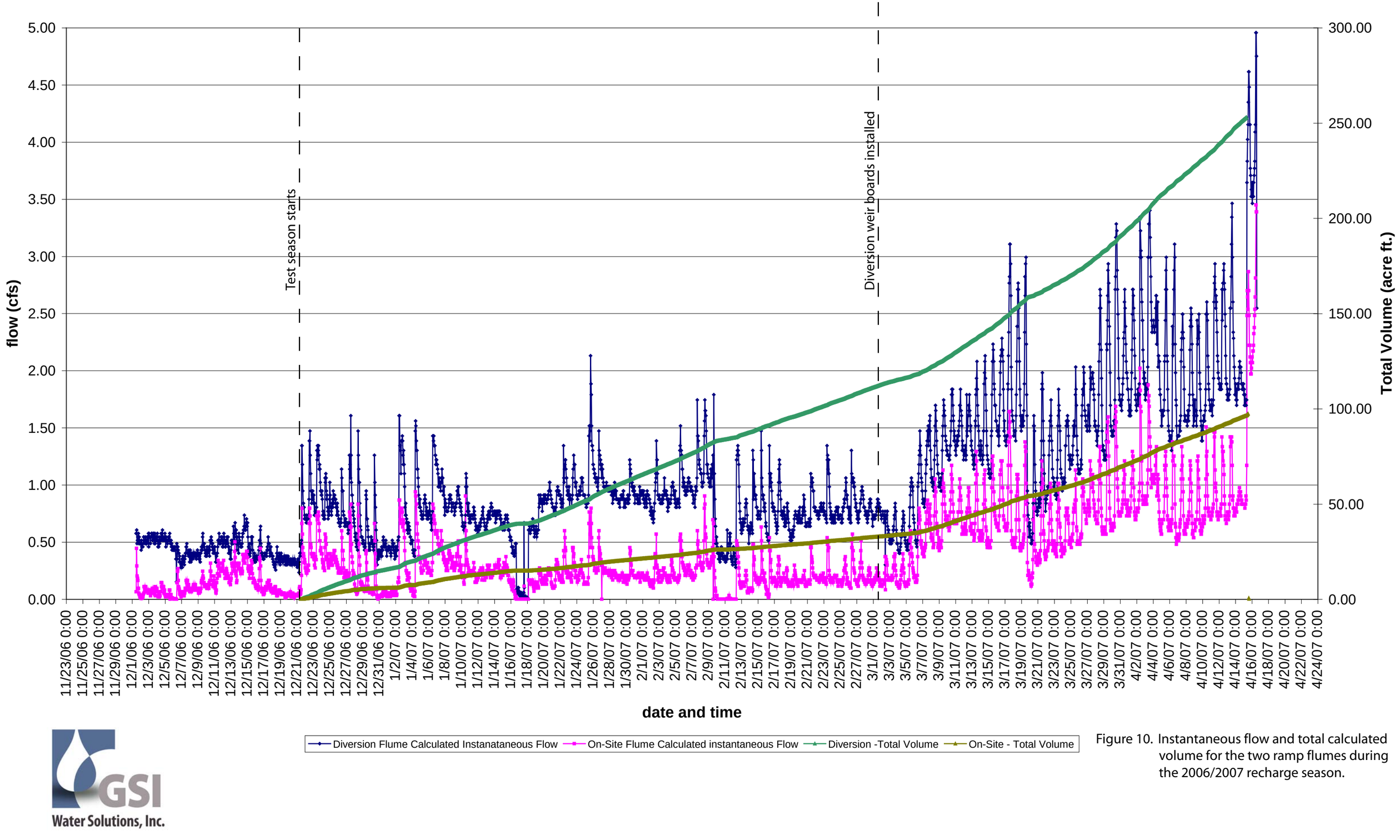
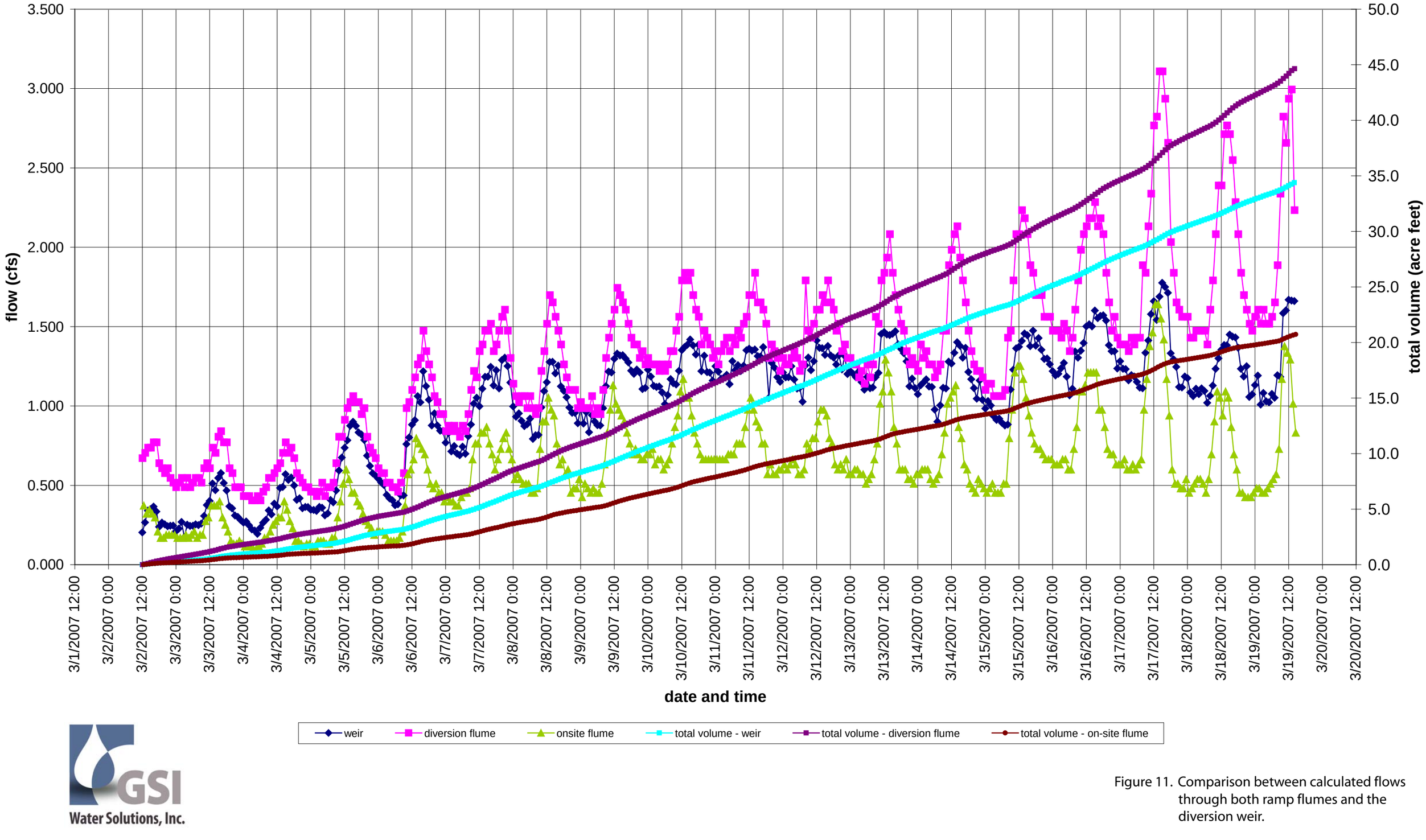


Figure 10. Instantaneous flow and total calculated volume for the two ramp flumes during the 2006/2007 recharge season.

GSI Water Solutions, Inc.

Flume vs. Weir Flow

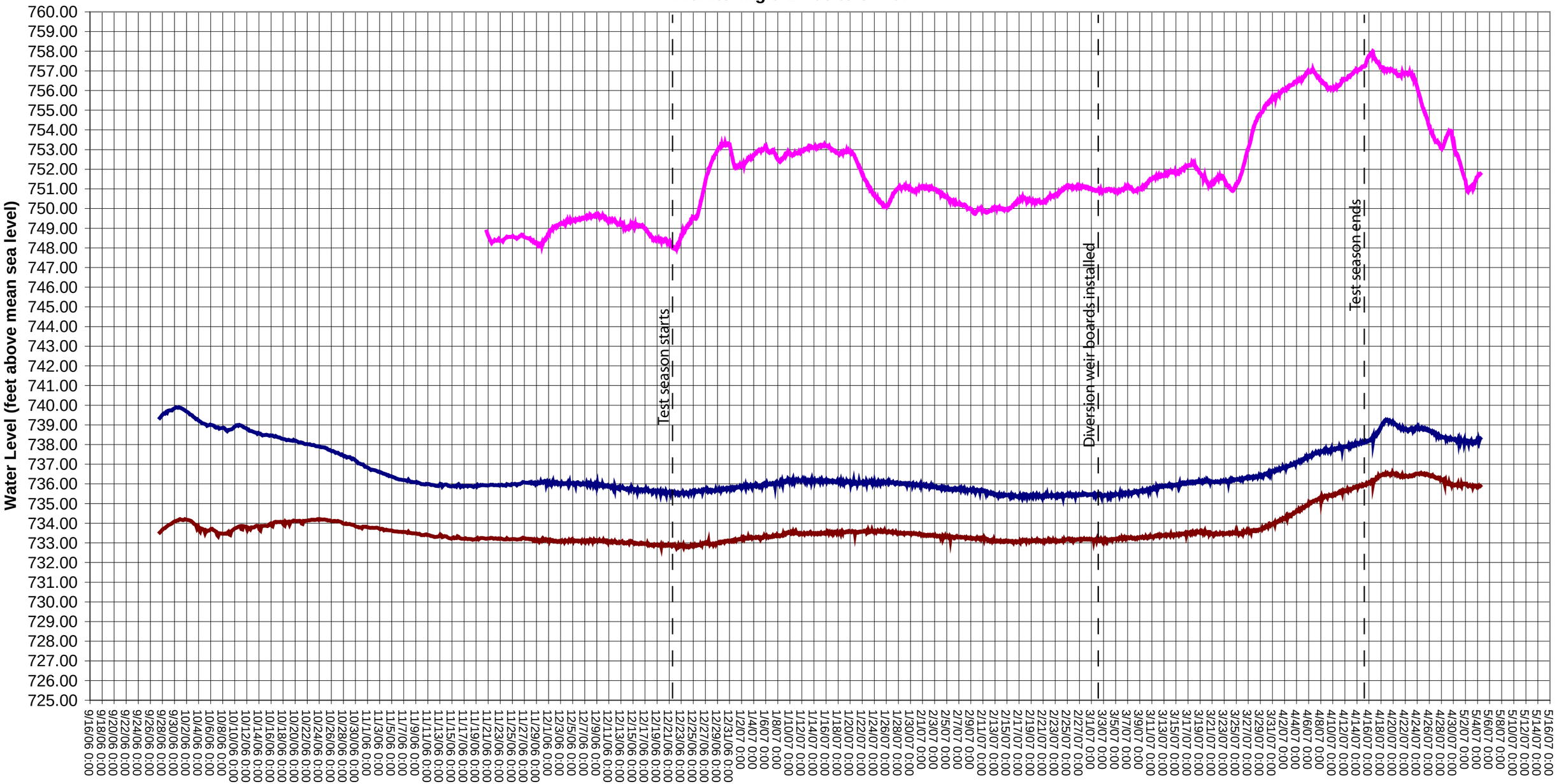


GSI Water Solutions, Inc.

Figure 11. Comparison between calculated flows through both ramp flumes and the diversion weir.

Hall Wentland Water Level Monitoring

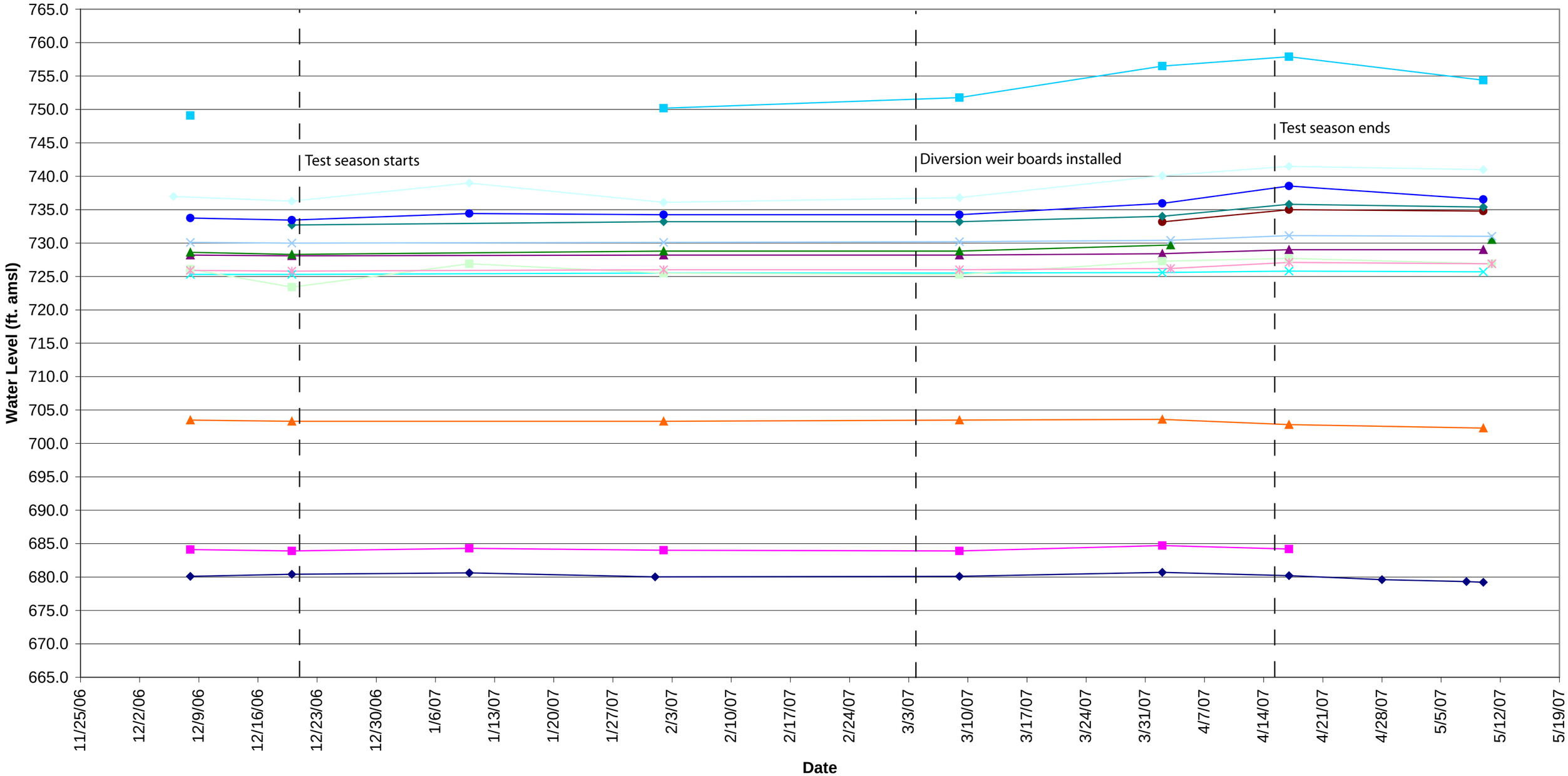
Monitoring 9-27-06 to 5-4-07



Water Solutions, Inc.

Figure 12. Hydrographs for moniroting wells HW-1, HW-2, and HW-3 for the period preceding, during, and following the 2006/2007 recharge season.

Page Monitoring Well Levels

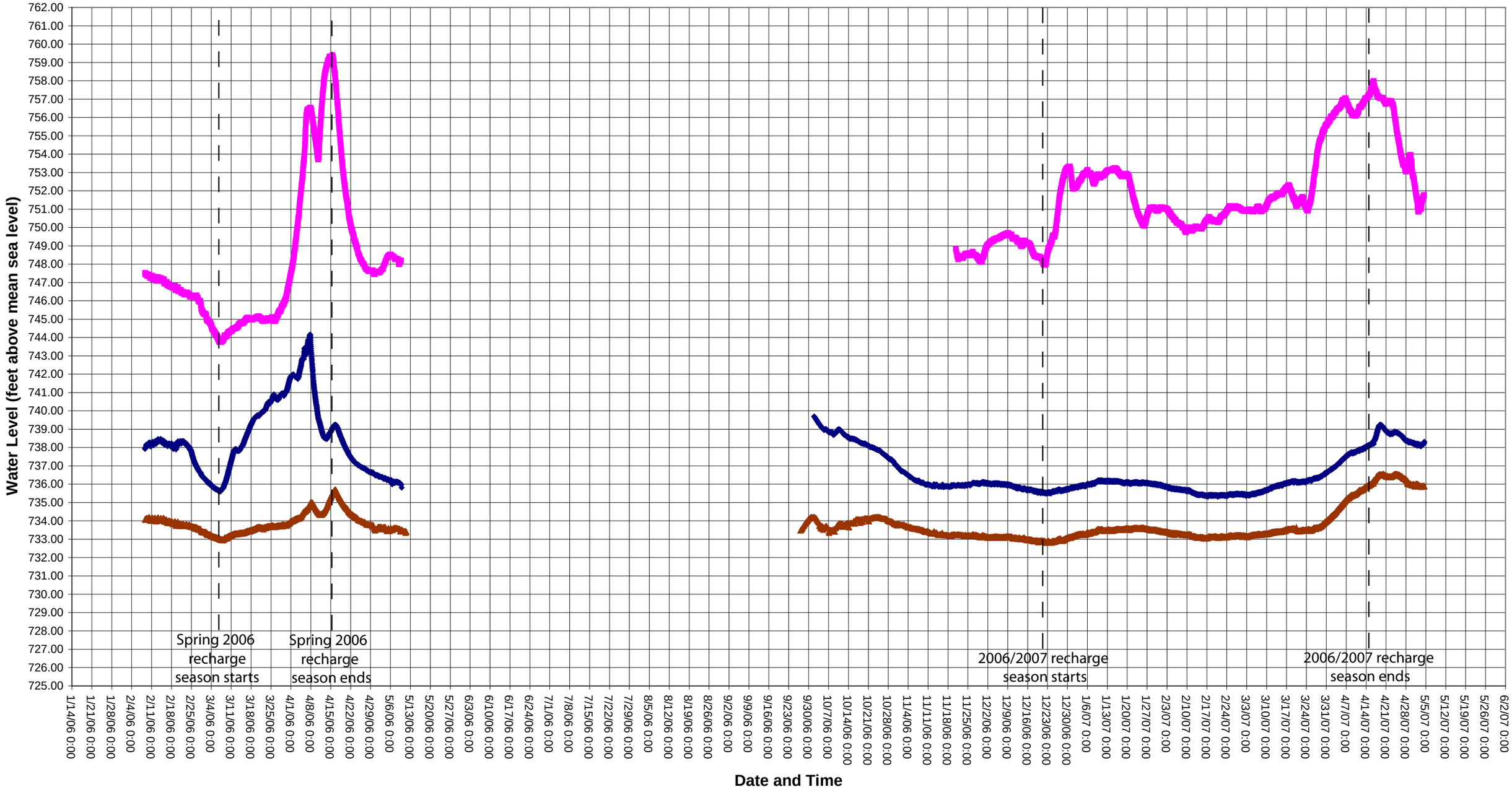


GSI Water Solutions, Inc.

Figure 13. Hydrograph for the manually measured off-site wells for the period preceding, during, and following the 2006/2007 season.

Hall Wentland Water Level Monitoring - 2006 and 2006/2007Seasons

Monitoring 2-8-06 to 5-4-07



Water Solutions, Inc.

Figure 14. Comparison between water levels in wells HW-1, HW-2, and HW-3 during the 2006 and 2006/2007 recharge seasons.

Appendix A

Field notes from the 2006/2007 recharge season

CONTENTS

PAGE	REFERENCE	DATE

9/27/06 down load transducers

HW-1 down loaded @ 12:20
DTW - 24.25

HW-2 down loaded @
DTW - 10.5

HW-3 down load @ 12 37
DTW - 23.33

HW-2 cable rusted through
donot have materials
to fix will reinstall
soon Transducer removed

HW-diversion down load @ 13:50
staff @ 0.62

10/31/2006

Going to HW 558 today to meet Ivana of HWA and give her lab blank / blind teed samples

Bottle marked "A" is low range hardness sample
Total 100 mg/l
calcium 50 mg/l

Bottle marked "B" is an manganics ~~standard~~

Nitrate-N 2mg/l
orthophosphated - 2mg/l

Meet Ivana outside at well on heeler field at ~ 1120. Give her the two blank samples A + B
C

10/31/06 (2)

Call Tom P ~ 1130, ELWW gauge has been running about 5 cfs

At ELWW/wells Gate at 1145, Flow is pretty slow on ELWW, gate has a lot of grass debris on it. Will need to be cleaned.

Ingle
ELWW at ~~Tuttle~~ Chapel Rd, low flow, fairly slow, cows in field + channel above the culvert

1150 @ StateLine gauge on ELWW Much better flow here than above gauge @ 0.41 to 0.42

Transducer still out in MW2, tied old wire from here

~~Moto~~ @ 1210

Back in Sfga @ 1:10 PM (1310)

11/20/2006

Onsite HW @ 1400 to install sonde transducer & fix other one

DTW 19.82' bTOC @ 1410
TD on well 49.8'

Sensor part on transducer @ 45.45' below top of cap gasket

Transducer back on sonde HW-2 @ 1437

Offsite @ 1450

11/21/2006

Onsite at HW-3 @ 1120
Transducer was pulled w/ cable
" recovered @ 1128
23.74' below RP

Bottom of casing 49.48'

Transducer back in hole @ 1145

Onsite HW-1 @ 1150, waiting for keys to show up

Transducer had broken w/, still trying to catch

Recovered transducer @ 1215
DTW 21.60 below RP @ 1217

Depth to bottom 53'

Back in @ 1230

11/27/2006

On site @ HW-2 1240

DTW 20.24' Below RP

Done @ 1245 of offsite

11/28

On site @ H.W 1015

computer time ~~1056~~ 1047

Time	flume pos
1047	0.22 cfs
1050	0.09
1052	
1053	1.1
1054	1.1
105506	0.6 cfs
1057	0.25
1058	0.6
1059	1.05
1100	1.1
1101	0.14
1102:36	0.15

1125, @ on-site flume + gauge
flow right now in flume @ 0.3

At 1130 m so, staff gauge @ 0.3 & 0.23
(flume manual readings)

12/1/06 pg2

Flume gauge @ 1334 is at 0.3 cfs (wells turned)

ELWW Gauge 0.48 to 0.49 @ 1342

Flume gauge at 1347 at 0.23 cfs

12/6/06

on site 9:20 - met ODFW at 0.[illegible] fish screen approved
John F and Tom P. on site

diversion flume gauge: 0.21 cfs @ 9:36
downloading transducer: 9:38

ELWW staff gauge: 0.34

HW-1 DTW = 27.60' TOC 10:05

HW-3 DTW = 23.86' TOC 10:16

on site flume gauge: 0.16 cfs 10:22

HW-2 DTW = 19.21' TOC 10:32

12/27/2006

Sample prep for H-W ~~Hoss~~ monitoring event.

Sample A, highrange hardness
sample
total hardness 1000 mg/l
Ca " 500 mg/l
12/27-A

Sample B, Inorganics

Nitrate-N 2 mg/l
phosphate (PO_4) 2mg/l
Sulfate (SO_4) 50 mg/l
12/27 - B

on site HW-3 11:40
gave Laura sample standards

download HW-3.
DTW - 11:47 - 24.02

HW-1 / bero
DTW - 12:01 - 23.99

12/27/2006
on site. Flume: 0.60
12:28

HW-2 - 12:40 - 16.84

diversion flume: 2.0
12:57
↑
after cleaning screen

ELWW: 0.41 13:06

2/9/07

onsite 13:10

HW-1 DTW - 27.97' TOC

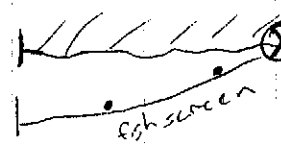
HW-3 DTW - 23.76' TOC

onsite flume gauge - 0.35 13:45
before cleaning diversion screen

HW-2 DTW - 16.93' TOC

diversion flume gauge - 0.40 14:12
before cleaning screen
after cleaning screen - 1.50 14:17
- 0.70 14:22
- 0.70 14:30
- 0.69 14:36

14:15 - filled gap at east end of fish screen.



14:33 - 1.32' below top of screen N side
1.21 below top of screen S side

14:45 - ELWW gauge - 0.33

02 March 2007

Onsite @ 1030 @ Wells Otis gauge
Ramp flume gauge @ 0.0cfs

Working on cleaning screen
Transducer installed in weir gauge 0.0 @ 1055

Bunny cleaning flow on ramp flume
consistently @ 0.1 cfs

1110 flow @ 0.05 cfs

1118, pull ~~stg~~ ramp flume transducer to download

1135, Transducer back in ramp flume reading 0.15 cfs

Flow over weir reads
1.06 ft on gauge or "0" on weir

1135, at HW-1
DTW 28.20 ft below rp @ 1137

3/19/07 ①

on side HW-1 14:00
DTW - 27.45'

@ HW-3 14:27
DTW -23.35'

@ HW-2 14:38
DTW - 17.10'

@ on side flume 14:42
gauge reads : 0.72 cfs

@ diversion @ 15:10
staff reads : 1.25'
flume reads : 0.72 cfs

@ ELWW gauge 15:26 - 0.36'

1145 at HW-3
DTW 23.83 e 1147

1153 e flume on to side
Flume still e 0.15 cfs

1201 e HW-2
1203 DTW ~~17.83~~ 17.78 below RR

1205 off side HW

4/16/07

KAL onsite @ H-W, setting ditch transducers

onsite pulled plot

Then @ wells ditch turnout, flume has beaver bypassing.
1545 4/16/07

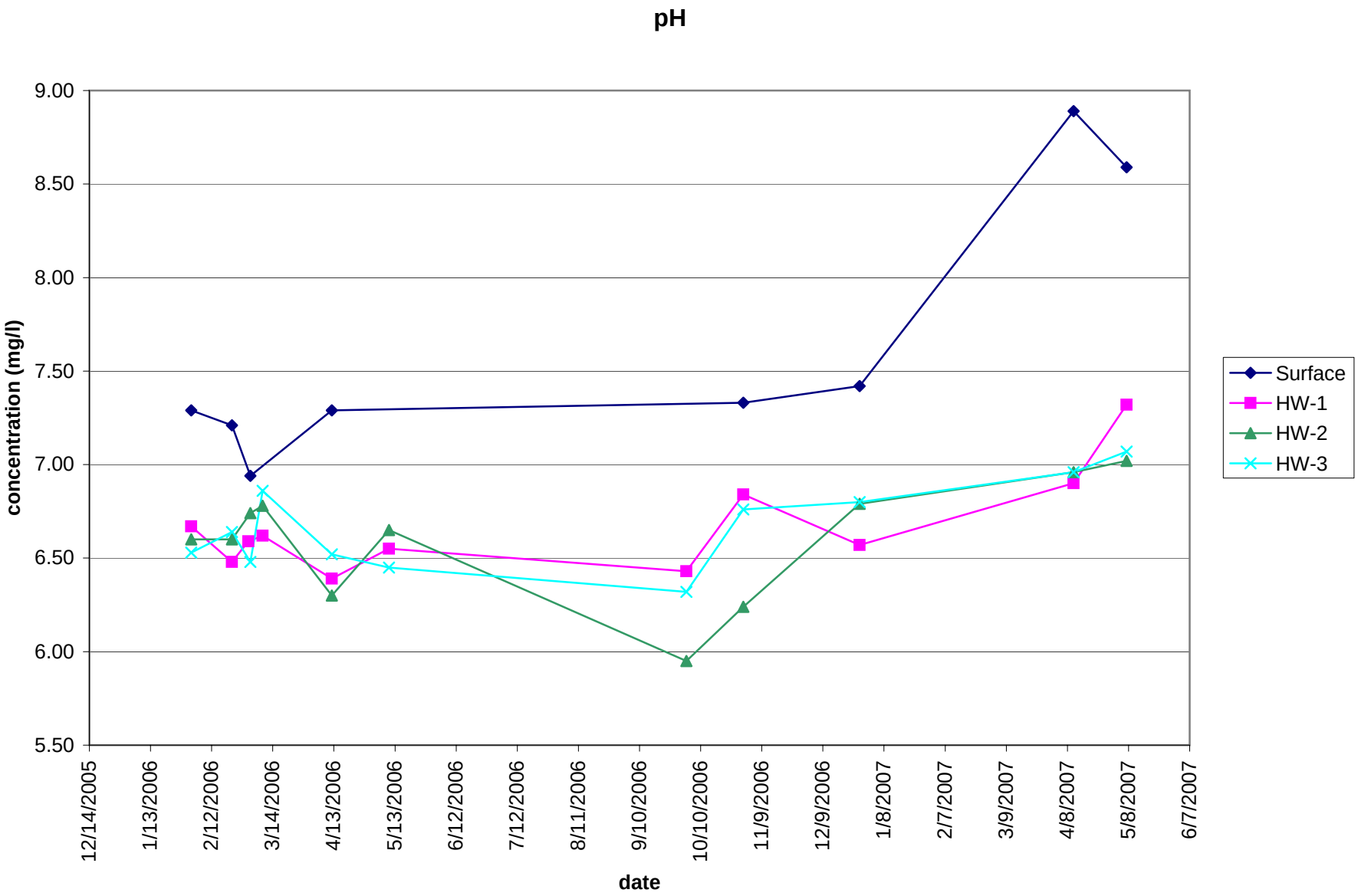
back onsite @ 1750 to download HW-1 & barologger

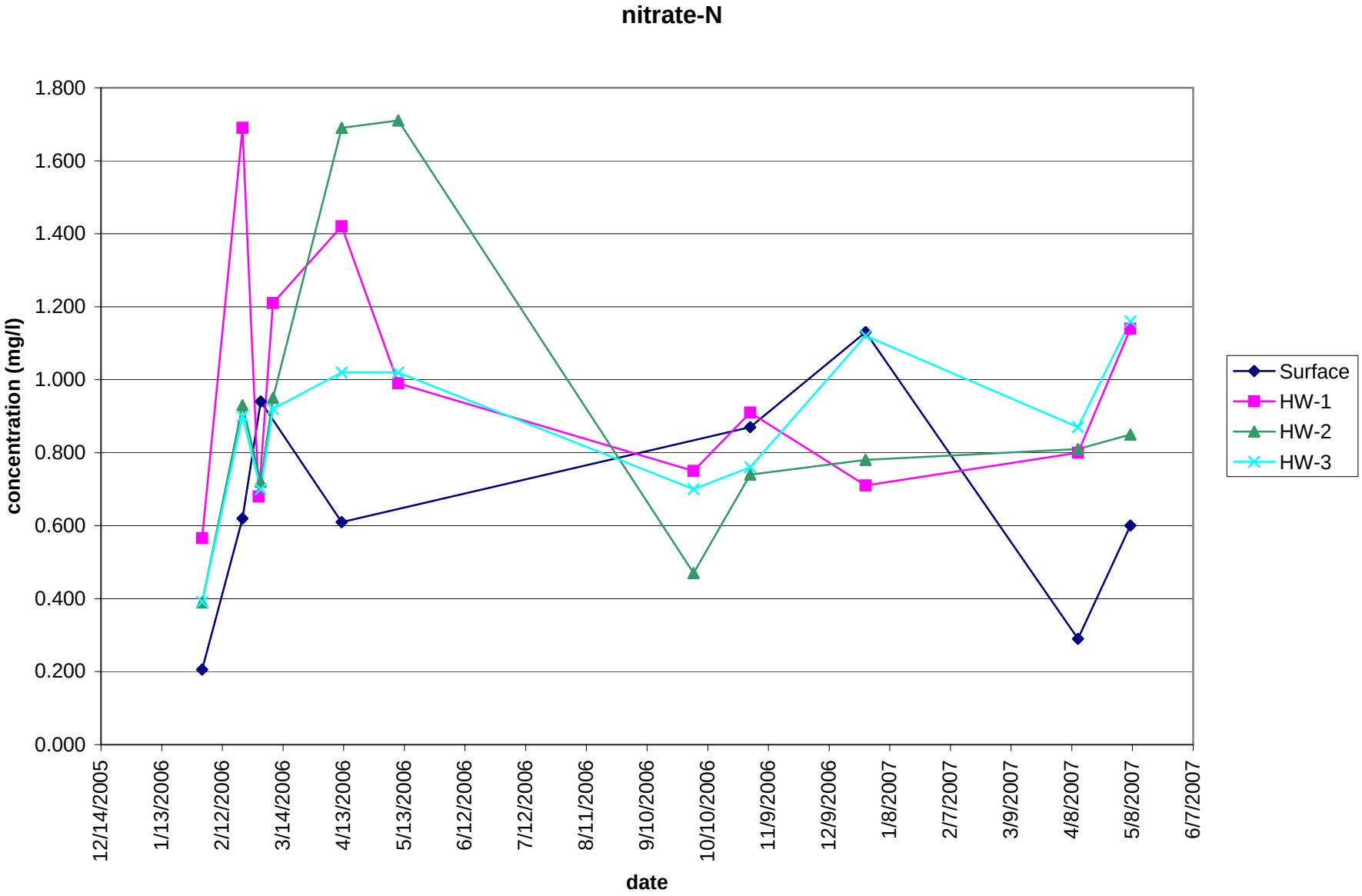
manual measurement @ 1752
DTW 25.26 btp

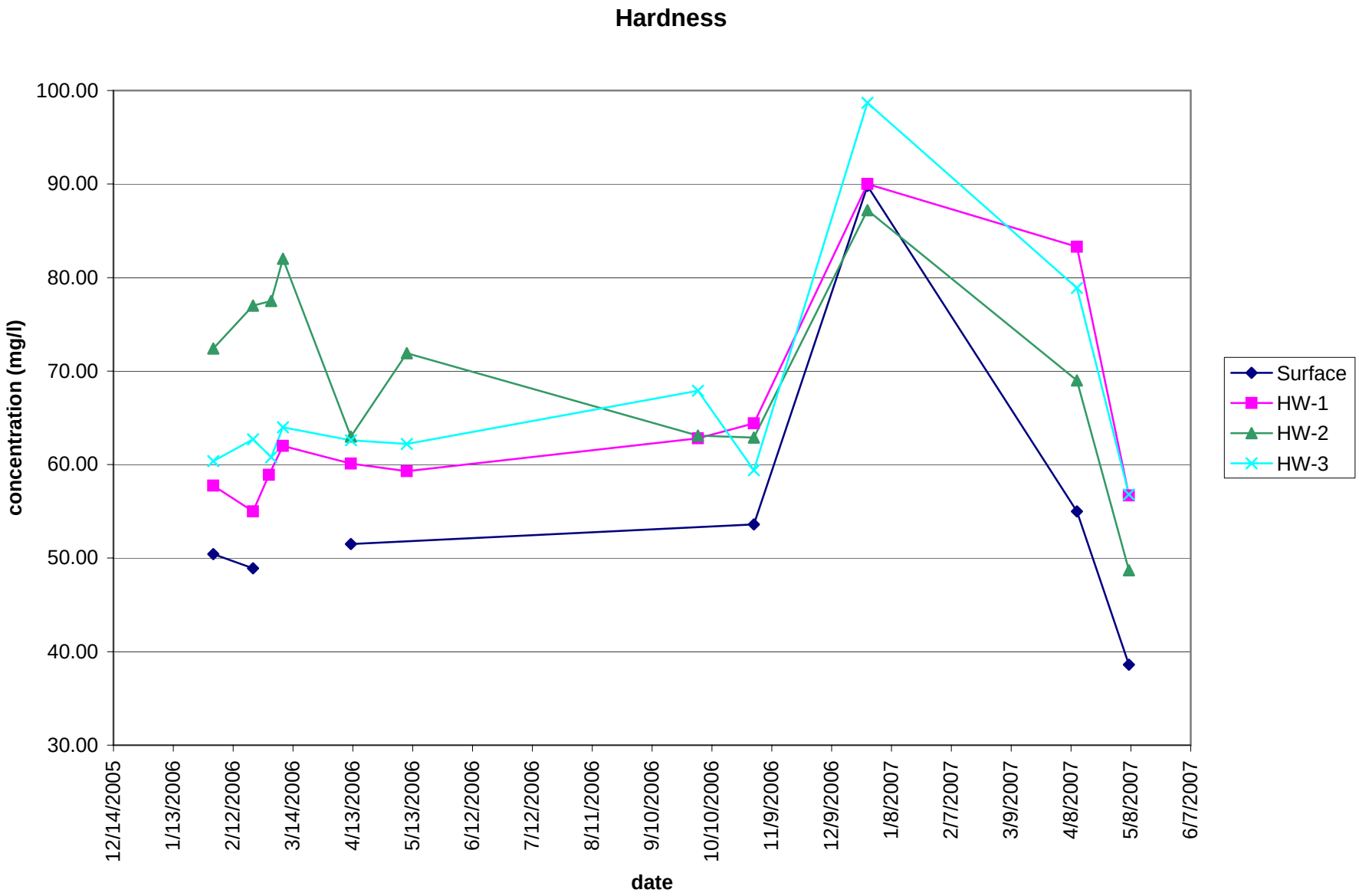
off site @ 1800

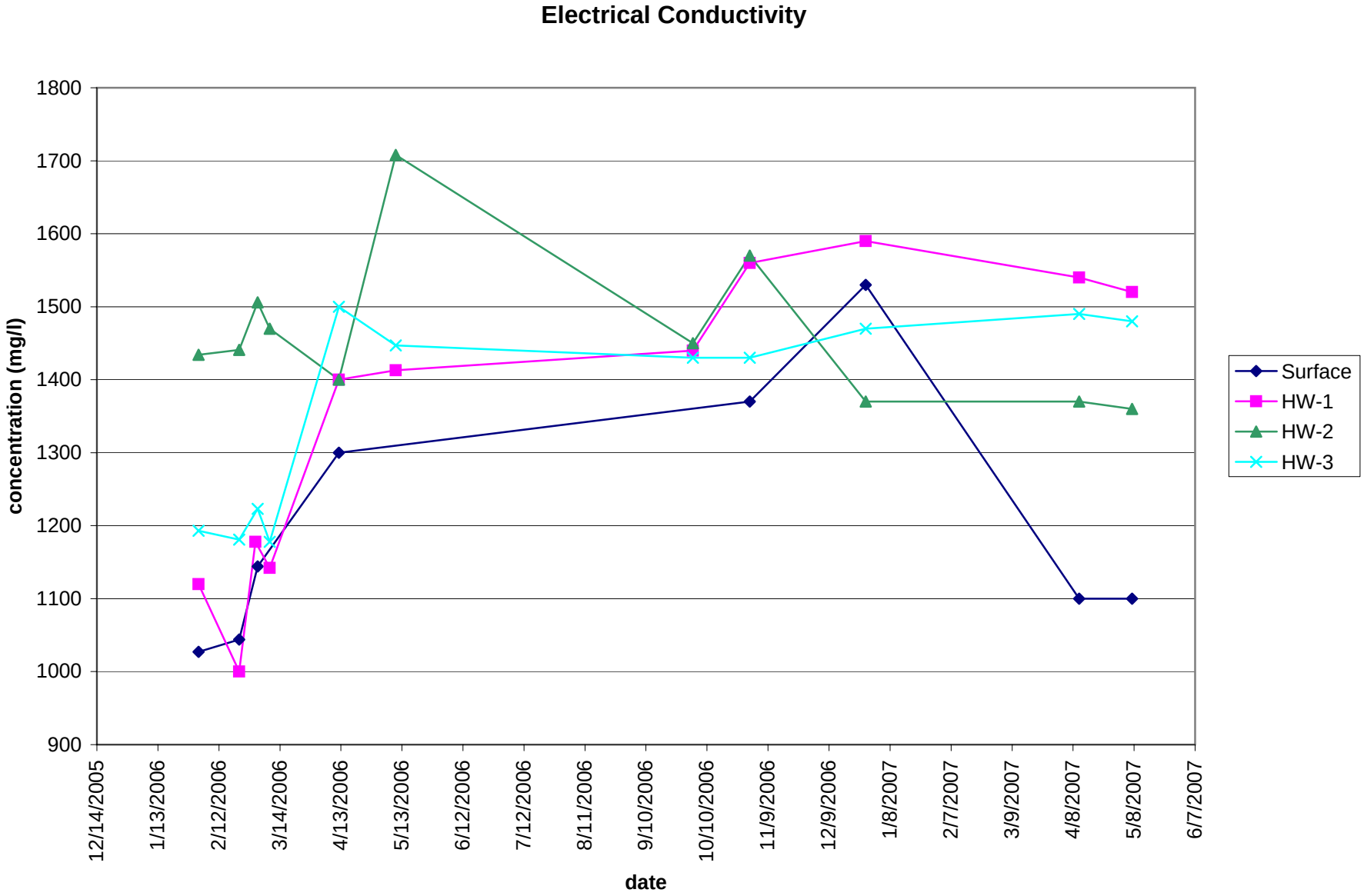
Appendix B

Water quality results for the 2006/2007 recharge season

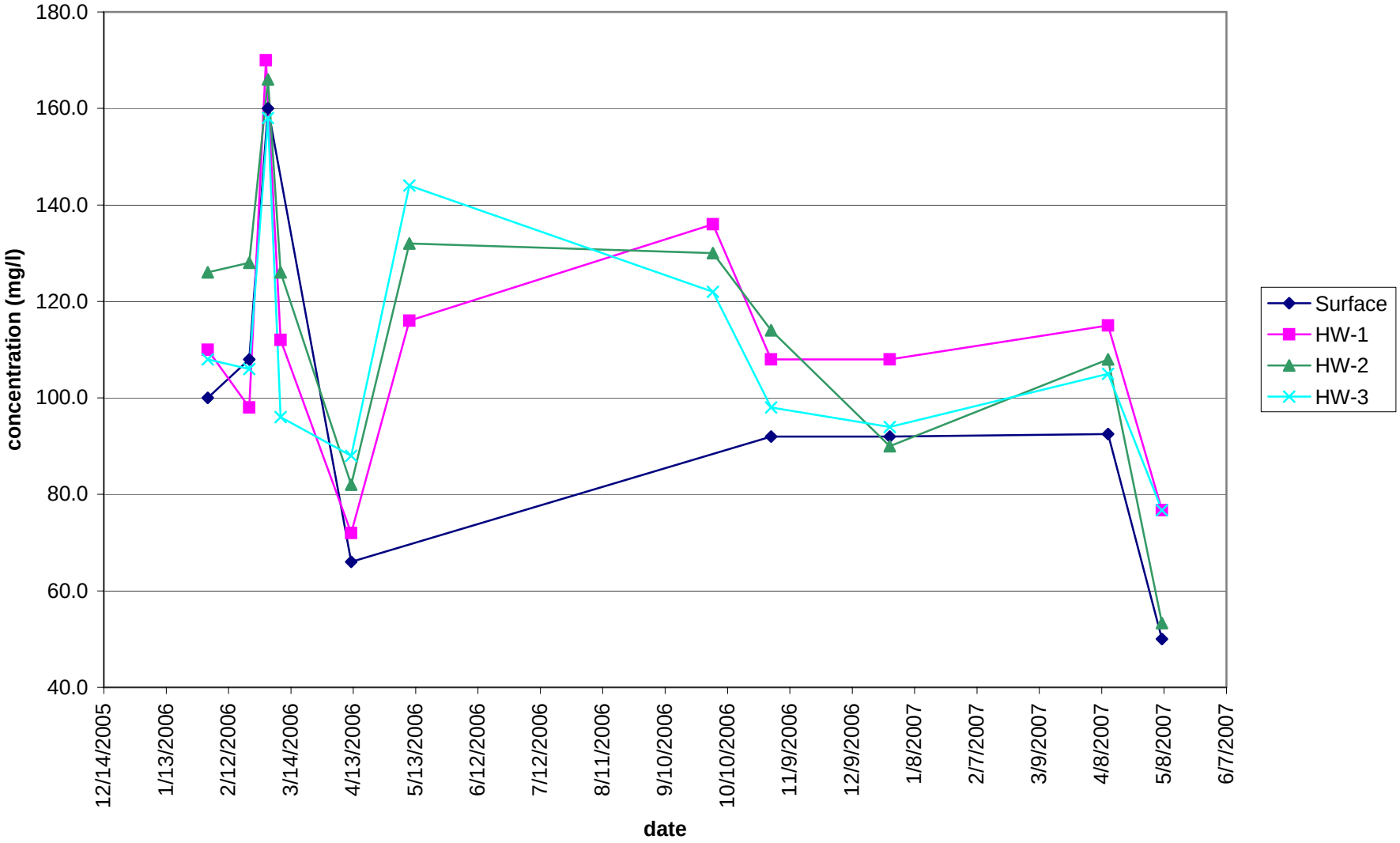

pH
9.00
8.50
8.00
7.50
7.00
6.50
6.00
5.50
concentration (mg/l)
12/14/2005
1/13/2006
2/12/2006
3/14/2006
4/13/2006
5/13/2006
6/12/2006
7/12/2006
8/11/2006
9/10/2006
10/10/2006
11/9/2006
12/9/2006
1/8/2007
2/7/2007
3/9/2007
4/8/2007
5/8/2007
6/7/2007
date
Surface
HW-1
HW-2
HW-3

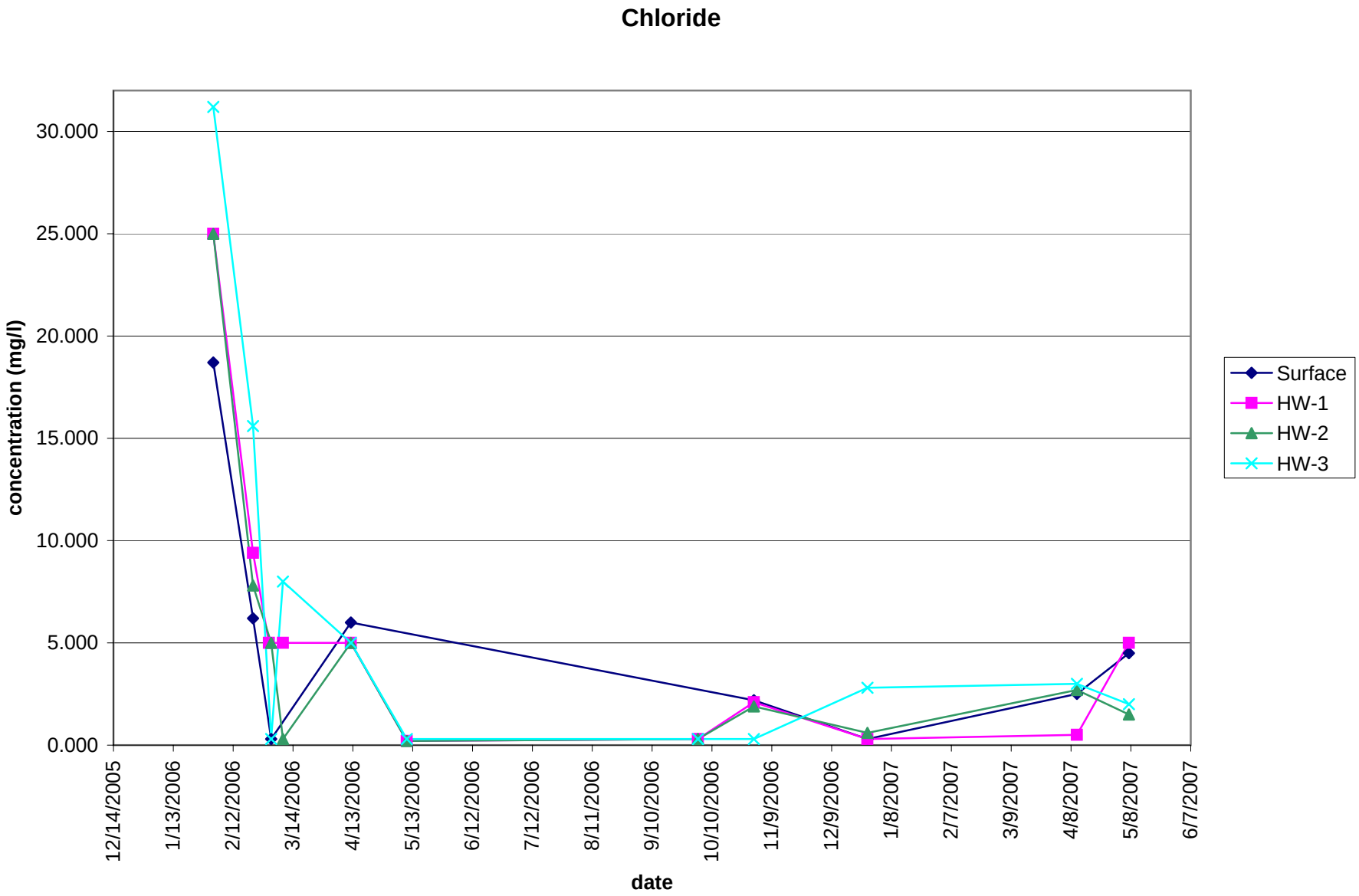

nitrate-N
concentration (mg/l)
1.800
1.600
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
12/14/2005
1/13/2006
2/12/2006
3/14/2006
4/13/2006
5/13/2006
6/12/2006
7/12/2006
8/11/2006
9/10/2006
10/10/2006
11/9/2006
12/9/2006
1/8/2007
2/7/2007
3/9/2007
4/8/2007
5/8/2007
6/7/2007
date
Surface
HW-1
HW-2
HW-3

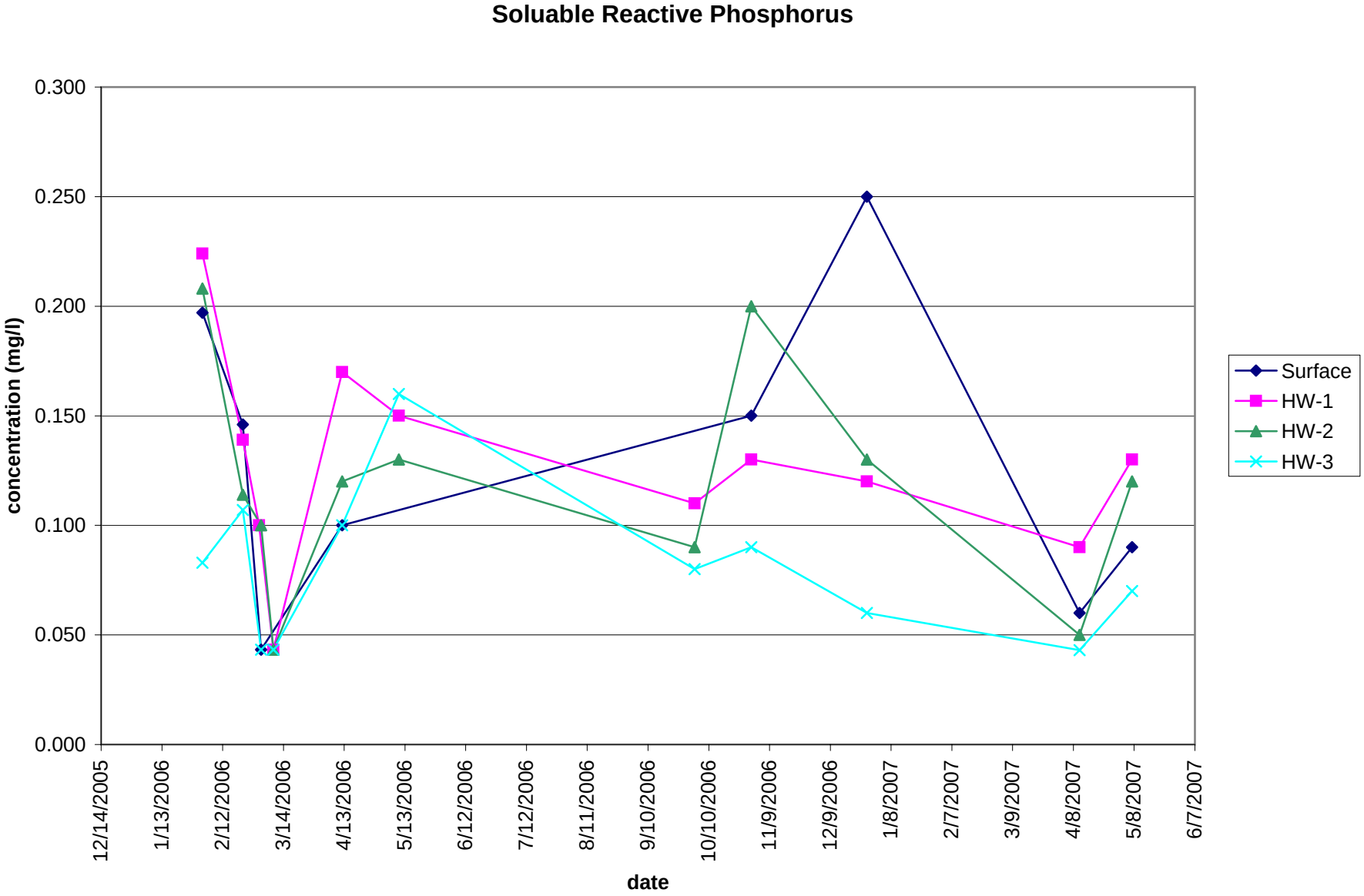

Hardness
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
concentration (mg/l)
12/14/2005
1/13/2006
2/12/2006
3/14/2006
4/13/2006
5/13/2006
6/12/2006
7/12/2006
8/11/2006
9/10/2006
10/10/2006
11/9/2006
12/9/2006
1/8/2007
2/7/2007
3/9/2007
4/8/2007
5/8/2007
6/7/2007
date
Surface
HW-1
HW-2
HW-3


Electrical Conductivity
concentration (mg/l)
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
12/14/2005
1/13/2006
2/12/2006
3/14/2006
4/13/2006
5/13/2006
6/12/2006
7/12/2006
8/11/2006
9/10/2006
10/10/2006
11/9/2006
12/9/2006
1/8/2007
2/7/2007
3/9/2007
4/8/2007
5/8/2007
6/7/2007
date
Surface
HW-1
HW-2
HW-3

Total Dissolved Solids




Chloride
concentration (mg/l)
30.000
25.000
20.000
15.000
10.000
5.000
0.000
12/14/2005
1/13/2006
2/12/2006
3/14/2006
4/13/2006
5/13/2006
6/12/2006
7/12/2006
8/11/2006
9/10/2006
10/10/2006
11/9/2006
12/9/2006
1/8/2007
2/7/2007
3/9/2007
4/8/2007
5/8/2007
6/7/2007
date
Surface
HW-1
HW-2
HW-3


Soluable Reactive Phosphorus
0.300
0.250
0.200
0.150
0.100
0.050
0.000
concentration (mg/l)
12/14/2005
1/13/2006
2/12/2006
3/14/2006
4/13/2006
5/13/2006
6/12/2006
7/12/2006
8/11/2006
9/10/2006
10/10/2006
11/9/2006
12/9/2006
1/8/2007
2/7/2007
3/9/2007
4/8/2007
5/8/2007
6/7/2007
date
Surface
HW-1
HW-2
HW-3

Kuo Testing Labs, Inc. Daily Field Report

Project:	Hall - Wentland SAR Monitoring	**Project#:**
Contractor:	Kuo Testing Labs, Inc.	**Task #:**
KTL Personnel:	Laura Hofbauer	**Page OF**
		Date:04/11/07
Weather:		

TIME:	DESCRIPTION OF WORK
11:38	on site HW-2
01:08	on site HW-3
01:36	on site - surface water
01:56	on site - HW-1

Kuo Testing Labs, Inc.

