ANNUAL GROUNDWATER MONITORING REPORT

Hazardous Waste Management Units
5, 7, 10 and 16
CALENDAR YEAR 2010

RADFORD ARMY AMMUNITION PLANT
RADFORD, VIRGINIA

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DAA PROJECT NO. B03204-08

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EXECUTIVE SUMMARY

This document presents the Annual Groundwater Monitoring Report for calendar year 2010 for Hazardous Waste Management Units (HWMUs) 5, 7, 10, and 16 located at the Radford Army Ammunition Plant (Radford AAP) in Radford, Virginia. The Annual Groundwater Monitoring Report was compiled in accordance with the requirements specified in the Final Hazardous Waste Post-Closure Care Permit dated October 4, 2002, for HWMUs 5, 7, 10, and 16. This Annual Groundwater Monitoring Report evaluates the analytical data from Second Quarter 2010 and Fourth Quarter 2010 for each Unit.

HWMU-5

The calendar year 2010 groundwater monitoring events served as the first and second semiannual Corrective Action (CA) groundwater monitoring events for HWMU-5 conducted in accordance with Permit Module VI – *Groundwater Corrective Action & Monitoring Program for Unit 5*, which was approved by the Virginia Department of Environmental Quality (VDEQ) in the *Final Class 3 Hazardous Waste Permit Modification* dated November 5, 2009. Plume monitoring well 5W12A was installed in February 2010.

During Second Quarter 2010, trichloroethene (TCE) was detected in point of compliance well 5W5B at a concentration less than the GPS of 5 µg/l. However, during Fourth Quarter 2010, TCE was detected in well 5W5B at a concentration greater than the GPS of 5 µg/l. However, no daughter products of TCE were detected in well 5W5B during the 2010 monitoring events. The observed concentration fluctuations of TCE in point of compliance well 5W