Groundwater Sampling Field Data Sheet

Page ___ of

PROJECT NAME: Hall-Wentland SAR Project	**No.:**	**WELL NO:** HW - 1
FIELD SAMPLER: Laura Hofbauer		**DATE:** 04/11/07
FIELD ANALYST: Laura Hofbauer		
SAMPLING METHOD: Battery Operated Whale Water Mini Purge Pump		
FIELD INSTRUMENTS USED: Orion pH Meter model 210A Hach Conductivity Meter Solinst Water Level Meter Model 101 HF Scientific ORT-15 CE Turbidi Meter		**CONDITION of WELL:** satisfactory

Water Level Data		Well Construction Data		Well Purging Data	
1) Total Well Depth (feet)	52.30	Outside Casing Diameter D_2 (in.)	2"	Calculate Casing Volume	
2) Initial Depth to Water WT** (feet)	25.82	Bore Hole Diameter D_3 (in.)	6"	L_1 26.48 *0.16 = 4.23 CV in Gallons	
3) Final Depth To Water	25.84	Filter Pack Length L_2 (feet)	12	CV 4.23 /2 = 2.12 BV in Gallons	
		Porosity of Filter Pack N (%)	25	Total Purge Volume (gals) CV*(3)= TPV(gals)	12.71
				Actual Volume Purged (gals)	15
4) Length of Water in Column L_1 *Value on Line1– Value on Line 2 (feet)*	26.48			Number of Bore Volumes Purged	6

* The surveyed point on the inside (usually PVC) casing

** The depth to the water table before removing any water from the well

WELL PURGING MEASUREMENTS

Time	Cumulative Gallons Purged	pH	Temperature °C	Conductivity µs/cm 2mS 20mS	Turbidity NTU	Purge Rate GPM	Comments
02:01			began	purge			
02:04	3	7.04	13.3	0154	0.44		
02:06	6	6.96	12.9	0154	0.23		
02:08	9	6.96	12.8	0154	0.19		
02:10	12	6.93	12.8	0153	0.15		
02:12	15	6.90	12.9	0154	0.12		
			End purge	Collected	sample		

Forms by Gina Clark

Kuo Testing Labs, Inc.

337 South 1st Avenue, Othello, WA 99344
(509) 488-0112 Phone (509) 488-0118 Fax (800) 328-0112 Toll Free
Web Site: http://www.kuotesting.com e-mail: kuotest@atnet.net

DATE COLLECTED: 4/11/2007
DATE RECEIVED: 4/12/2007
DATE REPORTED: 5/22/2007

SYSTEM / CUSTOMER:
GSI , Inc.
1020 N. Center Pkwy, Ste F
Kennewick WA 99336
Project Name:Hall Wentland

SEND REPORT TO:
Ground Water Solutions, Inc.
1020 N. Center Pkwy, Ste F
Kennewick WA 99336
Attn: Jon, Kevin

SAMPLE NO.	CUSTOMER SAMPLE NO.	ANALYSIS	RESULTS	MDL	UNITS	ANALYSTS
87719	HW-1	Nitrate as Nitrogen	0.80	0.015	mg/L	Reed
87719	HW-1	Nitrite as Nitrogen	ND	0.0023	mg/L	Reed
87719	HW-1	Hardness	83.3	0.11	mg/L	Reed
87719	HW-1	Chloride	0.50	0.297	mg/L	Reed
87719	HW-1	Orthophosphate as P	0.09	0.043	mg/L	Reed
87719	HW-1	COD	<8	8	mg/L	Morris
87719	HW-1	Total Coliform and E. Coli	Absent/Absent			Reed
87719	HW-1	SOC/Synthetic Organic Compounds	Attached Report		mg/L	Edge Analytical
87719	HW-1	Total Dissolved Solids	115	21.1	mg/L	Reed

<(0.001): indicates the analyte was not detected at or above the concentration indicated.
ND: None Detected
mg/L:Indicates milligrams per litre
PQL=Practical Quantitation Limit is the lowest level that can be achieved within specified limits of precision and accuracy during routine laboratory operating conditions
MDL: Method Detection Limit
Please check out our new Web Site at http://www.kuotesting.com
Upon Visual Observation

Dr. Eugene Kuo, Quality Assurance Manager

05-28-07
Date

EDGE ANALYTICAL
"The lab you can trust"

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Corporate Office | 800.755.9295 • 360.757.1400 • 360.757.1402fax
Bellingham WA | 805 Orchard Dr Suite 4 - 98225
Microbiology | 360.671.0688 • 360.671.1577fax

HERBICIDES IN DRINKING WATER

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

Reference Number: 07-04495

Project: 87719 —> 87722

System Name:
System ID Number:
DOH Source Number:
Multiple Sources:
Sample Type:
Sample Purpose: Investigative or Other
Sample Location: 87719
County:
Sampled By:
Sampler Phone:

Field ID: 87719
Lab Number: 04610230
Date Collected: 4/11/2007
Date Extracted: 515_070417
Date Analyzed: 4/30/2007
Report Date: 5/3/2007
Analyst: HY/CC
Supervisor:

EPA Method 515.1 For State Drinking Water Compliance

DOH#	COMPOUNDS	RESULTS	Units	SRL	Trigger	MCL	COMMENT
	EPA Regulated						
37	2,4 - D	ND	ug/L	0.2	0.2	70	
38	2,4,5 - TP (SILVEX)	ND	ug/L	0.4	0.4	50	
134	PENTACHLOROPHENOL	ND	ug/L	0.08	0.08	1	
137	DALAPON	ND	ug/L	2	2	200	
139	DINOSEB	ND	ug/L	0.4	0.4	7	
140	PICLORAM	ND	ug/L	0.2	0.2	500	
	EPA Unregulated						
138	DICAMBA	ND	ug/L	0.2	0.2		
	State Unregulated						
222	TOTAL DCPA	ND	ug/L	0.1	0.1		
225	DCPA (ACID METABOLITES)	ND	ug/L	0.1	0.1		
135	2,4 DB	ND	ug/L	1.0	1.0		
136	2,4,5 T	ND	ug/L	0.4	0.4		
220	BENTAZON	ND	ug/L	0.5	0.5		
221	DICHLORPROP	ND	ug/L	0.5	0.5		
223	ACIFLUORFEN	ND	ug/L	2.0	2.0		
224	CHLORAMBEN	ND	ug/L	0.2	0.2		
226	3,5 - DICHLOROBENZOIC ACID	ND	ug/L	0.5	0.5		

*- An amount of "ND" indicates that the compound was not detected above the Lab's Method Detection Limit - MDL.
**- Maximum Contaminant Level, maximum permissible level of a contaminant in water established by EPA, NPDWR. State Advisory Level (SAL) for Unregulated compounds.
A blank MCL or SAL value indicates a level is not currently established.
***- If a compound is detected > or = to the State Reporting Level, SRL, specified increased monitoring frequencies may occur per DOH.
****- Method Detection Limit is the lab's minimum concentration a compound can be measured and reported with 99% confidence that the compound concentration is greater than zero.
J - Estimated value.

EDGE ANALYTICAL
The lab you can trust!

Burlington WA | 1620 S Walnut St - 98233
Corporate Office | 800.755.9295 • 360.757.1400 • 360.757.1402fax
Bellingham WA | 805 Orchard Dr Suite 4 - 98225
Microbiology | 360.671.0688 • 360.671.1577fax

SYNTHETIC ORGANIC COMPOUNDS (SOC) REPORT

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

Reference Number: 07-04495

Project: 87719 —> 87722

System Name:
System ID Number:
DOH Source Number:
Multiple Sources:
Sample Type:
Sample Purpose: Investigative or Other
Sample Location: 87719
County:
Sampled By:
Sampler Phone:

Field ID: 87719
Lab Number: 04610230
Date Collected: 4/11/2007
Date Extracted: 525_070416
Date Analyzed: 4/16/2007
Report Date: 4/26/2007
Analyst: CO
Supervisor:

EPA Method 525.2 For State Drinking Water Compliance

DOH#	COMPOUNDS	RESULTS	Units	SRL	Trigger	MCL	COMMENT
	EPA Regulated						
33	ENDRIN	ND	ug/L	0.02	0.02	2	
34	LINDANE (BHC - GAMMA)	ND	ug/L	0.04	0.04	0.2	
35	METHOXYCHLOR	ND	ug/L	0.2	0.2	40	
117	ALACHLOR	ND	ug/L	0.4	0.4	2	
119	ATRAZINE	ND	ug/L	0.2	0.2	3	
120	BENZO(A)PYRENE	ND	ug/L	0.04	0.04	0.2	
122	CHLORDANE, TECHNICAL	ND	ug/L	0.4	0.4	2	
124	DI(ETHYLHEXYL)-ADIPATE	ND	ug/L	1.3	1.3	400	
125	DI(ETHYLHEXYL)-PHTHALATE	ND	ug/L	1.3	1.3	6	
126	HEPTACHLOR	ND	ug/L	0.08	0.08	0.4	
127	HEPTACHLOR EPOXIDE	ND	ug/L	0.04	0.04	0.2	
128	HEXACHLOROBENZENE	ND	ug/L	0.2	0.2	1	
129	HEXACHLOROCYCLO-PENTADIENE	ND	ug/L	0.2	0.2	50	
133	SIMAZINE	ND	ug/L	0.15	0.15	4	
134	PENTACHLOROPHENOL	ND	ug/L	0.4	0.08	1	screening only / compliance by 515.1
	EPA Unregulated						
118	ALDRIN	ND	ug/L	0.2	0.2		
121	BUTACHLOR	ND	ug/L	0.4	0.4		
123	DIELDRIN	ND	ug/L	0.2	0.2		
130	METOLACHLOR	ND	ug/L	1.0	1.0		
131	METRIBUZIN	ND	ug/L	0.2	0.2		
132	PROPACHLOR	ND	ug/L	0.2	0.2		
	State Unregulated - Other						
179	BROMACIL	ND	ug/L	0.2	0.2		
190	TERBACIL	ND	ug/L	0.2	0.2		
202	DIAZINON	ND	ug/L	0.2	0.2		
208	EPTC	ND	ug/L	0.3	0.3		Unstable in Acidified Sample Matrix

*- An amount of "ND" indicates that the compound was not detected above the Lab's Method Detection Limit - MDL.
**- Maximum Contaminant Level, maximum permissible level of a contaminant in water established by EPA, NPDWR. State Advisory Level (SAL) for Unregulated compounds.
A blank MCL or SAL value indicates a level is not currently established.
***- If a compound is detected > or = to the State Reporting Level, SRL, specified increased monitoring frequencies may occur per DOH.
****- Method Detection Limit is the lab's minimum concentration a compound can be measured and reported with 99% confidence that the compound concentration is greater than zero.
J - Estimated value.

SYNTHETIC ORGANIC COMPOUNDS (SOC) REPORT

DOH#	COMPOUNDS	RESULTS	Units	SRL	Trigger	MCL	COMMENT
232	4,4-DDD	ND	ug/L	0.2	0.2		
233	4,4-DDE	ND	ug/L	0.2	0.2		
234	4,4-DDT	ND	ug/L	0.2	0.2		
236	CYANAZINE	ND	ug/L	0.2	0.2		Qualitative Analysis Only
239	MALATHION	0.4	ug/L	0.2	0.2		Field dup - 0.3 ug/L
240	PARATHION	ND	ug/L	0.2	0.2		
243	TRIFLURALIN	ND	ug/L	0.2	0.2		
	- PAHs						
96	NAPTHALENE	ND	ug/L	0.1	0.1		
254	FLUORENE	ND	ug/L	0.2	0.2		
244	ACENAPHTHYLENE	ND	ug/L	0.2	0.2		
245	ACENAPHTHENE	ND	ug/L	0.2	0.2		
246	ANTHRACENE	ND	ug/L	0.2	0.2		
247	BENZ(A)ANTHRACENE	ND	ug/L	0.1	0.1		
248	BENZO(B)FLUORANTHENE	ND	ug/L	0.2	0.2		
249	BENZO(G,H,I)PERYLENE	ND	ug/L	0.2	0.2		
250	BENZO(K)FLUORANTHENE	ND	ug/L	0.2	0.2		
251	CHRYSENE	ND	ug/L	0.2	0.2		
252	DIBENZO(A,H)ANTHRACENE	ND	ug/L	0.2	0.2		
253	FLUORANTHENE	ND	ug/L	0.2	0.2		
255	INDENO(1,2,3-CD)PYRENE	ND	ug/L	0.2	0.2		
256	PHENANTHRENE	ND	ug/L	0.2	0.2		
257	PYRENE	ND	ug/L	0.2	0.2		
	- Phthalates						
258	BENZYL BUTYL PHTHALATE	ND	ug/L	0.6	0.6		
259	DI-N-BUTYL PHTHALATE	0.7	ug/L	0.6	0.6		Field dup - 0.6 ug/L
260	DIETHYL PHTHALATE	ND	ug/L	0.6	0.6		
261	DIMETHYL PHTHALATE	ND	ug/L	0.6	0.6		

*- An amount of "ND" indicates that the compound was not detected above the Lab's Method Detection Limit - MDL.
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J - Estimated value.

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Bellingham WA — Microbiology | 805 Orchard Dr Suite 4 - 98225 | 360.671.0688 • 360.671.1577fax

SYNTHETIC ORGANIC COMPOUNDS (SOC) REPORT

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

Reference Number: 07-04495

Project: 87719 —> 87722

System Name:
System ID Number:
DOH Source Number:
Multiple Sources:
Sample Type:
Sample Purpose: Investigative or Other
Sample Location: 87719
County:
Sampled By:
Sampler Phone:

Field ID: 87719
Lab Number: 04610230
Date Collected: 4/11/2007
Date Extracted: 508_070416
Date Analyzed: 4/16/2007
Report Date: 4/25/2007
Analyst: MM/CC
Supervisor:

EPA Method 508.1 For State Drinking Water Compliance

DOH#	COMPOUNDS	RESULTS	Units	SRL	Trigger	MCL	COMMENT
	PCBs/Toxaphene						
153	PCBS (Total Aroclors)	ND	ug/L	0.2	0.2	0.5	
173	AROCLOR 1221	ND	ug/L	20	20		
174	AROCLOR 1232	ND	ug/L	0.5	0.5		
175	AROCLOR 1242	ND	ug/L	0.5	0.3		
176	AROCLOR 1248	ND	ug/L	0.1	0.1		
177	AROCLOR 1254	ND	ug/L	0.1	0.1		
178	AROCLOR 1260	ND	ug/L	0.2	0.2		
180	AROCLOR 1016	ND	ug/L	0.1	0.1		
36	TOXAPHENE	ND	ug/L	2	2	3	

*- An amount of "ND" indicates that the compound was not detected above the Lab's Method Detection Limit - MDL.
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****- Method Detection Limit is the lab's minimum concentration a compound can be measured and reported with 99% confidence that the compound concentration is greater than zero.
J - Estimated value.

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CARBAMATES IN DRINKING WATER

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

Reference Number: 07-04495

Project: 87719 —> 87722

System Name:
System ID Number:
DOH Source Number:
Multiple Sources:
Sample Type:
Sample Purpose: Investigative or Other
Sample Location: 87719
County:
Sampled By:
Sampler Phone:

Field ID: 87719
Lab Number: 04610230
Date Collected: 4/11/2007
Date Extracted: 531_070503
Date Analyzed: 5/3/2007
Report Date: 5/8/2007
Analyst: CO
Supervisor:

EPA Method 531.2 For State Drinking Water Compliance

DOH#	COMPOUNDS	RESULTS	Units	SRL	Trigger	MCL	COMMENT
	EPA Regulated						
148	OXYMAL	ND	ug/L	4.0	4.0	200	
146	CARBOFURAN	ND	ug/L	1.8	1.8	40	
	EPA Unregulated						
144	ALDICARB SULFOXIDE	ND	ug/L	1.0	1.0		
143	ALDICARB SULFONE	ND	ug/L	1.6	1.6		
147	METHOMYL	ND	ug/L	1.0	1.0		
141	3-HYDROXYCARBOFURAN	ND	ug/L	2.0	2.0		
142	ALDICARB	ND	ug/L	1.0	1.0		
145	CARBARYL	ND	ug/L	2.0	2.0		
	State Unregulated - Other						
326	PROPOXUR (BAYGON)	ND	ug/L	1.0			
327	METHIOCARB	ND	ug/L	4.0			

*- An amount of "ND" indicates that the compound was not detected above the Lab's Method Detection Limit - MDL.
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****- Method Detection Limit is the lab's minimum concentration a compound can be measured and reported with 99% confidence that the compound concentration is greater than zero.
J - Estimated value.

Kuo Testing Labs, Inc.

Groundwater Sampling Field Data Sheet

Page ___ of ___

PROJECT NAME: Hall-Wentland SAR Project	No.:	WELL NO: HW - 2
FIELD SAMPLER: Laura Hofbauer		DATE: 04/11/07
FIELD ANALYST: Laura Hofbauer		
SAMPLING METHOD: Battery Operated Whale Water Mini Purge Pump		
FIELD INSTRUMENTS USED: Orion pH Meter model 210A Hach Conductivity Meter Solinst Water Level Meter Model 101 HF Scientific ORT-15 CE Turbidi Meter		CONDITION of WELL: satisfactory

Water Level Data		Well Construction Data		Well Purging Data	
1) Total Well Depth (feet)	49.78	Outside Casing Diameter D_2 (in.)	2"	Calculate Casing Volume	
2) Initial Depth to Water WT** (feet)	12.30	Bore Hole Diameter D_3 (in.)	6"	L_1 37.48*0.16 = 6.0 CV in Gallons	
3) Final Depth To Water	12.35	Filter Pack Length L_2 (feet)	12	CV 6.0 /2 = 3.6 BV in Gallons	
		Porosity of Filter Pack N (%)	25	Total Purge Volume (gals) CV*(3)= TPV(gals)	17.99
				Actual Volume Purged (gals)	15 17.5
4) Length of Water in Column L_1 *Value on Line1– Value on Line 2 (feet)*	37.48			Number of Bore Volumes Purged	5

* The surveyed point on the inside (usually PVC) casing

** The depth to the water table before removing any water from the well

WELL PURGING MEASUREMENTS

Time	Cumulative Gallons Purged	pH	Temperature °C	Conductivity µs/cm 2mS 20mS	Turbidity NTU	Purge Rate GPM	Comments
11:46			began	purge			
11:48	3.5	7.12	11.2	0137	6.09		
11:50	8.7	7.03	10.9	0137	2.36		
11:52	10.5	7.00	10.6	0137	1.54		
11:54	12.14	7.00	10.5	0137	1.15		
11:56	15 17.5	6.96	11.3	0137	0.83		
			End purge	Collected	sample		

Forms by Gina Clark

Kuo Testing Labs, Inc.

337 South 1st Avenue, Othello, WA 99344
(509) 488-0112 Phone (509) 488-0118 Fax (800) 328-0112 Toll Free
Web Site: http://www.kuotesting.com e-mail: kuotest@atnet.net

DATE COLLECTED: 4/11/2007
DATE RECEIVED: 4/12/2007
DATE REPORTED: 5/22/2007

SYSTEM / CUSTOMER:
GSI , Inc.
1020 N. Center Pkwy, Ste F
Kennewick WA 99336
Project Name:Hall Wentland

SEND REPORT TO:
Ground Water Solutions, Inc.
1020 N. Center Pkwy, Ste F
Kennewick WA 99336
Attn: Jon, Kevin

SAMPLE NO.	CUSTOMER SAMPLE NO.	ANALYSIS	RESULTS	MDL	UNITS	ANALYSTS
87720	HW-2	Nitrate as Nitrogen	0.81	0.015	mg/L	Reed
87720	HW-2	Nitrite as Nitrogen	ND	0.0023	mg/L	Reed
87720	HW-2	Total Dissolved Solids	108	21.1	mg/L	Reed
87720	HW-2	Hardness	69.0	0.11	mg/L	Reed
87720	HW-2	Chloride	2.70	0.297	mg/L	Reed
87720	HW-2	Orthophosphate as P	0.05	0.043	mg/L	Reed
87720	HW-2	COD	<8	8	mg/L	Morris
87720	HW-2	Total Coliform and E. Coli	Present/Absent			Reed
87720	HW-2	SOC/Synthetic Organic Compounds	Attached Report		mg/L	Edge Analytical

<(0.001): indicates the analyte was not detected at or above the concentration indicated.
ND: None Detected
mg/L:Indicates milligrams per litre
* PQL=Practical Quantitation Limit is the lowest level that can be achieved within specified limits of precision and accuracy during routine laboratory operating conditions
MDL: Method Detection Limit
Please check out our new Web Site at http://www.kuotesting.com
'Upon Visual Observation

Dr. Eugene Kuo, Quality Assurance Manager

05-28-07
Date

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HERBICIDES IN DRINKING WATER

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

System Name:
System ID Number:
DOH Source Number:
Multiple Sources:
Sample Type:
Sample Purpose: Investigative or Other
Sample Location: 87720
County:
Sampled By:
Sampler Phone:

Reference Number: 07-04495

Project: 87719 —> 87722
Field ID: 87720
Lab Number: 04610231
Date Collected: 4/11/2007
Date Extracted: 515_070417
Date Analyzed: 4/30/2007
Report Date: 5/3/2007
Analyst: HY/CC
Supervisor:

EPA Method 515.1 For State Drinking Water Compliance

DOH#	COMPOUNDS	RESULTS	Units	SRL	Trigger	MCL	COMMENT
	EPA Regulated						
37	2,4 - D	ND	ug/L	0.2	0.2	70	
38	2,4,5 - TP (SILVEX)	ND	ug/L	0.4	0.4	50	
134	PENTACHLOROPHENOL	ND	ug/L	0.08	0.08	1	
137	DALAPON	ND	ug/L	2	2	200	
139	DINOSEB	ND	ug/L	0.4	0.4	7	
140	PICLORAM	ND	ug/L	0.2	0.2	500	
	EPA Unregulated						
138	DICAMBA	ND	ug/L	0.2	0.2		
	State Unregulated						
222	TOTAL DCPA	ND	ug/L	0.1	0.1		
225	DCPA (ACID METABOLITES)	ND	ug/L	0.1	0.1		
135	2,4 DB	ND	ug/L	1.0	1.0		
136	2,4,5 T	ND	ug/L	0.4	0.4		
220	BENTAZON	ND	ug/L	0.5	0.5		
221	DICHLORPROP	ND	ug/L	0.5	0.5		
223	ACIFLUORFEN	ND	ug/L	2.0	2.0		
224	CHLORAMBEN	ND	ug/L	0.2	0.2		
226	3,5 - DICHLOROBENZOIC ACID	ND	ug/L	0.5	0.5		

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J - Estimated value.

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Bellingham WA (Microbiology) | 805 Orchard Dr Suite 4 - 98225
360.671.0688 • 360.671.1577fax

SYNTHETIC ORGANIC COMPOUNDS (SOC) REPORT

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

Reference Number: 07-04495

Project: 87719 ---> 87722

System Name:
System ID Number:
DOH Source Number:
Multiple Sources:
Sample Type:
Sample Purpose: Investigative or Other
Sample Location: 87720
County:
Sampled By:
Sampler Phone:

Field ID: 87720
Lab Number: 04610231
Date Collected: 4/11/2007
Date Extracted: 525_070416
Date Analyzed: 4/17/2007
Report Date: 4/25/2007
Analyst: CO
Supervisor:

EPA Method 525.2 For State Drinking Water Compliance

DOH#	COMPOUNDS	RESULTS	Units	SRL	Trigger	MCL	COMMENT
	EPA Regulated						
33	ENDRIN	ND	ug/L	0.02	0.02	2	
34	LINDANE (BHC - GAMMA)	ND	ug/L	0.04	0.04	0.2	
35	METHOXYCHLOR	ND	ug/L	0.2	0.2	40	
117	ALACHLOR	ND	ug/L	0.4	0.4	2	
119	ATRAZINE	ND	ug/L	0.2	0.2	3	
120	BENZO(A)PYRENE	ND	ug/L	0.04	0.04	0.2	
122	CHLORDANE, TECHNICAL	ND	ug/L	0.4	0.4	2	
124	DI(ETHYLHEXYL)-ADIPATE	ND	ug/L	1.3	1.3	400	
125	DI(ETHYLHEXYL)-PHTHALATE	ND	ug/L	1.3	1.3	6	
126	HEPTACHLOR	ND	ug/L	0.08	0.08	0.4	
127	HEPTACHLOR EPOXIDE	ND	ug/L	0.04	0.04	0.2	
128	HEXACHLOROBENZENE	ND	ug/L	0.2	0.2	1	
129	HEXACHLOROCYCLO-PENTADIENE	ND	ug/L	0.2	0.2	50	
133	SIMAZINE	ND	ug/L	0.15	0.15	4	
134	PENTACHLOROPHENOL	ND	ug/L	0.4	0.08	1	screening only / compliance by 515.1
	EPA Unregulated						
118	ALDRIN	ND	ug/L	0.2	0.2		
121	BUTACHLOR	ND	ug/L	0.4	0.4		
123	DIELDRIN	ND	ug/L	0.2	0.2		
130	METOLACHLOR	ND	ug/L	1.0	1.0		
131	METRIBUZIN	ND	ug/L	0.2	0.2		
132	PROPACHLOR	ND	ug/L	0.2	0.2		
	State Unregulated - Other						
179	BROMACIL	ND	ug/L	0.2	0.2		
190	TERBACIL	ND	ug/L	0.2	0.2		
202	DIAZINON	ND	ug/L	0.2	0.2		
208	EPTC	ND	ug/L	0.3	0.3		Unstable in Acidified Sample Matrix

*- An amount of "ND" indicates that the compound was not detected above the Lab's Method Detection Limit - MDL.
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SYNTHETIC ORGANIC COMPOUNDS (SOC) REPORT

DOH#	COMPOUNDS	RESULTS	Units	SRL	Trigger	MCL	COMMENT
232	4,4-DDD	ND	ug/L	0.2	0.2		
233	4,4-DDE	ND	ug/L	0.2	0.2		
234	4,4-DDT	ND	ug/L	0.2	0.2		
236	CYANAZINE	ND	ug/L	0.2	0.2		Qualitative Analysis Only
239	MALATHION	0.3	ug/L	0.2	0.2		
240	PARATHION	ND	ug/L	0.2	0.2		
243	TRIFLURALIN	ND	ug/L	0.2	0.2		
	- PAHs						
96	NAPTHALENE	ND	ug/L	0.1	0.1		
254	FLUORENE	ND	ug/L	0.2	0.2		
244	ACENAPHTHYLENE	ND	ug/L	0.2	0.2		
245	ACENAPHTHENE	ND	ug/L	0.2	0.2		
246	ANTHRACENE	ND	ug/L	0.2	0.2		
247	BENZ(A)ANTHRACENE	ND	ug/L	0.1	0.1		
248	BENZO(B)FLUORANTHENE	ND	ug/L	0.2	0.2		
249	BENZO(G,H,I)PERYLENE	ND	ug/L	0.2	0.2		
250	BENZO(K)FLUORANTHENE	ND	ug/L	0.2	0.2		
251	CHRYSENE	ND	ug/L	0.2	0.2		
252	DIBENZO(A,H)ANTHRACENE	ND	ug/L	0.2	0.2		
253	FLUORANTHENE	ND	ug/L	0.2	0.2		
255	INDENO(1,2,3-CD)PYRENE	ND	ug/L	0.2	0.2		
256	PHENANTHRENE	ND	ug/L	0.2	0.2		
257	PYRENE	ND	ug/L	0.2	0.2		
	- Phthalates						
258	BENZYL BUTYL PHTHALATE	ND	ug/L	0.6	0.6		
259	DI-N-BUTYL PHTHALATE	0.5KK	ug/L	0.6	0.6		
260	DIETHYL PHTHALATE	ND	ug/L	0.6	0.6		
261	DIMETHYL PHTHALATE	ND	ug/L	0.6	0.6		

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SYNTHETIC ORGANIC COMPOUNDS (SOC) REPORT

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

Reference Number: 07-04495

Project: 87719 —> 87722

System Name:
System ID Number:
DOH Source Number:
Multiple Sources:
Sample Type:
Sample Purpose: Investigative or Other
Sample Location: 87720
County:
Sampled By:
Sampler Phone:

Field ID: 87720
Lab Number: 04610231
Date Collected: 4/11/2007
Date Extracted: 508_070416
Date Analyzed: 4/18/2007
Report Date: 4/25/2007
Analyst: MM/CC
Supervisor:

EPA Method 508.1 For State Drinking Water Compliance

DOH#	COMPOUNDS	RESULTS	Units	SRL	Trigger	MCL	COMMENT
	PCBs/Toxaphene						
153	PCBS (Total Aroclors)	**ND**	ug/L	0.2	0.2	0.5	
173	AROCLOR 1221	**ND**	ug/L	20	20		
174	AROCLOR 1232	**ND**	ug/L	0.5	0.5		
175	AROCLOR 1242	**ND**	ug/L	0.5	0.3		
176	AROCLOR 1248	**ND**	ug/L	0.1	0.1		
177	AROCLOR 1254	**ND**	ug/L	0.1	0.1		
178	AROCLOR 1260	**ND**	ug/L	0.2	0.2		
180	AROCLOR 1016	**ND**	ug/L	0.1	0.1		
36	TOXAPHENE	**ND**	ug/L	2	2	3	

*- An amount of "ND" indicates that the compound was not detected above the Lab's Method Detection Limit - MDL.
**- Maximum Contaminant Level, maximum permissible level of a contaminant in water established by EPA, NPDWR. State Advisory Level (SAL) for Unregulated compounds.
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J - Estimated value.

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Bellingham WA | 805 Orchard Dr Suite 4 - 98225
Microbiology | 360.671.0688 • 360.671.1577fax

CARBAMATES IN DRINKING WATER

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

System Name:
System ID Number:
DOH Source Number:
Multiple Sources:
Sample Type:
Sample Purpose: Investigative or Other
Sample Location: 87722
County:
Sampled By:
Sampler Phone:

Reference Number: 07-04495

Project: 87719 —> 87722

Field ID: 87722
Lab Number: 04610233
Date Collected: 4/11/2007
Date Extracted: 531_070418
Date Analyzed: 4/18/2007
Report Date: 4/26/2007
Analyst: CO
Supervisor:

EPA Method 531.2 For State Drinking Water Compliance

DOH#	COMPOUNDS	RESULTS	Units	SRL	Trigger	MCL	COMMENT
	EPA Regulated						
148	OXYMAL	ND	ug/L	4.0	4.0	200	
146	CARBOFURAN	ND	ug/L	1.8	1.8	40	
	EPA Unregulated						
144	ALDICARB SULFOXIDE	ND	ug/L	1.0	1.0		
143	ALDICARB SULFONE	ND	ug/L	1.6	1.6		
147	METHOMYL	ND	ug/L	1.0	1.0		
141	3-HYDROXYCARBOFURAN	ND	ug/L	2.0	2.0		
142	ALDICARB	ND	ug/L	1.0	1.0		
145	CARBARYL	ND	ug/L	2.0	2.0		
	State Unregulated - Other						
326	PROPOXUR (BAYGON)	ND	ug/L	1.0			
327	METHIOCARB	ND	ug/L	4.0			

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CARBAMATES IN DRINKING WATER

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

System Name:
System ID Number:
DOH Source Number:
Multiple Sources:
Sample Type:
Sample Purpose: Investigative or Other
Sample Location: 87720
County:
Sampled By:
Sampler Phone:

Reference Number: 07-04495

Project: 87719 —> 87722

Field ID: 87720
Lab Number: 04610231
Date Collected: 4/11/2007
Date Extracted: 531_070418
Date Analyzed: 4/18/2007
Report Date: 4/26/2007
Analyst: CO
Supervisor:

EPA Method 531.2 For State Drinking Water Compliance

DOH#	COMPOUNDS	RESULTS	Units	SRL	Trigger	MCL	COMMENT
	EPA Regulated						
148	OXYMAL	ND	ug/L	4.0	4.0	200	
146	CARBOFURAN	ND	ug/L	1.8	1.8	40	
	EPA Unregulated						
144	ALDICARB SULFOXIDE	ND	ug/L	1.0	1.0		
143	ALDICARB SULFONE	ND	ug/L	1.6	1.6		
147	METHOMYL	ND	ug/L	1.0	1.0		
141	3-HYDROXYCARBOFURAN	ND	ug/L	2.0	2.0		
142	ALDICARB	ND	ug/L	1.0	1.0		
145	CARBARYL	ND	ug/L	2.0	2.0		
	State Unregulated - Other						
326	PROPOXUR (BAYGON)	ND	ug/L	1.0			
327	METHIOCARB	ND	ug/L	4.0			

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Kuo Testing Labs, Inc.

Groundwater Sampling Field Data Sheet

PROJECT NAME: Hall-Wentland SAR Project	**No.:**	**WELL NO:** HW - 3
FIELD SAMPLER: Laura Hofbauer		**DATE:** 04/11/07
FIELD ANALYST: Laura Hofbauer		
SAMPLING METHOD: Battery Operated Whale Water Mini Purge Pump		
FIELD INSTRUMENTS USED: Orion pH Meter model 210A Hach Conductivity Meter Solinst Water Level Meter Model 101 HF Scientific ORT-15 CE Turbidi Meter		**CONDITION of WELL:** satisfactory

Water Level Data		Well Construction Data		Well Purging Data	
1) Total Well Depth (feet)	50.05	Outside Casing Diameter D_2 (in.)	2"	Calculate Casing Volume	
2) Initial Depth to Water WT** (feet)	21.40	Bore Hole Diameter D_3 (in.)	6"	L_1 28.65 *0.16 = 4.58 CV in Gallons	
3) Final Depth To Water	21.43	Filter Pack Length L_2 (feet)	12	CV 4.58 /2 = 2.29 BV in Gallons	
		Porosity of Filter Pack N (%)	25	Total Purge Volume (gals) CV*(3)= TPV(gals)	13.75
				Actual Volume Purged (gals)	15
4) Length of Water in Column L_1 *Value on Line1– Value on Line 2 (feet)*	28.65			Number of Bore Volumes Purged	6

* The surveyed point on the inside (usually PVC) casing

** The depth to the water table before removing any water from the well

WELL PURGING MEASUREMENTS

Time	Cumulative Gallons Purged	pH	Temperature °C	Conductivity µs/cm 2mS 20mS	Turbidity NTU	Purge Rate GPM	Comments
01:14			began	purge			
01:16	3	7.03	13.3	0149	1.29		
01:18	6	7.03	12.9	0149	0.79		
01:20	9	6.98	12.8	0149	0.58		
01:22	12	6.98	12.7	0149	0.35		
01:24	15	6.96	13.1	0149	0.27		
			End purge	Collected	sample		
			Duplicate				

Forms by Gina Clark

Kuo Testing Labs, Inc.

337 South 1st Avenue, Othello, WA 99344
(509) 488-0112 Phone (509) 488-0118 Fax (800) 328-0112 Toll Free
Web Site: http://www.kuotesting.com e-mail: kuotest@atnet.net

DATE COLLECTED: 4/11/2007
DATE RECEIVED: 4/12/2007
DATE REPORTED: 5/29/2007

SYSTEM / CUSTOMER:
GSI , Inc.
1020 N. Center Pkwy, Ste F
Kennewick WA 99336
Project Name:Hall Wentland

SEND REPORT TO:
Ground Water Solutions, Inc.
1020 N. Center Pkwy, Ste F
Kennewick WA 99336
Attn: Jon, Kevin

SAMPLE NO.	CUSTOMER SAMPLE NO.	ANALYSIS	RESULTS	MDL	UNITS	ANALYSTS
87721	HW-3	Nitrate as Nitrogen	0.87	0.20	mg/L	Coffey
87721	HW-3	Nitrite as Nitrogen	ND	0.0023	mg/L	Reed
87721	HW-3	Total Dissolved Solids	105	21.1	mg/L	Reed
87721	HW-3	Hardness	78.9	0.11	mg/L	Reed
87721	HW-3	Chloride	3.00	0.297	mg/L	Reed
87721	HW-3	Orthophosphate as P	<0.043	0.043	mg/L	Reed
87721	HW-3	COD	<8	8	mg/L	Morris
87721	HW-3	Total Coliform and E. Coli	Absent/Absent			Reed
87721	HW-3	SOC/Synthetic Organic Compounds	Attached Report		mg/L	Edge Analytical

<(0.001): indicates the analyte was not detected at or above the concentration indicated.
ND: None Detected
mg/L:Indicates milligrams per litre
* PQL=Practical Quantitation Limit is the lowest level that can be achieved within specified limits of precision and accuracy during routine laboratory operating conditions
MDL: Method Detection Limit
Please check out our new Web Site at http://www.kuotesting.com
'Upon Visual Observation

Dr. Eugene Kuo, Quality Assurance Manager

05-31-07
Date

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HERBICIDES IN DRINKING WATER

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

Reference Number: 07-04495

Project: 87719 —> 87722

System Name:
System ID Number:
DOH Source Number:
Multiple Sources:
Sample Type:
Sample Purpose: Investigative or Other
Sample Location: 87721
County:
Sampled By:
Sampler Phone:

Field ID: 87721
Lab Number: 04610232
Date Collected: 4/11/2007
Date Extracted: 515_070417
Date Analyzed: 4/30/2007
Report Date: 5/3/2007
Analyst: HY/CC
Supervisor:

EPA Method 515.1 For State Drinking Water Compliance

DOH#	COMPOUNDS	RESULTS	Units	SRL	Trigger	MCL	COMMENT
	EPA Regulated						
37	2,4 - D	ND	ug/L	0.2	0.2	70	
38	2,4,5 - TP (SILVEX)	ND	ug/L	0.4	0.4	50	
134	PENTACHLOROPHENOL	ND	ug/L	0.08	0.08	1	
137	DALAPON	ND	ug/L	2	2	200	
139	DINOSEB	ND	ug/L	0.4	0.4	7	
140	PICLORAM	ND	ug/L	0.2	0.2	500	
	EPA Unregulated						
138	DICAMBA	ND	ug/L	0.2	0.2		
	State Unregulated						
222	TOTAL DCPA	ND	ug/L	0.1	0.1		
225	DCPA (ACID METABOLITES)	ND	ug/L	0.1	0.1		
135	2,4 DB	ND	ug/L	1.0	1.0		
136	2,4,5 T	ND	ug/L	0.4	0.4		
220	BENTAZON	ND	ug/L	0.5	0.5		
221	DICHLORPROP	ND	ug/L	0.5	0.5		
223	ACIFLUORFEN	ND	ug/L	2.0	2.0		
224	CHLORAMBEN	ND	ug/L	0.2	0.2		
226	3,5 - DICHLOROBENZOIC ACID	ND	ug/L	0.5	0.5		

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Bellingham WA (Microbiology) | 805 Orchard Dr Suite 4 - 98225
360.671.0688 • 360.671.1577fax

SYNTHETIC ORGANIC COMPOUNDS (SOC) REPORT

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

Reference Number: 07-04495

Project: 87719 —> 87722

System Name:
System ID Number:
DOH Source Number:
Multiple Sources:
Sample Type:
Sample Purpose: Investigative or Other
Sample Location: 87721
County:
Sampled By:
Sampler Phone:

Field ID: 87721
Lab Number: 04610232
Date Collected: 4/11/2007
Date Extracted: 525_070416
Date Analyzed: 4/17/2007
Report Date: 4/25/2007
Analyst: CO
Supervisor:

EPA Method 525.2 For State Drinking Water Compliance

DOH#	COMPOUNDS	RESULTS	Units	SRL	Trigger	MCL	COMMENT
	EPA Regulated						
33	ENDRIN	ND	ug/L	0.02	0.02	2	
34	LINDANE (BHC - GAMMA)	ND	ug/L	0.04	0.04	0.2	
35	METHOXYCHLOR	ND	ug/L	0.2	0.2	40	
117	ALACHLOR	ND	ug/L	0.4	0.4	2	
119	ATRAZINE	ND	ug/L	0.2	0.2	3	
120	BENZO(A)PYRENE	ND	ug/L	0.04	0.04	0.2	
122	CHLORDANE, TECHNICAL	ND	ug/L	0.4	0.4	2	
124	DI(ETHYLHEXYL)-ADIPATE	ND	ug/L	1.3	1.3	400	
125	DI(ETHYLHEXYL)-PHTHALATE	ND	ug/L	1.3	1.3	6	
126	HEPTACHLOR	ND	ug/L	0.08	0.08	0.4	
127	HEPTACHLOR EPOXIDE	ND	ug/L	0.04	0.04	0.2	
128	HEXACHLOROBENZENE	ND	ug/L	0.2	0.2	1	
129	HEXACHLOROCYCLO-PENTADIENE	ND	ug/L	0.2	0.2	50	
133	SIMAZINE	ND	ug/L	0.15	0.15	4	
134	PENTACHLOROPHENOL	ND	ug/L	0.4	0.08	1	screening only / compliance by 515.1
	EPA Unregulated						
118	ALDRIN	ND	ug/L	0.2	0.2		
121	BUTACHLOR	ND	ug/L	0.4	0.4		
123	DIELDRIN	ND	ug/L	0.2	0.2		
130	METOLACHLOR	ND	ug/L	1.0	1.0		
131	METRIBUZIN	ND	ug/L	0.2	0.2		
132	PROPACHLOR	ND	ug/L	0.2	0.2		
	State Unregulated - Other						
179	BROMACIL	ND	ug/L	0.2	0.2		
190	TERBACIL	ND	ug/L	0.2	0.2		
202	DIAZINON	ND	ug/L	0.2	0.2		Unstable in Acidified Sample Matrix
208	EPTC	ND	ug/L	0.3	0.3		

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SYNTHETIC ORGANIC COMPOUNDS (SOC) REPORT

DOH#	COMPOUNDS	RESULTS	Units	SRL	Trigger	MCL	COMMENT
232	4,4-DDD	ND	ug/L	0.2	0.2		
233	4,4-DDE	ND	ug/L	0.2	0.2		
234	4,4-DDT	ND	ug/L	0.2	0.2		
236	CYANAZINE	ND	ug/L	0.2	0.2		Qualitative Analysis Only
239	MALATHION	0.4	ug/L	0.2	0.2		
240	PARATHION	ND	ug/L	0.2	0.2		
243	TRIFLURALIN	ND	ug/L	0.2	0.2		
	- PAHs						
96	NAPTHALENE	ND	ug/L	0.1	0.1		
254	FLUORENE	ND	ug/L	0.2	0.2		
244	ACENAPHTHYLENE	ND	ug/L	0.2	0.2		
245	ACENAPHTHENE	ND	ug/L	0.2	0.2		
246	ANTHRACENE	ND	ug/L	0.2	0.2		
247	BENZ(A)ANTHRACENE	ND	ug/L	0.1	0.1		
248	BENZO(B)FLUORANTHENE	ND	ug/L	0.2	0.2		
249	BENZO(G,H,I)PERYLENE	ND	ug/L	0.2	0.2		
250	BENZO(K)FLUORANTHENE	ND	ug/L	0.2	0.2		
251	CHRYSENE	ND	ug/L	0.2	0.2		
252	DIBENZO(A,H)ANTHRACENE	ND	ug/L	0.2	0.2		
253	FLUORANTHENE	ND	ug/L	0.2	0.2		
255	INDENO(1,2,3-CD)PYRENE	ND	ug/L	0.2	0.2		
256	PHENANTHRENE	ND	ug/L	0.2	0.2		
257	PYRENE	ND	ug/L	0.2	0.2		
	- Phthalates						
258	BENZYL BUTYL PHTHALATE	ND	ug/L	0.6	0.6		
259	DI-N-BUTYL PHTHALATE	0.6	ug/L	0.6	0.6		
260	DIETHYL PHTHALATE	ND	ug/L	0.6	0.6		
261	DIMETHYL PHTHALATE	ND	ug/L	0.6	0.6		

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SYNTHETIC ORGANIC COMPOUNDS (SOC) REPORT

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

Reference Number: 07-04495

Project: 87719 —> 87722

System Name:
System ID Number:
DOH Source Number:
Multiple Sources:
Sample Type:
Sample Purpose: Investigative or Other
Sample Location: 87721
County:
Sampled By:
Sampler Phone:

Field ID: 87721
Lab Number: 04610232
Date Collected: 4/11/2007
Date Extracted: 508_070416
Date Analyzed: 4/18/2007
Report Date: 4/25/2007
Analyst: MM/C(
Supervisor:

EPA Method 508.1 For State Drinking Water Compliance

DOH#	COMPOUNDS	RESULTS	Units	SRL	Trigger	MCL	COMMENT
	PCBs/Toxaphene						
153	PCBS (Total Aroclors)	ND	ug/L	0.2	0.2	0.5	
173	AROCLOR 1221	ND	ug/L	20	20		
174	AROCLOR 1232	ND	ug/L	0.5	0.5		
175	AROCLOR 1242	ND	ug/L	0.5	0.3		
176	AROCLOR 1248	ND	ug/L	0.1	0.1		
177	AROCLOR 1254	ND	ug/L	0.1	0.1		
178	AROCLOR 1260	ND	ug/L	0.2	0.2		
180	AROCLOR 1016	ND	ug/L	0.1	0.1		
36	TOXAPHENE	ND	ug/L	2	2	3	

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SYNTHETIC ORGANIC COMPOUNDS (SOC) REPORT

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

Reference Number: 07-04495

Project: 87719 —> 87722

System Name:
System ID Number:
DOH Source Number:
Multiple Sources:
Sample Type:
Sample Purpose: Investigative or Other
Sample Location: 87722
County:
Sampled By:
Sampler Phone:

Field ID: 87722
Lab Number: 04610233
Date Collected: 4/11/2007
Date Extracted: 508_070416
Date Analyzed: 4/16/2007
Report Date: 4/25/2007
Analyst: MM/CF
Supervisor:

EPA Method 508.1 For State Drinking Water Compliance

DOH#	COMPOUNDS	RESULTS	Units	SRL	Trigger	MCL	COMMENT
	PCBs/Toxaphene						
153	PCBS (Total Aroclors)	**ND**	ug/L	0.2	0.2	0.5	
173	AROCLOR 1221	**ND**	ug/L	20	20		
174	AROCLOR 1232	**ND**	ug/L	0.5	0.5		
175	AROCLOR 1242	**ND**	ug/L	0.5	0.3		
176	AROCLOR 1248	**ND**	ug/L	0.1	0.1		
177	AROCLOR 1254	**ND**	ug/L	0.1	0.1		
178	AROCLOR 1260	**ND**	ug/L	0.2	0.2		
180	AROCLOR 1016	**ND**	ug/L	0.1	0.1		
36	TOXAPHENE	**ND**	ug/L	2	2	3	

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CARBAMATES IN DRINKING WATER

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

Reference Number: 07-04495

Project: 87719 ---> 87722

System Name:
System ID Number:
DOH Source Number:
Multiple Sources:
Sample Type:
Sample Purpose: Investigative or Other
Sample Location: 87721
County:
Sampled By:
Sampler Phone:

Field ID: 87721
Lab Number: 04610232
Date Collected: 4/11/2007
Date Extracted: 531_070418
Date Analyzed: 4/18/2007
Report Date: 4/26/2007
Analyst: CO
Supervisor:

EPA Method 531.2 For State Drinking Water Compliance

DOH#	COMPOUNDS	RESULTS	Units	SRL	Trigger	MCL	COMMENT
	EPA Regulated						
148	OXYMAL	ND	ug/L	4.0	4.0	200	
146	CARBOFURAN	ND	ug/L	1.8	1.8	40	
	EPA Unregulated						
144	ALDICARB SULFOXIDE	ND	ug/L	1.0	1.0		
143	ALDICARB SULFONE	ND	ug/L	1.6	1.6		
147	METHOMYL	ND	ug/L	1.0	1.0		
141	3-HYDROXYCARBOFURAN	ND	ug/L	2.0	2.0		
142	ALDICARB	ND	ug/L	1.0	1.0		
145	CARBARYL	ND	ug/L	2.0	2.0		
	State Unregulated - Other						
326	PROPOXUR (BAYGON)	ND	ug/L	1.0			
327	METHIOCARB	ND	ug/L	4.0			

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***- If a compound is detected > or = to the State Reporting Level, SRL, specified increased monitoring frequencies may occur per DOH.
****- Method Detection Limit is the lab's minimum concentration a compound can be measured and reported with 99% confidence that the compound concentration is greater than zero.
J - Estimated value.

Kuo Testing Labs, Inc.

Daily Field Report

Project:	Hall - Wentland SAR Monitoring	**Project#:**	
Contractor:	Kuo Testing Labs, Inc.	**Task #:**	
KTL Personnel:	Laura Hofbauer	**Page**	**OF**
		Date:	**04/11/07**

SITE	TIME	pH	CONDUCTIVITY	TEMPERATURE	TURBIDITY
SOURCE	01:47	8.89	0110	14.9	5.68

Kuo Testing Labs, Inc.

337 South 1st Avenue, Othello, WA 99344
(509) 488-0112 Phone (509) 488-0118 Fax (800) 328-0112 Toll Free
Web Site: http://www.kuotesting.com e-mail: kuotest@atnet.net

DATE COLLECTED: 4/11/2007
DATE RECEIVED: 4/12/2007
DATE REPORTED: 5/22/2007

SYSTEM / CUSTOMER:
GSI , Inc.
1020 N. Center Pkwy, Ste F
Kennewick WA 99336
Project Name:Hall Wentland

SEND REPORT TO:
Ground Water Solutions, Inc.
1020 N. Center Pkwy, Ste F
Kennewick WA 99336
Attn: Jon, Kevin

SAMPLE NO.	CUSTOMER SAMPLE NO.	ANALYSIS	RESULTS	MDL	UNITS	ANALYSTS
87722	HW- SW	Nitrate as Nitrogen	0.29	0.015	mg/L	Reed
87722	HW- SW	Nitrite as Nitrogen	ND	0.0023	mg/L	Reed
87722	HW- SW	Total Dissolved Solids	92.5	21.1	mg/L	Reed
87722	HW- SW	Hardness	55.0	0.11	mg/L	Reed
87722	HW- SW	Chloride	2.50	0.297	mg/L	Reed
87722	HW- SW	Orthophosphate as P	0.06	0.043	mg/L	Reed
87722	HW- SW	COD	15.0	8	mg/L	Morris
87722	HW- SW	Total Coliform and E. Coli	Present/Present			Reed
87722	HW- SW	SOC/Synthetic Organic Compounds	Attached Report		mg/L	Edge Analytical

<(0.001): indicates the analyte was not detected at or above the concentration indicated.
ND: None Detected
mg/L:Indicates milligrams per litre
* PQL=Practical Quantitation Limit is the lowest level that can be achieved within specified limits of precision and accuracy during routine laboratory operating conditions
MDL: Method Detection Limit
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'Upon Visual Observation

Dr. Eugene Kuo, Quality Assurance Manager

05-28-07
Date

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Microbiology | 360.671.0688 • 360.671.1577fax

HERBICIDES IN DRINKING WATER

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

Reference Number: 07-04495

Project: 87719 —> 87722

System Name:
System ID Number:
DOH Source Number:
Multiple Sources:
Sample Type:
Sample Purpose: Investigative or Other
Sample Location: 87722
County:
Sampled By:
Sampler Phone:

Field ID: 87722
Lab Number: 04610233
Date Collected: 4/11/2007
Date Extracted: 515_070417
Date Analyzed: 4/30/2007
Report Date: 5/3/2007
Analyst: HY/CC
Supervisor:

EPA Method 515.1 For State Drinking Water Compliance

DOH#	COMPOUNDS	RESULTS	Units	SRL	Trigger	MCL	COMMENT
	EPA Regulated						
37	2,4 - D	ND	ug/L	0.2	0.2	70	
38	2,4,5 - TP (SILVEX)	ND	ug/L	0.4	0.4	50	
134	PENTACHLOROPHENOL	ND	ug/L	0.08	0.08	1	
137	DALAPON	ND	ug/L	2	2	200	
139	DINOSEB	ND	ug/L	0.4	0.4	7	
140	PICLORAM	ND	ug/L	0.2	0.2	500	
	EPA Unregulated						
138	DICAMBA	ND	ug/L	0.2	0.2		
	State Unregulated						
222	TOTAL DCPA	ND	ug/L	0.1	0.1		
225	DCPA (ACID METABOLITES)	ND	ug/L	0.1	0.1		
135	2,4 DB	ND	ug/L	1.0	1.0		
136	2,4,5 T	ND	ug/L	0.4	0.4		
220	BENTAZON	ND	ug/L	0.5	0.5		
221	DICHLORPROP	ND	ug/L	0.5	0.5		
223	ACIFLUORFEN	ND	ug/L	2.0	2.0		
224	CHLORAMBEN	ND	ug/L	0.2	0.2		
226	3,5 - DICHLOROBENZOIC ACID	ND	ug/L	0.5	0.5		

*- An amount of "ND" indicates that the compound was not detected above the Lab's Method Detection Limit - MDL.
**- Maximum Contaminant Level, maximum permissible level of a contaminant in water established by EPA, NPDWR. State Advisory Level (SAL) for Unregulated compounds.
A blank MCL or SAL value indicates a level is not currently established.
***- If a compound is detected > or = to the State Reporting Level, SRL, specified increased monitoring frequencies may occur per DOH.
****- Method Detection Limit is the lab's minimum concentration a compound can be measured and reported with 99% confidence that the compound concentration is greater than zero.
J - Estimated value.

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Microbiology | 360.671.0688 • 360.671.1577fax

SYNTHETIC ORGANIC COMPOUNDS (SOC) REPORT

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

System Name:
System ID Number:
DOH Source Number:
Multiple Sources:
Sample Type:
Sample Purpose: Investigative or Other
Sample Location: 87722
County:
Sampled By:
Sampler Phone:

Reference Number: 07-04495

Project: 87719 —> 87722

Field ID: 87722
Lab Number: 04610233
Date Collected: 4/11/2007
Date Extracted: 525_070416
Date Analyzed: 4/17/2007
Report Date: 4/25/2007
Analyst: CO
Supervisor:

EPA Method 525.2 For State Drinking Water Compliance

DOH#	COMPOUNDS	RESULTS	Units	SRL	Trigger	MCL	COMMENT
	EPA Regulated						
33	ENDRIN	ND	ug/L	0.02	0.02	2	
34	LINDANE (BHC - GAMMA)	ND	ug/L	0.04	0.04	0.2	
35	METHOXYCHLOR	ND	ug/L	0.2	0.2	40	
117	ALACHLOR	ND	ug/L	0.4	0.4	2	
119	ATRAZINE	ND	ug/L	0.2	0.2	3	
120	BENZO(A)PYRENE	ND	ug/L	0.04	0.04	0.2	
122	CHLORDANE, TECHNICAL	ND	ug/L	0.4	0.4	2	
124	DI(ETHYLHEXYL)-ADIPATE	ND	ug/L	1.3	1.3	400	
125	DI(ETHYLHEXYL)-PHTHALATE	ND	ug/L	1.3	1.3	6	
126	HEPTACHLOR	ND	ug/L	0.08	0.08	0.4	
127	HEPTACHLOR EPOXIDE	ND	ug/L	0.04	0.04	0.2	
128	HEXACHLOROBENZENE	ND	ug/L	0.2	0.2	1	
129	HEXACHLOROCYCLO-PENTADIENE	ND	ug/L	0.2	0.2	50	
133	SIMAZINE	ND	ug/L	0.15	0.15	4	
134	PENTACHLOROPHENOL	ND	ug/L	0.4	0.08	1	screening only / compliance by 515.1
	EPA Unregulated						
118	ALDRIN	ND	ug/L	0.2	0.2		
121	BUTACHLOR	ND	ug/L	0.4	0.4		
123	DIELDRIN	ND	ug/L	0.2	0.2		
130	METOLACHLOR	ND	ug/L	1.0	1.0		
131	METRIBUZIN	ND	ug/L	0.2	0.2		
132	PROPACHLOR	ND	ug/L	0.2	0.2		
	State Unregulated - Other						
179	BROMACIL	ND	ug/L	0.2	0.2		
190	TERBACIL	ND	ug/L	0.2	0.2		
202	DIAZINON	ND	ug/L	0.2	0.2		Unstable in Acidified Sample Matrix
208	EPTC	ND	ug/L	0.3	0.3		

*- An amount of "ND" indicates that the compound was not detected above the Lab's Method Detection Limit - MDL.
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***- If a compound is detected > or = to the State Reporting Level, SRL, specified increased monitoring frequencies may occur per DOH.
****- Method Detection Limit is the lab's minimum concentration a compound can be measured and reported with 99% confidence that the compound concentration is greater than zero.
J - Estimated value.

SYNTHETIC ORGANIC COMPOUNDS (SOC) REPORT

DOH#	COMPOUNDS	RESULTS	Units	SRL	Trigger	MCL	COMMENT
232	4,4-DDD	ND	ug/L	0.2	0.2		
233	4,4-DDE	ND	ug/L	0.2	0.2		
234	4,4-DDT	ND	ug/L	0.2	0.2		
236	CYANAZINE	ND	ug/L	0.2	0.2		Qualitative Analysis Only
239	MALATHION	ND	ug/L	0.2	0.2		
240	PARATHION	ND	ug/L	0.2	0.2		
243	TRIFLURALIN	ND	ug/L	0.2	0.2		
	- PAHs						
96	NAPTHALENE	ND	ug/L	0.1	0.1		
254	FLUORENE	ND	ug/L	0.2	0.2		
244	ACENAPHTHYLENE	ND	ug/L	0.2	0.2		
245	ACENAPHTHENE	ND	ug/L	0.2	0.2		
246	ANTHRACENE	ND	ug/L	0.2	0.2		
247	BENZ(A)ANTHRACENE	ND	ug/L	0.1	0.1		
248	BENZO(B)FLUORANTHENE	ND	ug/L	0.2	0.2		
249	BENZO(G,H,I)PERYLENE	ND	ug/L	0.2	0.2		
250	BENZO(K)FLUORANTHENE	ND	ug/L	0.2	0.2		
251	CHRYSENE	ND	ug/L	0.2	0.2		
252	DIBENZO(A,H)ANTHRACENE	ND	ug/L	0.2	0.2		
253	FLUORANTHENE	ND	ug/L	0.2	0.2		
255	INDENO(1,2,3-CD)PYRENE	ND	ug/L	0.2	0.2		
256	PHENANTHRENE	ND	ug/L	0.2	0.2		
257	PYRENE	ND	ug/L	0.2	0.2		
	- Phthalates						
258	BENZYL BUTYL PHTHALATE	ND	ug/L	0.6	0.6		
259	DI-N-BUTYL PHTHALATE	ND	ug/L	0.6	0.6		
260	DIETHYL PHTHALATE	ND	ug/L	0.6	0.6		
261	DIMETHYL PHTHALATE	ND	ug/L	0.6	0.6		

*- An amount of "ND" indicates that the compound was not detected above the Lab's Method Detection Limit - MDL.
**- Maximum Contaminant Level, maximum permissible level of a contaminant in water established by EPA, NPDWR. State Advisory Level (SAL) for Unregulated compounds.
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DATE COLLECTED: 4/11/2007
DATE RECEIVED: 4/12/2007
DATE REPORTED: 5/22/2007

SYSTEM / CUSTOMER

GSI , Inc.
1020 N. Center Pkwy, Ste F
Kennewick WA 99336
Project Name:Hall Wentland

SEND REPORT TO:

Ground Water Solutions, Inc.
1020 N. Center Pkwy, Ste F
Kennewick WA 99336
Attn: Jon, Kevin

SAMPLE NO.	CUSTOMER SAMPLE NO.	ANALYSIS	RESULTS	MDL	UNITS	ANALYSTS
87723	Duplicate	Nitrate as Nitrogen	0.84	0.015	mg/L	Reed
87723	Duplicate	Nitrite as Nitrogen	ND	0.0023	mg/L	Reed
87723	Duplicate	Total Dissolved Solids	108	21.1	mg/L	Reed
87723	Duplicate	Hardness	78.7	0.11	mg/L	Reed
87723	Duplicate	Chloride	2.50	0.297	mg/L	Reed
87723	Duplicate	Orthophosphate as P	0.07	0.043	mg/L	Reed
87723	Duplicate	COD	<8	8	mg/L	Morris
87723	Duplicate	Total Coliform and E. Coli	Absent/Absent			Reed

<(0.001): indicates the analyte was not detected at or above the concentration indicated.
ND: None Detected
mg/L:Indicates milligrams per litre
* PQL=Practical Quantitation Limit is the lowest level that can be achieved within specified limits of precision and accuracy during routine laboratory operating conditions
MDL: Method Detection Limit
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'Upon Visual Observation

Dr. Eugene Kuo, Quality Assurance Manager

05-28-07
Date

Kuo Testing Labs, Inc.

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DATE COLLECTED: 4/11/2007
DATE RECEIVED: 4/12/2007
DATE REPORTED: 5/22/2007

SYSTEM / CUSTOMER:
GSI , Inc.
1020 N. Center Pkwy, Ste F
Kennewick WA 99336
Project Name:Hall Wentland

SEND REPORT TO:
Ground Water Solutions, Inc.
1020 N. Center Pkwy, Ste F
Kennewick WA 99336
Attn: Jon, Kevin

SAMPLE NO.	CUSTOMER SAMPLE NO.	ANALYSIS	RESULTS	MDL	UNITS	ANALYSTS
87724	Field Blank	Nitrate as Nitrogen	ND	0.015	mg/L	Reed
87724	Field Blank	Nitrite as Nitrogen	ND	0.0023	mg/L	Reed
87724	Field Blank	Total Dissolved Solids	143	21.1	mg/L	Reed
87724	Field Blank	Hardness	ND	0.11	mg/L	Reed
87724	Field Blank	Chloride	2.20	0.297	mg/L	Reed
87724	Field Blank	Orthophosphate as P	ND	0.043	mg/L	Reed
87724	Field Blank	COD	<8	8	mg/L	Morris

<(0.001): indicates the analyte was not detected at or above the concentration indicated.
ND: None Detected
mg/L:Indicates milligrams per litre
* PQL=Practical Quantitation Limit is the lowest level that can be achieved within specified limits of precision and accuracy during routine laboratory operating conditions
MDL: Method Detection Limit
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Dr. Eugene Kuo, Quality Assurance Manager

05-28-07
Date

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QUALITY CONTROL REPORT
BLANK REPORT

Reference Number: 07-04495
Report Date: 05/08/07

Batch	Analyte	Result	Units	Limit	QC Qualifier	Method	Type*	Comments
508_070416	AROCLOR 1221	ND	ug/L	0.12		508.1	MB	
	AROCLOR 1232	ND	ug/L	0.02		508.1	MB	
	AROCLOR 1242	ND	ug/L	0.02		508.1	MB	
	AROCLOR 1248	ND	ug/L	0.02		508.1	MB	
	AROCLOR 1254	ND	ug/L	0.02		508.1	MB	
	AROCLOR 1260	ND	ug/L	0.02		508.1	MB	
	AROCLOR 1016	ND	ug/L	0.02		508.1	MB	
	TETRACHLORO-M-XYLENE (SURR)	84	%	0.00		508.1	MB	
515_070417	2,4 - D	ND	ug/L	0.05		515.1	MB	
	2,4,5 - TP (SILVEX)	ND	ug/L	0.10		515.1	MB	
	PENTACHLOROPHENOL	ND	ug/L	0.02		515.1	MB	
	DALAPON	ND	ug/L	0.50		515.1	MB	
	DINOSEB	ND	ug/L	0.10		515.1	MB	
	PICLORAM	ND	ug/L	0.05		515.1	MB	
	DICAMBA	ND	ug/L	0.05		515.1	MB	
	TOTAL DCPA	ND	ug/L	0.02		515.1	MB	
	DCPA (ACID METABOLITES)	ND	ug/L	0.10		515.1	MB	
	2,4 DB	ND	ug/L	0.25		515.1	MB	
	2,4,5 T	ND	ug/L	0.10		515.1	MB	
	BENTAZON	ND	ug/L	0.12		515.1	MB	
	DICHLORPROP	ND	ug/L	0.12		515.1	MB	
	ACIFLUORFEN	ND	ug/L	0.50		515.1	MB	
	CHLORAMBEN	ND	ug/L	0.20		515.1	MB	
525_070416	ENDRIN	ND	ug/L	0.02		525.2	MB	
	LINDANE (BHC - GAMMA)	ND	ug/L	0.02		525.2	MB	
	METHOXYCHLOR	ND	ug/L	0.02		525.2	MB	
	ALACHLOR	ND	ug/L	0.02		525.2	MB	
	ATRAZINE	ND	ug/L	0.02		525.2	MB	
	BENZO(A)PYRENE	ND	ug/L	0.02		525.2	MB	
	CHLORDANE, TECHNICAL	ND	ug/L	0.02		525.2	MB	
	DI(ETHYLHEXYL)ADIPATE	ND	ug/L	0.02		525.2	MB	
	DI(ETHYLHEXYL)PHTHALATE	ND	ug/L	0.60		525.2	MB	
	HEPTACHLOR	ND	ug/L	0.02		525.2	MB	
	HEPTACHLOR EPOXIDE	ND	ug/L	0.02		525.2	MB	
	HEXACHLOROBENZENE	ND	ug/L	0.02		525.2	MB	
	HEXACHLOROCYCLO-PENTADIENE	ND	ug/L	0.02		525.2	MB	
	SIMAZINE	ND	ug/L	0.02		525.2	MB	

*Notation:

LRB: Laboratory Reagent Blanks are used to determine the background level of the analytes in a laboratory batch. Therefore, this report may include analytes not requested for your submitted samples.

MB: Method Blanks are used to determine background levels of analytes in digested and extracted laboratory reagent water.

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Microbiology | 360.671.0688 - 360.671.1577fax

QUALITY CONTROL REPORT
BLANK REPORT

Reference Number: 07-04495
Report Date: 05/08/07

Batch	Analyte	Result	Units	Limit	QC Qualifier	Method	Type*	Comments
525_070416	PENTACHLOROPHENOL	ND	ug/L	0.04		525.2	MB	
	ALDRIN	ND	ug/L	0.05		525.2	MB	
	BUTACHLOR	ND	ug/L	0.10		525.2	MB	
	DIELDRIN	ND	ug/L	0.05		525.2	MB	
	METOLACHLOR	ND	ug/L	0.25		525.2	MB	
	METRIBUZIN	ND	ug/L	0.05		525.2	MB	
	PROPACHLOR	ND	ug/L	0.05		525.2	MB	
	BROMACIL	ND	ug/L	0.05		525.2	MB	
	TERBACIL	ND	ug/L	0.05		525.2	MB	
	DIAZINON	ND	ug/L	0.05		525.2	MB	
	EPTC	ND	ug/L	0.07		525.2	MB	
	4,4-DDD	ND	ug/L	0.05		525.2	MB	
	4,4-DDE	ND	ug/L	0.05		525.2	MB	
	4,4-DDT	ND	ug/L	0.05		525.2	MB	
	CYANAZINE	ND	ug/L	0.05		525.2	MB	
	MALATHION	ND	ug/L	0.05		525.2	MB	
	PARATHION	ND	ug/L	0.05		525.2	MB	
	TRIFLURALIN	ND	ug/L	0.05		525.2	MB	
	NAPTHALENE	ND	ug/L	0.02		525.2	MB	
	FLUORENE	ND	ug/L	0.05		525.2	MB	
	ACENAPHTHENE	ND	ug/L	0.05		525.2	MB	
	ANTHRACENE	ND	ug/L	0.05		525.2	MB	
	BENZ(A)ANTHRACENE	ND	ug/L	0.02		525.2	MB	
	BENZO(B)FLUORANTHENE	ND	ug/L	0.05		525.2	MB	
	BENZO(G,H,I)PERYLENE	ND	ug/L	0.05		525.2	MB	
	BENZO(K)FLUORANTHENE	ND	ug/L	0.05		525.2	MB	
	CHRYSENE	ND	ug/L	0.05		525.2	MB	
	DIBENZO(A,H)ANTHRACENE	ND	ug/L	0.05		525.2	MB	
	FLUORANTHENE	ND	ug/L	0.05		525.2	MB	
	INDENO(1,2,3-CD)PYRENE	ND	ug/L	0.05		525.2	MB	
	PHENANTHRENE	ND	ug/L	0.05		525.2	MB	
	PYRENE	ND	ug/L	0.05		525.2	MB	
	BENZYL BUTYL PHTHALATE	ND	ug/L	0.60		525.2	MB	
	DI-N-BUTYL PHTHALATE	ND	ug/L	0.60		525.2	MB	
	DIETHYL PHTHALATE	ND	ug/L	0.60		525.2	MB	
	DIMETHYL PHTHALATE	ND	ug/L	0.60		525.2	MB	
	1,3-DIMETHYL-2-NITROBENZENE (Sur	87	%			525.2	MB	
	PERYLENE-D12 (Surr)	94	%			525.2	MB	
	PYRENE-D10 (Surr)	104	%			525.2	MB	

*Notation:

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MB: Method Blanks are used to determine background levels of analytes in digested and extracted laboratory reagent water

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QUALITY CONTROL REPORT
BLANK REPORT

Reference Number: 07-04495
Report Date: 05/08/07

Batch	Analyte	Result	Units	Limit	QC Qualifier	Method	Type*	Comments
526_070416	TRIPHENYLPHOSPHATE (Sur)	110	%			525.2	MB	
531_070418	OXYMAL	ND	ug/L	1.00		531.2	MB	
	CARBOFURAN	ND	ug/L	0.45		531.2	MB	
	ALDICARB SULFOXIDE	ND	ug/L	0.25		531.2	MB	
	ALDICARB SULFONE	ND	ug/L	0.40		531.2	MB	
	METHOMYL	ND	ug/L	0.25		531.2	MB	
	3-HYDROXYCARBOFURAN	ND	ug/L	0.50		531.2	MB	
	ALDICARB	ND	ug/L	0.25		531.2	MB	
	CARBARYL	ND	ug/L	0.50		531.2	MB	
	PROPOXUR (BAYGON)	ND	ug/L	0.25		531.2	MB	
	METHIOCARB	ND	ug/L	1.00		531.2	MB	
531_070503	OXYMAL	ND	ug/L	1.00		531.2	MB	
	CARBOFURAN	ND	ug/L	0.45		531.2	MB	
	ALDICARB SULFOXIDE	ND	ug/L	0.25		531.2	MB	
	ALDICARB SULFONE	ND	ug/L	0.40		531.2	MB	
	METHOMYL	ND	ug/L	0.25		531.2	MB	
	3-HYDROXYCARBOFURAN	ND	ug/L	0.50		531.2	MB	
	ALDICARB	ND	ug/L	0.25		531.2	MB	
	CARBARYL	ND	ug/L	0.50		531.2	MB	
	PROPOXUR (BAYGON)	ND	ug/L	0.25		531.2	MB	
	METHIOCARB	ND	ug/L	1.00		531.2	MB	

*Notation:

LRB: Laboratory Reagent Blanks are used to determine the background level of the analytes in a laboratory batch. Therefore, this report may include analytes not requested for your submitted samples.

MB: Method Blanks are used to determine background levels of analytes in digested and extracted laboratory reagent water.

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QUALITY CONTROL REPORT
QCS/LFB REPORT

Reference Number: 07-04495
Report Date: 05/08/07

Batch	Analyte	Result	True Value	Units	Method	% Recovery	Limits	QC Qualifier	Type*	Comment
508_070416	AROCLOR 1260	0.44	0.5	ug/L	508.1	88	60-140		LFB	
	TETRACHLORO-M-XYLENE (SURR)	84		%	508.1		70-130		LFB	
525_070416	ENDRIN	1.36	1	ug/L	525.2	136	70-130	HQ	LFB	
	LINDANE (BHC - GAMMA)	1.01	1	ug/L	525.2	101	70-130		LFB	
	METHOXYCHLOR	1.2	1	ug/L	525.2	120	70-130		LFB	
	ALACHLOR	2.21	2	ug/L	525.2	111	70-130		LFB	
	ATRAZINE	2.16	2	ug/L	525.2	108	70-130		LFB	
	BENZO(A)PYRENE	0.88	1	ug/L	525.2	88	70-130		LFB	
	CHLORDANE, TECHNICAL	1.05	1	ug/L	525.2	105	70-130		LFB	
	DI(ETHYLHEXYL)-ADIPATE	1.19	1	ug/L	525.2	119	70-130		LFB	
	DI(ETHYLHEXYL)-PHTHALATE	1.28	1	ug/L	525.2	128	70-130		LFB	
	HEPTACHLOR	1.1	1	ug/L	525.2	110	70-130		LFB	
	HEPTACHLOR EPOXIDE	1.05	1	ug/L	525.2	105	70-130		LFB	
	HEXACHLOROBENZENE	1.03	1	ug/L	525.2	103	70-130		LFB	
	HEXACHLOROCYCLO-PENTADIENE	0.83	1	ug/L	525.2	83	70-130		LFB	
	SIMAZINE	1.04	1	ug/L	525.2	104	70-130		LFB	
	PENTACHLOROPHENOL	3.55	4	ug/L	525.2	89	70-130		LFB	
	ALDRIN	0.94	1	ug/L	525.2	94	70-130		LFB	
	BUTACHLOR	1.14	1	ug/L	525.2	114	70-130		LFB	
	DIELDRIN	1.13	1	ug/L	525.2	113	70-130		LFB	
	METOLACHLOR	1.12	1	ug/L	525.2	112	70-130		LFB	
	METRIBUZIN	1.48	1	ug/L	525.2	148	70-130		LFB	
	PROPACHLOR	1.1	1	ug/L	525.2	110	70-130		LFB	
	BROMACIL	1.1	1	ug/L	525.2	110	70-130		LFB	
	TERBACIL	1.3	1	ug/L	525.2	130	70-130		LFB	
	DIAZINON	0.99	1	ug/L	525.2	99	70-130		LFB	
	EPTC	1.02	1	ug/L	525.2	102	70-130		LFB	
	4,4-DDD	1.01	1	ug/L	525.2	101	70-130		LFB	
	4,4-DDE	1.03	1	ug/L	525.2	103	70-130		LFB	
	4,4-DDT	1.03	1	ug/L	525.2	103	70-130		LFB	
	CYANAZINE	1.07	1	ug/L	525.2	107	70-130		LFB	
	MALATHION	1.22	1	ug/L	525.2	122	70-130		LFB	
	PARATHION	1.09	1	ug/L	525.2	109	70-130		LFB	
	TRIFLURALIN	1.11	1	ug/L	525.2	111	70-130		LFB	
	FLUORENE	1.02	1	ug/L	525.2	102	70-130		LFB	

*Notation:

% Recovery = (Result of Analysis)/(True Value) * 100

NA = Indicates % Recovery could not be calculated.

QCS: Quality Control Sample, a solution containing known concentrations of method analytes which is used to fortify an aliquot of reagent matrix. The QCS is obtained from an external source and is used to check lab performance.

LFB: Laboratory Fortified Blank, an aliquot of reagent matrix to which known quantities of method analytes are added in the lab. The LFB is analyzed exactly like a sample, and its purpose is to determine whether method performance is within accepted control limits.

FORM: cLFB

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QUALITY CONTROL REPORT
QCS/LFB REPORT

Reference Number: 07-04495
Report Date: 05/08/07

Batch	Analyte	Result	True Value	Units	Method	% Recovery	Limits	QC Qualifier	Type*	Comment
525_070416	ACENAPHTHYLENE	0.98	1	ug/L	525.2	98	70-130		LFB	
	ANTHRACENE	0.77	1	ug/L	525.2	77	70-130		LFB	
	BENZ(A)ANTHRACENE	0.97	1	ug/L	525.2	97	70-130		LFB	
	BENZO(B)FLUORANTHENE	1.05	1	ug/L	525.2	105	70-130		LFB	
	BENZO(G,H,I)PERYLENE	1.12	1	ug/L	525.2	112	70-130		LFB	
	BENZO(K)FLUORANTHENE	0.97	1	ug/L	525.2	97	70-130		LFB	
	CHRYSENE	1.04	1	ug/L	525.2	104	70-130		LFB	
	DIBENZO(A,H)ANTHRACENE	1.11	1	ug/L	525.2	111	70-130		LFB	
	INDENO(1,2,3-CD)PYRENE	1.07	1	ug/L	525.2	107	70-130		LFB	
	PHENANTHRENE	0.99	1	ug/L	525.2	99	70-130		LFB	
	PYRENE	0.99	1	ug/L	525.2	99	70-130		LFB	
	BENZYL BUTYL PHTHALATE	1.06	1	ug/L	525.2	106	70-130		LFB	
	DI-N-BUTYL PHTHALATE	1.12	1	ug/L	525.2	112	70-130		LFB	
	DIETHYL PHTHALATE	1.1	1	ug/L	525.2	110	70-130		LFB	
	DIMETHYL PHTHALATE	1.11	1	ug/L	525.2	111	70-130		LFB	
	1,3-DIMETHYL-2-NITROBENZENE (Surr)	86		%	525.2	NA	70-130		LFB	
	PERYLENE-D12 (Surr)	103		%	525.2	NA	70-130		LFB	
	PYRENE-D10 (Surr)	99		%	525.2	NA	70-130		LFB	
	TRIPHENYLPHOSPHATE (Surr)	105		%	525.2	NA	70-130		LFB	
531_070418	OXYMAL	9.1	10	ug/L	531.2	91	70-130		LFB	
	CARBOFURAN	9	10	ug/L	531.2	90	70-130		LFB	
	ALDICARB SULFOXIDE	8.6	10	ug/L	531.2	86	70-130		LFB	
	ALDICARB SULFONE	9	10	ug/L	531.2	90	70-130		LFB	
	METHOMYL	8.8	10	ug/L	531.2	88	70-130		LFB	
	3-HYDROXYCARBOFURAN	8.8	10	ug/L	531.2	88	70-130		LFB	
	ALDICARB	8.9	10	ug/L	531.2	89	70-130		LFB	
	CARBARYL	9.3	10	ug/L	531.2	93	70-130		LFB	
	PROPOXUR (BAYGON)	8.2	10	ug/L	531.2	82	70-130		LFB	
	METHIOCARB	8.1	10	ug/L	531.2	81	70-130		LFB	
531_070418	OXYMAL	20.2	20	ug/L	531.2	101	70-130		LFB	
	CARBOFURAN	20.2	20	ug/L	531.2	101	70-130		LFB	
	ALDICARB SULFOXIDE	19.5	20	ug/L	531.2	98	70-130		LFB	
	ALDICARB SULFONE	20	20	ug/L	531.2	100	70-130		LFB	
	METHOMYL	19.9	20	ug/L	531.2	100	70-130		LFB	

*Notation:

% Recovery = (Result of Analysis)/(True Value) * 100

NA = Indicates % Recovery could not be calculated.

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FORM: cLFB

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QUALITY CONTROL REPORT
QCS/LFB REPORT

Reference Number: 07-04495
Report Date: 05/08/07

Batch	Analyte	Result	True Value	Units	Method	% Recovery	Limits	QC Qualifier	Type*	Comment
531_070418	3-HYDROXYCARBOFURAN	19.3	20	ug/L	531.2	97	70-130		LFB	
	ALDICARB	19.1	20	ug/L	531.2	96	70-130		LFB	
	CARBARYL	21	20	ug/L	531.2	105	70-130		LFB	
	PROPOXUR (BAYGON)	19.6	20	ug/L	531.2	98	70-130		LFB	
	METHIOCARB	19.5	20	ug/L	531.2	98	70-130		LFB	
531_070503	OXYMAL	1.8	2	ug/L	531.2	90	70-130		LFB	
	CARBOFURAN	2	2	ug/L	531.2	100	70-130		LFB	
	ALDICARB SULFOXIDE	2.1	2	ug/L	531.2	105	70-130		LFB	
	ALDICARB SULFONE	2	2	ug/L	531.2	100	70-130		LFB	
	METHOMYL	1.7	2	ug/L	531.2	85	70-130		LFB	
	3-HYDROXYCARBOFURAN	1.8	2	ug/L	531.2	90	70-130		LFB	
	ALDICARB	2.1	2	ug/L	531.2	105	70-130		LFB	
	CARBARYL	2	2	ug/L	531.2	100	70-130		LFB	
	PROPOXUR (BAYGON)	2	2	ug/L	531.2	100	70-130		LFB	
	METHIOCARB	2.4	2	ug/L	531.2	120	70-130		LFB	
531_070503	OXYMAL	20.5	20	ug/L	531.2	103	70-130		LFB	
	CARBOFURAN	21.2	20	ug/L	531.2	106	70-130		LFB	
	ALDICARB SULFOXIDE	23	20	ug/L	531.2	115	70-130		LFB	
	ALDICARB SULFONE	19.7	20	ug/L	531.2	99	70-130		LFB	
	METHOMYL	20.6	20	ug/L	531.2	103	70-130		LFB	
	3-HYDROXYCARBOFURAN	20.8	20	ug/L	531.2	104	70-130		LFB	
	ALDICARB	21.4	20	ug/L	531.2	107	70-130		LFB	
	CARBARYL	21.5	20	ug/L	531.2	108	70-130		LFB	
	PROPOXUR (BAYGON)	21.9	20	ug/L	531.2	110	70-130		LFB	
	METHIOCARB	20.9	20	ug/L	531.2	105	70-130		LFB	
515_070417	2,4 - D	1.7	2	ug/L	515.1	85	70-130		QCS	
	2,4,5 - TP (SILVEX)	0.93	1	ug/L	515.1	93	70-130		QCS	
	PENTACHLOROPHENOL	0.9	1	ug/L	515.1	90	70-130		QCS	
	DALAPON	9.7	13	ug/L	515.1	75	70-130		QCS	
	DINOSEB	1.6	2	ug/L	515.1	80	70-130		QCS	
	PICLORAM	0.74	1	ug/L	515.1	74	70-130		QCS	
	DICAMBA	0.91	1	ug/L	515.1	91	70-130		QCS	
	TOTAL DCPA	1.1	1	ug/L	515.1	110	70-130		QCS	

*Notation:

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NA = Indicates % Recovery could not be calculated.

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FORM: cLFB

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QUALITY CONTROL REPORT
QCS/LFB REPORT

Reference Number: 07-04495
Report Date: 05/08/07

Batch	Analyte	Result	True Value	Units	Method	% Recovery	Limits	QC Qualifier	Type*	Comment
515_070417	2,4 DB	7.3	8	ug/L	515.1	91	70-130		QCS	
	2,4,5 T	0.9	1	ug/L	515.1	90	70-130		QCS	
	BENTAZON	2	2	ug/L	515.1	100	70-130		QCS	
	DICHLORPROP	2.5	3	ug/L	515.1	83	70-130		QCS	
	ACIFLUORFEN	0.71	1	ug/L	515.1	71	70-130		QCS	
	CHLORAMBEN	0.82	1	ug/L	515.1	82	70-130		QCS	
	2,4 - DCAA (SURR)	105		%	515.1		70-130		QCS	

*Notation:

% Recovery = (Result of Analysis)/(True Value) * 100

NA = Indicates % Recovery could not be calculated.

QCS: Quality Control Sample, a solution containing known concentrations of method analytes which is used to fortify an aliquot of reagent matrix. The QCS is obtained from an external source and is used to check lab performance.

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FORM: cLFB

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QUALITY CONTROL REPORT

Duplicate and Matrix Spike/Matrix Spike Duplicate Report

Reference Number: 07-04495
Report Date: 5/8/2007

Duplicate

Batch	Sample	Analyte	Result	Duplicate Result	Units	%RPD	Limits	QC Qualifier		Comments
515_070417										
	10200	TOTAL DCPA	0.5	0.5	ug/L	0.0	0-45		DUP	
	10200	2,4 - DCAA (SURR)	98	103	%	5.0	0-45		DUP	
525_070416										
	9595	BROMACIL	1.4	1.45	ug/L	3.5	0-45		DUP	
	9595	1,3-DIMETHYL-2-NITROBENZENE (Surr	95	94	%	1.1	0-45		DUP	
	9595	PYRENE-D10 (Surr)	100	100	%	0.0	0-45		DUP	
	9595	PERYLENE-D12 (Surr)	97	92	%	5.3	0-45		DUP	
	9595	TRIPHENYLPHOSPHATE (Surr)	104	76	%	31.1	0-45		DUP	
	9596	DI(ETHYLHEXYL)-PHTHALATE	2.5	1.3	ug/L	63.2	0-45	FD	DUP	
	9596	BROMACIL	5.2	4.9	ug/L	5.9	0-45		DUP	
	9596	1,3-DIMETHYL-2-NITROBENZENE (Surr	101	97	%	4.0	0-45		DUP	
	9596	PYRENE-D10 (Surr)	103	108	%	4.7	0-45		DUP	
	9596	PERYLENE-D12 (Surr)	92	99	%	7.3	0-45		DUP	
	9596	TRIPHENYLPHOSPHATE (Surr)	107	80	%	28.9	0-45		DUP	
	10230	MALATHION	0.4	0.3	ug/L	28.6	0-45		DUP	
	10230	DI-N-BUTYL PHTHALATE	0.7	0.6	ug/L	15.4	0-45		DUP	
	10230	1,3-DIMETHYL-2-NITROBENZENE (Surr	95	102	%	7.1	0-45		DUP	
	10230	PYRENE-D10 (Surr)	104	107	%	2.8	0-45		DUP	
	10230	PERYLENE-D12 (Surr)	102	103	%	1.0	0-45		DUP	
	10230	TRIPHENYLPHOSPHATE (Surr)	108	100	%	8.6	0-45		DUP	
	10233	1,3-DIMETHYL-2-NITROBENZENE (Surr	98	93	%	5.2	0-45		DUP	
	10233	PYRENE-D10 (Surr)	103	104	%	1.0	0-45		DUP	
	10233	PERYLENE-D12 (Surr)	102	107	%	4.8	0-45		DUP	
	10233	TRIPHENYLPHOSPHATE (Surr)	110	112	%	1.8	0-45		DUP	

%RPD = Relative Percent Difference

NA = Indicates %RPD could not be calculated

Matrix Spike (MS)/Matrix Spike Duplicate (MSD) analyses are used to determine the accuracy (MS) and precision (MSD) of a analytical method in a given sample matrix. Therefore, the usefulness of this report is limited to samples of similar matrices analyzed in the same analytical batch.

Only Duplicate sample with detections are listed in this report

Matrix Spike

Batch	Sample	Analyte	Result	Spike Result	Duplicate Spike Result	Spike Conc	Units	Percent Recovery MS	Percent Recovery MSD	Limits	%RPD	Limits	QC Qualifier		Comments
515_070417															
	10230	2,4 - D	ND	1.6		2	ug/L	80	NA	65-135	NA	0-60		LFM	
	10230	2,4,5 - TP (SILVEX)	ND	0.9		1	ug/L	90	NA	65-135	NA	0-60		LFM	
	10230	PENTACHLOROPHENOL	ND	0.86		1	ug/L	86	NA	65-135	NA	0-60		LFM	
	10230	DALAPON	ND	8.9		13	ug/L	68	NA	65-135	NA	0-60		LFM	
	10230	DINOSEB	ND	1.5		2	ug/L	75	NA	65-135	NA	0-60		LFM	
	10230	PICLORAM	ND	0.66		1	ug/L	66	NA	65-135	NA	0-60		LFM	
	10230	DICAMBA	ND	0.86		1	ug/L	86	NA	65-135	NA	0-60		LFM	
	10230	TOTAL DCPA	ND	1.1		1	ug/L	110	NA	65-135	NA	0-60		LFM	
	10230	2,4 DB	ND	7.2		8	ug/L	90	NA	65-135	NA	0-60		LFM	
	10230	2,4,5 T	ND	0.87		1	ug/L	87	NA	65-135	NA	0-60		LFM	
	10230	BENTAZON	ND	1.8		2	ug/L	90	NA	65-135	NA	0-60		LFM	
	10230	DICHLORPROP	ND	2.4		3	ug/L	80	NA	65-135	NA	0-60		LFM	
	10230	ACIFLUORFEN	ND	0.7		1	ug/L	70	NA	65-135	NA	0-60		LFM	
	10230	CHLORAMBEN	ND	0.75		1	ug/L	75	NA	65-135	NA	0-60		LFM	
	10230	2,4 - DCAA (SURR)	106	107			%		NA	70-130	NA	0-60		LFM	
525_070416															
	9334	ENDRIN	ND	1.34		1	ug/L	134	NA	70-130	NA	0-60	HQ	LFM	
	9334	LINDANE (BHC - GAMMA)	ND	1.1		1	ug/L	110	NA	70-130	NA	0-60		LFM	
	9334	METHOXYCHLOR	ND	1.39		1	ug/L	139	NA	70-130	NA	0-60	HQ	LFM	
	9334	ALACHLOR	ND	2.1		2	ug/L	105	NA	70-130	NA	0-60		LFM	
	9334	ATRAZINE	ND	2.06		2	ug/L	103	NA	70-130	NA	0-60		LFM	
	9334	BENZO(A)PYRENE	ND	1.07		1	ug/L	107	NA	70-130	NA	0-60		LFM	
	9334	CHLORDANE, TECHNICAL	ND	0.96		1	ug/L	96	NA	70-130	NA	0-60		LFM	
	9334	DI(ETHYLHEXYL)-ADIPATE	ND	1.19		1	ug/L	119	NA	70-130	NA	0-60		LFM	
	9334	DI[ETHYLHEXYL)-PHTHALATE	ND	1.61		1	ug/L	161	NA	70-130	NA	0-60		LFM	
	9334	HEPTACHLOR	ND	1.06		1	ug/L	106	NA	70-130	NA	0-60		LFM	
	9334	HEPTACHLOR EPOXIDE	ND	1.04		1	ug/L	104	NA	70-130	NA	0-60		LFM	
	9334	HEXACHLOROBENZENE	ND	1.01		1	ug/L	101	NA	70-130	NA	0-60		LFM	
	9334	HEXACHLOROCYCLO-PENTADIENE	ND	0.98		1	ug/L	98	NA	70-130	NA	0-60		LFM	
	9334	SIMAZINE	ND	1.03		1	ug/L	103	NA	70-130	NA	0-60		LFM	
	9334	PENTACHLOROPHENOL	ND	4.27		4	ug/L	107	NA	70-130	NA	0-60		LFM	
	9334	ALDRIN	ND	1.02		1	ug/L	102	NA	70-130	NA	0-60		LFM	
	9334	BUTACHLOR	ND	1.08		1	ug/L	108	NA	70-130	NA	0-60		LFM	
	9334	DIELDRIN	ND	1.12		1	ug/L	112	NA	70-130	NA	0-60		LFM	
	9334	METOLACHLOR	ND	1.03		1	ug/L	103	NA	70-130	NA	0-60		LFM	

%RPD = Relative Percent Difference

NA = Indicates %RPD could not be calculated

Matrix Spike (MS)/Matrix Spike Duplicate (MSD) analyses are used to determine the accuracy (MS) and precision (MSD) of a analytical method in a given sample matrix. Therefore, the usefulness of this report is limited to samples of similar matrices analyzed in the same analytical batch.

Only Duplicate sample with detections are listed in this report

Matrix Spike

Batch	Sample	Analyte	Result	Spike Result	Duplicate Spike Result	Spike Conc	Units	Percent Recovery MS	Percent Recovery MSD	Limits	%RPD	Limits	QC Qualifier		Comments
	9334	METRIBUZIN	ND	1.53		1	ug/L	153	NA	70-130	NA	0-60	HQ	LFM	
	9334	PROPACHLOR	ND	1.04		1	ug/L	104	NA	70-130	NA	0-60		LFM	
	9334	BROMACIL	ND	1.12		1	ug/L	112	NA	70-130	NA	0-60		LFM	
	9334	TERBACIL	ND	1.15		1	ug/L	115	NA	70-130	NA	0-60		LFM	
	9334	DIAZINON	ND	1.1		1	ug/L	110	NA	70-130	NA	0-60		LFM	
	9334	EPTC	ND	0.9		1	ug/L	90	NA	70-130	NA	0-60		LFM	
	9334	4,4-DDD	ND	1.01		1	ug/L	101	NA	70-130	NA	0-60		LFM	
	9334	4,4-DDE	ND	0.97		1	ug/L	97	NA	70-130	NA	0-60		LFM	
	9334	4,4-DDT	ND	1.1		1	ug/L	110	NA	70-130	NA	0-60		LFM	
	9334	CYANAZINE	ND	1.02		1	ug/L	102	NA	70-130	NA	0-60		LFM	
	9334	MALATHION	ND	1.22		1	ug/L	122	NA	70-130	NA	0-60		LFM	
	9334	PARATHION	ND	1.2		1	ug/L	120	NA	70-130	NA	0-60		LFM	
	9334	TRIFLURALIN	ND	0.97		1	ug/L	97	NA	70-130	NA	0-60		LFM	
	9334	FLUORENE	ND	1.02		1	ug/L	102	NA	70-130	NA	0-60		LFM	
	9334	ACENAPHTHYLENE	ND	0.99		1	ug/L	99	NA	70-130	NA	0-60		LFM	
	9334	ANTHRACENE	ND	0.97		1	ug/L	97	NA	70-130	NA	0-60		LFM	
	9334	BENZ(A)ANTHRACENE	ND	1		1	ug/L	100	NA	70-130	NA	0-60		LFM	
	9334	BENZO(B)FLUORANTHENE	ND	1.04		1	ug/L	104	NA	70-130	NA	0-60		LFM	
	9334	BENZO(G,H,I)PERYLENE	ND	1.3		1	ug/L	130	NA	70-130	NA	0-60		LFM	
	9334	BENZO(K)FLUORANTHENE	ND	1.05		1	ug/L	105	NA	70-130	NA	0-60		LFM	
	9334	CHRYSENE	ND	1.02		1	ug/L	102	NA	70-130	NA	0-60		LFM	
	9334	DIBENZO(A,H)ANTHRACENE	ND	1.3		1	ug/L	130	NA	70-130	NA	0-60		LFM	
	9334	INDENO(1,2,3-CD)PYRENE	ND	1.29		1	ug/L	129	NA	70-130	NA	0-60		LFM	
	9334	PHENANTHRENE	ND	1.04		1	ug/L	104	NA	70-130	NA	0-60		LFM	
	9334	PYRENE	ND	1		1	ug/L	100	NA	70-130	NA	0-60		LFM	
	9334	BENZYL BUTYL PHTHALATE	ND	1.14		1	ug/L	114	NA	70-130	NA	0-60		LFM	
	9334	DI-N-BUTYL PHTHALATE	ND	1.16		1	ug/L	116	NA	70-130	NA	0-60		LFM	
	9334	DIETHYL PHTHALATE	ND	1.11		1	ug/L	111	NA	70-130	NA	0-60		LFM	
	9334	DIMETHYL PHTHALATE	ND	1.12		1	ug/L	112	NA	70-130	NA	0-60		LFM	
	9334	1,3-DIMETHYL-2-NITROBENZENE (Surr	93	92			%		NA	70-130	NA	0-60		LFM	
	9334	PYRENE-D10 (Surr)	108	105			%		NA	70-130	NA	0-60		LFM	
	9334	PERYLENE-D12 (Surr)	104	104			%		NA	70-130	NA	0-60		LFM	
	9334	TRIPHENYLPHOSPHATE (Surr)	113	112			%		NA	70-130	NA	0-60		LFM	
531_070418															
	8957	OXYMAL	ND	10.7		10	ug/L	107	NA	70-130	NA	0-60		LFM	
	8957	CARBOFURAN	ND	10.3		10	ug/L	103	NA	70-130	NA	0-60		LFM	

%RPD = Relative Percent Difference

NA = Indicates %RPD could not be calculated

Matrix Spike (MS)/Matrix Spike Duplicate (MSD) analyses are used to determine the accuracy (MS) and precision (MSD) of a analytical method in a given sample matrix. Therefore, the usefulness of this report is limited to samples of similar matrices analyzed in the same analytical batch.

Only Duplicate sample with detections are listed in this report

Matrix Spike

Batch	Sample	Analyte	Result	Duplicate Spike Result	Duplicate Spike Result	Spike Conc	Units	Percent Recovery MS	Percent Recovery MSD	Limits	%RPD	Limits	QC Qualifier	Comments
	8957	ALDICARB SULFOXIDE	ND	10		10	ug/L	100	NA	70-130	NA	0-50	LFM	
	8957	ALDICARB SULFONE	ND	10.6		10	ug/L	106	NA	70-130	NA	0-50	LFM	
	8957	METHOMYL	ND	10.7		10	ug/L	107	NA	70-130	NA	0-50	LFM	
	8957	3-HYDROXYCARBOFURAN	ND	10.8		10	ug/L	108	NA	70-130	NA	0-50	LFM	
	8957	ALDICARB	ND	10.4		10	ug/L	104	NA	70-130	NA	0-50	LFM	
	8957	CARBARYL	ND	10.8		10	ug/L	108	NA	70-130	NA	0-50	LFM	
	8957	PROPOXUR (BAYGON)	ND	10.9		10	ug/L	109	NA	70-130	NA	0-50	LFM	
	8957	METHIOCARB	ND	11.4		10	ug/L	114	NA	70-130	NA	0-50	LFM	
	9337	OXYMAL	ND	9.6		10	ug/L	96	NA	70-130	NA	0-50	LFM	
	9337	CARBOFURAN	ND	10		10	ug/L	100	NA	70-130	NA	0-50	LFM	
	9337	ALDICARB SULFOXIDE	ND	9.1		10	ug/L	91	NA	70-130	NA	0-50	LFM	
	9337	ALDICARB SULFONE	ND	9.7		10	ug/L	97	NA	70-130	NA	0-50	LFM	
	9337	METHOMYL	ND	9.7		10	ug/L	97	NA	70-130	NA	0-50	LFM	
	9337	3-HYDROXYCARBOFURAN	ND	9.9		10	ug/L	99	NA	70-130	NA	0-50	LFM	
	9337	ALDICARB	ND	9.5		10	ug/L	95	NA	70-130	NA	0-50	LFM	
	9337	CARBARYL	ND	10.7		10	ug/L	107	NA	70-130	NA	0-50	LFM	
	9337	PROPOXUR (BAYGON)	ND	10		10	ug/L	100	NA	70-130	NA	0-50	LFM	
	9337	METHIOCARB	ND	9.5		10	ug/L	95	NA	70-130	NA	0-50	LFM	
531_070503														
	12371	OXYMAL	ND	10.4	10.5	10	ug/L	104	105	70-130	1.0	0-50	LFM	
	12371	CARBOFURAN	ND	10.8	10.2	10	ug/L	108	102	70-130	5.7	0-50	LFM	
	12371	ALDICARB SULFOXIDE	ND	10.6	10.3	10	ug/L	106	103	70-130	2.9	0-50	LFM	
	12371	ALDICARB SULFONE	ND	10.5	10.3	10	ug/L	105	103	70-130	1.9	0-50	LFM	
	12371	METHOMYL	ND	10.5	9.6	10	ug/L	105	96	70-130	9.0	0-50	LFM	
	12371	3-HYDROXYCARBOFURAN	ND	11	10.8	10	ug/L	110	108	70-130	1.8	0-50	LFM	
	12371	ALDICARB	ND	9.4	9.1	10	ug/L	94	91	70-130	3.2	0-50	LFM	
	12371	CARBARYL	ND	11.7	11.3	10	ug/L	117	113	70-130	3.5	0-50	LFM	
	12371	PROPOXUR (BAYGON)	ND	10.6	10.4	10	ug/L	106	104	70-130	1.9	0-50	LFM	
	12371	METHIOCARB	ND	11.2	11	10	ug/L	112	110	70-130	1.8	0-50	LFM	

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NA = Indicates %RPD could not be calculated

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Only Duplicate sample with detections are listed in this report

Qualifier Definitions

Reference Number: 07-04495
Report Date: 05/08/07

Qualifier	Definition
FD	The result is suspect, the field duplicate results do not agree.
HQ	High QCS recovery due to increased detector response of the sample extract. The continuing calibration checks are within acceptance limits.
KK	The amount detected is below the State Reporting Level but greater then the lab's Practical Quantitation Level.

Note: Some qualifier definitions found on this page may pertain to results or QC data which are not printed with this report.

FORM: QualifierDefs

QUALITY CONTROL REPORT
SURROGATE REPORT

Reference Number: 07-04495
Report Date: 05/08/07

Lab No	Analyte	Result	Qualifier	Units	Method	Limit
508_070416						
10230	TETRACHLORO-M-XYLENE (SURR)	91		%	508.1	Acceptance Limits 70%-130%
515_070417						
10230	2,4 - DCAA (SURR)	106		%	515.1	Acceptance Range is 70 - 130%
525_070416						
10230	1,3-DIMETHYL-2-NITROBENZENE (Surr)	95		%	525.2	Acceptance Range is 70% to 130%
	PYRENE-D10 (Surr)	104		%		Acceptance Range is 70% to 130%
	PERYLENE-D12 (Surr)	102		%		Acceptance Range is 70% to 130%
	TRIPHENYLPHOSPHATE (Surr)	109		%		Acceptance Range is 70% to 130%
508_070416						
10231	TETRACHLORO-M-XYLENE (SURR)	94		%	508.1	Acceptance Limits 70%-130%
515_070417						
10231	2,4 - DCAA (SURR)	108		%	515.1	Acceptance Range is 70 - 130%
525_070416						
10231	1,3-DIMETHYL-2-NITROBENZENE (Surr)	93		%	525.2	Acceptance Range is 70% to 130%
	PYRENE-D10 (Surr)	105		%		Acceptance Range is 70% to 130%
	PERYLENE-D12 (Surr)	98		%		Acceptance Range is 70% to 130%
	TRIPHENYLPHOSPHATE (Surr)	105		%		Acceptance Range is 70% to 130%
508_070416						
10232	TETRACHLORO-M-XYLENE (SURR)	93		%	508.1	Acceptance Limits 70%-130%
515_070417						
10232	2,4 - DCAA (SURR)	114		%	515.1	Acceptance Range is 70 - 130%
525_070416						
10232	1,3-DIMETHYL-2-NITROBENZENE (Surr)	100		%	525.2	Acceptance Range is 70% to 130%
	PYRENE-D10 (Surr)	104		%		Acceptance Range is 70% to 130%
	PERYLENE-D12 (Surr)	100		%		Acceptance Range is 70% to 130%
	TRIPHENYLPHOSPHATE (Surr)	107		%		Acceptance Range is 70% to 130%
508_070416						
10233	TETRACHLORO-M-XYLENE (SURR)	89		%	508.1	Acceptance Limits 70%-130%
515_070417						
10233	2,4 - DCAA (SURR)	122		%	515.1	Acceptance Range is 70 - 130%
525_070416						
10233	1,3-DIMETHYL-2-NITROBENZENE (Surr)	98		%	525.2	Acceptance Range is 70% to 130%
	PYRENE-D10 (Surr)	103		%		Acceptance Range is 70% to 130%
	PERYLENE-D12 (Surr)	102		%		Acceptance Range is 70% to 130%
	TRIPHENYLPHOSPHATE (Surr)	110		%		Acceptance Range is 70% to 130%

*Notation:

A surrogate is a pure compound added to a sample in the laboratory just before processing so that the overall efficiency of a method can be determined.

The Acceptance Limits (or Control Limits) approximate a 99% confidence interval around the mean recovery.

Kuo Testing Labs, Inc.

Daily Field Report

Project:	Hall-Wentland SAR Project	**Project#:**	
Contractor:	Kuo Testing Labs, Inc.	**Task #:**	
KTL Personnel:	Laura Hofbauer	**Page**	**OF**
	Diana Woolliams	**Date:**	**05/07/07**
Weather:	D2 ~ 30's		

TIME:	DESCRIPTION OF WORK
9:15	on site H.W. MW #2
9:46	on site sweeper water
9:57	on site H.W. MW #3
10:23	on site H.W. MW #1

Kuo Testing Labs, Inc.

Groundwater Sampling Field Data Sheet

PROJECT NAME: Hall-Wentland SAR Project	No.:	WELL NO: HW - 1
FIELD SAMPLER: Laura Hofbauer		DATE: 05/07/07
FIELD ANALYST: Laura Hofbauer		
SAMPLING METHOD: Battery Operated Whale Water Mini Purge Pump		
FIELD INSTRUMENTS USED: Orion pH Meter model 210A Hach Conductivity Meter Solinst Water Level Meter Model 101 HF Scientific ORT-15 CE Turbidi Meter		CONDITION of WELL: satisfactory

Water Level Data		Well Construction Data		Well Purging Data	
1) Total Well Depth (feet)	52.50	Outside Casing Diameter D_2 (in.)	2"	Calculate Casing Volume	
2) Initial Depth to Water WT** (feet)	24.79	Bore Hole Diameter D_3 (in.)	6"	L_1 27.71 *0.16 = 4.43 CV in Gallons	
3) Final Depth To Water	24.98	Filter Pack Length L_2 (feet)	12	CV 4.43 /2 = 2.22 BV in Gallons	
		Porosity of Filter Pack N (%)	25	Total Purge Volume (gals) CV*(3)= TPV(gals)	13.2
				Actual Volume Purged (gals)	15
4) Length of Water in Column L_1 *Value on Line1– Value on Line 2 (feet)*	27.71			Number of Bore Volumes Purged	6

* The surveyed point on the inside (usually PVC) casing

** The depth to the water table before removing any water from the well

WELL PURGING MEASUREMENTS

Time	Cumulative Gallons Purged	pH	Temperature °C	Conductivity µs/cm 2mS 20mS	Turbidity NTU	Purge Rate GPM	Comments
[illegible]			began	purge			
10:34	3	7.99	13.7	0152	6.64		
[illegible]	6	[illegible]	13.2	[illegible]	[illegible]		
[illegible]	9	7.93	[illegible]	0152	0.94		
10:56	12	7.94	[illegible]	[illegible]	[illegible]		
[illegible]	15	[illegible]	[illegible]	0152	[illegible]		
			End purge	Collected	sample		

Forms by Gina Clark

Kuo Testing Labs, Inc.

337 South 1st Avenue, Othello, WA 99344
(509) 488-0112 Phone (509) 488-0118 Fax (800) 328-0112 Toll Free
Web Site: http://www.kuotesting.com e-mail: kuotest@atnet.net

DATE COLLECTED: 5/7/2007
DATE RECEIVED: 5/8/2007
DATE REPORTED: 5/22/2007

SYSTEM / CUSTOMER

GSI , Inc.
1020 N. Center Pkwy, Ste F
Kennewick WA 99336
Project Name: Hall-Wetland SAR Project

SEND REPORT TO:

Ground Water Solutions, Inc.
1020 N. Center Pkwy, Ste F
Kennewick WA 99336
Attn: Jon, Kevin

SAMPLE NO.	CUSTOMER SAMPLE NO.	ANALYSIS	RESULTS	MDL	UNITS	ANALYSTS
88146	HW-1	Nitrate as Nitrogen	1.14	0.015	mg/L	Reed
88146	HW-1	Nitrite as Nitrogen	ND	0.0023	mg/L	Reed
88146	HW-1	Total Dissolved Solids	76.7	21.1	mg/L	Reed
88146	HW-1	Hardness	56.7	0.11	mg/L	Reed
88146	HW-1	Chloride	5.0	0.297	mg/L	Reed
88146	HW-1	Orthophosphate as P	0.13	0.043	mg/L	Reed
88146	HW-1	COD	<8	8	mg/L	Morris
88146	HW-1	Total Coliform and E. Coli	Present/Absent			Reed

mg/L:Indicates milligrams per litre
* PQL=Practical Quantitation Limit is the lowest level that can be achieved within specified limits of precision and accuracy during routine laboratory operating conditions
MDL: Method Detection Limit
Please check out our new Web Site at http://www.kuotesting.com
'Upon Visual Observation

Dr. Eugene Kuo, Quality Assurance Manager

05-28-07
Date

Kuo Testing Labs, Inc.

Groundwater Sampling Field Data Sheet

PROJECT NAME: Hall-Wentland SAR Project	**No.:**	**WELL NO:** HW - 2
FIELD SAMPLER: Laura Hofbauer		**DATE:** 05/07/07
FIELD ANALYST: Laura Hofbauer		
SAMPLING METHOD: Battery Operated Whale Water Mini Purge Pump		
FIELD INSTRUMENTS USED: Orion pH Meter model 210A Hach Conductivity Meter Solinst Water Level Meter Model 101 HF Scientific ORT-15 CE Turbidi Meter		**CONDITION of WELL:** satisfactory

Water Level Data		Well Construction Data		Well Purging Data	
1) Total Well Depth (feet)	49.77	Outside Casing Diameter D_2 (in.)	2"	Calculate Casing Volume	
2) Initial Depth to Water WT** (feet)	17.79	Bore Hole Diameter D_3 (in.)	6"	L_1 31.98 *0.16 = 5.11 CV in Gallons	
3) Final Depth To Water	17.85	Filter Pack Length L_2 (feet)	12	CV 5.11 /2 = 2.56 BV in Gallons	
		Porosity of Filter Pack N (%)	25	Total Purge Volume (gals) CV*(3)= TPV(gals)	15.4
				Actual Volume Purged (gals)	15
4) Length of Water in Column L_1 *Value on Line1– Value on Line 2 (feet)*	31.98			Number of Bore Volumes Purged	5

* The surveyed point on the inside (usually PVC) casing

** The depth to the water table before removing any water from the well

WELL PURGING MEASUREMENTS

Time	Cumulative Gallons Purged	pH	Temperature °C	Conductivity µs/cm 2mS 20mS	Turbidity NTU	Purge Rate GPM	Comments
9:22			began	purge			
9:26	3	6.87	11.6	0135	11.7		
9:28	6	6.95	11.0	0136	6.49		
9:30	9	7.00	10.9	0136	3.37		
9:32	12	7.02	10.7	0135	2.02		
9:34	15	7.02	10.8	0136	1.67		
			End purge	Collected	sample	+	Duplicate

Forms by Gina Clark

Kuo Testing Labs, Inc.

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Web Site: http://www.kuotesting.com e-mail: kuotest@atnet.net

DATE COLLECTED: 5/7/2007
DATE RECEIVED: 5/8/2007
DATE REPORTED: 5/29/2007

SYSTEM / CUSTOMER

GSI , Inc.
1020 N. Center Pkwy, Ste F
Kennewick WA 99336
Project Name:Hall-Wetland SAR Project

SEND REPORT TO:
Ground Water Solutions, Inc.
1020 N. Center Pkwy, Ste F
Kennewick WA 99336
Attn: Jon, Kevin

SAMPLE NO.	CUSTOMER SAMPLE NO.	ANALYSIS	RESULTS	MDL	UNITS	ANALYSTS
88147	HW-2	Nitrate as Nitrogen	0.85	0.20	mg/L	Coffey
88147	HW-2	Nitrite as Nitrogen	ND	0.0023	mg/L	Reed
88147	HW-2	Total Dissolved Solids	53.3	21.1	mg/L	Reed
88147	HW-2	Hardness	48.7	0.11	mg/L	Reed
88147	HW-2	Chloride	1.50	0.297	mg/L	Reed
88147	HW-2	Orthophosphate as P	0.12	0.043	mg/L	Reed
88147	HW-2	COD	<8	8	mg/L	Morris
88147	HW-2	Total Coliform and E. Coli	Present/Present			Reed

<(0.001): indicates the analyte was not detected at or above the concentration indicated.
ND: None Detected
mg/L:Indicates milligrams per litre
* PQL=Practical Quantitation Limit is the lowest level that can be achieved within specified limits of precision and accuracy during routine laboratory operating conditions
MDL: Method Detection Limit
Please check out our new Web Site at http://www.kuotesting.com
'Upon Visual Observation

Dr. Eugene Kuo, Quality Assurance Manager

05-31-07
Date

Kuo Testing Labs, Inc.

Groundwater Sampling Field Data Sheet

PROJECT NAME: Hall-Wentland SAR Project	**No.:**	**WELL NO:** HW - 3
FIELD SAMPLER: Laura Hofbauer		**DATE:** 05/07/07
FIELD ANALYST: Laura Hofbauer		
SAMPLING METHOD: Battery Operated Whale Water Mini Purge Pump		
FIELD INSTRUMENTS USED: Orion pH Meter model 210A Hach Conductivity Meter Solinst Water Level Meter Model 101 HF Scientific ORT-15 CE Turbidi Meter		**CONDITION of WELL:** satisfactory

Water Level Data		Well Construction Data		Well Purging Data	
1) Total Well Depth (feet)	49.01	Outside Casing Diameter D_2 (in.)	2"	Calculate Casing Volume	
2) Initial Depth to Water WT** (feet)	21.00	Bore Hole Diameter D_3 (in.)	6"	L_1 28.01 *0.16 = 4.48 CV in Gallons	
3) Final Depth To Water	20.90	Filter Pack Length L_2 (feet)	12	CV 4.48 /2 = 2.24 BV in Gallons	
		Porosity of Filter Pack N (%)	25	Total Purge Volume (gals) CV*(3)= TPV(gals)	13.4
				Actual Volume Purged (gals)	15
4) Length of Water in Column L_1 *Value on Line1– Value on Line 2 (feet)*	28.01			Number of Bore Volumes Purged	6

* The surveyed point on the inside (usually PVC) casing

** The depth to the water table before removing any water from the well

WELL PURGING MEASUREMENTS

Time	Cumulative Gallons Purged	pH	Temperature °C	Conductivity µs/cm 2mS 20mS	Turbidity NTU	Purge Rate GPM	Comments
10:04			began	purge			
10:06	3	7.32	14.0	0.146	0.64		
10:08	6	illegible	13.2	illegible	0.26		
10:10	9	illegible	illegible	0.142	illegible		
10:12	12	illegible	illegible	illegible	0.12		
10:14	15	illegible	13.2	0.142	0.11		
			End purge	Collected	sample		

Forms by Gina Clark

Kuo Testing Labs, Inc.

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Web Site: http://www.kuotesting.com e-mail: kuotest@atnet.net

DATE COLLECTED: 5/7/2007
DATE RECEIVED: 5/8/2007
DATE REPORTED: 5/22/2007

SYSTEM / CUSTOMER

GSI , Inc.
1020 N. Center Pkwy, Ste F
Kennewick WA 99336
Project Name: Hall-Wetland SAR Project

SEND REPORT TO:

Ground Water Solutions, Inc.
1020 N. Center Pkwy, Ste F
Kennewick WA 99336
Attn: Jon, Kevin

SAMPLE NO.	CUSTOMER SAMPLE NO.	ANALYSIS	RESULTS	MDL	UNITS	ANALYSTS
88148	HW-3	Nitrate as Nitrogen	1.16	0.015	mg/L	Reed
88148	HW-3	Nitrite as Nitrogen	ND	0.0023	mg/L	Reed
88148	HW-3	Total Dissolved Solids	76.7	21.1	mg/L	Reed
88148	HW-3	Hardness	56.8	0.11	mg/L	Reed
88148	HW-3	Chloride	2.0	0.297	mg/L	Reed
88148	HW-3	Orthophosphate as P	0.07	0.043	mg/L	Reed
88148	HW-3	COD	<8	8	mg/L	Morris
88148	HW-3	Total Coliform and E. Coli	Absent/Absent			Reed

mg/L: Indicates milligrams per litre
* PQL=Practical Quantitation Limit is the lowest level that can be achieved within specified limits of precision and accuracy during routine laboratory operating conditions
MDL: Method Detection Limit
Please check out our new Web Site at http://www.kuotesting.com
'Upon Visual Observation

Dr. Eugene Kuo, Quality Assurance Manager

05-28-07
Date

Kuo Testing Labs, Inc.

Daily Field Report

Project:	Hall - Wentland SAR Monitoring	**Project#:**	
Contractor:	Kuo Testing Labs, Inc.	**Task #:**	
KTL Personnel:	Laura Hofbauer	**Page**	**OF**
		Date:	**05/07/07**

SITE	TIME	pH	CONDUCTIVITY	TEMPERATURE	TURBIDITY
SOURCE	9:50	8.59	0110	15.9	6.51

Kuo Testing Labs, Inc.

337 South 1st Avenue, Othello, WA 99344
(509) 488-0112 Phone (509) 488-0118 Fax (800) 328-0112 Toll Free
Web Site: http://www.kuotesting.com e-mail: kuotest@atnet.net

DATE COLLECTED: 5/7/2007
DATE RECEIVED: 5/8/2007
DATE REPORTED: 5/22/2007

SYSTEM / CUSTOMER

GSI , Inc.
1020 N. Center Pkwy, Ste F
Kennewick WA 99336
Project Name: Hall-Wetland SAR Project

SEND REPORT TO:

Ground Water Solutions, Inc.
1020 N. Center Pkwy, Ste F
Kennewick WA 99336
Attn: Jon, Kevin

SAMPLE NO.	CUSTOMER SAMPLE NO.	ANALYSIS	RESULTS	MDL	UNITS	ANALYSTS
88149	HW-SW	Nitrate as Nitrogen	0.60	0.015	mg/L	Reed
88149	HW-SW	Nitrite as Nitrogen	ND	0.0023	mg/L	Reed
88149	HW-SW	Total Dissolved Solids	50.0	21.1	mg/L	Reed
88149	HW-SW	Hardness	38.6	0.11	mg/L	Reed
88149	HW-SW	Chloride	4.50	0.297	mg/L	Reed
88149	HW-SW	Orthophosphate as P	0.09	0.043	mg/L	Reed
88149	HW-SW	COD	<8	8	mg/L	Morris
88149	HW-SW	Total Coliform and E. Coli	Present/Present			Reed

mg/L: Indicates milligrams per litre
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'Upon Visual Observation

Dr. Eugene Kuo, Quality Assurance Manager

05-28-07
Date

Kuo Testing Labs, Inc.

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(509) 488-0112 Phone (509) 488-0118 Fax (800) 328-0112 Toll Free
Web Site: http://www.kuotesting.com e-mail: kuotest@atnet.net

DATE COLLECTED: 5/7/2007
DATE RECEIVED: 5/8/2007
DATE REPORTED: 5/22/2007

SYSTEM / CUSTOMER

GSI , Inc.
1020 N. Center Pkwy, Ste F
Kennewick WA 99336
Project Name: Hall-Wetland SAR Project

SEND REPORT TO:

Ground Water Solutions, Inc.
1020 N. Center Pkwy, Ste F
Kennewick WA 99336
Attn: Jon, Kevin

SAMPLE NO.	CUSTOMER SAMPLE NO.	ANALYSIS	RESULTS	MDL	UNITS	ANALYSTS
88150	Duplicate	Nitrate as Nitrogen	0.85	0.015	mg/L	Reed
88150	Duplicate	Nitrite as Nitrogen	ND	0.0023	mg/L	Reed
88150	Duplicate	Total Dissolved Solids	60	21.1	mg/L	Reed
88150	Duplicate	Hardness	48.7	0.11	mg/L	Reed
88150	Duplicate	Chloride	1.0	0.297	mg/L	Reed
88150	Duplicate	Orthophosphate as P	0.12	0.043	mg/L	Reed
88150	Duplicate	COD	<8	8	mg/L	Morris
88150	Duplicate	Total Coliform and E. Coli	Present/Present			Reed

mg/L: indicates milligrams per litre
* PQL=Practical Quantitation Limit is the lowest level that can be achieved within specified limits of precision and accuracy during routine laboratory operating conditions
MDL: Method Detection Limit
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Upon Visual Observation

Dr. Eugene Kuo, Quality Assurance Manager

05-28-07
Date

Kuo Testing Labs, Inc.

Daily Field Report

Project:	Hall - Wentland SAR Monitoring	**Project#:**	
Contractor:	Kuo Testing Labs, Inc.	**Task #:**	
KTL Personnel:	Laura Hofbauer	**Page**	**OF**
		Date:	**10/03/06**
Weather:	Cloudy, cool		

TIME:	DESCRIPTION OF WORK
1:01	on site MW 2
1:32	on site MW 3
1:69	on site MW 1

Kuo Testing Labs, Inc.

Groundwater Sampling Field Data Sheet

PROJECT NAME: Hall-Wentland SAR Project	No.:	WELL NO: HW - 1
FIELD SAMPLER: Laura Hofbauer		DATE: 10/03/06
FIELD ANALYST: Laura Hofbauer		
SAMPLING METHOD: Battery Operated Whale Water Mini Purge Pump		
FIELD INSTRUMENTS USED: Orion pH Meter model 210A Hach Conductivity Meter Solinst Water Level Meter Model 101 HF Scientific ORT-15 CE Turbidi Meter		CONDITION of WELL: satisfactory

Water Level Data		Well Construction Data		Well Purging Data	
1) Total Well Depth (feet)	53.14	Outside Casing Diameter D_2 (in.)	2"	Calculate Casing Volume	
2) Initial Depth to Water WT** (feet)	24.40	Bore Hole Diameter D_3 (in.)	6"	L_1 28.74 *0.16 = 4.60 CV in Gallons	
3) Final Depth To Water	24.41	Filter Pack Length L_2 (feet)	12	CV 4.60 /2 = 2.30 BV in Gallons	
		Porosity of Filter Pack N (%)	25	Total Purge Volume (gals) CV*(3)= TPV(gals)	13.80
				Actual Volume Purged (gals)	15
4) Length of Water in Column L_1 *Value on Line1– Value on Line 2 (feet)*	28.74			Number of Bore Volumes Purged	6

* The surveyed point on the inside (usually PVC) casing

** The depth to the water table before removing any water from the well

WELL PURGING MEASUREMENTS

Time	Cumulative Gallons Purged	pH	Temperature °C	Conductivity µs/cm 2mS 20mS	Turbidity NTU	Purge Rate GPM	Comments
2:04			began	purge			
2:05	3	6.32	13.1	0145	5.61		
2:07	6	6.37	12.8	0144	3.13		
2:09	9	6.36	12.8	0144	1.19		
2:11	12	6.40	12.8	0144	0.89		
2:13	15	6.43	12.8	0144	0.50		
			End purge	Collected	sample		

Form by Kuo Chen

Kuo Testing Labs, Inc.

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SYSTEM / CUSTOMER	DATE COLLECTED	DATE RECEIVED	DATE REPORTED
	10/3/2006	10/4/2006	10/20/2006

Ground Water Solutions
55 SW Yamhill St., Suite 400
Portland OR 97202
Project Name:Hall Wentland SAR

SEND REPORT TO:
Ground Water Solutions
55 SW Yamhill St., Suite 400
Portland OR 97202
Attn: Kevin Lindsey

SAMPLE NO	CUSTOMER SAMPLE NO	ANALYSIS	RESULTS	MDL	UNITS	ANALYSTS
85052	HW-1	Nitrate as Nitrogen	0.75	0.21	mg/L	Hatch
85052	HW-1	Nitrite as Nitrogen	ND	0.0023	mg/L	Hatch
85052	HW-1	Total Dissolved Solids	136	21.1	mg/L	Hatch
85052	HW-1	Hardness	62.8	0.11	mg/L	Hatch
85052	HW-1	Chloride	ND	0.297	mg/L	Hatch
85052	HW-1	Orthophosphate as P	0.11	0.0433	mg/L	Hatch
85052	HW-1	COD	ND	8	mg/L	Hatch
85052	HW-1	Fecal Coliforms	0.0		Col/100ml	Cascade Analytical

* PQL=Practical Quantitation Limit is the lowest level that can be achieved within specified limits of precision and accuracy during routine laboratory operating conditions
MDL: Method Detection Limit
Please check out our new Web Site at http://www.kuotesting.com

Dr. Eugene Kuo, Quality Assurance Manager

10/23/06
Date

Kuo Testing Labs, Inc.

Groundwater Sampling Field Data Sheet

PROJECT NAME: Hall-Wentland SAR Project	No.:	WELL NO: HW - 2
FIELD SAMPLER: Laura Hofbauer		DATE: 10/03/06
FIELD ANALYST: Laura Hofbauer		
SAMPLING METHOD: Battery Operated Whale Water Mini Purge Pump		
FIELD INSTRUMENTS USED: Orion pH Meter model 210A Hach Conductivity Meter Solinst Water Level Meter Model 101 HF Scientific ORT-15 CE Turbidi Meter		CONDITION of WELL: satisfactory

Water Level Data		Well Construction Data		Well Purging Data	
1) Total Well Depth (feet)	49.79	Outside Casing Diameter D_2 (in.)	2"	Calculate Casing Volume	
2) Initial Depth to Water WT** (feet)	12.10	Bore Hole Diameter D_3 (in.)	6"	L_1 37.69 *0.16 = 6.03 CV in Gallons	
3) Final Depth To Water	12.17	Filter Pack Length L_2 (feet)	12	CV 6.03 /2 = 3.02 BV in Gallons	
		Porosity of Filter Pack N (%)	25	Total Purge Volume (gals) CV*(3)= TPV(gals)	18.09
				Actual Volume Purged (gals)	15
4) Length of Water in Column L_1 *Value on Line1 – Value on Line 2 (feet)*	37.69			Number of Bore Volumes Purged	5

* The surveyed point on the inside (usually PVC) casing

** The depth to the water table before removing any water from the well

WELL PURGING MEASUREMENTS

Time	Cumulative Gallons Purged	pH	Temperature °C	Conductivity µs/cm 2mS 20mS	Turbidity NTU	Purge Rate GPM	Comments
1:09			began	purge			
1:11	3	5.56	18.2	0144	3.72		
1:13	6	5.71	18.1	0130	1.63		
1:15	9	5.81	17.9	0145	1.06		
1:16	12	5.90	17.9	0146	0.86		
1:18	15	5.95	18.0	0145	0.61		
			End purge	Collected	sample		

Forms by Kuo Lab

Kuo Testing Labs, Inc.

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Web Site: http://www.kuotesting.com e-mail: kuotest@atnet.net

DATE COLLECTED: 10/3/2006
DATE RECEIVED: 10/4/2006
DATE REPORTED: 10/20/2006

SYSTEM / CUSTOMER

Ground Water Solutions
55 SW Yamhill St., Suite 400
Portland OR 97202
Project Name: Hall Wentlend SAR

SEND REPORT TO:

Ground Water Solutions
55 SW Yamhill St., Suite 400
Portland OR 97202
Attn: Kevin Lindsey

SAMPLE NO.	CUSTOMER SAMPLE NO	ANALYSIS	RESULTS	MDL	UNITS	ANALYSTS
85053	HW-2	Nitrate as Nitrogen	0.47	0.21	mg/L	Hatch
85053	HW-2	Nitrite as Nitrogen	ND	0.0023	mg/L	Hatch
85053	HW-2	Total Dissolved Solids	130	21.1	mg/L	Hatch
85053	HW-2	Hardness	63.1	0.11	mg/L	Hatch
85053	HW-2	Chloride	ND	0.297	mg/L	Hatch
85053	HW-2	Orthophosphate as P	0.09	0.0433	mg/L	Hatch
85053	HW-2	COD	ND	8	mg/L	Hatch
85053	HW-2	Fecal Coliforms	0.0		Col/100ml	Cascade Analytical

[illegible] milligrams per liter
* PQL–Practical Quantitation Limit is the lowest level that can be achieved within specified limits of precision and accuracy during routine laboratory operating conditions
MDL: Method Detection Limit
Please check out our new Web Site at http://www.kuotesting.com

Molly Linn for Eugene
Dr. Eugene Kuo, Quality Assurance Manager

10/23/06
Date

Kuo Testing Labs, Inc.

Groundwater Sampling Field Data Sheet

Page ___ of

PROJECT NAME: Hall-Wentland SAR Project	No.:	WELL NO: HW - 3
FIELD SAMPLER: Laura Hofbauer		DATE: 10/03/06
FIELD ANALYST: Laura Hofbauer		
SAMPLING METHOD: Battery Operated Whale Water Mini Purge Pump		
FIELD INSTRUMENTS USED: Orion pH Meter model 210A Hach Conductivity Meter Solinst Water Level Meter Model 101 HF Scientific ORT-15 CE Turbidi Meter		CONDITION of WELL: satisfactory

Water Level Data		Well Construction Data		Well Purging Data	
1) Total Well Depth (feet)	50.00	Outside Casing Diameter D_2 (in.)	2"	Calculate Casing Volume	
2) Initial Depth to Water WT** (feet)	23.07	Bore Hole Diameter D_3 (in.)	6"	L_1 26.93 *0.16 = 4.31 CV in Gallons	
3) Final Depth To Water	23.07	Filter Pack Length L_2 (feet)	12	CV 4.31 /2 = 2.15 BV in Gallons	
		Porosity of Filter Pack N (%)	25	Total Purge Volume (gals) CV*(3)= TPV(gals)	12.93
				Actual Volume Purged (gals)	15
4) Length of Water in Column L_1 *Value on Line1 – Value on Line 2 (feet)*	26.93			Number of Bore Volumes Purged	6

* The surveyed point on the inside (usually PVC) casing

** The depth to the water table before removing any water from the well

WELL PURGING MEASUREMENTS

Time	Cumulative Gallons Purged	pH	Temperature °C	Conductivity µs/cm 2mS 20mS	Turbidity NTU	Purge Rate GPM	Comments
			began	purge			
01:40	3	6.16	13.5	0142	0.77		
01:42	6	6.22	13.2	0142	0.58		
01:44	9	6.27	13.1	0142	0.34		
01:46	12	6.30	13.1	0143	0.29		
01:48	15	6.32	13.2	0143	0.20		
			End purge	Collected	sample		

Form by Kuo Lab

Kuo Testing Labs, Inc.

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Web Site: http://www.kuotesting.com e-mail: kuotest@atnet.net

SYSTEM / CUSTOMER	DATE COLLECTED	DATE RECEIVED	DATE REPORTED
	10/3/2006	10/4/2006	10/20/2006

SEND REPORT TO:

Ground Water Solutions
55 SW Yamhill St., Suite 400
Portland OR 97202
Project Name: Hall Wentland SAR

Ground Water Solutions
55 SW Yamhill St., Suite 400
Portland OR 97202
Attn: Kevin Lindsey

SAMPLE NO.	CUSTOMER SAMPLE NO	ANALYSIS	RESULTS	MDL	UNITS	ANALYSTS
85054	HW-3	Nitrate as Nitrogen	0.70	0.21	mg/L	Hatch
85054	HW-3	Nitrite as Nitrogen	ND	0.0023	mg/L	Hatch
85054	HW-3	Total Dissolved Solids	122	21.1	mg/L	Hatch
85054	HW-3	Hardness	67.9	0.11	mg/L	Hatch
85054	HW-3	Chloride	ND	0.297	mg/L	Hatch
85054	HW-3	Orthophosphate as P	0.08	0.0433	mg/L	Hatch
85054	HW-3	COD	ND	8	mg/L	Hatch
85054	HW-3	Fecal Coliforms	0.0		Col/100ml	Cascade Analytical

mg/L=milligrams per liter
* PQL=Practical Quantitation Limit is the lowest level that can be achieved within specified limits of precision and accuracy during routine laboratory operating conditions
MDL: Method Detection Limit
Please check out our new Web Site at http://www.kuotesting.com

Molly Lin for Eugene
Dr. Eugene Kuo, Quality Assurance Manager

10/23/06
Date

Kuo Testing Labs, Inc.

Daily Field Report

Project:	Hall - Wentland SAR Monitoring	**Project#:**
Contractor:	Kuo Testing Labs, Inc.	**Task #:**
KTL Personnel:	Laura Hofbauer	**Page OF**
		Date:10/31/06
Weather:		

TIME:	DESCRIPTION OF WORK
11:11	on site HW-2 collect sample removed rusted transducer cable from well
12:07	on site HW-3
12:43	on site HW-1
01:25	source water pit is dry - no water
01:30	returned to ditch at Hilbers gate to collect source water samples

Kuo Testing Labs, Inc.

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DATE COLLECTED: 10/31/2006
DATE RECEIVED: 11/1/2006
DATE REPORTED: 12/8/2006

SYSTEM / CUSTOMER:
Groundwater Solutions
55 SW Yamhill St., Suite 400
Portland OR 97202
Project Name:Hall Wentland SAR

SEND REPORT TO:
Ground Water Solutions
55 SW Yamhill St., Suite 400
Portland OR 97202
Attn: Kevin Lindsey

SAMPLE NO	CUSTOMER SAMPLE NO	ANALYSIS	RESULTS	MDL	UNITS	METHODOLOGY
85491	HW-1	Nitrate as Nitrogen	0.91	0.21	mg/L	Hatch
85491	HW-1	Nitrite as Nitrogen	ND	0.0023	mg/L	Hatch
85491	HW-1	Total Dissolved Solids	108	21.1	mg/L	Hatch
85491	HW-1	Hardness	64.4	0.11	mg/L	Hatch
85491	HW-1	Chloride	2.10	0.297	mg/L	Hatch
85491	HW-1	Orthophosphate as P	0.13	0.0433	mg/L	Hatch
85491	HW-1	COD	ND	8	mg/L	Hatch
85491	HW-1	SOC/Synthetic Organic Compounds	Attached Report		mg/L	Edge Analytical
85491	HW-1	Fecal E-Coli	0		MPN/100ml	Cascade Analytical

<(0.001): indicates the analyte was not detected at or above the concentration indicated.
ND: None Detected
mg/L:Indicates milligrams per litre
* PQL=Practical Quantitation Limit is the lowest level that can be achieved within specified limits of precision and accuracy during routine laboratory operating conditions
MDL: Method Detection Limit
Please check out our new Web Site at http://www.kuotesting.com
***Sample passed hold time for Nitrate/Nitrite as Nitrogen*

Dr. Eugene Kuo, Quality Assurance Manager

12-08-06
Date

Kuo Testing Labs, Inc.

Groundwater Sampling Field Data Sheet

PROJECT NAME: **Hall-Wentland SAR Project**	No.:	WELL NO: **HW - 1**
FIELD SAMPLER: **Laura Hofbauer**		DATE: **10/31/06**
FIELD ANALYST: **Laura Hofbauer**		
SAMPLING METHOD: **Battery Operated Whale Water Mini Purge Pump**		
FIELD INSTRUMENTS USED: **Orion pH Meter model 210A** **Hach Conductivity Meter** **Solinst Water Level Meter Model 101** **HF Scientific ORT-15 CE Turbidi Meter**		CONDITION of WELL: satisfactory

Water Level Data		Well Construction Data		Well Purging Data	
1) Total Well Depth (feet)	53.10	Outside Casing Diameter D_2 (in.)	2"	Calculate Casing Volume	
2) Initial Depth to Water WT** (feet)	26.79	Bore Hole Diameter D_3 (in.)	6"	L_1 26.31 *0.16 = 4.21 CV in Gallons	
3) Final Depth To Water	26.35	Filter Pack Length L_2 (feet)	12	CV 4.21 /2 = 2.10 BV in Gallons	
		Porosity of Filter Pack N (%)	25	Total Purge Volume (gals) CV*(3)= TPV(gals)	12.63
				Actual Volume Purged (gals)	15
4) Length of Water in Column L_1 *Value on Line1– Value on Line 2 (feet)*	26.31			Number of Bore Volumes Purged	7

* The surveyed point on the inside (usually PVC) casing

** The depth to the water table before removing any water from the well

WELL PURGING MEASUREMENTS

Time	Cumulative Gallons Purged	pH	Temperature °C	Conductivity µs/cm 2mS 20mS	Turbidity NTU	Purge Rate GPM	Comments
12:51			began	purge			
12:53	3	6.84	12.6	0154	0.53		
12:55	6	6.96	12.4	0156	0.46		
12:57	9	6.99	12.4	0156	0.23		
12:59	12	6.98	12.3	0156	0.28		
01:01	15	6.84	12.2	0156	0.23		
			End purge	Collected	sample		

Terms of Service

EDGE ANALYTICAL
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Bellingham WA | 805 Orchard Dr Suite 4 - 98225
Microbiology | 360.671.0688 • 360.671.1577fax

DATA REPORT

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

Reference Number: 06-14429

Project: 85491,85492,85493,85494
Field ID: 85491
Sample Description: 85491
Sampled By:
Sample Date: 10/31/2006
Source Type:
Sampler Phone:

Lab Number: 04630515
Report Date: 12/8/2006
Date Analyzed: 11/15/2006
Extraction Date: 549_061106
Analyst: HY
Supervisor: for WJL
Analytical Method: 549.2
Paraquat

CAS	COMPOUND	RESULTS	Units	PQL	MDL	MCL	COMMENT
1910-42-5	PARAQUAT	ND	ug/L	2	1.0		

As amount of "ND" indicates that the compound was not detected above the Lab's Method Detection Limit - MDL.
MCL- Maximum Contaminant Level, maximum permissible level of a contaminant in water established by EPA, NPDWR. State Advisory Level (SAL) for Unregulated compounds.
A blank MCL or SAL value indicates a level is not currently established.
PQL - Practical Quantitation Limit is the concentration of the standard analyzed during the initial calibration.
MDL - Method Detection Limit is the lab's minimum concentration a compound can be measured and reported with 99% confidence that the compound concentration is greater than zero.
J - Estimated value.

FORM: SOC_GEN

EDGE ANALYTICAL
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Bellingham WA | 805 Orchard Dr Suite 4 - 98225
Microbiology | 360.671.0688 • 360.671.1577fax

CARBAMATES IN DRINKING WATER

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

Reference Number: 06-14429

Project: 85491,85492,86493,85494
Field ID: 85491
Sample Description: 85491
Sampled By:
Sample Date: 10/31/2006
Source Type:
Sampler Phone:

Lab Number: 04630515
Report Date: 12/6/2006
Date Analyzed: 11/14/2006
Extraction Date: 531_061114
Analyst: TM
Supervisor: WJL
Analytical Method: 531.2
Carbamates

CAS	COMPOUND	RESULTS	Units	PQL	MDL	MCL	COMMENT
	EPA Regulated						
23135-22-0	OXYMAL	ND	ug/L	1.0	0.81	200	
1563-66-2	CARBOFURAN	ND	ug/L	1.0	0.87	40	
	EPA Unregulated						
1646-87-3	ALDICARB SULFOXIDE	ND	ug/L	1.0	0.71		
1646-88-4	ALDICARB SULFONE	ND	ug/L	1.0	0.83		
16752-77-5	METHOMYL	ND	ug/L	1.0	0.86		
16655-82-6	3-HYDROXYCARBOFURAN	ND	ug/L	1.0	1.0		
116-06-3	ALDICARB	ND	ug/L	1.0	0.88		
63-25-2	CARBARYL	ND	ug/L	1.0	0.53		
	State Unregulated - Other						
114-26-1	PROPOXUR (BAYGON)	ND	ug/L	1.0	0.72		
2032-65-7	METHIOCARB	ND	ug/L	1.0	0.76		

An amount of "ND" indicates that the compound was not detected above the Lab's Method Detection Limit - MDL.
MCL- Maximum Contaminant Level, maximum permissible level of a contaminant in water established by EPA, NPDWR. State Advisory Level (SAL) for Unregulated compounds.
A blank MCL or SAL value indicates a level is not currently established.
PQL - Practical Quantitation Limit is the concentration of the standard analyzed during the initial calibration.
MDL - Method Detection Limit is the lab's minimum concentration a compound can be measured and reported with 99% confidence that the compound concentration is greater than zero.
J - Estimated value.

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360.671.0688 • 360.671.1577fax

SYNTHETIC ORGANIC COMPOUNDS (SOC) REPORT

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

Reference Number: 06-14429

Project: 85491,85492,85493,85494
Field ID: 85491
Sample Description: 85491
Sampled By:
Sample Date: 10/31/2006
Source Type:
Sampler Phone:

Lab Number: 04630515
Report Date: 12/8/2006
Date Analyzed: 11/13/2006
Extraction Date: 525_061113
Analyst: MM
Supervisor: dlf for WJL
Analytical Method: 525.2
Synthetic Organics

CAS	COMPOUND	RESULTS	Units	PQL	MDL	MCL	COMMENT
	EPA Regulated						
72-20-8	ENDRIN	ND	ug/L	0.1	0.030	2	
58-89-9	LINDANE (BHC - GAMMA)	ND	ug/L	0.1	0.028	0.2	
72-43-5	METHOXYCHLOR	ND	ug/L	0.1	0.015	40	
15972-60-8	ALACHLOR	ND	ug/L	0.1	0.044	2	
1912-24-9	ATRAZINE	ND	ug/L	0.1	0.030	3	
50-32-8	BENZO(A)PYRENE	ND	ug/L	0.1	0.012	0.2	
57-74-9	CHLORDANE, TECHNICAL	ND	ug/L	0.1	0.3	2	
103-23-1	DI(ETHYLHEXYL)-ADIPATE	ND	ug/L	0.1	0.022	400	
117-81-7	DI(ETHYLHEXYL)-PHTHALATE	ND	ug/L	0.1	0.063	6	
76-44-8	HEPTACHLOR	ND	ug/L	0.1	0.022	0.4	
1024-57-3	HEPTACHLOR EPOXIDE	ND	ug/L	0.1	0.02	0.2	
118-74-1	HEXACHLOROBENZENE	ND	ug/L	0.1	0.025	1	
77-47-4	HEXACHLOROCYCLO-PENTADIENE	ND	ug/L	0.1	0.024	50	
122-34-9	SIMAZINE	ND	ug/L	0.1	0.030	4	
87-86-5	PENTACHLOROPHENOL	ND	ug/L	0.4	0.08	1	screening only / compliance by 515.1
	EPA Unregulated						
309-00-2	ALDRIN	ND	ug/L	0.1	0.022		
23184-66-9	BUTACHLOR	ND	ug/L	0.1	0.024		
60-57-1	DIELDRIN	ND	ug/L	0.1	0.031		
51218-45-2	METOLACHLOR	ND	ug/L	0.1	0.024		
21087-64-9	METRIBUZIN	ND	ug/L	0.1	0.030		
1918-16-7	PROPACHLOR	ND	ug/L	0.1	0.031		
	State Unregulated - Other						
314-40-9	BROMACIL	ND	ug/L	0.1	0.031		
5902-51-2	TERBACIL	ND	ug/L	0.1	0.043		

An amount of "ND" indicates that the compound was not detected above the Lab's Method Detection Limit - MDL.
MCL- Maximum Contaminant Level, maximum permissible level of a contaminant in water established by EPA, NPDWR. State Advisory Level (SAL) for Unregulated compounds.
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PQL - Practical Quantitation Limit is the concentration of the standard analyzed during the initial calibration.
MDL - Method Detection Limit is the lab's minimum concentration a compound can be measured and reported with 99% confidence that the compound concentration is greater than zero.
J - Estimated value.

FORM: SOC_GEN

SYNTHETIC ORGANIC COMPOUNDS (SOC) REPORT

CAS	COMPOUND	RESULTS	Units	PQL	MDL	MCL	COMMENT
333-41-5	DIAZINON	ND	ug/L	0.1	0.035		Unstable in Acidified Sample Matrix
759-94-4	EPTC	ND	ug/L	0.1	0.028		
72-54-8	4,4-DDD	ND	ug/L	0.1	0.024		
72-55-9	4,4-DDE	ND	ug/L	0.1	0.024		
50-29-3	4,4-DDT	ND	ug/L	0.1	0.022		
21725-46-2	CYANAZINE	ND	ug/L	0.1	0.13		Qualitative Analysis Only
121-75-5	MALATHION	ND	ug/L	0.1	0.015		
56-38-2	PARATHION	ND	ug/L	0.1	0.022		
1582-09-8	TRIFLURALIN	ND	ug/L	0.1	0.024		
	- PAHs						
91-20-3	NAPTHALENE	ND	ug/L	0.1	0.1^		
86-73-7	FLUORENE	ND	ug/L	0.1	0.026		
208-96-8	ACENAPHTHYLENE	ND	ug/L	0.1	0.025		
83-32-9	ACENAPHTHENE	ND	ug/L	0.1	0.1^		
120-12-7	ANTHRACENE	ND	ug/L	0.1	0.012		
56-55-3	BENZ(A)ANTHRACENE	ND	ug/L	0.1	0.012		
205-99-2	BENZO(B)FLUORANTHENE	ND	ug/L	0.1	0.025		
191-24-2	BENZO(G,H,I)PERYLENE	ND	ug/L	0.1	0.025		
207-08-9	BENZO(K)FLUORANTHENE	ND	ug/L	0.1	0.022		
218-01-9	CHRYSENE	ND	ug/L	0.1	0.022		
53-70-3	DIBENZO(A,H)ANTHRACENE	ND	ug/L	0.1	0.024		
206-44-0	FLUORANTHENE	ND	ug/L	0.1	0.1^		
193-39-5	INDENO(1,2,3-CD)PYRENE	ND	ug/L	0.1	0.040		
85-01-8	PHENANTHRENE	ND	ug/L	0.1	0.015		
129-00-0	PYRENE	ND	ug/L	0.1	0.022		
	- Phthalates						
85-68-7	BENZYL BUTYL PHTHALATE	ND	ug/L	0.1	0.022		
84-74-2	DI-N-BUTYL PHTHALATE	ND	ug/L	0.1	0.085		
84-66-2	DIETHYL PHTHALATE	ND	ug/L	0.1	0.044		
131-11-3	DIMETHYL PHTHALATE	ND	ug/L	0.1	0.015		
	Other Compounds						
51235-04-2	HEXAZINONE	ND	ug/L	0.1	0.1^		

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J - Estimated value.

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Microbiology | 360.671.0688 • 360.671.1577fax

HERBICIDES IN DRINKING WATER

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

Reference Number: 06-14429

Project: 85491,85492,85493,85494
Field ID: 85491
Sample Description: 85491
Sampled By:
Sample Date: 10/31/2006
Source Type:
Sampler Phone:

Lab Number: 04630515
Report Date: 12/8/2006
Date Analyzed: 11/20/2006
Extraction Date: 515_061113
Analyst: TM
Supervisor: SJX for WJL
Analytical Method: 515.1
Chlorophenoxy Herbicides

CAS	COMPOUND	RESULTS	Units	PQL	MDL	MCL	COMMENT
	EPA Regulated						
94-75-7	2,4 - D	ND	ug/L	0.2	0.11	70	
93-72-1	2,4,5 - TP (SILVEX)	ND	ug/L	0.1	0.02	50	
87-86-5	PENTACHLOROPHENOL	ND	ug/L	0.1	0.044	1	
75-99-0	DALAPON	ND	ug/L	1.3	0.80	200	
88-85-7	DINOSEB	ND	ug/L	0.2	0.16	7	
1918-02-1	PICLORAM	ND	ug/L	0.1	0.089	500	
	EPA Unregulated						
1918-00-9	DICAMBA	ND	ug/L	0.1	0.045		
	State Unregulated						
1861-32-1	TOTAL DCPA	ND	ug/L	0.1	0.089		
E-14-02-8	DCPA (ACID METABOLITES)	ND	ug/L	0.1	0.1		
94-82-6	2,4 DB	ND	ug/L	0.8	0.10		
93-76-5	2,4,5 T	ND	ug/L	0.1	0.044		
25057-89-0	BENTAZON	ND	ug/L	0.2	0.067		
120-36-5	DICHLORPROP	ND	ug/L	0.3	0.089		
50594-66-6	ACIFLUORFEN	ND	ug/L	0.1	0.089		
133-90-4	CHLORAMBEN	ND	ug/L	0.2	0.2		
51-36-5	3,5 - DICHLOROBENZOIC ACID	ND	ug/L	0.1	0.044		

An amount of "ND" indicates that the compound was not detected above the Lab's Method Detection Limit - MDL.
MCL- Maximum Contaminant Level, maximum permissible level of a contaminant in water established by EPA, NPDWR. State Advisory Level (SAL) for Unregulated compounds.
A blank MCL or SAL value indicates a level is not currently established.
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MDL - Method Detection Limit is the lab's minimum concentration a compound can be measured and reported with 99% confidence that the compound concentration is greater than zero.
J - Estimated value.

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DATA REPORT

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

Reference Number: 06-14429

Project: 85491,85492,85493,85494
Field ID: 85491
Sample Description: 85491
Sampled By:
Sample Date: 10/31/2006
Source Type:
Sampler Phone:

Lab Number: 04630515
Report Date: 12/8/2006
Date Analyzed: 11/14/2006
Extraction Date: 508_061113
Analyst: MM
Supervisor: WJL
Analytical Method: 508.1
Synthetic Organics

CAS	COMPOUND	RESULTS	Units	PQL	MDL	MCL	COMMENT
	PCBs/Toxaphene						
1336-36-3	PCBS (Total Aroclors)	ND	ug/L	0.2		0.5	
11104-28-2	AROCLOR 1221	ND	ug/L	0.1	0.1^		
11141-16-5	AROCLOR 1232	ND	ug/L	0.1	0.1^		
53469-21-9	AROCLOR 1242	ND	ug/L	0.1	0.1^		
12672-29-6	AROCLOR 1248	ND	ug/L	0.1	0.1^		
11097-69-1	AROCLOR 1254	ND	ug/L	0.1	0.1^		
11096-82-5	AROCLOR 1260	ND	ug/L	0.1	0.08		
12674-11-2	AROCLOR 1016	ND	ug/L	0.1	0.1		
8001-35-2	TOXAPHENE	ND	ug/L	1	0.5	3	

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INORGANIC COMPOUNDS (IOC) REPORT

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

Reference Number: 06-14429

Project: 85491,85492,85493,85494
Field ID: 85491
Sample Description: 85491
Sampled By:
Sample Date: 10/31/2006
Source Type:

Lab Number: 04630515
Report Date: 11/17/2006
Date Received: 11/2/2006
Sampler Phone:
Supervisor:

CAS	ANALYTES	RESULTS	UNITS	POL	MDL	MCL	Analyst	METHOD	COMMENT
15541-45-4	BROMATE	ND	mg/L	0.005	0.0016	0.010	mvp	300.1	

NOTES:

SRL (State Reporting Level): Indicates the minimum reporting level required by the Washington Department of Health (DOH).

MCL (Maximum Contaminant Level) maximum permissible level of a contaminant in water established by EPA; Federal Action Levels are 0.015 mg/L for Lead and 1.3 mg/L for Copper. Sodium has a recommended limit of 20 mg/L. A blank MCL value indicates a level is not currently established.

Trigger Level: DOH Drinking Water Response level. Systems with compounds detected in excess of this level are required to take additional samples. Contact your regional DOH office.

ND (Not Detected): Indicates that the compound was not detected above the State Reporting Limit (SRL).

NA (Not Analyzed): Indicates that this compound was not analyzed.

FORM: IOC_GEN

Kuo Testing Labs, Inc.

337 South 1st Avenue, Othello, WA 99344
(509) 488-0112 Phone (509) 488-0118 Fax (800) 328-0112 Toll Free
Web Site: http://www.kuotesting.com e-mail: kuotest@atnet.net

DATE COLLECTED: 10/31/2006
DATE RECEIVED: 11/1/2006
DATE REPORTED: 12/8/2006

SYSTEM / CUSTOMER

Groundwater Solutions
55 SW Yamhill St., Suite 400
Portland OR 97202
Project Name:Hall Wentland- SAR

Ground Water Solutions
55 SW Yamhill St., Suite 400
Portland OR 97202
Attn: Kevin Lindsey

LAB #	CUSTOMER SAMPLE #	ANALYSIS	RESULTS	MDL	UNITS	ANALYSIS BY
85492	HW-2	Nitrate as Nitrogen	0.74	0.21	mg/L	Hatch
85492	HW-2	Nitrite as Nitrogen	ND	0.0023	mg/L	Hatch
85492	HW-2	Total Dissolved Solids	114	21.1	mg/L	Hatch
85492	HW-2	Hardness	62.9	0.11	mg/L	Hatch
85492	HW-2	Chloride	1.90	0.297	mg/L	Hatch
85492	HW-2	Orthophosphate as P	0.20	0.0433	mg/L	Hatch
85492	HW-2	COD	ND	8	mg/L	Hatch
85492	HW-2	SOC/Synthetic Organic Compounds	Attached Report		mg/L	Edge Analytical
85492	HW-2	Fecal E-Coli	0		MPN/100ml	Cascade Analytical

<(0.001): indicates the analyte was not detected at or above the concentration indicated.
ND: None Detected
mg/L:Indicates milligrams per litre
* PQL=Practical Quantitation Limit is the lowest level that can be achieved within specified limits of precision and accuracy during routine laboratory operating conditions
MDL: Method Detection Limit
Please check out our new Web Site at http://www.kuotesting.com
***Sample passed hold time for Nitrate/Nitrite as Nitrogen*

Dr. Eugene Kuo, Quality Assurance Manager

12-08-06
Date

Kuo Testing Labs, Inc.

Groundwater Sampling Field Data Sheet

PROJECT NAME: Hall-Wentland SAR Project	No.:	WELL NO: HW - 2
FIELD SAMPLER: Laura Hofbauer		DATE: 10/31/06
FIELD ANALYST: Laura Hofbauer		
SAMPLING METHOD: Battery Operated Whale Water Mini Purge Pump		
FIELD INSTRUMENTS USED: Orion pH Meter model 210A Hach Conductivity Meter Solinst Water Level Meter Model 101 HF Scientific ORT-15 CE Turbidi Meter		CONDITION of WELL: satisfactory

Water Level Data		Well Construction Data		Well Purging Data	
1) Total Well Depth (feet)	49.90	Outside Casing Diameter D_2 (in.)	2"	Calculate Casing Volume	
2) Initial Depth to Water WT** (feet)	21.20	Bore Hole Diameter D_3 (in.)	6"	L_1 28.7 *0.16 = 4.59 CV in Gallons	
3) Final Depth To Water	21.28	Filter Pack Length L_2 (feet)	12	CV 4.59 /2 = 2.30 BV in Gallons	
		Porosity of Filter Pack N (%)	25	Total Purge Volume (gals) CV*(3)= TPV(gals)	13.78
				Actual Volume Purged (gals)	15
4) Length of Water in Column L_1 *Value on Line1– Value on Line 2 (feet)*	28.7			Number of Bore Volumes Purged	6

* The surveyed point on the inside (usually PVC) casing

** The depth to the water table before removing any water from the well

WELL PURGING MEASUREMENTS

Time	Cumulative Gallons Purged	pH	Temperature °C	Conductivity µs/cm 2mS 20mS	Turbidity NTU	Purge Rate GPM	Comments
11:27			began	purge			
11:29	3	6.16	15.5	0160	58.3		
11:32	6	6.24	15.6	0157	19.3		
11:33	9	6.26	15.6	0157	9.52		
11:35	12	6.27	15.4	0152	4.69		
11:37	15	6.24	15.1	0157	2.28		
			End purge	Collected	sample		
			Collected Duplicate samples				

Forms by Gina Clark

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DATA REPORT

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

Reference Number: 06-14429

Project: 85491,85492,85493,85494
Field ID: 85492
Sample Description: 85492
Sampled By:
Sample Date: 10/31/2006
Source Type:
Sampler Phone:

Lab Number: 04630516
Report Date: 12/8/2006
Date Analyzed: 11/15/2006
Extraction Date: 549_061106
Analyst: HY
Supervisor:
Analytical Method: 549.2
Paraquat

CAS	COMPOUND	RESULTS	Units	PQL	MDL	MCL	COMMENT
1910-42-5	PARAQUAT	ND	ug/L	2	1.0		

An amount of "ND" indicates that the compound was not detected above the Lab's Method Detection Limit - MDL.
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FORM: SOC_GEN

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CARBAMATES IN DRINKING WATER

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

Reference Number: 06-14429

Project: 85491,85492,85493,85494
Field ID: 85492
Sample Description: 85492
Sampled By:
Sample Date: 10/31/2006
Source Type:
Sampler Phone:

Lab Number: 04630516
Report Date: 12/8/2006
Date Analyzed: 11/20/2006
Extraction Date: 531_061114
Analyst: TM
Supervisor:
Analytical Method: 531.2
Carbamates

CAS	COMPOUND	RESULTS	Units	PQL	MDL	MCL	COMMENT
	EPA Regulated						
23135-22-0	OXYMAL	ND	ug/L	1.0	0.81	200	
1563-66-2	CARBOFURAN	ND	ug/L	1.0	0.87	40	
	EPA Unregulated						
1646-87-3	ALDICARB SULFOXIDE	ND	ug/L	1.0	0.71		
1646-88-4	ALDICARB SULFONE	ND	ug/L	1.0	0.83		
16752-77-5	METHOMYL	ND	ug/L	1.0	0.86		
16655-82-6	3-HYDROXYCARBOFURAN	ND	ug/L	1.0	1.0		
116-06-3	ALDICARB	ND	ug/L	1.0	0.88		
63-25-2	CARBARYL	ND	ug/L	1.0	0.53		
	State Unregulated - Other						
114-26-1	PROPOXUR (BAYGON)	ND	ug/L	1.0	0.72		
2032-65-7	METHIOCARB	ND	ug/L	1.0	0.76		

An amount of "ND" indicates that the compound was not detected above the Lab's Method Detection Limit - MDL.
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SYNTHETIC ORGANIC COMPOUNDS (SOC) REPORT

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

Reference Number: 06-14429

Project: 85491,85492,85493,85494
Field ID: 85492
Sample Description: 85492
Sampled By:
Sample Date: 10/31/2006
Source Type:
Sampler Phone:

Lab Number: 04630516
Report Date: 12/8/2006
Date Analyzed: 11/13/2006
Extraction Date: 525_061113
Analyst: CO
Supervisor: JW P.r WLJ
Analytical Method: 525.2
Synthetic Organics

CAS	COMPOUND	RESULTS	Units	PQL	MDL	MCL	COMMENT
	EPA Regulated						
72-20-8	ENDRIN	ND	ug/L	0.1	0.030	2	
58-89-9	LINDANE (BHC - GAMMA)	ND	ug/L	0.1	0.028	0.2	
72-43-5	METHOXYCHLOR	ND	ug/L	0.1	0.015	40	
15972-60-8	ALACHLOR	ND	ug/L	0.1	0.044	2	
1912-24-9	ATRAZINE	ND	ug/L	0.1	0.030	3	
50-32-8	BENZO(A)PYRENE	ND	ug/L	0.1	0.012	0.2	
57-74-9	CHLORDANE, TECHNICAL	ND	ug/L	0.1	0.3	2	
103-23-1	DI(ETHYLHEXYL)-ADIPATE	ND	ug/L	0.1	0.022	400	
117-81-7	DI(ETHYLHEXYL)-PHTHALATE	ND	ug/L	0.1	0.063	6	
76-44-8	HEPTACHLOR	ND	ug/L	0.1	0.022	0.4	
1024-57-3	HEPTACHLOR EPOXIDE	ND	ug/L	0.1	0.02	0.2	
118-74-1	HEXACHLOROBENZENE	ND	ug/L	0.1	0.025	1	
77-47-4	HEXACHLOROCYCLO-PENTADIENE	ND	ug/L	0.1	0.024	50	
122-34-9	SIMAZINE	ND	ug/L	0.1	0.030	4	
87-86-5	PENTACHLOROPHENOL	ND	ug/L	0.4	0.08	1	screening only / compliance by 515.1
	EPA Unregulated						
309-00-2	ALDRIN	ND	ug/L	0.1	0.022		
23184-66-9	BUTACHLOR	ND	ug/L	0.1	0.024		
60-57-1	DIELDRIN	ND	ug/L	0.1	0.031		
51218-45-2	METOLACHLOR	ND	ug/L	0.1	0.024		
21087-64-9	METRIBUZIN	ND	ug/L	0.1	0.030		
1918-16-7	PROPACHLOR	ND	ug/L	0.1	0.031		
	State Unregulated - Other						
314-40-9	BROMACIL	ND	ug/L	0.1	0.031		
5902-51-2	TERBACIL	ND	ug/L	0.1	0.043		

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SYNTHETIC ORGANIC COMPOUNDS (SOC) REPORT

CAS	COMPOUND	RESULTS	Units	PQL	MDL	MCL	COMMENT
333-41-5	DIAZINON	ND	ug/L	0.1	0.035		Unstable in Acidified Sample Matrix
759-94-4	EPTC	ND	ug/L	0.1	0.028		
72-54-8	4,4-DDD	ND	ug/L	0.1	0.024		
72-55-9	4,4-DDE	ND	ug/L	0.1	0.024		
50-29-3	4,4-DDT	ND	ug/L	0.1	0.022		
21725-46-2	CYANAZINE	ND	ug/L	0.1	0.13		Qualitative Analysis Only
121-75-5	MALATHION	ND	ug/L	0.1	0.015		
56-38-2	PARATHION	ND	ug/L	0.1	0.022		
1582-09-8	TRIFLURALIN	ND	ug/L	0.1	0.024		
	- PAHs						
91-20-3	NAPTHALENE	ND	ug/L	0.1	0.1^		
86-73-7	FLUORENE	ND	ug/L	0.1	0.026		
208-96-8	ACENAPHTHYLENE	ND	ug/L	0.1	0.025		
83-32-9	ACENAPHTHENE	ND	ug/L	0.1	0.1^		
120-12-7	ANTHRACENE	ND	ug/L	0.1	0.012		
56-55-3	BENZ(A)ANTHRACENE	ND	ug/L	0.1	0.012		
205-99-2	BENZO(B)FLUORANTHENE	ND	ug/L	0.1	0.025		
191-24-2	BENZO(G,H,I)PERYLENE	ND	ug/L	0.1	0.025		
207-08-9	BENZO(K)FLUORANTHENE	ND	ug/L	0.1	0.022		
218-01-9	CHRYSENE	ND	ug/L	0.1	0.022		
53-70-3	DIBENZO(A,H)ANTHRACENE	ND	ug/L	0.1	0.024		
206-44-0	FLUORANTHENE	ND	ug/L	0.1	0.1^		
193-39-5	INDENO(1,2,3-CD)PYRENE	ND	ug/L	0.1	0.040		
85-01-8	PHENANTHRENE	ND	ug/L	0.1	0.015		
129-00-0	PYRENE	ND	ug/L	0.1	0.022		
	- Phthalates						
85-68-7	BENZYL BUTYL PHTHALATE	ND	ug/L	0.1	0.022		
84-74-2	DI-N-BUTYL PHTHALATE	1.1BQ	ug/L	0.1	0.085		Field dup - 0.9 ug/L
84-66-2	DIETHYL PHTHALATE	ND	ug/L	0.1	0.044		
131-11-3	DIMETHYL PHTHALATE	ND	ug/L	0.1	0.015		
	Other Compounds						
51235-04-2	HEXAZINONE	ND	ug/L	0.1	0.1^		

An amount of "ND" indicates that the compound was not detected above the Lab's Method Detection Limit - MDL.

MCL- Maximum Contaminant Level, maximum permissible level of a contaminant in water established by EPA, NPDWR. State Advisory Level (SAL) for Unregulated compounds.
A blank MCL or SAL value indicates a level is not currently established.

PQL - Practical Quantitation Limit is the concentration of the standard analyzed during the initial calibration.

MDL - Method Detection Limit is the lab's minimum concentration a compound can be measured and reported with 99% confidence that the compound concentration is greater than zero.

J - Estimated value.

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Microbiology | 360.671.0688 • 360.671.1577fax

HERBICIDES IN DRINKING WATER

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

Reference Number: 06-14429

Project: 85491,85492,85493,85494
Field ID: 85492
Sample Description: 85492
Sampled By:
Sample Date: 10/31/2006
Source Type:
Sampler Phone:

Lab Number: 04630516
Report Date: 12/8/2006
Date Analyzed: 11/20/2006
Extraction Date: 515_061113
Analyst: TM
Supervisor: WLJ
Analytical Method: 515.1
Chlorophenoxy Herbicides

CAS	COMPOUND	RESULTS	Units	PQL	MDL	MCL	COMMENT
	EPA Regulated						
94-75-7	2,4 - D	ND	ug/L	0.2	0.11	70	
93-72-1	2,4,5 - TP (SILVEX)	ND	ug/L	0.1	0.02	50	
87-86-5	PENTACHLOROPHENOL	ND	ug/L	0.1	0.044	1	
75-99-0	DALAPON	ND	ug/L	1.3	0.80	200	
88-85-7	DINOSEB	ND	ug/L	0.2	0.16	7	
1918-02-1	PICLORAM	ND	ug/L	0.1	0.089	500	
	EPA Unregulated						
1918-00-9	DICAMBA	ND	ug/L	0.1	0.045		
	State Unregulated						
1861-32-1	TOTAL DCPA	ND	ug/L	0.1	0.089		
E-14-02-8	DCPA (ACID METABOLITES)	ND	ug/L	0.1	0.1		
94-82-6	2,4 DB	ND	ug/L	0.8	0.10		
93-76-5	2,4,5 T	ND	ug/L	0.1	0.044		
25057-89-0	BENTAZON	ND	ug/L	0.2	0.067		
120-36-5	DICHLORPROP	ND	ug/L	0.3	0.089		
50594-66-6	ACIFLUORFEN	ND	ug/L	0.1	0.089		
133-90-4	CHLORAMBEN	ND	ug/L	0.2	0.2		
51-36-5	3,5 - DICHLOROBENZOIC ACID	ND	ug/L	0.1	0.044		

An amount of "ND" indicates that the compound was not detected above the Lab's Method Detection Limit - MDL.
MCL- Maximum Contaminant Level, maximum permissible level of a contaminant in water established by EPA, NPDWR. State Advisory Level (SAL) for Unregulated compounds.
A blank MCL or SAL value indicates a level is not currently established.
PQL - Practical Quantitation Limit is the concentration of the standard analyzed during the initial calibration.
MDL - Method Detection Limit is the lab's minimum concentration a compound can be measured and reported with 99% confidence that the compound concentration is greater than zero.
J - Estimated value.

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DATA REPORT

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

Reference Number: 06-14429

Project: 85491,85492,85493,85494
Field ID: 85492
Sample Description: 85492
Sampled By:
Sample Date: 10/31/2006
Source Type:
Sampler Phone:

Lab Number: 04630516
Report Date: 12/8/2006
Date Analyzed: 11/14/2006
Extraction Date: 508_061113
Analyst: MM
Supervisor: JM for WJL
Analytical Method: 508.1
Synthetic Organics

CAS	COMPOUND	RESULTS	Units	PQL	MDL	MCL	COMMENT
	PCBs/Toxaphene						
1336-36-3	PCBS (Total Aroclors)	ND	ug/L	0.2		0.5	
11104-28-2	AROCLOR 1221	ND	ug/L	0.1	0.1^		
11141-16-5	AROCLOR 1232	ND	ug/L	0.1	0.1^		
53469-21-9	AROCLOR 1242	ND	ug/L	0.1	0.1^		
12672-29-6	AROCLOR 1248	ND	ug/L	0.1	0.1^		
11097-69-1	AROCLOR 1254	ND	ug/L	0.1	0.1^		
11096-82-5	AROCLOR 1260	ND	ug/L	0.1	0.08		
12674-11-2	AROCLOR 1016	ND	ug/L	0.1	0.1		
8001-35-2	TOXAPHENE	ND	ug/L	1	0.5	3	

An amount of "ND" indicates that the compound was not detected above the Lab's Method Detection Limit - MDL.
MCL- Maximum Contaminant Level, maximum permissible level of a contaminant in water established by EPA, NPDWR. State Advisory Level (SAL) for Unregulated compounds.
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INORGANIC COMPOUNDS (IOC) REPORT

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

Reference Number: 06-14429

Project: 85491,85492,85493,85494
Field ID: 85492
Sample Description: 85492
Sampled By:
Sample Date: 10/31/2006
Source Type:

Lab Number: 04630516
Report Date: 11/17/2006
Date Received: 11/2/2006
Sampler Phone:
Supervisor

CAS	ANALYTES	RESULTS	UNITS	PQL	MDL	MCL	Analyst	METHOD	COMMENT
15541-45-4	BROMATE	ND	mg/L	0.005	0.0016	0.010	mvo	300.1	

NOTES:

SRL (State Reporting Level): Indicates the minimum reporting level required by the Washington Department of Health (DOH).

MCL (Maximum Contaminant Level) maximum permissible level of a contaminant in water established by EPA; Federal Action Levels are 0.015 mg/L for Lead and 1.3 mg/L for Copper. Sodium has a recommended limit of 20 mg/L. A blank MCL value indicates a level is not currently established.

Trigger Level: DOH Drinking Water Response level. Systems with compounds detected in excess of this level are required to take additional samples. Contact your regional DOH office.

ND (Not Detected): Indicates that the compound was not detected above the State Reporting Limit (SRL).

NA (Not Analyzed): Indicates that this compound was not analyzed.

FORM: IOC_GEN

Kuo Testing Labs, Inc.

337 South 1st Avenue, Othello, WA 99344
(509) 488-0112 Phone (509) 488-0118 Fax (800) 328-0112 Toll Free
Web Site: http://www.kuotesting.com e-mail: kuotest@atnet.net

DATE COLLECTED: 10/31/2006
DATE RECEIVED: 11/1/2006
DATE REPORTED: 12/8/2006

SYSTEM / CUSTOMER:
Groundwater Solutions
55 SW Yamhill St., Suite 400
Portland OR 97202
Project Name: Hall Wentland SAR

SEND REPORT TO:
Ground Water Solutions
55 SW Yamhill St., Suite 400
Portland OR 97202
Attn: Kevin Lindsey

SAMPLE NO	CUSTOMER SAMPLE NO	ANALYSIS	RESULT	MDL	UNITS	METHOD
85493	HW-3	Nitrate as Nitrogen	0.76	0.21	mg/L	Hatch
85493	HW-3	Nitrite as Nitrogen	ND	0.0023	mg/L	Hatch
85493	HW-3	Total Dissolved Solids	98.0	21.1	mg/L	Hatch
85493	HW-3	Hardness	59.4	0.11	mg/L	Hatch
85493	HW-3	Chloride	ND	0.297	mg/L	Hatch
85493	HW-3	Orthophosphate as P	0.09	0.0433	mg/L	Hatch
85493	HW-3	COD	ND	8	mg/L	Hatch
85493	HW-3	SOC/Synthetic Organic Compounds	Attached Report		mg/L	Edge Analytical
85493	HW-3	Fecal E-Coli	0		MPN/100ml	Cascade Analytical

<(0.001): indicates the analyte was not detected at or above the concentration indicated.
ND: None Detected
mg/L: Indicates milligrams per litre
* PQL=Practical Quantitation Limit is the lowest level that can be achieved within specified limits of precision and accuracy during routine laboratory operating conditions
MDL: Method Detection Limit
Please check out our new Web Site at http://www.kuotesting.com
***Sample passed hold time for Nitrate/Nitrite as Nitrogen*

Dr. Eugene Kuo, Quality Assurance Manager

12-08-06
Date

Kuo Testing Labs, Inc.

Groundwater Sampling Field Data Sheet

PROJECT NAME: Hall-Wentland SAR Project	No.:	WELL NO: HW - 3
FIELD SAMPLER: Laura Hofbauer		DATE: 10/31/06
FIELD ANALYST: Laura Hofbauer		
SAMPLING METHOD: Battery Operated Whale Water Mini Purge Pump		
FIELD INSTRUMENTS USED: Orion pH Meter model 210A Hach Conductivity Meter Solinst Water Level Meter Model 101 HF Scientific ORT-15 CE Turbidi Meter		CONDITION of WELL: satisfactory

Water Level Data		Well Construction Data		Well Purging Data	
1) Total Well Depth (feet)	50.12	Outside Casing Diameter D_2 (in.)	2"	Calculate Casing Volume	
2) Initial Depth to Water WT** (feet)	23.18	Bore Hole Diameter D_3 (in.)	6"	L_1 26.94 *0.16 = 4.31 CV in Gallons	
3) Final Depth To Water	23.30	Filter Pack Length L_2 (feet)	12	CV 4.31 /2 = 2.16 BV in Gallons	
		Porosity of Filter Pack N (%)	25	Total Purge Volume (gals) CV*(3)= TPV(gals)	12.9
				Actual Volume Purged (gals)	15
4) Length of Water in Column L_1 *Value on Line1– Value on Line 2 (feet)*	26.94			Number of Bore Volumes Purged	6

* The surveyed point on the inside (usually PVC) casing

** The depth to the water table before removing any water from the well

WELL PURGING MEASUREMENTS

Time	Cumulative Gallons Purged	pH	Temperature °C	Conductivity µs/cm 2mS 20mS	Turbidity NTU	Purge Rate GPM	Comments
12:17			began	purge			
12:19	3	6.02	12.7	0143	1.83		
12:20	6	6.64	12.7	0143	1.79		
12:22	9	6.70	12.7	0143	3.06		
12:24	12	6.72	12.7	0143	3.36		
12:26	15	6.76	12.7	0143	3.17		
			End purge	Collected	sample		

Terms by Gem Clerk

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DATA REPORT

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

Reference Number: 06-14429

Project: 85491,85492,85493,85494
Field ID: 85493
Sample Description: 85493
Sampled By:
Sample Date: 10/31/2006
Source Type:
Sampler Phone:

Lab Number: 04630517
Report Date: 12/8/2006
Date Analyzed: 11/15/2006
Extraction Date: 549_061106
Analyst: HY
Supervisor: WJL
Analytical Method: 549.2
Paraquat

CAS	COMPOUND	RESULTS	Units	PQL	MDL	MCL	COMMENT
1910-42-5	PARAQUAT	ND	ug/L	2	1.0		

An amount of "ND" indicates that the compound was not detected above the Lab's Method Detection Limit - MDL.
MCL- Maximum Contaminant Level, maximum permissible level of a contaminant in water established by EPA, NPDWR. State Advisory Level (SAL) for Unregulated compounds.
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MDL - Method Detection Limit is the lab's minimum concentration a compound can be measured and reported with 99% confidence that the compound concentration is greater than zero.
J - Estimated value.

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CARBAMATES IN DRINKING WATER

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

Reference Number: 06-14429

Project: 85491,85492,85493,85494
Field ID: 85493
Sample Description: 85493
Sampled By:
Sample Date: 10/31/2006
Source Type:
Sampler Phone:

Lab Number: 04630517
Report Date: 12/8/2006
Date Analyzed: 11/14/2006
Extraction Date: 531_061114
Analyst: TM
Supervisor: JM for WL
Analytical Method: 531.2 Carbamates

CAS	COMPOUND	RESULTS	Units	PQL	MDL	MCL	COMMENT
	EPA Regulated						
23135-22-0	OXYMAL	ND	ug/L	1.0	0.81	200	
1563-66-2	CARBOFURAN	ND	ug/L	1.0	0.87	40	
	EPA Unregulated						
1646-87-3	ALDICARB SULFOXIDE	ND	ug/L	1.0	0.71		
1646-88-4	ALDICARB SULFONE	ND	ug/L	1.0	0.83		
16752-77-5	METHOMYL	ND	ug/L	1.0	0.86		
16655-82-6	3-HYDROXYCARBOFURAN	ND	ug/L	1.0	1.0		
116-06-3	ALDICARB	ND	ug/L	1.0	0.88		
63-25-2	CARBARYL	ND	ug/L	1.0	0.53		
	State Unregulated - Other						
114-26-1	PROPOXUR (BAYGON)	ND	ug/L	1.0	0.72		
2032-65-7	METHIOCARB	ND	ug/L	1.0	0.76		

An amount of "ND" indicates that the compound was not detected above the Lab's Method Detection Limit - MDL.
MCL- Maximum Contaminant Level, maximum permissible level of a contaminant in water established by EPA, NPDWR. State Advisory Level (SAL) for Unregulated compounds.
A blank MCL or SAL value indicates a level is not currently established.
PQL - Practical Quantitation Limit is the concentration of the standard analyzed during the initial calibration.
MDL - Method Detection Limit is the lab's minimum concentration a compound can be measured and reported with 99% confidence that the compound concentration is greater than zero.
J - Estimated value.

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SYNTHETIC ORGANIC COMPOUNDS (SOC) REPORT

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

Reference Number: 06-14429

Project: 85491,85492,85493,85494
Field ID: 85493
Sample Description: 85493
Sampled By:
Sample Date: 10/31/2006
Source Type:
Sampler Phone:

Lab Number: 04630517
Report Date: 12/8/2006
Date Analyzed: 11/13/2006
Extraction Date: 525_061113
Analyst: MM
Supervisor: JM for WJL
Analytical Method: 525.2
Synthetic Organics

CAS	COMPOUND	RESULTS	Units	PQL	MDL	MCL	COMMENT
	EPA Regulated						
72-20-8	ENDRIN	ND	ug/L	0.1	0.030	2	
58-89-9	LINDANE (BHC - GAMMA)	ND	ug/L	0.1	0.028	0.2	
72-43-5	METHOXYCHLOR	ND	ug/L	0.1	0.015	40	
15972-60-8	ALACHLOR	ND	ug/L	0.1	0.044	2	
1912-24-9	ATRAZINE	ND	ug/L	0.1	0.030	3	
50-32-8	BENZO(A)PYRENE	ND	ug/L	0.1	0.012	0.2	
57-74-9	CHLORDANE, TECHNICAL	ND	ug/L	0.1	0.3	2	
103-23-1	DI(ETHYLHEXYL)-ADIPATE	ND	ug/L	0.1	0.022	400	
117-81-7	DI(ETHYLHEXYL)-PHTHALATE	3	ug/L	0.1	0.063	6	
76-44-8	HEPTACHLOR	ND	ug/L	0.1	0.022	0.4	
1024-57-3	HEPTACHLOR EPOXIDE	ND	ug/L	0.1	0.02	0.2	
118-74-1	HEXACHLOROBENZENE	ND	ug/L	0.1	0.025	1	
77-47-4	HEXACHLOROCYCLO-PENTADIENE	ND	ug/L	0.1	0.024	50	
122-34-9	SIMAZINE	ND	ug/L	0.1	0.030	4	
87-86-5	PENTACHLOROPHENOL	ND	ug/L	0.4	0.08	1	screening only / compliance by 515.1
	EPA Unregulated						
309-00-2	ALDRIN	ND	ug/L	0.1	0.022		
23184-66-9	BUTACHLOR	ND	ug/L	0.1	0.024		
60-57-1	DIELDRIN	ND	ug/L	0.1	0.031		
51218-45-2	METOLACHLOR	ND	ug/L	0.1	0.024		
21087-64-9	METRIBUZIN	ND	ug/L	0.1	0.030		
1918-16-7	PROPACHLOR	ND	ug/L	0.1	0.031		
	State Unregulated - Other						
314-40-9	BROMACIL	ND	ug/L	0.1	0.031		
5902-51-2	TERBACIL	ND	ug/L	0.1	0.043		

An amount of "ND" indicates that the compound was not detected above the Lab's Method Detection Limit - MDL.
MCL- Maximum Contaminant Level, maximum permissible level of a contaminant in water established by EPA, NPDWR. State Advisory Level (SAL) for Unregulated compounds.
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SYNTHETIC ORGANIC COMPOUNDS (SOC) REPORT

CAS	COMPOUND	RESULTS	Units	PQL	MDL	MCL	COMMENT
333-41-5	DIAZINON	ND	ug/L	0.1	0.035		Unstable in Acidified Sample Matrix
759-94-4	EPTC	ND	ug/L	0.1	0.028		
72-54-8	4,4-DDD	ND	ug/L	0.1	0.024		
72-55-9	4,4-DDE	ND	ug/L	0.1	0.024		
50-29-3	4,4-DDT	ND	ug/L	0.1	0.022		
21725-46-2	CYANAZINE	ND	ug/L	0.1	0.13		Qualitative Analysis Only
121-75-5	MALATHION	ND	ug/L	0.1	0.015		
56-38-2	PARATHION	ND	ug/L	0.1	0.022		
1582-09-8	TRIFLURALIN	ND	ug/L	0.1	0.024		
	- PAHs						
91-20-3	NAPTHALENE	ND	ug/L	0.1	0.1^		
86-73-7	FLUORENE	ND	ug/L	0.1	0.026		
208-96-8	ACENAPHTHYLENE	ND	ug/L	0.1	0.025		
83-32-9	ACENAPHTHENE	ND	ug/L	0.1	0.1^		
120-12-7	ANTHRACENE	ND	ug/L	0.1	0.012		
56-55-3	BENZ(A)ANTHRACENE	ND	ug/L	0.1	0.012		
205-99-2	BENZO(B)FLUORANTHENE	ND	ug/L	0.1	0.025		
191-24-2	BENZO(G,H,I)PERYLENE	ND	ug/L	0.1	0.025		
207-08-9	BENZO(K)FLUORANTHENE	ND	ug/L	0.1	0.022		
218-01-9	CHRYSENE	ND	ug/L	0.1	0.022		
53-70-3	DIBENZO(A,H)ANTHRACENE	ND	ug/L	0.1	0.024		
206-44-0	FLUORANTHENE	ND	ug/L	0.1	0.1^		
193-39-5	INDENO(1,2,3-CD)PYRENE	ND	ug/L	0.1	0.040		
85-01-8	PHENANTHRENE	ND	ug/L	0.1	0.015		
129-00-0	PYRENE	ND	ug/L	0.1	0.022		
	- Phthalates						
85-68-7	BENZYL BUTYL PHTHALATE	ND	ug/L	0.1	0.022		
84-74-2	DI-N-BUTYL PHTHALATE	0.9	ug/L	0.1	0.085		
84-66-2	DIETHYL PHTHALATE	ND	ug/L	0.1	0.044		
131-11-3	DIMETHYL PHTHALATE	ND	ug/L	0.1	0.015		
	Other Compounds						
51235-04-2	HEXAZINONE	ND	ug/L	0.1	0.1^		

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HERBICIDES IN DRINKING WATER

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

Reference Number: 06-14429

Project: 85491,85492,85493,85494
Field ID: 85493
Sample Description: 85493
Sampled By:
Sample Date: 10/31/2006
Source Type:
Sampler Phone:

Lab Number: 04630517
Report Date: 12/8/2006
Date Analyzed: 11/20/2006
Extraction Date: 515_061113
Analyst: TM
Supervisor: WJL
Analytical Method: 515.1
Chlorophenoxy Herbicides

CAS	COMPOUND	RESULTS	Units	PQL	MDL	MCL	COMMENT
	EPA Regulated						
94-75-7	2,4 - D	ND	ug/L	0.2	0.11	70	
93-72-1	2,4,5 - TP (SILVEX)	ND	ug/L	0.1	0.02	50	
87-86-5	PENTACHLOROPHENOL	ND	ug/L	0.1	0.044	1	
75-99-0	DALAPON	ND	ug/L	1.3	0.80	200	
88-85-7	DINOSEB	ND	ug/L	0.2	0.16	7	
1918-02-1	PICLORAM	ND	ug/L	0.1	0.089	500	
	EPA Unregulated						
1918-00-9	DICAMBA	ND	ug/L	0.1	0.045		
	State Unregulated						
1861-32-1	TOTAL DCPA	ND	ug/L	0.1	0.089		
E-14-02-8	DCPA (ACID METABOLITES)	ND	ug/L	0.1	0.1		
94-82-6	2,4 DB	ND	ug/L	0.8	0.10		
93-76-5	2,4,5 T	ND	ug/L	0.1	0.044		
25057-89-0	BENTAZON	ND	ug/L	0.2	0.067		
120-36-5	DICHLORPROP	ND	ug/L	0.3	0.089		
50594-66-6	ACIFLUORFEN	ND	ug/L	0.1	0.089		
133-90-4	CHLORAMBEN	ND	ug/L	0.2	0.2		
51-36-5	3,5 - DICHLOROBENZOIC ACID	ND	ug/L	0.1	0.044		

An amount of "ND" indicates that the compound was not detected above the Lab's Method Detection Limit - MDL.
MCL- Maximum Contaminant Level, maximum permissible level of a contaminant in water established by EPA, NPDWR. State Advisory Level (SAL) for Unregulated compounds.
A blank MCL or SAL value indicates a level is not currently established.
PQL - Practical Quantitation Limit is the concentration of the standard analyzed during the initial calibration.
MDL - Method Detection Limit is the lab's minimum concentration a compound can be measured and reported with 99% confidence that the compound concentration is greater than zero.
J - Estimated value.

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Bellingham WA | 805 Orchard Dr Suite 4 - 98225
Microbiology | 360.671.0688 • 360.671.1577fax

DATA REPORT

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

Reference Number: 06-14429

Project: 85491,85492,85493,85494
Field ID: 85493
Sample Description: 85493
Sampled By:
Sample Date: 10/31/2006
Source Type:
Sampler Phone:

Lab Number: 04630517
Report Date: 12/8/2006
Date Analyzed: 11/14/2006
Extraction Date: 508_061113
Analyst: MM
Supervisor: JWL for WJL
Analytical Method: 508.1
Synthetic Organics

CAS	COMPOUND	RESULTS	Units	PQL	MDL	MCL	COMMENT
	PCBs/Toxaphene						
1336-36-3	PCBS (Total Aroclors)	ND	ug/L	0.2		0.5	
11104-28-2	AROCLOR 1221	ND	ug/L	0.1	0.1^		
11141-16-5	AROCLOR 1232	ND	ug/L	0.1	0.1^		
53469-21-9	AROCLOR 1242	ND	ug/L	0.1	0.1^		
12672-29-6	AROCLOR 1248	ND	ug/L	0.1	0.1^		
11097-69-1	AROCLOR 1254	ND	ug/L	0.1	0.1^		
11096-82-5	AROCLOR 1260	ND	ug/L	0.1	0.08		
12674-11-2	AROCLOR 1016	ND	ug/L	0.1	0.1		
8001-35-2	TOXAPHENE	ND	ug/L	1	0.5	3	

An amount of "ND" indicates that the compound was not detected above the Lab's Method Detection Limit - MDL.
MCL- Maximum Contaminant Level, maximum permissible level of a contaminant in water established by EPA, NPDWR. State Advisory Level (SAL) for Unregulated compounds.
A blank MCL or SAL value indicates a level is not currently established.
PQL - Practical Quantitation Limit is the concentration of the standard analyzed during the initial calibration.
MDL - Method Detection Limit is the lab's minimum concentration a compound can be measured and reported with 99% confidence that the compound concentration is greater than zero.
J - Estimated value.

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INORGANIC COMPOUNDS (IOC) REPORT

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

Reference Number: 06-14429

Project: 85491,85492,85493,85494
Field ID: 85493
Sample Description: 85493
Sampled By:
Sample Date: 10/31/2006
Source Type:

Lab Number: 04630517
Report Date: 11/17/2006
Date Received: 11/2/2006
Sampler Phone:

Supervisor

CAS	ANALYTES	RESULTS	UNITS	PQL	MDL	MCL	Analyst	METHOD	COMMENT
15541-45-4	BROMATE	ND	mg/L	0.005	0.0016	0.010	mvp	300.1	

NOTES:

SRL (State Reporting Level): Indicates the minimum reporting level required by the Washington Department of Health (DOH).

MCL (Maximum Contaminant Level) maximum permissible level of a contaminant in water established by EPA; Federal Action Levels are 0.015 mg/L for Lead and 1.3 mg/L for Copper. Sodium has a recommended limit of 20 mg/L. A blank MCL value indicates a level is not currently established.

Trigger Level: DOH Drinking Water Response level. Systems with compounds detected in excess of this level are required to take additional samples. Contact your regional DOH office.

ND (Not Detected): Indicates that the compound was not detected above the State Reporting Limit (SRL).

NA (Not Analyzed): Indicates that this compound was not analyzed.

FORM: IOC_GEN

CLIENT : HALL - WENTLAND DATE: 10/03/06

KUO TESTING LABS, INC.

GROUNDWATER SAMPLING FIELD DATA

SITE	TIME	Ph	CONDUCTIVITY	TEMP	TURBIDITY
SOURCE	01:45	7.33	0137	8.7	27.4

Kuo Testing Labs, Inc.

337 South 1st Avenue, Othello, WA 99344
(509) 488-0112 Phone (509) 488-0118 Fax (800) 328-0112 Toll Free
Web Site: http://www.kuotesting.com e-mail: kuotest@atnet.net

SYSTEM/CUSTOMER	DATE COLLECTED	DATE RECEIVED	DATE REPORTED
SEND REPORT TO:	10/31/2006	11/1/2006	12/8/2006

Groundwater Solutions
55 SW Yamhill St., Suite 400
Portland OR 97202
Project Name:Hall Wentland SAR

Ground Water Solutions
55 SW Yamhill St., Suite 400
Portland OR 97202
Attn: Kevin Lindsey

LAB NUMBER	SAMPLE DESCRIPTION	ANALYSIS	RESULTS	MDL	UNITS	METHOD
85494	HW-SW	Nitrate as Nitrogen	0.87	0.21	mg/L	Hatch
85494	HW-SW	Nitrite as Nitrogen	ND	0.0023	mg/L	Hatch
85494	HW-SW	Total Dissolved Solids	92.0	21.1	mg/L	Hatch
85494	HW-SW	Hardness	53.6	0.11	mg/L	Hatch
85494	HW-SW	Chloride	2.19	0.297	mg/L	Hatch
85494	HW-SW	Orthophosphate as P	0.15	0.0433	mg/L	Hatch
85494	HW-SW	COD	4	8	mg/L	Hatch
85494	HW-SW	SOC/Synthetic Organic Compounds	Attached Report		mg/L	Edge Analytical
85494	HW-SW	Fecal E-Coli	5,000		MPN/100ml	Cascade Analytical

<(0.001): indicates the analyte was not detected at or above the concentration indicated.
ND: None Detected
mg/L:Indicates milligrams per litre
* PQL=Practical Quantitation Limit is the lowest level that can be achieved within specified limits of precision and accuracy during routine laboratory operating conditions
MDL: Method Detection Limit
Please check out our new Web Site at http://www.kuotesting.com
***Sample passed hold time for Nitrate/Nitrite as Nitrogen*

Dr. Eugene Kuo, Quality Assurance Manager

12-08-06
Date

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Bellingham WA | 805 Orchard Dr Suite 4 - 98225
Microbiology | 360.671.0688 • 360.671.1577fax

DATA REPORT

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

Reference Number: 06-14429

Project: 85491,85492,85493,85494
Field ID: 85494
Sample Description: 85494
Sampled By:
Sample Date: 10/31/2006
Source Type:
Sampler Phone:

Lab Number: 04630518
Report Date: 12/8/2006
Date Analyzed: 11/15/2006
Extraction Date: 549_061106
Analyst: HY
Supervisor:
Analytical Method: 549.2
Paraquat

CAS	COMPOUND	RESULTS	Units	PQL	MDL	MCL	COMMENT
1910-42-5	PARAQUAT	ND	ug/L	2	1.0		

An amount of "ND" indicates that the compound was not detected above the Lab's Method Detection Limit - MDL.
MCL- Maximum Contaminant Level, maximum permissible level of a contaminant in water established by EPA, NPDWR. State Advisory Level (SAL) for Unregulated compounds.
A blank MCL or SAL value indicates a level is not currently established.
PQL - Practical Quantitation Limit is the concentration of the standard analyzed during the initial calibration.
MDL - Method Detection Limit is the lab's minimum concentration a compound can be measured and reported with 99% confidence that the compound concentration is greater than zero.
J - Estimated value.

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CARBAMATES IN DRINKING WATER

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

Reference Number: 06-14429

Project: 85491,85492,85493,85494
Field ID: 85494
Sample Description: 85494
Sampled By:
Sample Date: 10/31/2006
Source Type:
Sampler Phone:

Lab Number: 04630518
Report Date: 12/8/2006
Date Analyzed: 11/14/2006
Extraction Date: 531_061114
Analyst: TM
Supervisor: JW for WJL
Analytical Method: 531.2
Carbamates

CAS	COMPOUND	RESULTS	Units	PQL	MDL	MCL	COMMENT
	EPA Regulated						
23135-22-0	OXYMAL	ND	ug/L	1.0	0.81	200	
1563-66-2	CARBOFURAN	ND	ug/L	1.0	0.87	40	
	EPA Unregulated						
1646-87-3	ALDICARB SULFOXIDE	ND	ug/L	1.0	0.71		
1646-88-4	ALDICARB SULFONE	ND	ug/L	1.0	0.83		
16752-77-5	METHOMYL	ND	ug/L	1.0	0.86		
16655-82-6	3-HYDROXYCARBOFURAN	ND	ug/L	1.0	1.0		
116-06-3	ALDICARB	ND	ug/L	1.0	0.88		
63-25-2	CARBARYL	ND	ug/L	1.0	0.53		
	State Unregulated - Other						
114-26-1	PROPOXUR (BAYGON)	ND	ug/L	1.0	0.72		
2032-65-7	METHIOCARB	ND	ug/L	1.0	0.76		

An amount of "ND" indicates that the compound was not detected above the Lab's Method Detection Limit - MDL.
MCL- Maximum Contaminant Level, maximum permissible level of a contaminant in water established by EPA, NPDWR. State Advisory Level (SAL) for Unregulated compounds.
A blank MCL or SAL value indicates a level is not currently established.
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J - Estimated value.

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SYNTHETIC ORGANIC COMPOUNDS (SOC) REPORT

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

Reference Number: 06-14429

Project: 85491,85492,85493,85494
Field ID: 85494
Sample Description: 85494
Sampled By:
Sample Date: 10/31/2006
Source Type:
Sampler Phone:

Lab Number: 04630518
Report Date: 12/8/2006
Date Analyzed: 11/13/2006
Extraction Date: 525_061113
Analyst: MM
Supervisor: JW for WJL
Analytical Method: 525.2
Synthetic Organics

CAS	COMPOUND	RESULTS	Units	PQL	MDL	MCL	COMMENT
	EPA Regulated						
72-20-8	ENDRIN	ND	ug/L	0.1	0.030	2	
58-89-9	LINDANE (BHC - GAMMA)	ND	ug/L	0.1	0.028	0.2	
72-43-5	METHOXYCHLOR	ND	ug/L	0.1	0.015	40	
15972-60-8	ALACHLOR	ND	ug/L	0.1	0.044	2	
1912-24-9	ATRAZINE	ND	ug/L	0.1	0.030	3	
50-32-8	BENZO(A)PYRENE	ND	ug/L	0.1	0.012	0.2	
57-74-9	CHLORDANE, TECHNICAL	ND	ug/L	0.1	0.3	2	
103-23-1	DI(ETHYLHEXYL)-ADIPATE	ND	ug/L	0.1	0.022	400	
117-81-7	DI(ETHYLHEXYL)-PHTHALATE	ND	ug/L	0.1	0.063	6	
76-44-8	HEPTACHLOR	ND	ug/L	0.1	0.022	0.4	
1024-57-3	HEPTACHLOR EPOXIDE	ND	ug/L	0.1	0.02	0.2	
118-74-1	HEXACHLOROBENZENE	ND	ug/L	0.1	0.025	1	
77-47-4	HEXACHLOROCYCLO-PENTADIENE	ND	ug/L	0.1	0.024	50	
122-34-9	SIMAZINE	ND	ug/L	0.1	0.030	4	
87-86-5	PENTACHLOROPHENOL	ND	ug/L	0.4	0.08	1	screening only / compliance by 515.1
	EPA Unregulated						
309-00-2	ALDRIN	ND	ug/L	0.1	0.022		
23184-66-9	BUTACHLOR	ND	ug/L	0.1	0.024		
60-57-1	DIELDRIN	ND	ug/L	0.1	0.031		
51218-45-2	METOLACHLOR	ND	ug/L	0.1	0.024		
21087-64-9	METRIBUZIN	ND	ug/L	0.1	0.030		
1918-16-7	PROPACHLOR	ND	ug/L	0.1	0.031		
	State Unregulated - Other						
314-40-9	BROMACIL	ND	ug/L	0.1	0.031		
5902-51-2	TERBACIL	ND	ug/L	0.1	0.043		

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SYNTHETIC ORGANIC COMPOUNDS (SOC) REPORT

CAS	COMPOUND	RESULTS	Units	PQL	MDL	MCL	COMMENT
333-41-5	DIAZINON	ND	ug/L	0.1	0.035		Unstable in Acidified Sample Matrix
759-94-4	EPTC	ND	ug/L	0.1	0.028		
72-54-8	4,4-DDD	ND	ug/L	0.1	0.024		
72-55-9	4,4-DDE	ND	ug/L	0.1	0.024		
50-29-3	4,4-DDT	ND	ug/L	0.1	0.022		
21725-46-2	CYANAZINE	ND	ug/L	0.1	0.13		Qualitative Analysis Only
121-75-5	MALATHION	ND	ug/L	0.1	0.015		
56-38-2	PARATHION	ND	ug/L	0.1	0.022		
1582-09-8	TRIFLURALIN	ND	ug/L	0.1	0.024		
	- PAHs						
91-20-3	NAPTHALENE	ND	ug/L	0.1	0.1^		
86-73-7	FLUORENE	ND	ug/L	0.1	0.026		
208-96-8	ACENAPHTHYLENE	ND	ug/L	0.1	0.025		
83-32-9	ACENAPHTHENE	ND	ug/L	0.1	0.1^		
120-12-7	ANTHRACENE	ND	ug/L	0.1	0.012		
56-55-3	BENZ(A)ANTHRACENE	ND	ug/L	0.1	0.012		
205-99-2	BENZO(B)FLUORANTHENE	ND	ug/L	0.1	0.025		
191-24-2	BENZO(G,H,I)PERYLENE	ND	ug/L	0.1	0.025		
207-08-9	BENZO(K)FLUORANTHENE	ND	ug/L	0.1	0.022		
218-01-9	CHRYSENE	ND	ug/L	0.1	0.022		
53-70-3	DIBENZO(A,H)ANTHRACENE	ND	ug/L	0.1	0.024		
206-44-0	FLUORANTHENE	ND	ug/L	0.1	0.1^		
193-39-5	INDENO(1,2,3-CD)PYRENE	ND	ug/L	0.1	0.040		
85-01-8	PHENANTHRENE	ND	ug/L	0.1	0.015		
129-00-0	PYRENE	ND	ug/L	0.1	0.022		
	- Phthalates						
85-68-7	BENZYL BUTYL PHTHALATE	ND	ug/L	0.1	0.022		
84-74-2	DI-N-BUTYL PHTHALATE	ND	ug/L	0.1	0.085		
84-66-2	DIETHYL PHTHALATE	ND	ug/L	0.1	0.044		
131-11-3	DIMETHYL PHTHALATE	ND	ug/L	0.1	0.015		
	Other Compounds						
51235-04-2	HEXAZINONE	ND	ug/L	0.1	0.1^		

An amount of "ND" indicates that the compound was not detected above the Lab's Method Detection Limit - MDL.
MCL- Maximum Contaminant Level, maximum permissible level of a contaminant in water established by EPA, NPDWR. State Advisory Level (SAL) for Unregulated compounds.
A blank MCL or SAL value indicates a level is not currently established.
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J - Estimated value.

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Microbiology | 360.671.0688 • 360.671.1577fax

HERBICIDES IN DRINKING WATER

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

Reference Number: 06-14429

Project: 85491,85492,85493,85494
Field ID: 85494
Sample Description: 85494
Sampled By:
Sample Date: 10/31/2006
Source Type:
Sampler Phone:

Lab Number: 04630518
Report Date: 12/8/2006
Date Analyzed: 11/20/2006
Extraction Date: 515_061113
Analyst: TM
Supervisor: JJK for WJL
Analytical Method: 515.1
Chlorophenoxy Herbicides

CAS	COMPOUND	RESULTS	Units	PQL	MDL	MCL	COMMENT
	EPA Regulated						
94-75-7	2,4 - D	ND	ug/L	0.2	0.11	70	
93-72-1	2,4,5 - TP (SILVEX)	ND	ug/L	0.1	0.02	50	
87-86-5	PENTACHLOROPHENOL	ND	ug/L	0.1	0.044	1	
75-99-0	DALAPON	ND	ug/L	1.3	0.80	200	
88-85-7	DINOSEB	ND	ug/L	0.2	0.16	7	
1918-02-1	PICLORAM	ND	ug/L	0.1	0.089	500	
	EPA Unregulated						
1918-00-9	DICAMBA	ND	ug/L	0.1	0.045		
	State Unregulated						
1861-32-1	TOTAL DCPA	ND	ug/L	0.1	0.089		
E-14-02-8	DCPA (ACID METABOLITES)	ND	ug/L	0.1	0.1		
94-82-6	2,4 DB	ND	ug/L	0.8	0.10		
93-76-5	2,4,5 T	ND	ug/L	0.1	0.044		
25057-89-0	BENTAZON	ND	ug/L	0.2	0.067		
120-36-5	DICHLORPROP	ND	ug/L	0.3	0.089		
50594-66-6	ACIFLUORFEN	ND	ug/L	0.1	0.089		
133-90-4	CHLORAMBEN	ND	ug/L	0.2	0.2		
51-36-5	3,5 - DICHLOROBENZOIC ACID	ND	ug/L	0.1	0.044		

An amount of "ND" indicates that the compound was not detected above the Lab's Method Detection Limit - MDL.
MCL- Maximum Contaminant Level, maximum permissible level of a contaminant in water established by EPA, NPDWR. State Advisory Level (SAL) for Unregulated compounds.
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J - Estimated value.

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Microbiology | 360.671.0688 • 360.671.1577fax

DATA REPORT

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

Reference Number: 06-14429

Project: 85491,85492,85493,85494
Field ID: 85494
Sample Description: 85494
Sampled By:
Sample Date: 10/31/2006
Source Type:
Sampler Phone:

Lab Number: 04630518
Report Date: 12/8/2006
Date Analyzed: 11/14/2006
Extraction Date: 508_061113
Analyst: MM
Supervisor: JAY F. WJL
Analytical Method: 508.1
Synthetic Organics

CAS	COMPOUND	RESULTS	Units	PQL	MDL	MCL	COMMENT
	PCBs/Toxaphene						
1336-36-3	PCBS (Total Aroclors)	ND	ug/L	0.2		0.5	
11104-28-2	AROCLOR 1221	ND	ug/L	0.1	0.1^		
11141-16-5	AROCLOR 1232	ND	ug/L	0.1	0.1^		
53469-21-9	AROCLOR 1242	ND	ug/L	0.1	0.1^		
12672-29-6	AROCLOR 1248	ND	ug/L	0.1	0.1^		
11097-69-1	AROCLOR 1254	ND	ug/L	0.1	0.1^		
11096-82-5	AROCLOR 1260	ND	ug/L	0.1	0.08		
12674-11-2	AROCLOR 1016	ND	ug/L	0.1	0.1		
8001-35-2	TOXAPHENE	ND	ug/L	1	0.5	3	

An amount of "ND" indicates that the compound was not detected above the Lab's Method Detection Limit - MDL.
MCL- Maximum Contaminant Level, maximum permissible level of a contaminant in water established by EPA, NPDWR. State Advisory Level (SAL) for Unregulated compounds.
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Microbiology | 360.671.0688 • 360.671.1577fax

INORGANIC COMPOUNDS (IOC) REPORT

Client Name: KUO Testing Labs Inc
337 S 1st
Othello, WA 99344

Reference Number: 06-14429

Project: 85491,85492,85493,85494
Field ID: 85494
Sample Description: 85494
Sampled By:
Sample Date: 10/31/2006
Source Type:

Lab Number: 04630518
Report Date: 11/17/2006
Date Received: 11/2/2006
Sampler Phone:
Supervisor:

CAS	ANALYTES	RESULTS	UNITS	PQL	MDL	MCL	Analyst	METHOD	COMMENT
15541-45-4	BROMATE	ND	mg/L	0.005	0.0016	0.010	mvp	300.1	

NOTES:

SRL (State Reporting Level): indicates the minimum reporting level required by the Washington Department of Health (DOH).

MCL (Maximum Contaminant Level) maximum permissible level of a contaminant in water established by EPA; Federal Action Levels are 0.015 mg/L for Lead and 1.3 mg/L for Copper. Sodium has a recommended limit of 20 mg/L. A blank MCL value indicates a level is not currently established.

Trigger Level: DOH Drinking Water Response level. Systems with compounds detected in excess of this level are required to take additional samples. Contact your regional DOH office.

ND (Not Detected): indicates that the compound was not detected above the State Reporting Limit (SRL).

NA (Not Analyzed): indicates that this compound was not analyzed.

FORM: IOC_GEN

Kuo Testing Labs, Inc.

337 South 1st Avenue, Othello, WA 99344
(509) 488-0112 Phone (509) 488-0118 Fax (800) 328-0112 Toll Free
Web Site: http://www.kuotesting.com e-mail: kuotest@atnet.net

DATE COLLECTED: 10/31/2006
DATE RECEIVED: 11/1/2006
DATE REPORTED: 12/8/2006
SYSTEM / CUSTOMER

Groundwater Solutions
55 SW Yamhill St., Suite 400
Portland OR 97202
Project Name: Hall Wentland SAR

Ground Water Solutions
55 SW Yamhill St., Suite 400
Portland OR 97202
Attn: Kevin Lindsey

SAMPLE #	CUSTOMER SAMPLE ID	ANALYSIS	RESULT	PQL*	UNITS	METHOD
85495	Duplicate	Nitrate as Nitrogen	0.73	0.21	mg/L	Hatch
85495	Duplicate	Nitrite as Nitrogen	ND	0.0023	mg/L	Hatch
85495	Duplicate	Total Dissolved Solids	106	21.1	mg/L	Hatch
85495	Duplicate	Hardness	64.5	0.11	mg/L	Hatch
85495	Duplicate	Chloride	2.20	0.297	mg/L	Hatch
85495	Duplicate	Orthophosphate as P	0.18	0.0433	mg/L	Hatch
85495	Duplicate	COD	3	8	mg/L	Hatch
85495	Duplicate	Fecal E-Coli	0		MPN/100ml	Cascade Analytical

<(0.001): indicates the analyte was not detected at or above the concentration indicated.
ND: None Detected
mg/L:Indicates milligrams per litre
* PQL=Practical Quantitation Limit is the lowest level that can be achieved within specified limits of precision and accuracy during routine laboratory operating conditions
MDL: Method Detection Limit
Please check out our new Web Site at http://www.kuotesting.com
***Sample passed hold time for Nitrate/Nitrite as Nitrogen*

Dr. Eugene Kuo, Quality Assurance Manager

12-08-06
Date

Kuo Testing Labs, Inc.

337 South 1st Avenue, Othello, WA 99344
(509) 488-0112 Phone (509) 488-0118 Fax (800) 328-0112 Toll Free
Web Site: http://www.kuotesting.com e-mail: kuotest@atnet.net

SYSTEM / CUSTOMER	DATE COLLECTED	DATE RECEIVED	DATE REPORTED
SEND REPORT TO	10/31/2006	11/1/2006	12/8/2006

Groundwater Solutions
55 SW Yamhill St., Suite 400
Portland OR 97202
Project Name:

Ground Water Solutions
55 SW Yamhill St., Suite 400
Portland OR 97202
Attn: Kevin Lindsey

LAB NO.	CUSTOMER SAMPLE NO.	ANALYSIS	RESULT	MDL	UNITS	METHOD
85496	Blind A	Hardness	115	0.11	mg/L	Hatch

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ND: None Detected
mg/L:Indicates milligrams per litre
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MDL: Method Detection Limit
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DATE COLLECTED: 10/31/2006
DATE RECEIVED: 11/1/2006
DATE REPORTED: 12/8/2006

SYSTEM/CUSTOMER:
Groundwater Solutions
55 SW Yamhill St., Suite 400
Portland OR 97202
Project Name:

SEND REPORT TO:
Ground Water Solutions
55 SW Yamhill St., Suite 400
Portland OR 97202
Attn: Kevin Lindsey

Lab No.	Client ID	Analysis	Results	MDL	Units	Method
85497	Blind B	Nitrate as Nitrogen	1.96	0.21	mg/L	Hatch
85497	Blind B	Orthophosphate as P	0.69	0.0433	mg/L	Hatch

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ND: None Detected
mg/L:Indicates milligrams per litre
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MDL: Method Detection Limit
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***Sample passed hold time for Nitrate/Nitrite as Nitrogen*

Dr. Eugene Kuo, Quality Assurance Manager

12-08-06
Date

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Burlington, WA 98233
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(360) 757-1400 - FAX (360) 757-1402

QUALITY CONTROL REPORT
BLANK REPORT

Reference Number: 06-14429
Report Date: 12/08/06

Batch	Analyte	Result	Units	Limit	QC Qualifier	Method	Type*	Comments
D061113A	BROMATE	ND	mg/L	0.01		300.1	LRB	
508_061113	AROCLOR 1221	ND	ug/L	0.12		508.1	MB	
	AROCLOR 1232	ND	ug/L	0.02		508.1	MB	
	AROCLOR 1242	ND	ug/L	0.02		508.1	MB	
	AROCLOR 1248	ND	ug/L	0.02		508.1	MB	
	AROCLOR 1254	ND	ug/L	0.02		508.1	MB	
	AROCLOR 1260	ND	ug/L	0.02		508.1	MB	
	AROCLOR 1016	ND	ug/L	0.02		508.1	MB	
	TETRACHLORO-M-XYLENE (SURR)	86	%	0.00		508.1	MB	
515_061113	2,4 - D	ND	ug/L	0.05		515.1	MB	
	2,4,5 - TP (SILVEX)	ND	ug/L	0.10		515.1	MB	
	PENTACHLOROPHENOL	ND	ug/L	0.02		515.1	MB	
	DALAPON	ND	ug/L	0.50		515.1	MB	
	DINOSEB	ND	ug/L	0.10		515.1	MB	
	PICLORAM	ND	ug/L	0.05		515.1	MB	
	DICAMBA	ND	ug/L	0.05		515.1	MB	
	TOTAL DCPA	ND	ug/L	0.02		515.1	MB	
	DCPA (ACID METABOLITES)	ND	ug/L	0.10		515.1	MB	
	2,4 DB	ND	ug/L	0.25		515.1	MB	
	2,4,5 T	ND	ug/L	0.10		515.1	MB	
	BENTAZON	ND	ug/L	0.12		515.1	MB	
	DICHLORPROP	ND	ug/L	0.12		515.1	MB	
	ACIFLUORFEN	ND	ug/L	0.50		515.1	MB	
	CHLORAMBEN	ND	ug/L	0.20		515.1	MB	
525_061113	ENDRIN	ND	ug/L	0.02		525.2	MB	
	LINDANE (BHC - GAMMA)	ND	ug/L	0.02		525.2	MB	
	METHOXYCHLOR	ND	ug/L	0.02		525.2	MB	
	ALACHLOR	ND	ug/L	0.02		525.2	MB	
	ATRAZINE	ND	ug/L	0.02		525.2	MB	
	BENZO(A)PYRENE	ND	ug/L	0.02		525.2	MB	
	CHLORDANE, TECHNICAL	ND	ug/L	0.02		525.2	MB	
	DI(ETHYLHEXYL)-ADIPATE	ND	ug/L	0.02		525.2	MB	
	DI(ETHYLHEXYL)-PHTHALATE	0.2	ug/L	0.60		525.2	MB	
	HEPTACHLOR	ND	ug/L	0.02		525.2	MB	
	HEPTACHLOR EPOXIDE	ND	ug/L	0.02		525.2	MB	
	HEXACHLOROBENZENE	ND	ug/L	0.02		525.2	MB	

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MB: Method Blanks are used to determine background levels of analytes in digested and extracted laboratory reagent water.

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QUALITY CONTROL REPORT
BLANK REPORT

Reference Number: 06-14429
Report Date: 12/08/06

Batch	Analyte	Result	Units	Limit	QC Qualifier	Method	Type*	Comments
525_061113	HEXACHLOROCYCLO-PENTADIENE	ND	ug/L	0.02		525.2	MB	
	SIMAZINE	ND	ug/L	0.02		525.2	MB	
	PENTACHLOROPHENOL	ND	ug/L	0.04		525.2	MB	
	ALDRIN	ND	ug/L	0.05		525.2	MB	
	BUTACHLOR	ND	ug/L	0.10		525.2	MB	
	DIELDRIN	ND	ug/L	0.05		525.2	MB	
	METOLACHLOR	ND	ug/L	0.25		525.2	MB	
	METRIBUZIN	ND	ug/L	0.05		525.2	MB	
	PROPACHLOR	ND	ug/L	0.05		525.2	MB	
	BROMACIL	ND	ug/L	0.05		525.2	MB	
	TERBACIL	ND	ug/L	0.05		525.2	MB	
	DIAZINON	ND	ug/L	0.05		525.2	MB	
	EPTC	ND	ug/L	0.07		525.2	MB	
	4,4-DDD	ND	ug/L	0.05		525.2	MB	
	4,4-DDE	ND	ug/L	0.05		525.2	MB	
	4,4-DDT	ND	ug/L	0.05		525.2	MB	
	CYANAZINE	ND	ug/L	0.05		525.2	MB	
	MALATHION	ND	ug/L	0.05		525.2	MB	
	PARATHION	ND	ug/L	0.05		525.2	MB	
	TRIFLURALIN	ND	ug/L	0.05		525.2	MB	
	NAPTHALENE	ND	ug/L	0.02		525.2	MB	
	FLUORENE	ND	ug/L	0.05		525.2	MB	
	ACENAPHTHENE	ND	ug/L	0.05		525.2	MB	
	ANTHRACENE	ND	ug/L	0.05		525.2	MB	
	BENZ(A)ANTHRACENE	ND	ug/L	0.02		525.2	MB	
	BENZO(B)FLUORANTHENE	ND	ug/L	0.05		525.2	MB	
	BENZO(G,H,I)PERYLENE	ND	ug/L	0.05		525.2	MB	
	BENZO(K)FLUORANTHENE	ND	ug/L	0.05		525.2	MB	
	CHRYSENE	ND	ug/L	0.05		525.2	MB	
	DIBENZO(A,H)ANTHRACENE	ND	ug/L	0.05		525.2	MB	
	FLUORANTHENE	ND	ug/L	0.05		525.2	MB	
	INDENO(1,2,3-CD)PYRENE	ND	ug/L	0.05		525.2	MB	
	PHENANTHRENE	ND	ug/L	0.05		525.2	MB	
	PYRENE	ND	ug/L	0.05		525.2	MB	
	BENZYL BUTYL PHTHALATE	ND	ug/L	0.60		525.2	MB	
	DI-N-BUTYL PHTHALATE	0.2	ug/L	0.60		525.2	MB	
	DIETHYL PHTHALATE	ND	ug/L	0.60		525.2	MB	
	DIMETHYL PHTHALATE	ND	ug/L	0.60		525.2	MB	
	1,3-DIMETHYL-2-NITROBENZENE (Sur	72	%			525.2	MB	

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QUALITY CONTROL REPORT
BLANK REPORT

Reference Number: 06-14429
Report Date: 12/08/06

Batch	Analyte	Result	Units	Limit	QC Qualifier	Method	Type*	Comments
525_061113	PERYLENE-D12 (Surr)	98	%			525.2	MB	
	PYRENE-D10 (Surr)	96	%			525.2	MB	
	TRIPHENYLPHOSPHATE (Surr)	96	%			525.2	MB	
525X_061113	HEXAZINONE	ND	ug/L	0.02		525.2	MB	
531_061114	OXYMAL	ND	ug/L	1.00		531.2	MB	
	CARBOFURAN	ND	ug/L	0.45		531.2	MB	
	ALDICARB SULFOXIDE	ND	ug/L	0.25		531.2	MB	
	ALDICARB SULFONE	ND	ug/L	0.40		531.2	MB	
	METHOMYL	ND	ug/L	0.25		531.2	MB	
	3-HYDROXYCARBOFURAN	ND	ug/L	0.50		531.2	MB	
	ALDICARB	ND	ug/L	0.25		531.2	MB	
	CARBARYL	ND	ug/L	0.50		531.2	MB	
	PROPOXUR (BAYGON)	ND	ug/L	0.25		531.2	MB	
	METHIOCARB	ND	ug/L	1.00		531.2	MB	
549_061106	PARAQUAT	ND	ug/L	0.50		549.2	MB	

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QUALITY CONTROL REPORT
QCS/LFB REPORT

Reference Number: 06-14429
Report Date: 12/08/06

Batch	Analyte	Result	True Value	Units	Method	% Recovery	Limits	QC Qualifier	Type*	Comment
508_061113	AROCLOR 1260	1.6	2	ug/L	508.1	80	70-130		LFB	
	TETRACHLORO-M-XYLENE (SURR)	91		%	508.1		70-130		LFB	
515_061113	2,4 - D	1.73	2	ug/L	515.1	87	70-130		LFB	
	2,4,5 - TP (SILVEX)	0.98	1	ug/L	515.1	98	70-130		LFB	
	PENTACHLOROPHENOL	0.94	1	ug/L	515.1	94	70-130		LFB	
	DALAPON	10.9	13	ug/L	515.1	84	70-130		LFB	
	DINOSEB	2.5	2	ug/L	515.1	125	70-130		LFB	
	PICLORAM	0.88	1	ug/L	515.1	88	70-130		LFB	
	DICAMBA	0.96	1	ug/L	515.1	96	70-130		LFB	
	2,4 - DCAA (SURR)	109		%	515.1		78-130		LFB	
525_061113	ENDRIN	0.84	1	ug/L	525.2	84	70-130		LFB	
	LINDANE (BHC - GAMMA)	0.83	1	ug/L	525.2	83	70-130		LFB	
	METHOXYCHLOR	1.3	1	ug/L	525.2	130	70-130		LFB	
	ALACHLOR	1.9	2	ug/L	525.2	95	70-130		LFB	
	ATRAZINE	1.91	2	ug/L	525.2	96	70-130		LFB	
	BENZO(A)PYRENE	1.08	1	ug/L	525.2	108	70-130		LFB	
	CHLORDANE, TECHNICAL	0.85	1	ug/L	525.2	85	70-130		LFB	
	DI(ETHYLHEXYL)-ADIPATE	1.06	1	ug/L	525.2	106	70-130		LFB	
	DI(ETHYLHEXYL)-PHTHALATE	3.9	1	ug/L	525.2	390	70-130		LFB	
	HEPTACHLOR	1.001	1	ug/L	525.2	100	70-130		LFB	
	HEPTACHLOR EPOXIDE	0.87	1	ug/L	525.2	87	70-130		LFB	
	HEXACHLOROBENZENE	0.91	1	ug/L	525.2	91	70-130		LFB	
	HEXACHLOROCYCLO-PENTADIENE	0.94	1	ug/L	525.2	94	70-130		LFB	
	SIMAZINE	0.95	1	ug/L	525.2	95	70-130		LFB	
	PENTACHLOROPHENOL	3.2	4	ug/L	525.2	80	70-130		LFB	
	ALDRIN	0.98	1	ug/L	525.2	98	70-130		LFB	
	BUTACHLOR	0.9	1	ug/L	525.2	90	70-130		LFB	
	DIELDRIN	1.19	1	ug/L	525.2	119	70-130		LFB	
	METOLACHLOR	1.03	1	ug/L	525.2	103	70-130		LFB	
	METRIBUZIN	0.89	1	ug/L	525.2	89	70-130		LFB	
	PROPACHLOR	1.03	1	ug/L	525.2	103	70-130		LFB	
	BROMACIL	1.08	1	ug/L	525.2	108	70-130		LFB	
	TERBACIL	1.23	1	ug/L	525.2	123	70-130		LFB	
	DIAZINON	0.72	1	ug/L	525.2	72	70-130		LFB	

*Notation:

% Recovery = (Result of Analysis)/(True Value) * 100

NA = Indicates % Recovery could not be calculated.

QCS: Quality Control Sample, a solution containing known concentrations of method analytes which is used to fortify an aliquot of reagent matrix. The QCS is obtained from an external source and is used to check lab performance.

LFB: Laboratory Fortified Blank, an aliquot of reagent matrix to which known quantities of method analytes are added in the lab. The LFB is analyzed exactly like a sample, and its purpose is to determine whether method performance is within accepted control limits.

FORM: cLFB

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QUALITY CONTROL REPORT
QCS/LFB REPORT

Reference Number: 06-14429
Report Date: 12/08/06

Batch	Analyte	Result	True Value	Units	Method	% Recovery	Limits	QC Qualifier	Type*	Comment
525_061113	EPTC	1.07	1	ug/L	525.2	107	70-130		LFB	
	4,4-DDD	0.92	1	ug/L	525.2	92	70-130		LFB	
	4,4-DDE	0.9	1	ug/L	525.2	90	70-130		LFB	
	4,4-DDT	0.94	1	ug/L	525.2	94	70-130		LFB	
	CYANAZINE	0.64	1	ug/L	525.2	64	70-130	LR	LFB	
	MALATHION	1.09	1	ug/L	525.2	109	70-130		LFB	
	PARATHION	0.89	1	ug/L	525.2	89	70-130		LFB	
	TRIFLURALIN	0.79	1	ug/L	525.2	79	70-130		LFB	
	FLUORENE	1.05	1	ug/L	525.2	105	70-130		LFB	
	ACENAPHTHYLENE	1.1	1	ug/L	525.2	110	70-130		LFB	
	ANTHRACENE	0.67	1	ug/L	525.2	67	70-130	LR	LFB	
	BENZ(A)ANTHRACENE	1.08	1	ug/L	525.2	108	70-130		LFB	
	BENZO(B)FLUORANTHENE	1.15	1	ug/L	525.2	115	70-130		LFB	
	BENZO(G,H,I)PERYLENE	1.07	1	ug/L	525.2	107	70-130		LFB	
	BENZO(K)FLUORANTHENE	1.18	1	ug/L	525.2	118	70-130		LFB	
	CHRYSENE	1.1	1	ug/L	525.2	110	70-130		LFB	
	DIBENZO(A,H)ANTHRACENE	1.06	1	ug/L	525.2	106	70-130		LFB	
	INDENO(1,2,3-CD)PYRENE	1.24	1	ug/L	525.2	124	70-130		LFB	
	PHENANTHRENE	1.04	1	ug/L	525.2	104	70-130		LFB	
	PYRENE	[illegible]	[illegible]	[illegible]	525.2	104	70-130		LFB	
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	
	DI-N-BUTYL PHTHALATE	[illegible]	[illegible]	ug/L	525.2	[illegible]	70-130		LFB	
	DIETHYL PHTHALATE	[illegible]	[illegible]	ug/L	525.2	[illegible]	70-130		LFB	
	DIMETHYL PHTHALATE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	
	[illegible]-DIMETHYL-2-NITROBENZENE (Surr)	81		%	525.2	NA	70-130		LFB	
	PERYLENE-D12 (Surr)	98		%	525.2	NA	70-130		LFB	
	PYRENE-D10 (Surr)	97		%	525.2	NA	70-130		LFB	
	TRIPHENYLPHOSPHATE (Surr)	94		%	525.2	NA	70-130		LFB	
525X_061113	HEXAZINONE	1.26	1	ug/L	525.2	126	70-130		LFB	
531_061114	OXYMAL	19.9	20	ug/L	531.2	100	70-130		LFB	
	CARBOFURAN	22.3	20	ug/L	531.2	112	70-130		LFB	
	ALDICARB SULFOXIDE	21.9	20	ug/L	531.2	110	70-130		LFB	
	ALDICARB SULFONE	18.5	20	ug/L	531.2	93	70-130		LFB	
	METHOMYL	17.8	20	ug/L	531.2	89	70-130		LFB	
	3-HYDROXYCARBOFURAN	19.7	20	ug/L	531.2	99	70-130		LFB	

*Notation:

% Recovery = (Result of Analysis)/(True Value) * 100

NA = Indicates % Recovery could not be calculated.

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FORM: cLFB

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QUALITY CONTROL REPORT
QCS/LFB REPORT

Reference Number: 06-14429
Report Date: 12/08/06

Batch	Analyte	Result	True Value	Units	Method	% Recovery	Limits	QC Qualifier	Type*	Comment
531_061114	ALDICARB	16	20	ug/L	531.2	80	70-130		LFB	
	CARBARYL	19	20	ug/L	531.2	95	70-130		LFB	
	PROPOXUR (BAYGON)	21.5	20	ug/L	531.2	108	70-130		LFB	
	METHIOCARB	23.7	20	ug/L	531.2	119	70-130		LFB	
531_061114	OXYMAL	2.1	2	ug/L	531.2	105	70-130		LFB	
	CARBOFURAN	2.4	2	ug/L	531.2	120	70-130		LFB	
	ALDICARB SULFOXIDE	2.1	2	ug/L	531.2	105	70-130		LFB	
	ALDICARB SULFONE	2.4	2	ug/L	531.2	120	70-130		LFB	
	METHOMYL	2.2	2	ug/L	531.2	110	70-130		LFB	
	3-HYDROXYCARBOFURAN	1.2	2	ug/L	531.2	60	70-130	LR	LFB	
	ALDICARB	1.8	2	ug/L	531.2	90	70-130		LFB	
	CARBARYL	2.3	2	ug/L	531.2	115	70-130		LFB	
	PROPOXUR (BAYGON)	1.9	2	ug/L	531.2	95	70-130		LFB	
	METHIOCARB	1.95	2	ug/L	531.2	98	70-130		LFB	
549_061106	PARAQUAT	23.5	20	ug/L	549.2	118	70-130		LFB	
531_061114	OXYMAL	73.8	78.11	ug/L	531.2	94	70-130		QCS	
	CARBOFURAN	32.6	32.9	ug/L	531.2	99	70-130		QCS	
	ALDICARB SULFOXIDE	22.3	26.5	ug/L	531.2	84	70-130		QCS	
	ALDICARB SULFONE	42.8	45.1	ug/L	531.2	95	70-130		QCS	
	METHOMYL	44.1	54.8	ug/L	531.2	80	70-130		QCS	
	3-HYDROXYCARBOFURAN	51.3	57.6	ug/L	531.2	89	70-130		QCS	
	ALDICARB	17.6	18.8	ug/L	531.2	94	70-130		QCS	
	CARBARYL	97.3	89.4	ug/L	531.2	109	70-130		QCS	
	PROPOXUR (BAYGON)	105	108	ug/L	531.2	97	70-130	LR	QCS	
	METHIOCARB	106.5	105	ug/L	531.2	101	70-130		QCS	
D061113A	BROMATE	0.029	0.0282	mg/L	300.1	103	75-125		QCS	

*Notation:

% Recovery = (Result of Analysis)/(True Value) * 100

NA = Indicates % Recovery could not be calculated.

QCS: Quality Control Sample, a solution containing known concentrations of method analytes which is used to fortify an aliquot of reagent matrix. The QCS is obtained from an external source and is used to check lab performance.

LFB: Laboratory Fortified Blank, an aliquot of reagent matrix to which known quantities of method analytes are added in the lab. The LFB is analyzed exactly like a sample, and its purpose is to determine whether method performance is within accepted control limits.

FORM: cLFB

EDGE ANALYTICAL
The lab you can trust!
11525 Knudson Rd
Burlington, WA 98233
(800) 755-9295
(360) 757-1400 - FAX (360) 757-1402

QUALITY CONTROL REPORT

Duplicate and Matrix Spike/Matrix Spike Duplicate Report

Reference Number: 06-14429
Report Date: 12/8/2006

Matrix Spike

Batch	Sample	Analyte	Result	Spike Result	Duplicate Spike Result	Spike Conc	Units	Percent Recovery MS	Percent Recovery MSD	Limits	%RPD	Limits	QC Qualifier	Comments
515_061113														
	30516	2,4 - D	ND	1.62		2	ug/L	81	NA	65-135	NA	0-60		LFM
	30516	2,4,5 - TP (SILVEX)	ND	0.96		1	ug/L	96	NA	65-135	NA	0-60		LFM
	30516	PENTACHLOROPHENOL	ND	0.92		1	ug/L	92	NA	65-135	NA	0-60		LFM
	30516	DALAPON	ND	11.1		13	ug/L	85	NA	65-135	NA	0-60		LFM
	30516	DINOSEB	ND	3.89		2	ug/L	195	NA	65-135	NA	0-60	HQ	LFM
	30516	PICLORAM	ND	0.82		1	ug/L	82	NA	65-135	NA	0-60		LFM
	30516	DICAMBA	ND	0.94		1	ug/L	94	NA	65-135	NA	0-60		LFM
	30516	2,4 - DCAA (SURR)	88	105			%		NA	70-130	NA	0-60		LFM
525_061113														
	30517	ENDRIN	ND	0.98	0.86	1	ug/L	98	86	70-130	11.0	0-60		LFM
	30517	LINDANE (BHC - GAMMA)	ND	0.91	0.88	1	ug/L	91	88	70-130	3.4	0-60		LFM
	30517	METHOXYCHLOR	ND	0.86	1.18	1	ug/L	86	118	70-130	31.4	0-60		LFM
	30517	ALACHLOR	ND	2.05	2.02	2	ug/L	103	101	70-130	1.5	0-60		LFM
	30517	ATRAZINE	ND	1.8	1.82	2	ug/L	90	91	70-130	1.1	0-60		LFM
	30517	BENZO(A)PYRENE	ND	0.78	1.06	1	ug/L	78	106	70-130	30.4	0-60		LFM
	30517	CHLORDANE, TECHNICAL	ND	0.87	0.92	1	ug/L	87	92	70-130	5.6	0-60		LFM
	30517	DI(ETHYLHEXYL)-ADIPATE	ND	0.86	1.38	1	ug/L	86	138	70-130	46.4	0-60		LFM
	30517	DI(ETHYLHEXYL)-PHTHALATE	3	0.99	1.43	1	ug/L	-201	-157	70-130	24.6	0-60	VA	LFM
	30517	HEPTACHLOR	ND	0.93	0.96	1	ug/L	93	96	70-130	3.2	0-60		LFM
	30517	HEPTACHLOR EPOXIDE	ND	0.86	0.86	1	ug/L	86	86	70-130	0.0	0-60		LFM
	30517	HEXACHLOROBENZENE	ND	0.82	0.84	1	ug/L	82	84	70-130	2.4	0-60		LFM
	30517	HEXACHLOROCYCLO-PENTADIENE	ND	0.74	0.73	1	ug/L	74	73	70-130	1.4	0-60		LFM
	30517	SIMAZINE	ND	0.98	0.89	1	ug/L	98	89	70-130	9.6	0-60		LFM
	30517	PENTACHLOROPHENOL	ND	4.32	4.07	4	ug/L	108	102	70-130	6.0	0-50		LFM
	30517	ALDRIN	ND	0.84	0.98	1	ug/L	84	98	70-130	13.3	0-60		LFM
	30517	BUTACHLOR	ND	0.91	0.88	1	ug/L	91	88	70-130	3.4	0-60		LFM
	30517	DIELDRIN	ND	1.02	1.07	1	ug/L	102	107	70-130	4.8	0-60		LFM
	30517	METOLACHLOR	ND	0.96	1.01	1	ug/L	96	101	70-130	5.1	0-60		LFM

%RPD = Relative Percent Difference

NA = Indicates %RPD could not be calculated

Matrix Spike (MS)/Matrix Spike Duplicate (MSD) analyses are used to determine the accuracy (MS) and precision (MSD) of a analytical method in a given sample matrix. Therefore, the usefulness of this report is limited to samples of similar matrices analyzed in the same analytical batch.

Only Duplicate sample with detections are listed in this report

Matrix Spike

Batch	Sample	Analyte	Result	Spike Result	Duplicate Spike Result	Spike Conc	Units	Percent Recovery MS	Percent Recovery MSD	QC Limits	%RPD	QC Limits	Qualifier	Comments
	30517	METRIBUZIN	ND	1.01	0.92	1	ug/L	101	92	70-130	9.3	0-60		LFM
	30517	PROPACHLOR	ND	0.97	0.98	1	ug/L	97	98	70-130	1.0	0-60		LFM
	30517	BROMACIL	ND	1.03	1.04	1	ug/L	103	104	70-130	1.0	0-60		LFM
	30517	TERBACIL	ND	1.22	1.22	1	ug/L	122	122	70-130	0.0	0-60		LFM
	30517	DIAZINON	ND	1.03	0.87	1	ug/L	103	87	70-130	16.8	0-60		LFM
	30517	EPTC	ND	1.11	1.13	1	ug/L	111	113	70-130	1.8	0-60		LFM
	30517	4,4-DDD	ND	0.88	0.91	1	ug/L	88	91	70-130	3.4	0-60		LFM
	30517	4,4-DDE	ND	0.86	0.9	1	ug/L	86	90	70-130	4.5	0-60		LFM
	30517	4,4-DDT	ND	0.91	0.87	1	ug/L	91	87	70-130	4.5	0-60		LFM
	30517	CYANAZINE	ND	0.81	0.71	1	ug/L	81	71	70-130	13.2	0-60		LFM
	30517	MALATHION	ND	1.11	1.02	1	ug/L	111	102	70-130	8.5	0-60		LFM
	30517	PARATHION	ND	0.95	0.89	1	ug/L	95	89	70-130	6.5	0-60		LFM
	30517	TRIFLURALIN	ND	0.74	0.68	1	ug/L	74	68	70-130	8.5	0-60		LFM
	30517	FLUORENE	ND	1.02	1.03	1	ug/L	102	103	70-130	1.0	0-60		LFM
	30517	ACENAPHTHYLENE	ND	1.1	1.11	1	ug/L	110	111	70-130	0.9	0-60		LFM
	30517	ANTHRACENE	ND	0.98	0.88	1	ug/L	98	88	70-130	10.8	0-60		LFM
	30517	BENZ(A)ANTHRACENE	ND	0.72	1.1	1	ug/L	72	110	70-130	41.8	0-60		LFM
	30517	BENZO(B)FLUORANTHENE	ND	0.8	1.1	1	ug/L	80	110	70-130	31.8	0-60		LFM
	30517	BENZO(G,H,I)PERYLENE	ND	0.81	0.98	1	ug/L	81	98	70-130	19.0	0-60		LFM
	30517	BENZO(K)FLUORANTHENE	ND	0.74	1.18	1	ug/L	74	118	70-130	45.8	0-60		LFM
	30517	CHRYSENE	ND	0.72	1.09	1	ug/L	72	109	70-130	40.9	0-60		LFM
	30517	DIBENZO(A,H)ANTHRACENE	ND	0.86	0.92	1	ug/L	86	92	70-130	6.7	0-60		LFM
	30517	INDENO(1,2,3-CD)PYRENE	ND	0.89	1.11	1	ug/L	89	111	70-130	22.0	0-60		LFM
	30517	PHENANTHRENE	ND	1.02	1.06	1	ug/L	102	106	70-130	3.8	0-60		LFM
	30517	PYRENE	ND	1.01	1.04	1	ug/L	101	104	70-130	2.9	0-60		LFM
	[redacted]													
	30517	DIETHYL PHTHALATE	ND	[redacted]			ug/L	[redacted]		70-130	3.1	0-60	S	LFM
	[redacted]						ug/L			70-130	0.0	0-60		LFM
	30517	1,3-DIMETHYL-2-NITROBENZENE (Surr	74	71	87		%		NA	70-130	NA	0-60		LFM
	30517	PYRENE-D10 (Surr)	94	91	97		%		NA	70-130	NA	0-60		LFM
	30517	PERYLENE-D12 (Surr)	99	109	101		%		NA	70-130	NA	0-60		LFM
	30517	TRIPHENYLPHOSPHATE (Surr)	91	92	96		%		NA	70-130	NA	0-60		LFM
525X_061113														
	30517	HEXAZINONE	ND	1.24	1.18	1	ug/L	124	118	70-130	5.0	0-60		LFM
549_061106														
	30516	PARAQUAT	ND	9.91		20	ug/L	50	NA	70-130	NA	0-50	LQ	LFM

%RPD = Relative Percent Difference

NA = Indicates %RPD could not be calculated

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Only Duplicate sample with detections are listed in this report

Reference Number: 06-14429
Report Date: 12/8/2006

Matrix Spike

Batch	Sample	Analyte	Result	Spike Result	Duplicate Spike Result	Spike Conc	Units	Percent Recovery MS	Percent Recovery MSD	Limits	%RPD	Limits	QC Qualifier	Comments

%RPD = Relative Percent Difference

NA = Indicates %RPD could not be calculated

Matrix Spike (MS)/Matrix Spike Duplicate (MSD) analyses are used to determine the accuracy (MS) and precision (MSD) of a analytical method in a given sample matrix. Therefore, the usefulness of this report is limited to samples of similar matrices analyzed in the same analytical batch.

Only Duplicate sample with detections are listed in this report

QUALITY CONTROL REPORT
SURROGATE REPORT

Reference Number: 06-14429
Report Date: 12/08/06

Lab No	Analyte	Result	Qualifier	Units	Method	Limit
508_061113						
30515	TETRACHLORO-M-XYLENE (SURR)	71		%	508.1	Acceptance Range is 42% to 137%
515_061113						
30515	2,4 - DCAA (SURR)	90		%	515.1	Acceptance Range is 60% to 140%
525_061113						
30515	1,3-DIMETHYL-2-NITROBENZENE (Surr)	82		%	525.2	Acceptance Range is 70% to 130%
	PYRENE-D10 (Surr)	88		%		Acceptance Range is 70% to 130%
	PERYLENE-D12 (Surr)	102		%		Acceptance Range is 70% to 130%
	TRIPHENYLPHOSPHATE (Surr)	94		%		Acceptance Range is 70% to 130%
508_061113						
30516	TETRACHLORO-M-XYLENE (SURR)	68	LQ	%	508.1	Acceptance Range is 42% to 137%
515_061113						
30516	2,4 - DCAA (SURR)	88		%	515.1	Acceptance Range is 60% to 140%
525_061113						
30516	1,3-DIMETHYL-2-NITROBENZENE (Surr)	80		%	525.2	Acceptance Range is 70% to 130%
	PYRENE-D10 (Surr)	96		%		Acceptance Range is 70% to 130%
	PERYLENE-D12 (Surr)	92		%		Acceptance Range is 70% to 130%
	TRIPHENYLPHOSPHATE (Surr)	97		%		Acceptance Range is 70% to 130%
508_061113						
30517	TETRACHLORO-M-XYLENE (SURR)	82		%	508.1	Acceptance Range is 42% to 137%
515_061113						
30517	2,4 - DCAA (SURR)	74		%	515.1	Acceptance Range is 60% to 140%
525_061113						
30517	1,3-DIMETHYL-2-NITROBENZENE (Surr)	74		%	525.2	Acceptance Range is 70% to 130%
	PYRENE-D10 (Surr)	84		%		Acceptance Range is 70% to 130%
	PERYLENE-D12 (Surr)	99		%		Acceptance Range is 70% to 130%
	TRIPHENYLPHOSPHATE (Surr)	91		%		Acceptance Range is 70% to 130%
508_061113						
30518	TETRACHLORO-M-XYLENE (SURR)	78		%	508.1	Acceptance Range is 42% to 137%
515_061113						
30518	2,4 - DCAA (SURR)	130		%	515.1	Acceptance Range is 60% to 140%
525_061113						
30518	1,3-DIMETHYL-2-NITROBENZENE (Surr)	78		%	525.2	Acceptance Range is 70% to 130%
	PYRENE-D10 (Surr)	86		%		Acceptance Range is 70% to 130%
	PERYLENE-D12 (Surr)	105		%		Acceptance Range is 70% to 130%
	TRIPHENYLPHOSPHATE (Surr)	104		%		Acceptance Range is 70% to 130%

*Notation:

A surrogate is a pure compound added to a sample in the laboratory just before processing so that the overall efficiency of a method can be determined.

The Acceptance Limits (or Control Limits) approximate a 99% confidence interval around the mean recovery.

Kuo Testing Labs, Inc.

Daily Field Report

Project:	Hall - Wentland SAR Monitoring	**Project#:**	
Contractor:	Kuo Testing Labs, Inc.	**Task #:**	
KTL Personnel:	Laura Hofbauer	**Page OF**	
		Date:12/27/06	
Weather:			

TIME:	DESCRIPTION OF WORK
10:45	on site MW-2
11:20	on site MW-3
11:40	horse pasture [illegible]
	will sample surface water and [illegible]
	from other side of the fence
11:58	sampling [illegible] water
12:10	on site MW-1

Kuo Testing Labs, Inc.

Groundwater Sampling Field Data Sheet

PROJECT NAME: **Hall-Wentland SAR Project**	No.:	WELL NO: **HW - 1**
FIELD SAMPLER: **Laura Hofbauer**		DATE: **12/27/06**
FIELD ANALYST: **Laura Hofbauer**		
SAMPLING METHOD: **Battery Operated Whale Water Mini Purge Pump**		
FIELD INSTRUMENTS USED: **Orion pH Meter model 210A** **Hach Conductivity Meter** **Solinst Water Level Meter Model 101** **HF Scientific ORT-15 CE Turbidi Meter**		CONDITION of WELL: satisfactory

Water Level Data		Well Construction Data		Well Purging Data	
1) Total Well Depth (feet)	53.10	Outside Casing Diameter D_2 (in.)	2"	Calculate Casing Volume	
2) Initial Depth to Water WT** (feet)	28.05	Bore Hole Diameter D_3 (in.)	6"	L_1 25.05 *0.16 = 4.01 CV in Gallons	
3) Final Depth To Water	28.05	Filter Pack Length L_2 (feet)	12	CV 4.01 /2 = 2.00 BV in Gallons	
		Porosity of Filter Pack N (%)	25	Total Purge Volume (gals) CV*(3)= TPV(gals)	12.02
				Actual Volume Purged (gals)	15
4) Length of Water in Column L_1 *Value on Line1– Value on Line 2 (feet)*	25.05			Number of Bore Volumes Purged	7

* The surveyed point on the inside (usually PVC) casing

** The depth to the water table before removing any water from the well

WELL PURGING MEASUREMENTS

Time	Cumulative Gallons Purged	pH	Temperature °C	Conductivity µs/cm 2mS 20mS	Turbidity NTU	Purge Rate GPM	Comments
12:15			began	purge			
12:17	3	6.10	11.9	0162	0.27		
12:19	6	6.19	12.1	0159	0.18		
12:21	9	6.38	12.1	0159	0.16		
12:23	12	6.54	12.1	0159	0.14		
12:25	15	6.57	12.1	0159	0.13		
			End purge	Collected	sample		

Forms by Gina Clark

Kuo Testing Labs, Inc.

337 South 1st Avenue, Othello, WA 99344
(509) 488-0112 Phone (509) 488-0118 Fax (800) 328-0112 Toll Free
Web Site: http://www.kuotesting.com e-mail: kuotest@atnet.net

DATE COLLECTED: 12/27/2006
DATE RECEIVED: 12/28/200
DATE REPORTED: 2/7/2007

SYSTEM / CUSTOMER:

Ground Water Solutions, Inc.
1020 N. Center Pkwy, Ste F
Kennewick WA 99336

Project Name:

Ground Water Solutions, Inc.
1020 N. Center Pkwy, Ste F
Kennewick WA 99336

Attn:

LAB NO.	SAMPLE ID	ANALYSIS	RESULTS	MDL	UNITS	ANALYSTS
86252	HW-1	Nitrate as Nitrogen	0.71	0.21	mg/L	Hatch
86252	HW-1	Nitrite as Nitrogen	ND	0.0023	mg/L	Hatch
86252	HW-1	Total Dissolved Solids	108	21.1	mg/L	Hatch
86252	HW-1	Hardness	90.0	0.11	mg/L	Hatch
86252	HW-1	Chloride	<0.297	0.297	mg/L	Hatch
86252	HW-1	Orthophosphate as P	0.12	0.0433	mg/L	Hatch
86252	HW-1	COD	<8	8	mg/L	Hatch
86252	HW-1	Fecal Coliforms	ND		cfu/100mL	Micro Analytical

<(0.001): indicates the analyte was not detected at or above the concentration indicated.
ND: None Detected
mg/L:Indicates milligrams per litre
* PQL=Practical Quantitation Limit is the lowest level that can be achieved within specified limits of precision and accuracy during routine laboratory operating conditions
MDL: Method Detection Limit
Please check out our new Web Site at http://www.kuotesting.com
***TNTC= Too Numerous To Count*

Dr. Eugene Kuo, Quality Assurance Manager

02-07-07
Date

Kuo Testing Labs, Inc.

Groundwater Sampling Field Data Sheet

PROJECT NAME: Hall-Wentland SAR Project	No.:	WELL NO: HW - 2
FIELD SAMPLER: Laura Hofbauer		DATE: 12/27/06
FIELD ANALYST: Laura Hofbauer		
SAMPLING METHOD: Battery Operated Whale Water Mini Purge Pump		
FIELD INSTRUMENTS USED: Orion pH Meter model 210A Hach Conductivity Meter Solinst Water Level Meter Model 101 HF Scientific ORT-15 CE Turbidi Meter		CONDITION of WELL: satisfactory

Water Level Data		Well Construction Data		Well Purging Data	
1) Total Well Depth (feet)	49.70	Outside Casing Diameter D_2 (in.)	2"	Calculate Casing Volume	
2) Initial Depth to Water WT** (feet)	16.97	Bore Hole Diameter D_3 (in.)	6"	L_1 32.83 *0.16 = 5.27 CV in Gallons	
3) Final Depth To Water	17.10	Filter Pack Length L_2 (feet)	12	CV 5.27 /2 = 2.63 BV in Gallons	
		Porosity of Filter Pack N (%)	25	Total Purge Volume (gals) CV*(3)= TPV(gals)	15.8
				Actual Volume Purged (gals)	15
4) Length of Water in Column L_1 *Value on Line1– Value on Line 2 (feet)*	32.93			Number of Bore Volumes Purged	5

* The surveyed point on the inside (usually PVC) casing

** The depth to the water table before removing any water from the well

WELL PURGING MEASUREMENTS

Time	Cumulative Gallons Purged	pH	Temperature °C	Conductivity µs/cm 2mS 20mS	Turbidity NTU	Purge Rate GPM	Comments
11:01			began	purge			
11:02	3	6.71	14.8	0139	19.6		
11:04	6	6.74	14.9	0139	21.6		
11:05	9	6.74	14.8	0138	9.61		
11:07	12	6.76	14.7	0138	4.65		
11:08	15	6.79	14.4	0137	4.12		
			End purge	Collected	sample		

Forms by Gina Clark

Kuo Testing Labs, Inc.

337 South 1st Avenue, Othello, WA 99344
(509) 488-0112 Phone (509) 488-0118 Fax (800) 328-0112 Toll Free
Web Site: http://www.kuotesting.com e-mail: kuotest@atnet.net

DATE COLLECTED: 12/27/2006
DATE RECEIVED: 12/28/200
DATE REPORTED: 2/7/2007

SYSTEM / CUSTOMER

Ground Water Solutions, Inc.
1020 N. Center Pkwy, Ste F
Kennewick WA 99336
Project Name:

SEND REPORT TO

Ground Water Solutions, Inc.
1020 N. Center Pkwy, Ste F
Kennewick WA 99336
Attn:

SAMPLE NO	SOURCE / SAMPLE NO	ANALYSIS	RESULTS	MDL	UNITS	METHODS
86253	HW-2	Nitrate as Nitrogen	0.78	0.21	mg/L	Hatch
86253	HW-2	Nitrite as Nitrogen	ND	0.0023	mg/L	Hatch
86253	HW-2	Total Dissolved Solids	90.0	21.1	mg/L	Hatch
86253	HW-2	Hardness	87.2	0.11	mg/L	Hatch
86253	HW-2	Chloride	0.60	0.297	mg/L	Hatch
86253	HW-2	Orthophosphate as P	0.13	0.0433	mg/L	Hatch
86253	HW-2	COD	<8	8	mg/L	Hatch
86253	HW-2	Fecal Coliforms	145		cfu/100mL	Micro Analytical

<(0.001): indicates the analyte was not detected at or above the concentration indicated.
ND: None Detected
mg/L:Indicates milligrams per litre
* PQL=Practical Quantitation Limit is the lowest level that can be achieved within specified limits of precision and accuracy during routine laboratory operating conditions
MDL: Method Detection Limit
Please check out our new Web Site at http://www.kuotesting.com
***TNTC= Too Numerous To Count*

Dr. Eugene Kuo, Quality Assurance Manager

02-07-07
Date

Kuo Testing Labs, Inc.

Groundwater Sampling Field Data Sheet

PROJECT NAME: Hall-Wentland SAR Project	No.:	WELL NO: HW - 3
FIELD SAMPLER: Laura Hofbauer		DATE: 12/27/06
FIELD ANALYST: Laura Hofbauer		
SAMPLING METHOD: Battery Operated Whale Water Mini Purge Pump		
FIELD INSTRUMENTS USED: Orion pH Meter model 210A Hach Conductivity Meter Solinst Water Level Meter Model 101 HF Scientific ORT-15 CE Turbidi Meter		CONDITION of WELL: satisfactory

Water Level Data		Well Construction Data		Well Purging Data	
1) Total Well Depth (feet)	50.05	Outside Casing Diameter D_2 (in.)	2"	Calculate Casing Volume	
2) Initial Depth to Water WT** (feet)	24.10	Bore Hole Diameter D_3 (in.)	6"	L_1 25.95 *0.16 = 4.15 CV in Gallons	
3) Final Depth To Water	24.10	Filter Pack Length L_2 (feet)	12	CV 4.15 /2 = 2.08 BV in Gallons	
		Porosity of Filter Pack N (%)	25	Total Purge Volume (gals) CV*(3)= TPV(gals)	12.46
				Actual Volume Purged (gals)	15
4) Length of Water in Column L_1 *Value on Line1– Value on Line 2 (feet)*	25.95			Number of Bore Volumes Purged	7

* The surveyed point on the inside (usually PVC) casing

** The depth to the water table before removing any water from the well

WELL PURGING MEASUREMENTS

Time	Cumulative Gallons Purged	pH	Temperature °C	Conductivity µs/cm 2mS 20mS	Turbidity NTU	Purge Rate GPM	Comments
11:27			began	purge			
11:29	3	6.65	12.3	0149	3.03		
11:30	6	6.68	12.4	0147	3.80		
11:32	9	6.72	12.4	0147	4.34		
11:34	12	6.73	12.4	0147	3.30		
11:36	15	6.80	12.5	0147	2.44		
			End purge	Collected	sample		
				duplicate samples			

Forms by Gina Clark

Kuo Testing Labs, Inc.

337 South 1st Avenue, Othello, WA 99344
(509) 488-0112 Phone (509) 488-0118 Fax (800) 328-0112 Toll Free
Web Site: http://www.kuotesting.com e-mail: kuotest@atnet.net

DATE COLLECTED: 12/27/2006
DATE RECEIVED: 12/28/200
DATE REPORTED: 2/7/2007

SYSTEM / CUSTOMER:
Ground Water Solutions, Inc.
1020 N. Center Pkwy, Ste F
Kennewick WA 99336
Project Name:

SEND REPORT TO:
Ground Water Solutions, Inc.
1020 N. Center Pkwy, Ste F
Kennewick WA 99336
Attn:

ANALYSIS NO.	CUSTOMER SAMPLE NO.	ANALYSIS	RESULTS	MDL	UNITS	ANALYSIS
86254	HW-3	Nitrate as Nitrogen	1.12	0.21	mg/L	Hatch
86254	HW-3	Nitrite as Nitrogen	ND	0.0023	mg/L	Hatch
86254	HW-3	Total Dissolved Solids	94.0	21.1	mg/L	Hatch
86254	HW-3	Hardness	98.7	0.11	mg/L	Hatch
86254	HW-3	Chloride	2.80	0.297	mg/L	Hatch
86254	HW-3	Orthophosphate as P	0.06	0.0433	mg/L	Hatch
86254	HW-3	COD	ND	8	mg/L	Hatch
86254	HW-3	Fecal Coliforms	ND		cfu/100mL	Micro Analytical

<(0.001): indicates the analyte was not detected at or above the concentration indicated.
ND: None Detected
mg/L:Indicates milligrams per litre
* PQL=Practical Quantitation Limit is the lowest level that can be achieved within specified limits of precision and accuracy during routine laboratory operating conditions
MDL: Method Detection Limit
Please check out our new Web Site at http://www.kuotesting.com
***TNTC= Too Numerous To Count*

Dr. Eugene Kuo, Quality Assurance Manager

02-07-07
Date

Kuo Testing Labs, Inc.

Daily Field Report

Project:	Hall - Wentland SAR Monitoring	**Project#:**	
Contractor:	Kuo Testing Labs, Inc.	**Task #:**	
KTL Personnel:	Laura Hofbauer	**Page**	**OF**
		Date:	**12/27/06**

SITE	TIME	pH	CONDUCTIVITY	TEMPERATURE	TURBIDITY
SOURCE	12:00	7.42	0153	6.3	8.36

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DATE COLLECTED: 12/27/2006
DATE RECEIVED: 12/28/200
DATE REPORTED: 2/7/2007

SYSTEM/CUSTOMER:

Ground Water Solutions, Inc.
1020 N. Center Pkwy, Ste F
Kennewick WA 99336
Project Name.

Ground Water Solutions, Inc.
1020 N. Center Pkwy, Ste F
Kennewick WA 99336
Attn:

SAMPLE NO	SYSTEM/CUSTOMER SAMPLE NO	ANALYSIS	RESULTS	MDL	UNITS	ANALYSIS
86255	HW-SW	Nitrate as Nitrogen	1.33	0.21	mg/L	Hatch
86255	HW-SW	Nitrite as Nitrogen	ND	0.0023	mg/L	Hatch
86255	HW-SW	Total Dissolved Solids	92.0	21.1	mg/L	Hatch
86255	HW-SW	Hardness	89.8	0.11	mg/L	Hatch
86255	HW-SW	Chloride	ND	0.297	mg/L	Hatch
86255	HW-SW	Orthophosphate as P	0.25	0.0433	mg/L	Hatch
86255	HW-SW	COD	8	8	mg/L	Hatch
86255	HW-SW	Fecal Coliforms	ND		cfu/100mL	Micro Analytical

<(0.001): indicates the analyte was not detected at or above the concentration indicated.
ND: None Detected
mg/L:Indicates milligrams per litre
* PQL=Practical Quantitation Limit is the lowest level that can be achieved within specified limits of precision and accuracy during routine laboratory operating conditions
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Dr. Eugene Kuo, Quality Assurance Manager

02-07-07
Date

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Web Site: http://www.kuotesting.com e-mail: kuotest@atnet.net

DATE COLLECTED: 12/27/2006
DATE RECEIVED: 12/28/200
DATE REPORTED: 2/7/2007

SYSTEM/CUSTOMER:

Ground Water Solutions, Inc.
1020 N. Center Pkwy, Ste F
Kennewick WA 99336

Project Name:

Ground Water Solutions, Inc.
1020 N. Center Pkwy, Ste F
Kennewick WA 99336

Attn:

SAMPLE NO	CUSTOMER SAMPLE NO	ANALYSIS	RESULTS	MDL	UNITS	ANALYSIS
86256	Duplicate	Nitrate as Nitrogen	0.85	0.21	mg/L	Hatch
86256	Duplicate	Nitrite as Nitrogen	ND	0.0023	mg/L	Hatch
86256	Duplicate	Total Dissolved Solids	92.0	21.1	mg/L	Hatch
86256	Duplicate	Hardness	86.6	0.11	mg/L	Hatch
86256	Duplicate	Chloride	ND	0.297	mg/L	Hatch
86256	Duplicate	Orthophosphate as P	0.11	0.0433	mg/L	Hatch
86256	Duplicate	COD	ND	8	mg/L	Hatch
86256	Duplicate	Fecal Coliforms	ND		cfu/100mL	Micro Analytical

<(0.001): indicates the analyte was not detected at or above the concentration indicated.
ND: None Detected
mg/L:Indicates milligrams per litre
* PQL=Practical Quantitation Limit is the lowest level that can be achieved within specified limits of precision and accuracy during routine laboratory operating conditions
MDL: Method Detection Limit
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Dr. Eugene Kuo, Quality Assurance Manager

02-07-07
Date

Kuo Testing Labs, Inc.

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(509) 488-0112 Phone (509) 488-0118 Fax (800) 328-0112 Toll Free
Web Site: http://www.kuotesting.com e-mail: kuotest@atnet.net

DATE COLLECTED: 12/27/2006
DATE RECEIVED: 12/28/200
DATE REPORTED: 2/26/2007

SYSTEM / CUSTOMER

Ground Water Solutions, Inc.
1020 N. Center Pkwy, Ste F
Kennewick WA 99336
Project Name:

Ground Water Solutions, Inc.
1020 N. Center Pkwy, Ste F
Kennewick WA 99336
Attn. Jon, Kevin

SAMPLE NO	CUSTOMER SAMPLE NO	ANALYSIS	RESULTS	MDL	UNITS	ANALYSTS
86257	Blind A&B	Nitrate as Nitrogen	2.05	0.21	mg/L	Hatch
86257	Blind A&B	Nitrite as Nitrogen	ND	0.0023	mg/L	Hatch
86257	Blind A&B	Hardness	1220	0.11	mg/L	Hatch

<(0.001): indicates the analyte was not detected at or above the concentration indicated.
ND: None Detected
mg/L:Indicates milligrams per litre
* PQL=Practical Quantitation Limit is the lowest level that can be achieved within specified limits of precision and accuracy during routine laboratory operating conditions
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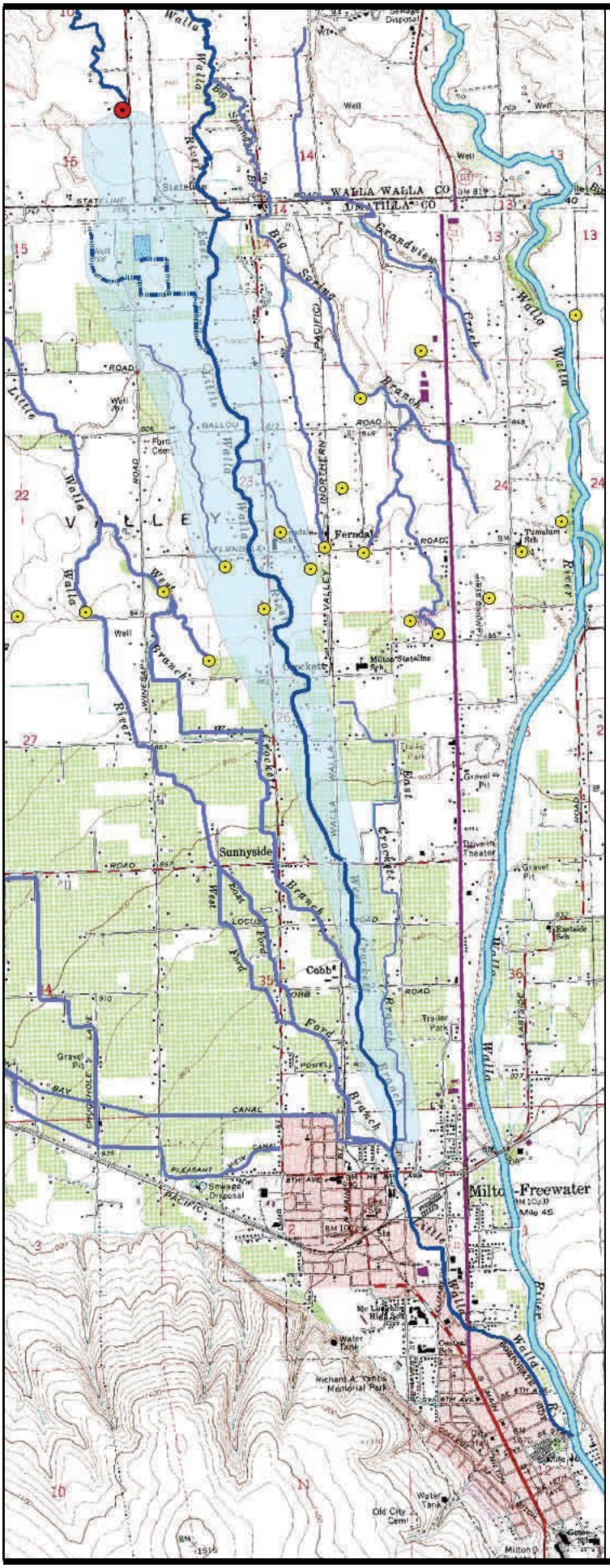
Dr. Eugene Kuo, Quality Assurance Manager

2/8/07
Date

Appendix C

Hall-Wentland Recharge Project, Long-Term Implementation Strategy, prepared by Fountainhead, June 2007



STRATEGIC PLAN

HALL-WENTLAND RECHARGE PROJECT

LONG-TERM IMPLEMENTATION STRATEGY

WALLA WALLA COUNTY
WATERSHED PLANNING DEPT.
GRANT NO. G0600312

compiled by
JOHN WARINNER, PE
FOUNTAINHEAD

in cooperation with
Native Creek Society
Groundwater Solutions
Washington Department of Ecology
Walla Walla River Irrigation District
Oregon Water Resources Department
Walla Walla Basin Watershed Council
Oregon Department of Fish and Wildlife
Walla Walla County Watershed Planning
Walla Walla County Conservation District

JUNE 2007

TABLE OF CONTENTS

FIGURES

TABLES

1.0 Executive Summary

1.1 Background and Purpose

Over the past 50 to 60 years, substantial increases in groundwater and surface water use – and various other factors – have resulted in declining shallow groundwater levels, diminished spring creek flows, reduced base streamflow, and increased water temperature in surface streams.

In 2003, Tom Page – a Walla Walla County landowner – initiated the Hall-Wentland Shallow Aquifer Recharge Project as an experiment to determine the degree to which intentional inundation of upgradient fields would increase the discharge of water from McEvoy Spring.

Over the past several years, Mr. Page and others have monitored and operated this project to improve our technical understanding of the hydrogeological response of the shallow gravel groundwater aquifer – and associated springs – to this intentional recharge activity, and to replenish upgradient groundwater to increase the base discharge from McEvoy Spring.

This monitoring and operational testing has been performed under Grant No. G0600312, funded by the Washington Department of Ecology (WDOE) and administered by the Walla Walla County Watershed Planning Department (WWCWPD).

The purpose of this Strategic Plan is to organize an ongoing strategic effort to:

1. Sustain short-term implementation of the Hall-Wentland Recharge Project through the duration of the Limited License authorized by the Oregon Water Resources Department.

2. Catalyze long-term, seasonal replenishment of McEvoy Spring which feeds McEvoy Spring Branch, a small tributary of the Walla Walla River.

1.2 Short-Term Implementation Strategy

The primary goal of the short-term implementation strategy is to sustain monitoring and operation of the Hall-Wentland Recharge Project through the duration of the Limited License authorized by the Oregon Water Resources Department (16 NOV 2005 through 1 NOV 2010, with a use season from November 1 through April 15 each year).

A secondary goal of the short-term implementation strategy is to supplement the flow of water in the East Prong Little Walla Walla River with water diverted from the Walla Walla River, so that the operators of the Hall-Wentland Recharge Project can test the capacity of the system to infiltrate water, and to evaluate the response of the system to an increased recharge rate.

Accomplishing the primary goal requires operation of the Wells Ditch system and the Hall-Wentland recharge site. Accomplishing the secondary goal requires the additional operation and management of systems that divert streamflow from the Walla Walla River and convey it to the East Prong Little Walla Walla River (both within and beyond the Walla Walla River Irrigation District).

Operation of the Hall-Wentland Recharge Project to accomplish the primary goal involves the following core activities:

1. Catalyze Project
2. Sponsor and Administer Project
3. Fund Project
4. Authorize Control and Use of Water and Potential Environmental Effects
5. Hold Limited License with OWRD (and other permits)
6. Provide Access to Land Used as Recharge Site
7. Hold Lease with Landowner
8. Monitor Hydrological Conditions
9. Evaluate Hydrological Conditions
10. Manage and Control Water
11. Underwrite Risks of Accidental Harm

Expansion of the Hall-Wentland Recharge Project to accomplish the secondary goal involves the following additional activities:

12. Confirm and/or Increase Hydraulic Capacity of Wells Ditch
13. Divert Streamflow from Walla Walla River
14. Convey Water to WWRID Boundary
15. Convey Water from WWRID Boundary to Wells Ditch
16. Underwrite Additional Risks of Accidental Harm

To sustain monitoring and operation of the Hall-Wentland Recharge Project through the duration of the Limited License authorized by the Oregon Water Resources Department, Fountainhead recommends an adaptive process featuring three main steps:

- Step One. Organize the People
- Step Two. Organize the Money
- Step Three. Implement the Current Possibilities

The first step is for the project Champion/Catalyst (Tom Page) to identify an appropriate Local Sponsor/Administrator to replace Walla Walla County Watershed Planning Department, who have communicated their intention to cease serving in this capacity. Fountainhead recommends the Walla Walla Basin Watershed Council as the most appropriate and capable replacement for the Sponsor/Administrator role.

The new Sponsor/Administrator and Mr. Page should then work together to identify and secure commitments from the remaining required parties. Fountainhead provides a table summarizing recommended parties for each required role, in the order they should be approached.

Once the Sponsor/Administrator and Champion/Catalyst have assembled the complete project team, they should request that each team member prepare an operational budget for each proposed activity under two scenarios: full operation of the system; and limited operation of the system (no supplementation of streamflow in the East Prong Little Walla Walla River).

The Sponsor/Administrator should then compile a complete budget for each of the two scenarios, then contact prospective funders to determine the level of funding available for the project.

Finally, the Sponsor/Administrator should secure an associated grant contract, execute associated subcontracts with each subcontractor, and implement the project.

1.3 Long-Term Implementation Strategy

The primary goal of the long-term implementation strategy is to catalyze and sustain long-term, seasonal replenishment of McEvoy Spring.

This goal can potentially be accomplished in a variety of ways – and it is likely to in the context of a comprehensive regional groundwater management program, rather than an independent effort targeted specifically at McEvoy Spring.

Since the specific recharge areas and water flow paths through which water flows to McEvoy Spring – and other springs similar to McEvoy Spring – are currently unknown, this is likely to remain an experimental effort into the foreseeable future.

To accomplish the stated goal of long-term, seasonal replenishment of McEvoy Spring, Fountainhead recommends an iterative, adaptive process featuring four main steps:

- Step One. Measure the location and timing of current water flow paths
- Step Two. Communicate monitoring results and cultivate the engagement of water users
- Step Three. Establish increasingly clear goals regarding desirable water flow paths
- Step Four. Experiment with systems that can potentially improve water flow paths

Over the past five-to-six years, the Walla Walla Basin Watershed Council has developed an extensive monitoring system to measure streamflows, groundwater table levels, and spring discharges throughout the alluvial fan associated with the Walla Walla River and Little Walla Walla River system. This basic hydrological information provides an excellent foundation upon which to develop a long-term program for adaptive management of water flowing through the Walla Walla River and Little Walla Walla River system – and it should be continued into the future to inform future water management decisions and to evaluate the effects of water management activities.

As more water flow information is collected, it will become increasingly important to convert these raw data into useful information that can guide on-the-ground water management activities. It will become equally important to publicize the results in a manner that increases public awareness and facilitates public engagement in decisionmaking and improved water management actions.

Ultimately, the members of the Walla Walla watershed community should develop clearly identified management points (specific groundwater wells and springs that will be used to indicate hydrological performance) and clearly stated goals regarding the desirable hydrological performance at each of these management points. Specific working performance goals should be identified for all the springs of social, ecological and/or economic importance in the Walla Walla River system – and adaptively refined over time. These performance goals will likely be based on known or estimated historical performance, balanced with other current demands on the hydrologic system.

As citizens become more aware of how water is flowing – and how we desire for water to flow – the remaining step will be to learn the most effective ways to control the flow of water to generate the desired results. This should include experimentation with a variety of water management techniques, including the following systems:

- Operate Hall-Wentland Recharge Project through Limited License period
- Increase flows to the Hall-Wentland recharge site by diverting water from the Walla Walla River to supplement streamflows in the East Prong Little Walla Walla River
- Evaluate and consider the potential value of reconfiguring the lower Wells Ditch system
- Evaluate effects of sustaining year-round flow in streams/ditches within WWRID
- Investigate potential ways to retrofit bulges within WWRID to recharge groundwater
- Investigate potential ways to decrease groundwater pumping in M-F vicinity

1.4 Feedback

Please provide feedback and constructive comments and recommendations to:

John Warinner, PE
Fountainhead
1860 Blue Creek Road
Walla Walla, WA 99362
509.529.2646 phone
warinner@gohighspeed.com

2.0 Purpose & Scope

2.1 Purpose

The purpose of this Strategic Plan is to organize a strategic effort to:

1. Sustain short-term implementation of the Hall-Wentland Recharge Project through the duration of the Limited License authorized by the Oregon Water Resources Department.

2. Catalyze long-term, seasonal replenishment of McEvoy Spring which feeds McEvoy Spring Branch, a small tributary of the Walla Walla River.

2.2 Rationale

The rationale for this project has been described extensively in various previous documents (see bibliography in Chapter 5). In summary, a high degree of hydraulic connection occurs between surface water and shallow groundwater flowing through the Walla Walla Basin. Over the past 50 to 60 years, substantial increases in groundwater and surface water use – and various other factors – have resulted in declining shallow groundwater levels, diminished spring creek flows, reduced base streamflow, and increased water temperature in surface streams. Sustaining sufficient water supplies and restoring the ecological health of the Walla Walla River and its tributaries will require effective, integrated management of surface and ground waters, including effective, seasonal recharge and replenishment of groundwater aquifers.

2.3 Background

Tom Page – a Walla Walla County landowner – initiated the Hall-Wentland Shallow Aquifer Recharge Project in 2003, as an experiment to determine the degree to which intentional inundation of upgradient fields would increase the discharge of water from McEvoy Spring, located apparently downgradient from these fields.

Over the past several years, Mr. Page has encouraged other parties to add value to the project that he initiated. At Mr. Page's prompting, Walla Walla County Watershed Planning Department secured and administered funding from the Washington Department of Ecology to formalize and enhance the Hall-Wentland Shallow Aquifer Recharge Project. Under the technical guidance of Dr. Kevin Lindsey (a hydrogeologist formerly with Kennedy/Jenks Consultants and now with Groundwater Solutions), this groundwater recharge project has been monitored and operated to:

- improve our technical understanding of the hydrogeological response of the shallow gravel groundwater aquifer – and associated springs – to this intentional recharge activity (primary goal); and

- replenish upgradient groundwater to increase the base discharge from McEvoy Spring.

This monitoring and operational testing has been performed under Grant No. G0600312, funded by the Washington Department of Ecology (WDOE) and administered by the Walla Walla County Watershed Planning Department (WWCWPD).

The Hall-Wentland Recharge Project involves intentional diversion of streamflow from the East Prong Little Walla Walla River, conveyance of this water to the recharge site via Wells Ditch, and application of the water to agricultural fields (adjacent properties owned by Gordon Hall and Loren Wentland) using a practice similar to flood irrigation. The project also involves an array of monitoring wells and streamflow measurement stations used to record and evaluate the hydraulic response of the groundwater aquifer to the recharge water.

Oregon water law states that under the legal practice of irrigation, water must be put to the beneficial use of growing a crop. While recharge of groundwater aquifers is socially beneficial in many cases, groundwater recharge is currently not included among the beneficial uses associated with the authorized practice of irrigation. Therefore, intentional practice of groundwater recharge requires specific authorization from the Oregon Water Resources Department (OWRD).

In the case of the Hall-Wentland Recharge Project, OWRD has provided this authorization in the form of a Limited License – a temporary permit for the purpose of testing the feasibility of this form of water use. Long-term operation of the Hall-Wentland Recharge Project, beyond the five-year duration of the Limited License (16 NOV 2005 through 1 NOV 2010, with a use season from November 1 through April 15 each year), will require a permanent water right specifically for the purpose of groundwater recharge.

2.4 Scope

Due to the "ad-hoc" nature of this experimental project, Walla Walla County Watershed Planning hired the author of this Strategic Plan (Fountainhead) to develop a strategy for long-term operation of the Hall-Wentland Recharge Project. However, during the course of this effort, it became evident that the primary value of the Hall-Wentland Recharge Project is to gain practical information about one particular technique for recharging the shallow gravel aquifer. In time, it may become evident that there are more effective and/or more sustainable ways to seasonally replenish the flow of water through the shallow gravel aquifer to McEvoy Spring. Hence, operation of the Hall-Wentland Recharge Project (in its current form) may turn out to be a relatively short-term practice.

When these realizations came to light, Walla Walla County Watershed Planning Department requested a two-part strategy, including a short-term strategy for sustaining operation of the Hall-Wentland Recharge Project, and a long-term strategy for sustaining the flow of water from McEvoy Spring.

The geographic scope for both of these inquiries involves, to varying degrees, the complete hydrologic system upgradient of McEvoy Spring illustrated in Figure 2-1, including (from south to north):

- Walla Walla River, the stream reach conveying water from the Blue Mountains to the Little Walla Walla River diversion

- Little Walla Walla River diversion, the impoundment, headgate and screen system controlling the flow of water from the Walla Walla River into the Little Walla Walla River

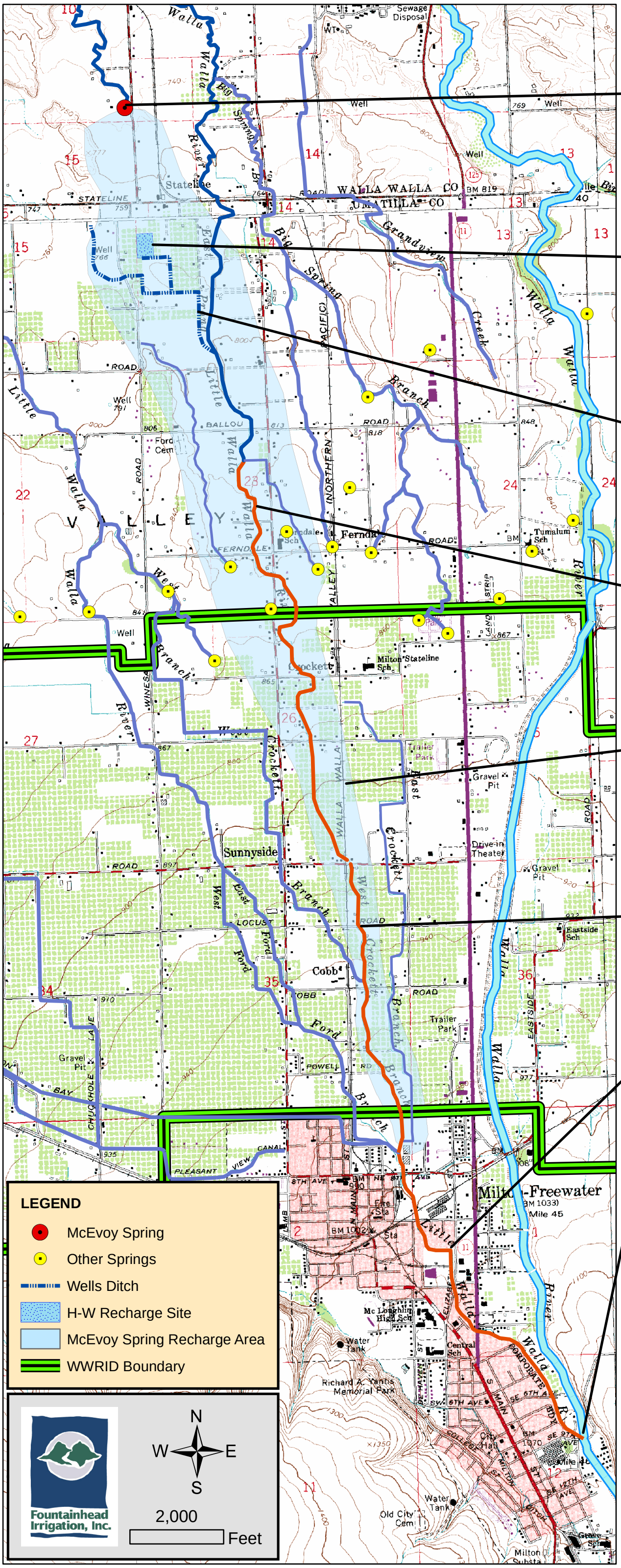
- Little Walla Walla River, the stream reach conveying water from the Walla Walla River to the "Frog" (the point at which water is diverted into an array of various streams and ditches)

- East Prong Little Walla Walla River, the stream reach conveying water from the “Frog” to Wells Ditch

- Wells Ditch, the ditch system conveying water from the East Prong Little Walla Walla River to the Hall-Wentland Recharge Site

- Hall-Wentland Recharge Site, the agricultural lands owned by Gordon Hall and Loren Wentland (immediately south of Stateline Road and east of Winesap Road near Milton-Freewater, Oregon), and associated water control structures, used to spread water diverted from Wells Ditch and to allow it to infiltrate into the soil and percolate through the soil profile into the shallow gravel aquifer

- Shallow Gravel Aquifer, the geological deposits of coarse gravel, sand, silt and clay underlying the previously-listed elements that conveys water to McEvoy Spring (and other associated springs)



McEVOY SPRING

Point at which water discharges from shallow gravel aquifer to surface stream

HALL-WENTLAND SITE

Fields where water is applied to recharge shallow gravel groundwater aquifer

WELLS DITCH SYSTEM

Ditch that conveys water from East Prong Little Walla Walla River to Hall-Wentland site

EAST PRONG LITTLE WW

Reach of East Prong Little Walla Walla River downstream of WWRID service area

SPRING RECHARGE AREA

Estimated boundary of land area contributing recharge to McEvoy Spring

EAST PRONG LITTLE WW

Reach of East Prong Little Walla Walla River within WWRID service area

LITTLE WALLA WALLA RIVER

Reach of Little Walla Walla River from Walla Walla River Diversion to The Frog

WW RIVER DIVERSION

Diversion from Walla Walla River near Cemetary Bridge

FIGURE 2-1

Primary Hydrologic Features Associated With Hall-Wentland SAR Project

Revised 04 MAY 2007 by John Warinner, PE

3.0 Short-Term Implementation Strategy

3.1 Desired Outcome

The primary goal of the short-term implementation strategy is to sustain monitoring and operation of the Hall-Wentland Recharge Project through the duration of the Limited License authorized by the Oregon Water Resources Department (16 NOV 2005 through 1 NOV 2010, with a use season from November 1 through April 15 each year).

A secondary goal of the short-term implementation strategy is to supplement the flow of water in the East Prong Little Walla Walla River with water diverted from the Walla Walla River, so that the operators of the Hall-Wentland Recharge Project can test the capacity of the system to infiltrate water, and to evaluate the response of the system to an increased recharge rate.

3.2 System Description

The primary elements of the hydrologic system associated with the Hall-Wentland Recharge Project was described and illustrated in Section 2.4.

Accomplishing the primary goal requires operation of the Wells Ditch system and the Hall-Wentland recharge site.

Accomplishing the secondary goal requires operation and management of the following elements of the hydrologic system:

- Little Walla Walla River diversion, the impoundment, headgate and screen system controlling the flow of water from the Walla Walla River into the Little Walla Walla River (normally operated and managed by Walla Walla River Irrigation District (WWRID))

- Little Walla Walla River, the stream reach conveying water from the Walla Walla River to the "Frog" (normally operated and managed by WWRID)

- East Prong Little Walla Walla River, the stream reach conveying water from the "Frog" to the northern boundary of the WWRID service area (normally operated and managed by WWRID)

- East Prong Little Walla Walla River, the stream reach conveying water from the northern boundary of the WWRID service area to Wells Ditch (normally operated and managed by individual, independent landowners)

- Wells Ditch, the ditch system conveying water from the East Prong Little Walla Walla River to the Hall-Wentland Recharge Site (normally operated by AJ Wentland and other landowners served by Wells Ditch)

- Hall-Wentland Recharge Site, the agricultural lands owned by Gordon Hall and Loren Wentland (immediately south of Stateline Road and east of Winesap Road near Milton-Freewater, Oregon), and associated water control structures, used to spread water diverted from Wells Ditch and to allow it to infiltrate into the soil and percolate through the soil profile

into the shallow gravel aquifer (recently operated by Tom Page as a subcontractor to Groundwater Solutions)

- Hall-Wentland Recharge Project groundwater monitoring system (recently operated by Groundwater Solutions and Tom Page)

3.3 Core Activities

Operation of the Hall-Wentland Recharge Project, in its current form, involves the following core activities.

3.3.1 Catalyze Project

The Champion(s) or Catalyst(s) provide(s) the fundamental driving force behind the project. Project Champion/Catalysts are typically private landowners and/or local service providers with a personal understanding of the need for the project and the standing and will to vocalize and represent the value of the project. With the substantial need that exists for improved water management and ecological restoration throughout the Walla Walla Basin, potential projects are unlikely to occur in the absence of substantial representation by a Champion/Catalyst.

To date, Tom Page has served as the Champion/Catalyst. He remains committed to continue serving in this capacity, provided that public funding and administrative support remain available for the project.

3.3.2 Sponsor and Administer Project

The Sponsor/Administrator organizes, assembles, and stewards the tasks, people, money and other resources required to perform the project. This task is especially necessary for projects that are unlikely to occur without substantial public funding. The Sponsor/Administrator must be an entity with authority/standing with the public funding agency(ies). In some cases, the Champion and the Sponsor/Administrator roles are performed by the same individual, or individuals within the same organization. However, in many cases, the Champion lacks the standing and/or capacity to play the Sponsor/Administrator role, so a third party performs this role.

To date, Walla Walla County Watershed Planning has served as Sponsor/Administrator. Walla Walla County Watershed Planning Department intends to discontinue operating in this role, due to their internal workload, production capacity, and professional qualifications. They desire for another, better-qualified organization to assume the role of Sponsor/Administrator for the project.

Participants in the development of this strategic plan discussed several possible organizations potentially suited to assume this role, including: Walla Walla Basin Watershed Council (WWBWC); Walla Walla County Conservation District (WWCCD); Walla Walla Water Management Initiative (WMI); Native Creek Society; McEvoy Spring Branch Restoration Group (an informal group of landowners currently restoring McEvoy Spring Branch); or an individual, such as Tom Page.

Private professional consulting firms (such as Groundwater Solutions and Fountainhead) are not the most appropriate organizations to serve as the Sponsor/Administrator for publicly-funded restoration projects.

3.3.3 Fund Project

The Funder(s) provide(s) the money required to purchase the labor, equipment and other resources required to implement the project.

To date, Washington Department of Ecology (WDOE) has served as primary Funder. In the context of the Walla Walla Water Management Initiative, WDOE and other local agencies have expressed an ongoing interest in – and commitment to – experimentation with recharge and replenishment of the shallow gravel aquifer.

Governmental funding of the Hall-Wentland Recharge Project is somewhat complicated by the Oregon-Washington state line. With the exception of some surface and ground water monitoring that occurs on the Washington side of the state line, almost all of the project activities occur in Oregon. However, the primary intent of these activities is to path Oregon surface water so that it flows underground through the shallow gravel aquifer to emerge (at least in part) from McEvoy Spring, which is located in Washington.

Due to complications with the expenditure of Washington State funds to pay for activities occurring in Oregon, it would be ideal to develop a project funding package combining funds from Oregon-based and Washington-based agencies. WDOE and Oregon Watershed Enhancement Board (OWEB) appear to be the leading candidates to serve as Funder for the Hall-Wentland project. However, the Walla Walla Basin Watershed Council, Walla Walla County Conservation District, and/or Walla Walla Watershed Alliance may be able and willing to secure funding from other sources.

3.3.4 Authorize Project

Depending on the project scope, project activities fall under the jurisdiction of one or more regulatory agencies.

3.3.4.1 Authorize Control and Use of Water

According to state water laws in Oregon and Washington, water flowing through these states is owned by the respective state. Water flowing through Oregon is administered by the Oregon Water Resources Department. Water flowing through Washington is administered by the Washington Department of Ecology. These agencies must authorize the activities of other parties who desire to manage or otherwise affect the flow of water through these respective states. All the water control activities associated with the Hall-Wentland Recharge Project occur in the State of Oregon, and are therefore under the jurisdiction of Oregon Water Resources Department.

To date, OWRD has authorized the diversion of water from the East Prong Little Walla Walla River into and through Wells Ditch for application to the recharge site for the purpose of intentional groundwater recharge. OWRD has granted this authority in the form of a Limited License – a temporary permit for the purpose of testing the feasibility of this form of water use. The Limited License authorizes the diversion of water for a five-year term, beginning on November 16, 2005 and ending on November 1, 2010, with an annual season of use extending from November 1 through April 15 each year. This Limited License is actually held by WWRID, due to the fact that the license authorizes diversion of water from the Walla Walla River (at Cemetary Bridge), in addition to the East Prong Little Walla Walla River (at Wells Ditch).

This arrangement is somewhat problematic, as the Walla Walla River diversion system is an integral part of the WWRID system – however, the Wells Ditch system is not. Wells Ditch is used to

divert and convey water from the East Prong Little Walla Walla River at a location that lies far outside of the WWRID service area boundary. WWRID is concerned that this arrangement associates them with operations and risks that are beyond their jurisdiction and control. In light of the litigious battles they have been through in recent years, they are understandably reluctant to open themselves to liabilities in addition to those already associated with their own internal operations. At this juncture, they have expressed a willingness to consider shouldering this responsibility, but only if sufficient funds are provided to enable them to cover their associated y activities.

3.3.4.2 Authorize Potential Effects on Threatened and Endangered Species

In the event that water control activities affect international treaties and/or threatened or endangered species, these activities are additionally subject to the jurisdiction of the Confederated Tribes of the Umatilla Indian Reservation (CTUIR), and state and federal agencies, including the Oregon and Washington Departments of Fish and Wildlife (ODFW and WDFW), National Marine Fisheries Service (NMFS), and the United States Fish and Wildlife Service (USFWS).

To date, no project participants have been required to grant express permission from these agencies to operate the Hall-Wentland Recharge Project, as the Hall-Wentland Recharge Project has been operated using only streamflows occurring naturally in the East Prong Little Walla Walla River. The primary goal of continuing to operate the recharge system in this manner can be accomplished without these additional activities and associated risks.

However, the secondary goal of supplementing streamflow in the East Prong Little Walla Walla River to increase the rate and volume of flow to the recharge project cannot be accomplished without addressing the fact that diverting streamflow from the Walla Walla River for intentional supplementation of flow in the East Prong Little Walla Walla River, may potentially attract threatened or endangered species of fish into upper reaches of the Little Walla Walla River system – where they are unlikely to survive due to migration barriers, out-of-stream uses of water, predation and other factors.

Prior to initiating operations of this nature, project participants must install structural devices to prevent problematic fish migration and/or obtain a “Safe Harbor Agreement” or similar written permission from the appropriate agency(ies) to protect themselves from legal liability.

These agencies have been involved in the regulatory review of the Limited License issued by OWRD – and have generally voiced their support for the project at this experimental phase.

3.3.5 Hold Limited License with OWRD (and other permits)

The Limited Licensee holds the Limited License whereby OWRD grants permission to divert streamflows from the East Prong Little Walla Walla River and Walla Walla River for intentional recharge of groundwater at the Hall-Wentland Recharge site.

As discussed in Section 3.3.4, WWRID has served as the Limited License holder to date. They have expressed a willingness to continue serving in this capacity, provided that funds are made available to enable them to cover the costs associated with this function. Their responsibilities and associated costs are simpler and lower (respectively) if the Hall-Wentland Recharge Project is operated with streamflows flowing in the East Prong Little Walla Walla under normal operating conditions. WWRID is subject to more substantial risks and associated costs if they agree to divert

streamflow from the Walla Walla River to intentionally supplement streamflow in the East Prong Little Walla Walla River.

3.3.6 Provide Access to Land Used as Recharge Site

The Landowners provide access to use their land as the surface that is intentionally inundated to path surface water to the shallow gravel groundwater aquifer. Historically, Gordon Hall and Loren Wentland have leased their land to Walla Walla County Watershed Planning Department for this purpose. Both parties have indicated a willingness to continue leasing their land for this purpose, provided they are equitably compensated and appropriately protected from liability for consequences of project activities.

3.3.7 Hold Lease with Landowner

The Lease Holder holds the lease with the landowners whose property is used for the recharge site: Gordon Hall and Loren Wentland. To date, Walla Walla County Watershed Planning Department has served as the Lease Holder. However, Walla Walla County Watershed Planning Department intends to discontinue operating in this role, due to their internal workload, production capacity, and professional qualifications. They desire for another, better-qualified organization to assume the role of Lease Holder for the project.

Several possible organizations are potentially suited to assume this role, including: Walla Walla Basin Watershed Council (WWBWC); Walla Walla County Conservation District (WWCCD); Walla Walla Water Management Initiative (WMI); Native Creek Society; McEvoy Spring Branch Restoration Group (an informal group of landowners currently restoring McEvoy Spring Branch); or an individual, such as Tom Page.

In any event, the project budget should include sufficient funds to cover the cost of adequately insuring the Lease Holder and the Landowners against potential liability associated with the project.

3.3.8 Monitor Hydrological Conditions

The Hydrological Monitor operates and maintains the monitoring system that measures the hydrologic response of surface and ground water features. Now that the monitoring system is installed and functional, this activity is limited to collecting (downloading) recorded data, servicing sensors and data recorders, and compiling recorded data into databases and/or spreadsheets that the project evaluator can use to evaluate the hydrological response of the system to recharge activities.

To date, Groundwater Solutions – in association with Tom Page – has served as the Hydrological Monitor. Groundwater Solutions and Tom Page remain interested in serving in this manner and they have clearly demonstrated their qualifications and capacity to perform these roles. However, since Groundwater Solutions is a private consulting firm, it is probably appropriate to invite them and other qualified organizations to competitively bid to provide these professional services as contracts are renewed to continue the project.

3.3.9 Evaluate Hydrological Conditions

The Hydrological Evaluator analyzes the hydrological data collected by the project monitor to determine whether the recharge system ought to be operated, the rate at which the water manager(s) should deliver water to recharge project, and to characterize the hydrological performance and response of the groundwater recharge system. Functionally, the Hydrological

Evaluator serves as the technical leader of the project, with primary responsibility for directing the activities of the on-the-ground water manager(s) in coordination with the project champion/catalyst.

Historically, Kevin Lindsey of Groundwater Solutions (formerly with Kennedy/Jenks Consultants) has performed the role of Hydrological Evaluator and Technical Leader. Groundwater Solutions remains interested in serving in this manner and they have clearly demonstrated their qualifications and capacity to perform these roles. However, since Groundwater Solutions is a private consulting firm, it is probably appropriate to invite them and other qualified organizations to competitively bid to provide these professional services as contracts are renewed to continue the project.

3.3.10 Manage and Control Water

The Water Manager(s) personally control(s) the headgates, ditches and other physical features that guide and control the flow of water from the original source(s) to the recharge site. Generally, these water control activities are performed under the direction of the Hydrological Evaluator (Technical Leader) who is responsible for evaluating hydrological conditions (see Section 3.2.5). Historically, Tom Page and AJ Wentland have served as Water Managers for the Hall-Wentland Recharge Project.

3.3.11 Underwrite Risks of Accidental Harm

The Risk Underwriter(s) provide(s) insurance policies to cover potential harm that might occur as a result of intentional water control activities (see Section 3.3). Historically, Walla Walla County has opted not to purchase a specific insurance rider for this purpose. Rather, through contractual terms, they have required their subcontractors (such as Groundwater Solutions and Fountainhead) to demonstrate proof of professional liability insurance and to hold Walla Walla County harmless for any damages resulting from negligence of the professional services provider.

Since accomplishing the primary goal involves only operation of the Wells Ditch system and the Hall-Wentland recharge site, the risk exposure is substantially different than for the second goal which involves operation and management of the additional system elements between the Walla Walla River diversion and Wells Ditch diversion.

To accomplish the primary goal, insurance is required for seasonal operation of Wells Ditch and the Hall-Wentland recharge site.

Accomplishing the secondary goal is additionally complicated by other administrative and jurisdictional boundaries associated with the WWRID service area – and the associated presence and absence of formal maintenance of water conveyance channels within and outside of the WWRID service area. To accomplish the secondary goal, insurance is required for operation of the Walla Walla River diversion and the Little Walla Walla River channels from this point of diversion to the Wells Ditch point of diversion. This includes stream/ditch reaches both within and beyond the boundaries and jurisdiction of WWRID – which probably necessitates separate insurance policies held by separate organizations for these respective portions of the water conveyance system.

3.3.12 Divert Streamflow from Walla Walla River

This activity is not necessary to achieve the primary goal. If the secondary goal is to be achieved, the secondary streamflow diverter must divert flow from the Walla Walla River (Diverter WWRID) and manage this water flow to supplement streamflow in the East Prong Little Walla Walla River system (Conveyor WWRID). As discussed previously, OWRD has granted permission for WWRID

to perform this function (from a water rights standpoint) via the Limited License. To date, this activity has not occurred for aforementioned reasons.

If the secondary goal is to be achieved, WWRID will almost certainly need to perform this role, due to their ownership of, and responsibility for, the existing streamflow diversion structure. The primary obstacles to this activity, which have been presented previously, are: (a) legal concerns relating to attraction of threatened and/or endangered species of fish into the upper reaches of the Little Walla Walla River system; (b) financial concerns relating to the need for additional insurance; and (c) jurisdictional concerns relating to operation and management of the stream system downstream of the WWRID boundary. All three of these issues must be addressed in order for WWRID to divert flow from the Walla Walla River and manage this flow to supplement flow in the East Prong Little Walla Walla River.

3.3.13 Convey Water to WWRID Boundary

This activity is not necessary to achieve the primary goal. However, it is necessary to achieve the secondary goal. The discussion of this activity has been integrated into Section 3.3.13 regarding diversion of streamflow from the Walla Walla River into and through the WWRID system (Conveyor WWRID).

3.3.14 Convey Water from WWRID Boundary to Wells Ditch

This activity is not necessary to achieve the primary goal. If the secondary goal is to be achieved, the secondary water conveyer must manage the supplemented streamflow downstream of the WWRID service area boundary to the point of diversion for Wells Ditch. As discussed previously, this stream reach lies outside of the WWRID service area and is therefore outside of their jurisdiction and control. For this reason, a different party (Conveyor Non-WWRID) must manage the flow of water – and associated risks – for this portion of the hydrologic system.

To date, no party has been required to perform this role, since WWRID has not diverted supplemental flows from the Walla Walla River. Possible organizations potentially suited to assume this role, include: Walla Walla Basin Watershed Council (WWBWC); Walla Walla County Conservation District (WWCCD); Walla Walla Water Management Initiative (WMI); Native Creek Society; McEvoy Spring Branch Restoration Group (an informal group of landowners currently restoring McEvoy Spring Branch); or an individual, such as Tom Page. If none of these parties are able and willing to provide this service, the function could potentially be included by a professional services contractor.

In any event, the project budget will need to include sufficient funds to cover the costs associated with this activity.

3.3.15 Confirm and/or Increase Hydraulic Capacity of Wells Ditch

A Hydraulic Designer has determined the hydraulic capacity of Wells Ditch and designed the improvements required to enable Wells Ditch to convey additional streamflow to the Hall-Wentland recharge site. To achieve the secondary goal, a Hydraulic Contractor must improve Wells Ditch to provide additional hydraulic capacity.

Possible organizations potentially suited to assume this role, include: Walla Walla Basin Watershed Council (WWBWC); Walla Walla County Conservation District (WWCCD); Walla Walla Water Management Initiative (WMI); Native Creek Society; McEvoy Spring Branch Restoration Group (an informal group of landowners currently restoring McEvoy Spring Branch); or an individual, such as

Tom Page or AJ Wentland. If none of these parties are able and willing to provide this service, the function could potentially be included by a professional contractor. In any event, the project budget will need to include sufficient funds to cover the costs associated with this activity.

3.3 Assumptions & Risks

An appropriate strategy for accomplishing the stated primary and secondary goals should carefully consider the following key assumptions and critical risks:

1. All water belongs to the state in which it occurs and its use is subject to the laws and policies of that respective state.

2. The portion of the shallow gravel aquifer associated with the Hall-Wentland project falls across the Oregon-Washington state line, presenting unique jurisdictional challenges.

3. The hydrologic system associated with the Hall-Wentland Recharge Project includes elements both beyond and within the Walla Walla River Irrigation District boundary, presenting additional jurisdictional challenges.

4. Oregon and Washington appear to have substantially different financial resources to invest in water conservation and ecological restoration projects – and constraints on the geographic boundaries within which they can invest them.

5. No particular party is clearly responsible to seasonally replenish and sustain the flow of water into and through the shallow gravel aquifer.

6. Intentional control of water into and through surface streams and groundwater aquifers includes risks and hazards that must be anticipated and mitigated, including maintaining the hydraulic capacity of conveyance channels to safely convey flow under varying weather conditions, controlling the location and/or rate of water flow to prevent flooding, and minimizing the risk of drowning.

7. Intentional management of water to replenish groundwater flow is a relatively new and experimental practice for the people living in the Walla Walla Basin, requiring public subsidy and potentially new forms of organization and operation.

8. Leaders of the water conservation and ecological restoration community in the Walla Walla Basin have a finite capacity to initiate, administer and implement projects. Many, if not most, resource management organizations are currently operating at or near this capacity.

9. Walla Walla County Watershed Planning Department intends to discontinue operating in the role of sponsor/administrator for the Hall-Wentland Recharge Project, due to their internal workload, production capacity, and professional qualifications.

3.4 Strategic Path

Assembling the people and money required to accomplish a task is often a bit of a riddle. To attract public funding (money) you need a constituency (people) and a clear plan of action. However, it often seems easier to decide on a clear plan of action if you know how much money you have to work with – and who is going to do the work. So where is one to start?

In this situation, Fountainhead recommends an adaptive process featuring three main steps:

- Step One. Organize the People
- Step Two. Organize the Money
- Step Three. Implement the Current Possibilities

3.4.1 Organize the People

Figures 3-1 and 3-2 illustrate a recommended way to organize the multiple parties required to perform the Core Activities identified in Section 3.3. Figure 3-1 illustrates the recommended flow of AUTHORITY and Figure 3-2 illustrates the recommended flow of MONEY.

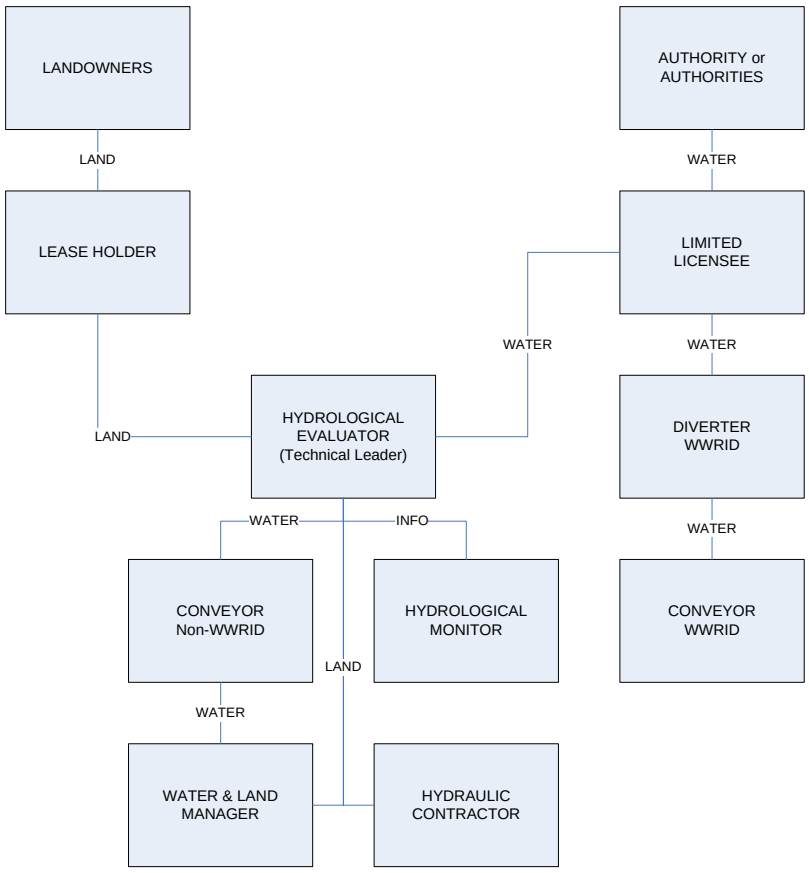


Figure 3-1. Organizational Chart Indicating Flow of AUTHORITY for Short-Term Implementation Strategy

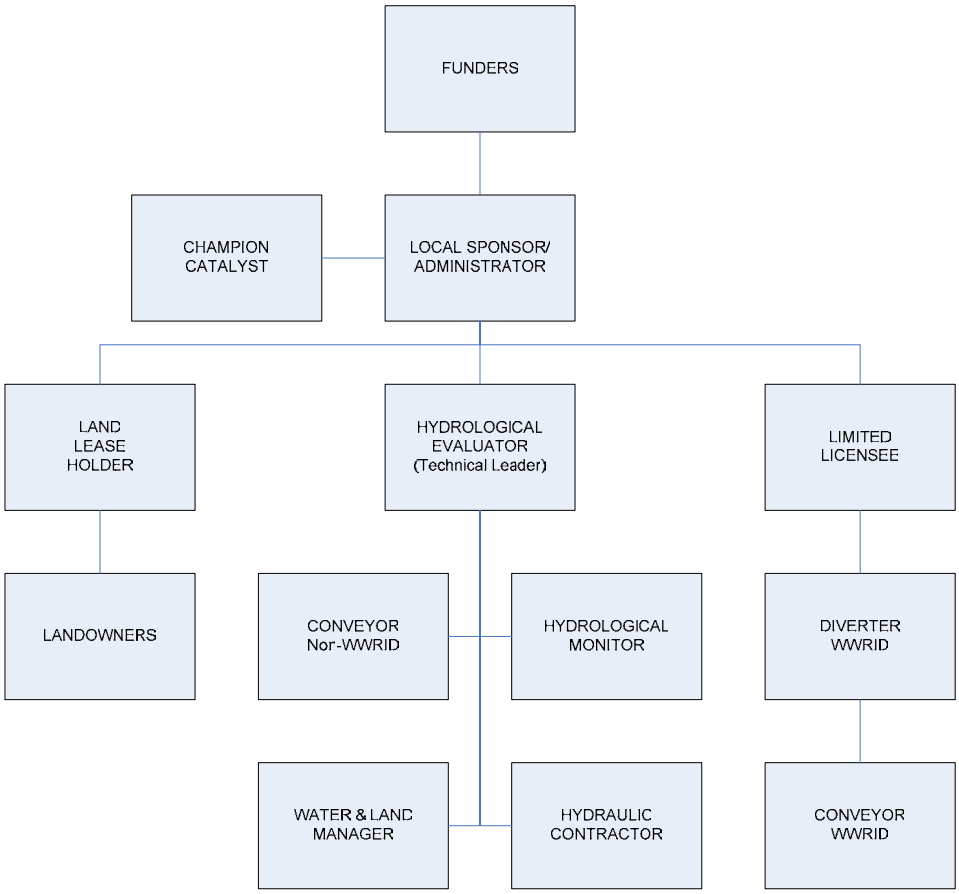


Figure 3-2. Organizational Chart Indicating Flow of MONEY for Short-Term Implementation Strategy

The first step is to fill in this organizational chart as completely as possible with committed project partners. This responsibility falls to the Champion/Catalyst – Tom Page – who initiated this project and remains the key party committed to its progress.

As Champion/Catalyst, Mr. Page's first priority should be to identify an appropriate Local Sponsor Administrator to replace Walla Walla County Watershed Planning Department, which has communicated its intention to cease serving in this capacity.

The new Sponsor/Administrator and Mr. Page should then work together to identify and secure commitments from the remaining required parties. Table 3-1 summarizes the local public service agencies recommended for each of the core activities described in Section 3.3. We recommend that the new Sponsor/Administrator and Mr. Page approach these parties in the order they are presented in this table. In light of current uncertainties regarding the availability of project funding, we recommend that Mr. Page and the new Sponsor/Administrator request commitments from the other parties subject to successful funding of the project.

To the maximum degree possible, local public service agencies should provide the required services. If local public service agencies lack capacity to provide a required service, the most qualified professional contractor(s) should be selected through an open, public solicitation for Statements of Qualifications from qualified parties.

TABLE 3-1
Recommended Project Partners

ROLE	RECOMMENDED PARTNER	ALTERNATE PARTNER
Champion/Catalyst	Tom Page	*None*
Sponsor/Administrator	WW Basin Watershed Council	WW County Conservation Dist.
Landowners	Gordon Hall & Loren Wentland	*None*
Limited Licensee	WW River Irrigation District	WW Basin Watershed Council
Hydrological Evaluator (Technical Leader)	WW Basin Watershed Council	WW County Conservation Dist.
Hydrological Monitor	WW Basin Watershed Council	WW County Conservation Dist.
Lease Holder	WW Basin Watershed Council	WW County Conservation Dist.
Diverter WWRID	WW River Irrigation District	*None*
Conveyor WWRID	WW River Irrigation District	*None*
Conveyor Non-WWRID	WW Basin Watershed Council	Tom Page &/or AJ Wentland
Water Manager	Gordon Hall & AJ Wentland	Tom Page
Risk Underwriter(s)	*Selected by Risk Holders*	*None*
Authority	Oregon Water Resources Dept.	ODFW, CTUIR, NMFS, USFWS
Hydraulic Contractor	AJ Wentland	*Private Contractor*
Funder(s)	Washington Dept of Ecology	Oregon Watershed Enhancement Board

3.4.2 Organize the Money

Once the Sponsor/Administrator and Champion/Catalyst have assembled the complete project team, they should request that each team member prepare an operational budget for each proposed activity under two scenarios:

Scenario 1 should assume full operation of the system, including diversion of streamflow from the Walla Walla River to supplement streamflow in the East Prong Little Walla Walla River.

Scenario 2 should assume limited operation of the system, including no diversion of streamflow from the Walla Walla River and no supplementation of streamflow in the East Prong Little Walla Walla River (essentially continuation of the current operational program).

The Sponsor/Administrator should then compile two project budgets – one for each of the two scenarios.

Next, the Sponsor/Administrator should contact WDOE, OWEB, the Walla Walla Water Management Initiative (WMI) board, Funding Working Group and other prospective funders to determine the level of funding available for the project.

Finally, the Sponsor/Administrator should secure an associated grant contract – and execute associated subcontracts with each subcontractor as indicated in Figure 3-2 (chart of money flow).

3.4.3 Implement the Current Possibilities

Clarifying the source(s) and amount(s) of available funding will greatly clarify how much is possible to accomplish at this juncture. It may prove possible to accomplish both the primary and secondary goals identified in Section 3.1. However, it may also become evident that sufficient funding is only available to accomplish the primary goal – and not the secondary goal – at this time.

4.0 Long-Term Implementation Strategy

4.1 Desired Outcome

The primary goal of the long-term implementation strategy is to catalyze and sustain long-term, seasonal replenishment of McEvoy Spring.

4.2 System Description

The primary elements of the hydrologic system associated with the Hall-Wentland Recharge Project were described and illustrated in Section 2.4.

4.3 Assumptions & Risks

An appropriate strategy for accomplishing the stated primary goal should carefully consider the following key assumptions and critical risks:

1. McEvoy Spring is one of over 30 springs associated with the shallow gravel aquifer and distributary stream systems flowing through and across the floor of the Walla Walla Basin.

2. No particular party is currently clearly responsible to seasonally replenish and sustain the flow of water into and through the shallow gravel aquifer to McEvoy Spring and other springs similar to McEvoy Spring.

3. Management of water to recharge McEvoy Spring is likely to occur in the context of a comprehensive regional groundwater management program, rather than an independent effort targeted specifically at McEvoy Spring.

4. The specific recharge areas and water flow paths through which water flows to McEvoy Spring – and other springs similar to McEvoy Spring – are currently unknown. However, groundwater monitoring results suggest that the water table slope and flow gradient generally follow the topographical gradient of the ground surface.

5. Operation of the Hall-Wentland Recharge System – or a modified version of this system – may prove to be an effective method for replenishing upgradient groundwater flows and sustaining seasonal discharge from McEvoy Spring.

6. Sustaining year-round streamflows in the streams and ditches within the Walla Walla River Irrigation District may prove to be an effective method for replenishing upgradient groundwater flows and sustaining seasonal discharge from McEvoy Spring (and other springs similar to McEvoy Spring).

7. Developing new recharge systems and/or retrofitting bulges within the Walla Walla River Irrigation District may prove to be an effective method for replenishing upgradient groundwater flows and sustaining seasonal discharge from McEvoy Spring (and other springs similar to McEvoy Spring.

8. Decreasing pumping of groundwater from the shallow gravel aquifer upgradient from McEvoy Spring may prove to be an effective method for sustaining seasonal discharge from McEvoy Spring (and other springs similar to McEvoy Spring)

4.4 Strategic Path

To accomplish the stated goal of long-term, seasonal replenishment of McEvoy Spring, Fountainhead recommends an iterative, adaptive process featuring four main steps:

- Step One. Measure the location and timing of current water flow paths
- Step Two. Communicate monitoring results and cultivate the engagement of water users
- Step Three. Establish increasingly clear goals regarding desirable water flow paths
- Step Four. Experiment with systems that can potentially improve water flow paths

4.4.1 Measure Current Water Flow Paths

Over the past five-to-six years, the Walla Walla Basin Watershed Council has developed an extensive monitoring system to measure streamflows, groundwater table levels, and spring discharges throughout the alluvial fan associated with the Walla Walla River and Little Walla Walla River system. McEvoy Spring and McEvoy Spring Branch have been included in this monitoring program. Results of these monitoring efforts have been addressed in independent reports that should be consulted for details in this regard. This basic hydrological information provides an excellent foundation upon which to develop a long-term program for adaptive management of water flowing through the Walla Walla River and Little Walla Walla River system – and it should be continued into the future to inform future water management decisions and to evaluate the effects of water management activities.

The Walla Walla Basin Watershed Council has clearly demonstrated its capacity to lead this effort on both sides of the Oregon-Washington state line. Possible organizations potentially suited to add value to this effort include: Walla Walla County Conservation District (WWCCD); Walla Walla Water Management Initiative (WMI); Native Creek Society; Tri-State Steelheaders; McEvoy Spring Branch Restoration Group (an informal group of landowners currently restoring McEvoy Spring Branch); and individuals, such as Tom Page or AJ Wentland. The United States Geological Survey (USGS) and professional hydrogeologists and water resource engineers may also be able to add value to this effort.

4.4.2 Communicate Monitoring Results and Cultivate Water User Engagement

As more water flow information is collected, it will become increasingly important to convert raw data into useful information that can guide on-the-ground water management activities. It will become equally important to publicize the results in a manner that increases public awareness and facilitates public engagement in decisionmaking and improved water management actions. As more citizens become able and accustomed to accessing information via the Internet, this medium will undoubtedly be the preferred way to provide members of the general public with open and direct access to historical and current hydrological information.

Recent efforts have been made to provide a central link to the large and increasing volume of hydrological and ecological data associated with the Walla Walla Basin. The EKO-System program created by Paladin Data Systems in the context of the Bi-State Habitat Conservation Plan is probably the most notable and recent. Unfortunately, there have been various barriers to participation in the Paladin program. At this writing, the system has not been robustly adopted as the primary gateway to ecological information pertaining to the Walla Walla Basin.

In the context of current projects related to the Hydro North groundwater/spring monitoring program and the Walla Walla Water Management Initiative, the Walla Walla Basin Watershed Council and other parties are revisiting the universe of existing data and current data streams. In light of almost certain advancement in the realm of information-based decision-making, this area is worthy of substantial focus and investment.

Walla Walla Basin Watershed Council, Tri-State Steelheaders, the Confederated Tribes of the Umatilla Indian Reservation, state and federal water and fisheries agencies (OWRD, ODFW, WDOE, and WDFW), Walla Walla County Conservation District, the three local county governments (Umatilla, Walla Walla and Columbia Counties), Walla Walla Water Management Initiative (WMI), Native Creek Society, McEvoy Spring Branch Restoration Group (an informal group of landowners currently restoring McEvoy Spring Branch), and individuals, such as Tom Page have all demonstrated capacity to contribute to this effort. The United States Geological Survey (USGS) and professional hydrogeologists and water resource engineers may also be able to add value to this effort.

4.4.3 Establish Increasingly Clear Goals Regarding Desirable Water Flow Paths

As more water flow information is collected, it will become increasingly important to convert these raw data into useful information that can guide on-the-ground water management activities. It will become equally important to publicize the results in a manner that increases public awareness and facilitates public engagement in decisionmaking and improved water management actions.

Ultimately, the members of the Walla Walla watershed community should develop clearly identified management points (specific groundwater wells and springs that will be used to indicate hydrological performance) and clearly stated goals regarding the desirable hydrological performance at each of these management points. These performance goals will likely be based on known or estimated historical performance, balanced with other current demands on the hydrologic system.

An example would be to identify McEvoy Spring as a hydrological monitoring point, and to establish the following as a working goal for the desired performance of McEvoy Spring:

Performance Goal for McEvoy Spring
The flow of water is managed upgradient from McEvoy Spring such that discharge from McEvoy Spring fluctuates from a minimum of 3 cfs during the summer-fall season to 6 cfs during the winter-spring season.

Similar goals should be identified for all the springs of social, ecological and/or economic importance in the Walla Walla River system – and adaptively refined over time. In time, it may become possible to correlate spring discharges to groundwater table elevations, such that multiple (and somewhat problematic) surface flow measurements can be replaced with groundwater table elevation measurements in dedicated monitoring wells.

4.4.4 Experiment with Systems to Improve Water Flow Paths

As citizens become more aware of how water is flowing – and how we desire for water to flow – the remaining step will be to learn the most effective ways to control the flow of water to generate the desired results. This should include experimentation with a variety of water management techniques, including the following systems.

4.4.4.1 Operate Hall-Wentland Recharge Project Through Limited License Period

At a meeting of interested stakeholders on January 19, 2007, the participants discussed and unanimously agreed that continuing operation of the Hall-Wentland Recharge Project – at least through the duration of the Limited License with Oregon Water Resources Department – would continue to yield desired value on the investments made to date. Participants also noted that continuing the project will also demonstrate due diligence in the pursuit of innovative solutions to local water management challenges.

The participants agreed that operation of the Hall-Wentland Recharge System – or a modified version of this system – may prove to be an effective method for replenishing upgradient groundwater flows and sustaining seasonal discharge from McEvoy Spring. They also agreed that, in the long-term, operation of the Hall-Wentland Recharge Project might be terminated in favor of other methods of groundwater management. However, results of continued project activities were required to evaluate the value of ongoing recharge activities at this particular location.

A strategy for short-term implementation of the Hall-Wentland Recharge Project was presented in Section 3 of this document.

Figure 4-1 illustrates an alternative for continuing operation of the Hall-Wentland Recharge Project in the same manner that has been conducted for the past two years.

Figure 4-2 illustrates an alternative for enhancing operation of the Hall-Wentland Recharge Project by diverting streamflow from the Walla Walla River in order to supplement streamflow in the East Prong Little Walla Walla River, so that this additional flow can be diverted into Wells Ditch and applied to the recharge site.

Figure 4-3 illustrates another alternative for enhancing operation of the Hall-Wentland Recharge Project by reconfiguring Wells Ditch to flow primarily to the Hall-Wentland recharge site, and then flowing into a gravity-fed pipeline to serve the downgradient reach currently served by Wells Ditch. This reconfiguration would improve positive control of water to the downstream end of Wells Ditch in a manner that would path surplus water into the shallow gravel aquifer rather than the existing outfall to Walsh Creek.

4.4.4.2 Evaluate Effects of Sustaining Year-Round Flow in Streams/Ditches within WWRID

Sustaining year-round streamflows in the streams and ditches within the Walla Walla River Irrigation District may also prove to be an effective method for replenishing upgradient groundwater flows and sustaining seasonal discharge from McEvoy Spring (and other springs similar to McEvoy Spring). This water management strategy is illustrated in Figure 4-4.

4.4.4.3 Evaluate Effects of Retrofitting Bulges within WWRID to Recharge Groundwater

Developing new recharge systems and/or retrofitting bulges within the Walla Walla River Irrigation District may prove to be an effective method for replenishing upgradient groundwater flows and sustaining seasonal discharge from McEvoy Spring (and other springs similar to McEvoy Spring). This water management strategy is illustrated in Figure 4-5.

With support from the Walla Walla Watershed Alliance, Walla Walla Basin Watershed Council, and Walla Walla River Irrigation District, Fountainhead recently initiated an experimental project of this nature. However, early in this project, it became apparent that the timing was not conducive to successful implementation of this experiment. So the project was cancelled in lieu of better timing.

4.4.4.4 Investigate Potential Ways to Decreasing Groundwater Pumping in M-F Vicinity

Decreasing pumping of groundwater from the shallow gravel aquifer upgradient from McEvoy Spring may prove to be an effective method for sustaining seasonal discharge from McEvoy Spring (and other springs similar to McEvoy Spring). This water management strategy is illustrated in Figure 4-6.

PERFORMANCE GOAL

Discharge from McEvoy Spring fluctuates from 3 cfs (minimum) during summer-fall to 6 cfs during winter-spring (3,260 acre-feet).

MANAGEMENT STRATEGY

SPONSOR/ADMINISTRATOR guides team activities
AUTHORITY grants permission to LIMITED LICENSEE
HYDRO MONITOR monitors flow of water through system
HYDRO MONITOR provides flow data to HYDRO EVALUATOR
HYDRO EVALUATOR directs actions of WATER MANAGER

WATER MANAGER diverts water from the East Prong Little Walla Walla River, conveys water via Wells Ditch to the Hall-Wentland Recharge Site, and applies it to land parcels owned by LANDOWNERS to augment water flow in the shallow gravel groundwater aquifer.

POTENTIAL PARTNERS

CONTRIBUTOR	POTENTIAL PARTNERS
Champion/Catalyst	Tom Page
Sponsor/Administrator	WW Basin Watershed Council
Funder	WA Dept of Ecology and OWEB
Landowners	Gordon Hall and Loren Wentland
Land Lease Holder	WWBWC or WWCCD
Authority	Oregon Water Resources Dept.
Limited Licensee	WW River Irrigation District
Hydrological Evaluator	WWBWC, WWCCD or Contractor
Hydrological Monitor	WWBWC, WWCCD or Contractor
Water Manager	AJ Wentland, Tom Page or WWBWC
Risk Underwriters	TBD by Risk Holders

REQUIRED FUNDING

CONTRIBUTOR	REQ'D FUNDING
Champion/Catalyst	TBD
Sponsor/Administrator	TBD
Landowners	TBD
Land Lease Holder	TBD
Limited Licensee	TBD
Hydrological Evaluator	TBD
Hydrological Monitor	TBD
Water Manager	TBD

STRATEGIC PATH

1. Champion/Catalyst identify new Sponsor/Administrator
2. Champion and new Sponsor secure other partners
3. Project partners estimate required funding by task
4. Sponsor/Administrator assemble budget estimates
5. Sponsor/Administrator and Champion identify funders
6. Sponsor/Administrator negotiate contracts
7. Project partners implement project

LEGEND

- McEvoy Spring
- Other Springs
- Wells Ditch
- H-W Recharge Site
- McEvoy Spring Recharge Area
- WWRID Boundary

Fountainhead Irrigation, Inc.

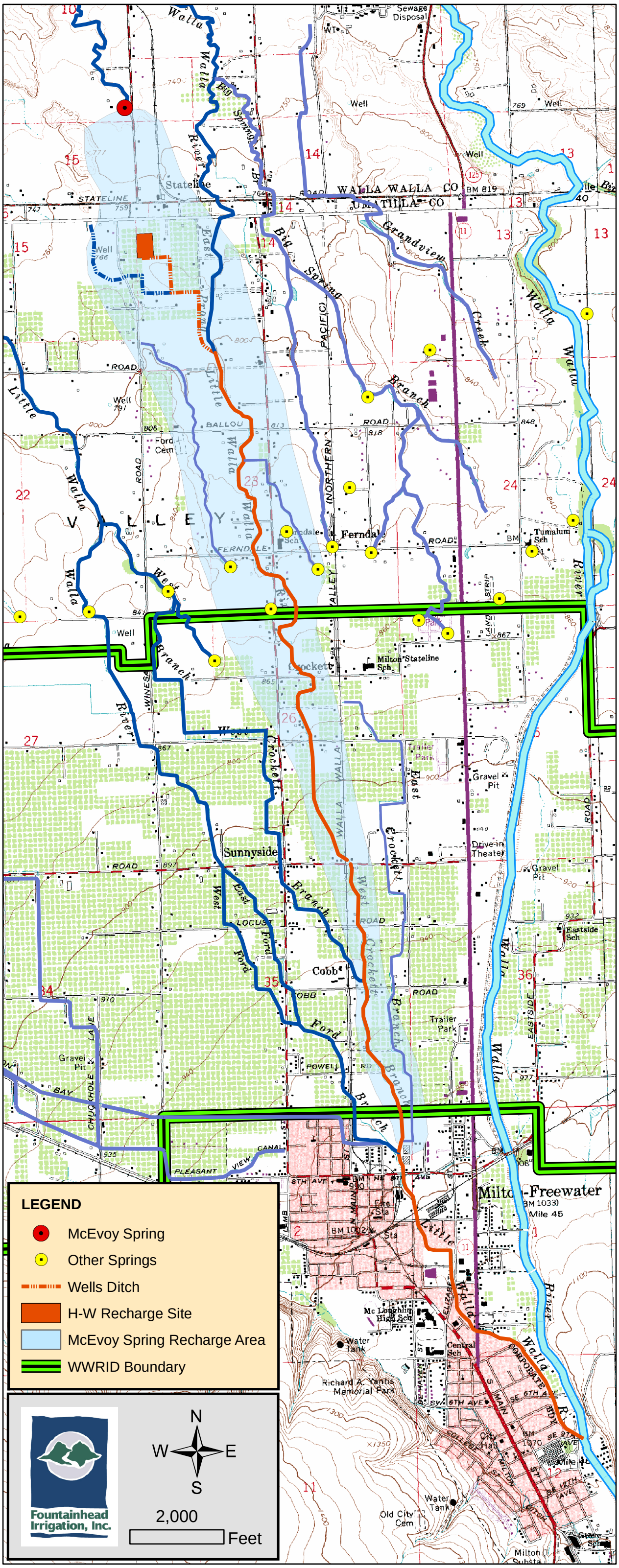
N W E S

2,000 Feet

FIGURE 4-1

ALTERNATIVE 1 Continue Operating Hall-Wentland SAR Site

Revised 09 MAY 2007 by John Warinner, PE



PERFORMANCE GOAL

Discharge from McEvoy Spring fluctuates from 3 cfs (minimum) during summer-fall to 6 cfs during winter-spring (3,260 acre-feet).

MANAGEMENT STRATEGY

SPONSOR/ADMINISTRATOR guides team activities
AUTHORITY grants permission to LIMITED LICENSEE
HYDRO MONITOR monitors flow of water through system
HYDRO MONITOR provides flow data to HYDRO EVALUATOR
HYDRO EVALUATOR calls for water from LIMITED LICENSEE
LIMITED LICENSEE directs actions of DIVERTER WWRID
LIMITED LICENSEE directs actions of CONVEYOR WWRID
HYDRO EVALUATOR directs actions of CONVEYOR non-WWRID
HYDRO EVALUATOR directs actions of WATER MANAGER

DIVERTER WWRID diverts water from WW River to Little WW River
CONVEYOR WWRID conveys water through WWRID
CONVEYOR non-WWRID conveys water WWRID to Wells Ditch

WATER MANAGER diverts water from the East Prong Little Walla Walla River, conveys water via Wells Ditch to the Hall-Wentland Recharge Site, and applies it to land parcels owned by LANDOWNERS to augment water flow in the shallow gravel groundwater aquifer.

POTENTIAL PARTNERS

CONTRIBUTOR	POTENTIAL PARTNERS
Champion/Catalyst	Tom Page
Sponsor/Administrator	WW Basin Watershed Council
Funder	WA Dept of Ecology and OWEB
Landowners	Gordon Hall and Loren Wentland
Land Lease Holder	WWBWC or WWCCD
Authority	Oregon Water Resources Dept.
Limited Licensee	WW River Irrigation District
Hydrological Evaluator	WWBWC, WWCCD or Contractor
Hydrological Monitor	WWBWC, WWCCD or Contractor
Hydraulic Contractor	WWBWC, WWCCD or Contractor
Diverter WWRID	WW River Irrigation District
Conveyor WWRID	WW River Irrigation District
Conveyor non-WWRID	WWBWC, WWCCD or Contractor
Water Manager	AJ Wentland, Tom Page or WWBWC
Risk Underwriters	TBD by Risk Holders

REQUIRED FUNDING

CONTRIBUTOR	REQ'D FUNDING
Champion/Catalyst	TBD
Sponsor/Administrator	TBD
Funder	TBD
Landowners	TBD
Land Lease Holder	TBD
Authority	TBD
Limited Licensee	TBD
Hydrological Evaluator	TBD
Hydrological Monitor	TBD
Hydraulic Contractor	TBD
Diverter WWRID	TBD
Conveyor WWRID	TBD
Conveyor non-WWRID	TBD
Water Manager	TBD
Risk Underwriters	TBD

STRATEGIC PATH

1. Champion/Catalyst identify new Sponsor/Administrator
2. Champion and new Sponsor secure other partners
3. Project partners estimate required funding by task
4. Sponsor/Administrator assemble budget estimates
5. Sponsor/Administrator and Champion identify funders
6. Sponsor/Administrator negotiate contracts
7. Project partners implement project

FIGURE 4-2

ALTERNATIVE 2
Increase Flow to Hall-Wentland SAR Site

Revised 10 MAY 2007 by John Warinner, PE

PERFORMANCE GOAL

Discharge from McEvoy Spring fluctuates from 3 cfs (minimum) during summer-fall to 6 cfs during winter-spring (3,260 acre-feet).

MANAGEMENT STRATEGY

SPONSOR/ADMINISTRATOR guides team activities
AUTHORITY grants permission to LIMITED LICENSEE
HYDRO MONITOR monitors flow of water through system
HYDRO MONITOR provides flow data to HYDRO EVALUATOR
HYDRO EVALUATOR directs HYDRAULIC CONTRACTOR actions
HYDRO EVALUATOR directs WATER MANAGER actions

HYDRAULIC CONTRACTOR reconfigures lower Wells Ditch so all water flows to Hall-Wentland pond/bulge and only flows downstream on-demand via pressurized pipe.

WATER MANAGER diverts water from the East Prong Little Walla Walla River, conveys water via Wells Ditch to new pond/bulge at Hall-Wentland Recharge Site. Water delivered to downgradient Wells Ditch users on-demand via pressurized pipe. Surplus water routed to recharge groundwater via current spreading method and/or vertical or horizontal well(s).

Can be combined with Alternative 2 (increased flow to HW site).

POTENTIAL PARTNERS

CONTRIBUTOR	POTENTIAL PARTNERS
Champion/Catalyst	Tom Page
Sponsor/Administrator	WW Basin Watershed Council
Funder	WA Dept of Ecology and OWEB
Landowners	Gordon Hall and Loren Wentland
Land Lease Holder	WWBWC or WWCCD
Authority	Oregon Water Resources Dept.
Limited Licensee	WW River Irrigation District
Hydrological Evaluator	WWBWC, WWCCD or Contractor
Hydrological Monitor	WWBWC, WWCCD or Contractor
Hydraulic Contractor	WWBWC, WWCCD or Contractor
Water Manager	AJ Wentland, Tom Page or WWBWC
Risk Underwriters	TBD by Risk Holders

REQUIRED FUNDING

CONTRIBUTOR	REQ'D FUNDING
Champion/Catalyst	TBD
Sponsor/Administrator	TBD
Funder	TBD
Landowners	TBD
Land Lease Holder	TBD
Authority	TBD
Limited Licensee	TBD
Hydrological Evaluator	TBD
Hydrological Monitor	TBD
Hydraulic Contractor	TBD
Water Manager	TBD
Risk Underwriters	TBD

STRATEGIC PATH

1. Champion/Catalyst identify new Sponsor/Administrator
2. Champion and new Sponsor secure other partners
3. Project partners estimate required funding by task
4. Sponsor/Administrator assemble budget estimates
5. Sponsor/Administrator and Champion identify funders
6. Sponsor/Administrator negotiate contracts
7. Project partners implement project

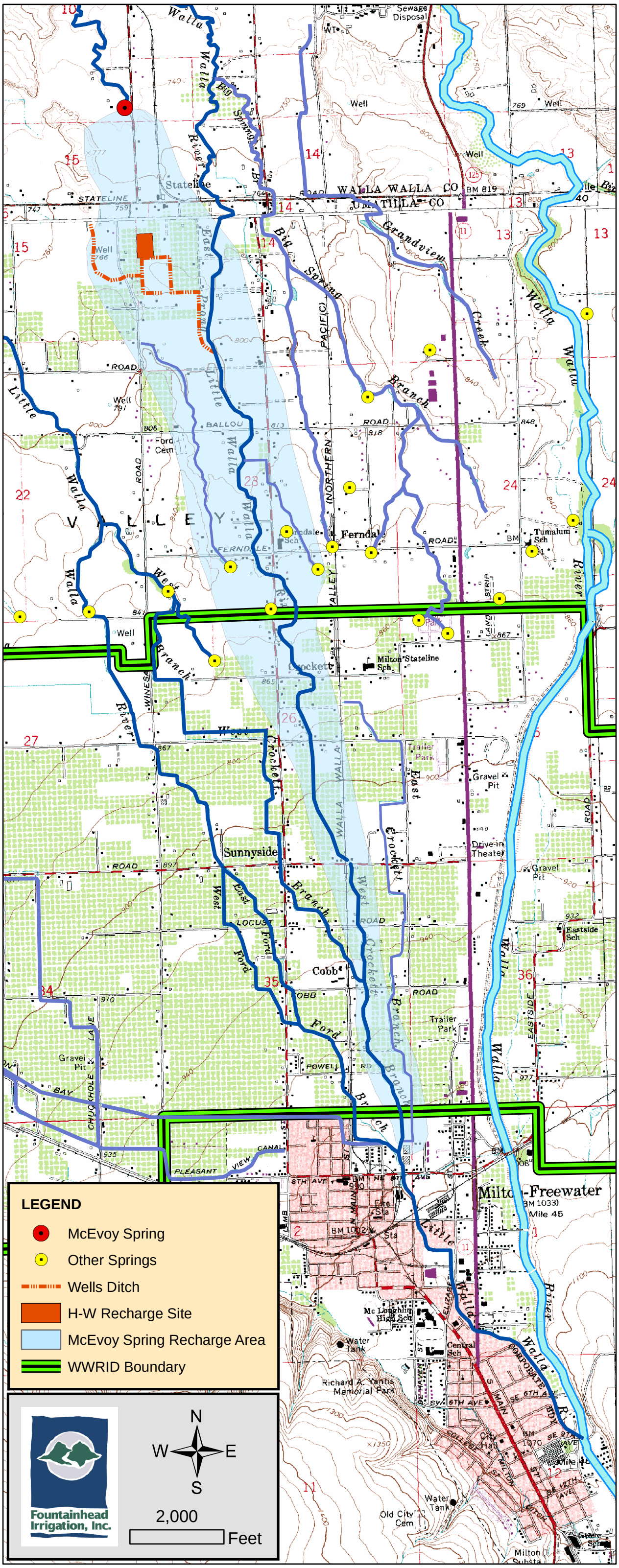
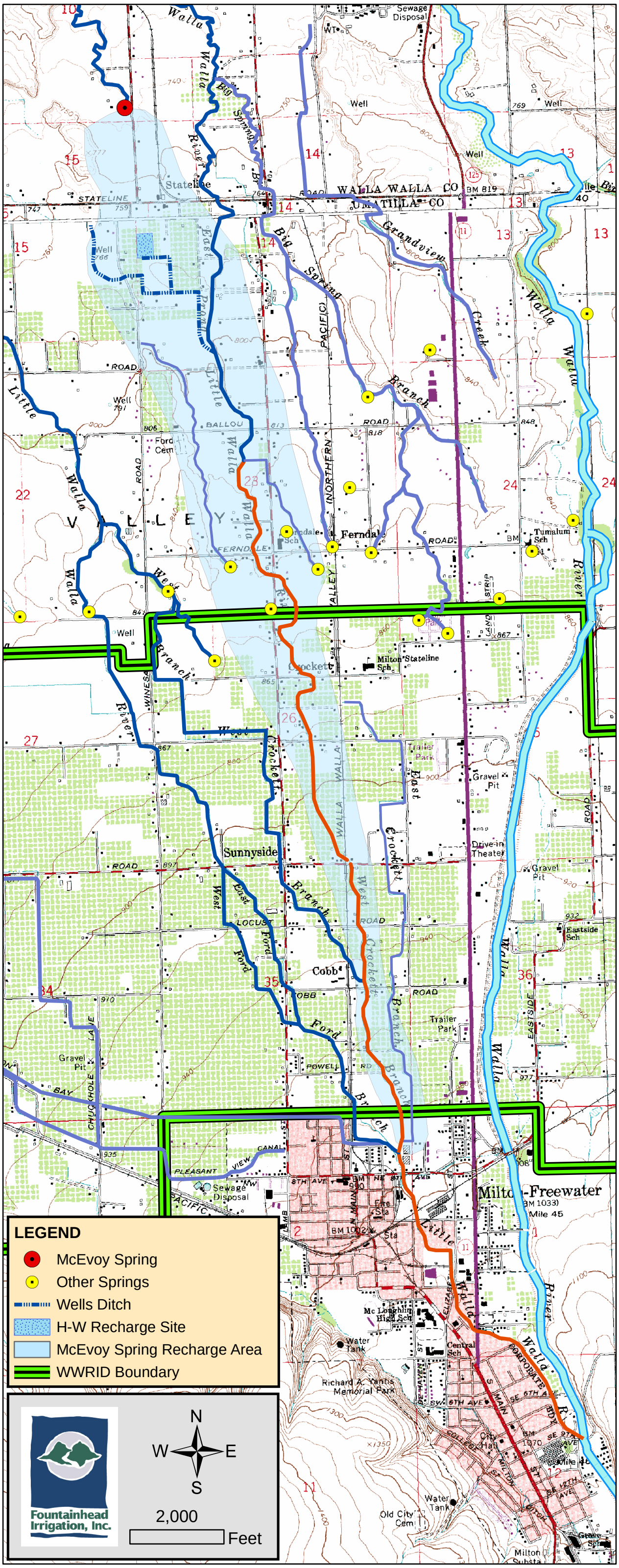


FIGURE 4-3

ALTERNATIVE 3
Reconfigure Lower Wells Ditch System

Revised 10 MAY 2007 by John Warinner, PE



PERFORMANCE GOAL

Discharge from McEvoy Spring fluctuates from 3 cfs (minimum) during summer-fall to 6 cfs during winter-spring (3,260 acre-feet).

MANAGEMENT STRATEGY

SPONSOR/ADMINISTRATOR guides team activities
AUTHORITY grants permission to LIMITED LICENSEE
HYDRO MONITOR monitors flow of water through system
HYDRO MONITOR provides flow data to HYDRO EVALUATOR
HYDRO EVALUATOR calls for water from LIMITED LICENSEE
LIMITED LICENSEE directs actions of DIVERTER WWRID
LIMITED LICENSEE directs actions of CONVEYOR WWRID

DIVERTER WWRID diverts water from WW River to Little WW River
CONVEYOR WWRID conveys water through WWRID

POTENTIAL PARTNERS

CONTRIBUTOR	POTENTIAL PARTNERS
Champion/Catalyst	Tom Page
Sponsor/Administrator	WWRID or WWBWC
Funder	WA Dept of Ecology and OWEB
Authority	Oregon Water Resources Dept.
Limited Licensee	WW River Irrigation District
Hydrological Evaluator	WWRID or WWBWC
Hydrological Monitor	WWRID or WWBWC
Diverter WWRID	WW River Irrigation District
Conveyor WWRID	WW River Irrigation District
Risk Underwriters	TBD by Risk Holders

REQUIRED FUNDING

CONTRIBUTOR	REQ'D FUNDING
Champion/Catalyst	TBD
Sponsor/Administrator	TBD
Funder	TBD
Authority	TBD
Limited Licensee	TBD
Hydrological Evaluator	TBD
Hydrological Monitor	TBD
Diverter WWRID	TBD
Conveyor WWRID	TBD
Risk Underwriters	TBD

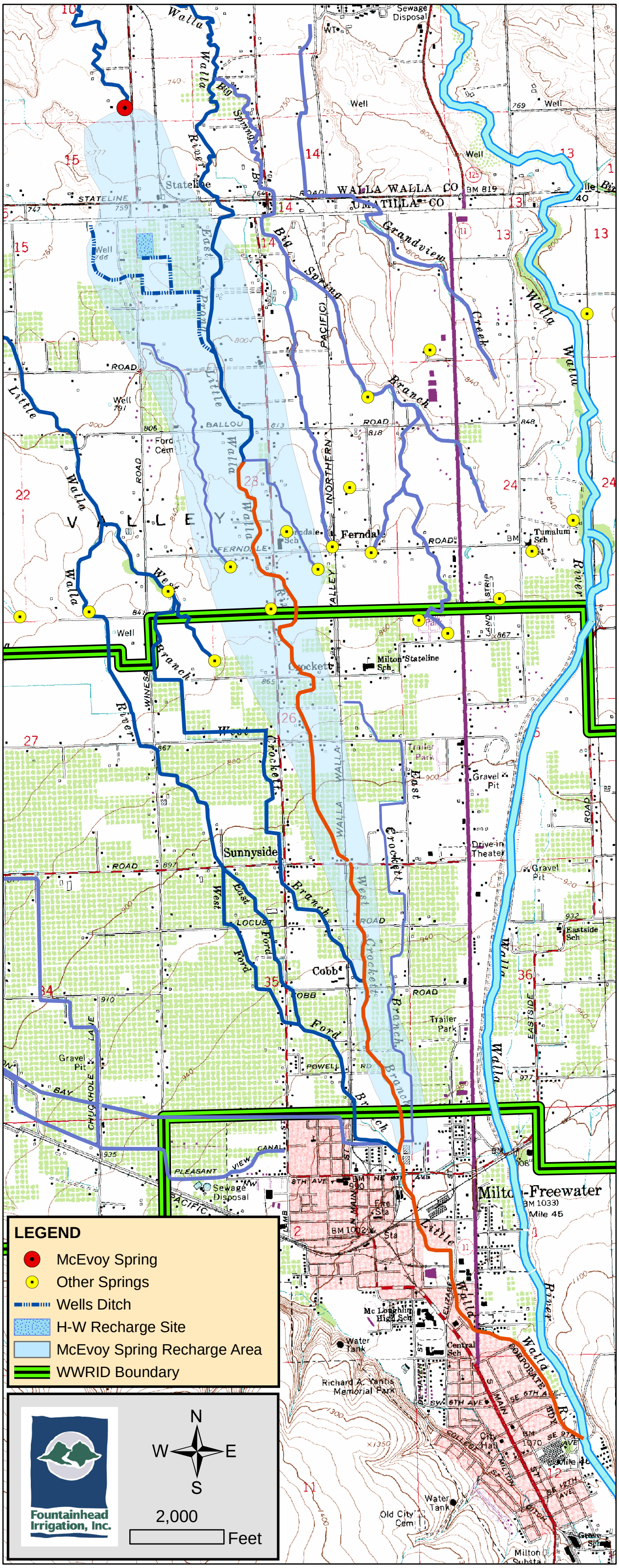
STRATEGIC PATH

1. Champion/Catalyst identify new Sponsor/Administrator
2. Champion and new Sponsor secure other partners
3. Project partners estimate required funding by task
4. Sponsor/Administrator assemble budget estimates
5. Sponsor/Administrator and Champion identify funders
6. Sponsor/Administrator negotiate contracts
7. Project partners implement project

FIGURE 4-4

ALTERNATIVE 4
Sustain Year-Round Flow in Streams & WWRID Ditches

Revised 10 MAY 2007 by John Warinner, PE



PERFORMANCE GOAL

Discharge from McEvoy Spring fluctuates from 3 cfs (minimum) during summer-fall to 6 cfs during winter-spring (3,260 acre-feet).

MANAGEMENT STRATEGY

SPONSOR/ADMINISTRATOR guides team activities
AUTHORITY grants permission to LIMITED LICENSEE
HYDRO MONITOR monitors flow of water through system
HYDRO MONITOR provides flow data to HYDRO EVALUATOR
HYDRO EVALUATOR calls for water from LIMITED LICENSEE
LIMITED LICENSEE directs actions of DIVERTER WWRID
LIMITED LICENSEE directs actions of CONVEYOR WWRID

DIVERTER WWRID diverts water from WW River to Little WW River
CONVEYOR WWRID conveys water through WWRID

POTENTIAL PARTNERS

CONTRIBUTOR	POTENTIAL PARTNERS
Champion/Catalyst	Tom Page
Sponsor/Administrator	WWRID or WWBWC
Funder	WA Dept of Ecology and OWEB
Authority	Oregon Water Resources Dept.
Limited Licensee	WW River Irrigation District
Hydrological Evaluator	WWRID or WWBWC
Hydrological Monitor	WWRID or WWBWC
Diverter WWRID	WW River Irrigation District
Conveyor WWRID	WW River Irrigation District
Risk Underwriters	TBD by Risk Holders

REQUIRED FUNDING

CONTRIBUTOR	REQ'D FUNDING
Champion/Catalyst	TBD
Sponsor/Administrator	TBD
Funder	TBD
Authority	TBD
Limited Licensee	TBD
Hydrological Evaluator	TBD
Hydrological Monitor	TBD
Diverter WWRID	TBD
Conveyor WWRID	TBD
Risk Underwriters	TBD

STRATEGIC PATH

1. Champion/Catalyst identify new Sponsor/Administrator
2. Champion and new Sponsor secure other partners
3. Project partners estimate required funding by task
4. Sponsor/Administrator assemble budget estimates
5. Sponsor/Administrator and Champion identify funders
6. Sponsor/Administrator negotiate contracts
7. Project partners implement project

FIGURE 4-5

ALTERNATIVE 5
Retrofit WWRID Bulges to Recharge Groundwater

Revised 10 MAY 2007 by John Warinner, PE

PERFORMANCE GOAL

Discharge from McEvoy Spring fluctuates from 3 cfs (minimum) during summer-fall to 6 cfs during winter-spring (3,260 acre-feet).

MANAGEMENT STRATEGY

SPONSOR/ADMINISTRATOR guides team activities
HYDRO MONITOR assembles data regarding well pumping
HYDRO EVALUATOR identifies wells with greatest effect on spring
HYDRO EVALUATOR communicates wtih well owners and users
HYDRO EVALUATOR identifies ways to reduce well pumping
HYDRO EVALUATOR prioritizes conservation opportunities
AUTHORITY grants permissions to implement conservation practices
OWNERS and/or HYDRO CONTRACTOR(s) implement practices

POTENTIAL PARTNERS

CONTRIBUTORS	POTENTIAL PARTNERS
Champion/Catalyst	WW Basin Watershed Council
Sponsor/Administrator	WW Basin Watershed Council
Hydrological Evaluator	WWBWC and/or Contractor
Hydrological Monitor	WWBWC and/or Contractor
Hydrological Contractor	WWBWC and/or Contractor
Well Owners/Users	TBD based on hydrological study
Authority	Oregon Water Resources Dept.

REQUIRED FUNDING

CONTRIBUTORS	REQ'D FUNDING
Champion/Catalyst	TBD
Sponsor/Administrator	TBD
Hydrological Evaluator	TBD
Hydrological Monitor	TBD
Hydrological Contractor	TBD
Well Owners/Users	TBD
Authority	TBD

STRATEGIC PATH

1. Champion/Catalyst identify Sponsor/Administrator
2. Champion and Sponsor secure required partners
3. Project partners estimate required funding by task
4. Sponsor/Administrator assemble budget estimates
5. Sponsor/Administrator and Champion identify funders
6. Sponsor/Administrator negotiate contracts
7. Project partners implement project

LEGEND

- McEvoy Spring
- Other Springs
- Wells Ditch
- H-W Recharge Site
- McEvoy Spring Recharge Area
- WWRID Boundary

N W E S

2,000 Feet

Fountainhead Irrigation, Inc.

FIGURE 4-6

ALTERNATIVE 6
Decrease Upgradient Groundwater Pumping

Revised 10 MAY 2007 by John Warinner, PE

5.0 Bibliography

The following documents are most closely associated with the Hall-Wentland Recharge Project and this Long-Term Implementation Strategy:

1. Lindsey, Kevin, *Results of the First Season of Shallow Aquifer Recharge Testing*, June 2006.

2. Lindsey, Kevin, *Hall-Wentland Shallow Aquifer Recharge Monitoring and Testing Plan*, June 2006.

3. Newcomb, R.C. *Geology and Groundwater Resources of the Walla Walla River Basin*. Water Supply Bulletin #21. Washington Department of Conservation, Division of Water Resources, 1965.

4. Piper, A.M., T.W. Robinson, and H.E. Thomas. *Groundwater in the Walla Walla Basin, OR-WA-Part I*. Department of the Interior, United States Geological Survey, 1933.

5. Piper, A.M., T.W. Robinson, and H.E. Thomas. *Groundwater in the Walla Walla Basin, OR-WA-Part II*. Department of the Interior, United States Geological Survey, 1933.

6. Bower, Robert, *Hudson Bay Aquifer Recharge Project – Annual Report 2004*, Hudson Bay District Improvement Company and Walla Walla Basin Watershed Council, 2004.

7. Warinner, John, et al., *Shallow Aquifer Recharge – Strategy for Restoring and Seasonally Recharging Shallow Gravel Aquifer(s) and Spring-Fed Streams of the Walla Walla Watershed*, June 2006.

People desiring a comprehensive list of documents related to this subject should refer to lists compiled by Bob Bower (Walla Walla Basin Watershed Council), Tom Darnell (Oregon State University Extension), and/or HDR-EES (in association with the WRIA 32 Watershed Plan, Bi-State Habitat Conservation Plan, and Subbasin Plan).

FOR MORE INFORMATION

JOHN WARINNER, PE
FOUNTAINHEAD
1860 BLUE CREEK ROAD
WALLA WALLA, WA
99362

509.529.2646
warinner@gohighspeed.com

HALL-WENTLAND RECHARGE PROJECT

LONG-TERM IMPLEMENTATION STRATEGY

WALLA WALLA COUNTY
WATERSHED PLANNING DEPT.
GRANT NO. G0600312

FOUNTAINHEAD
JUNE 2007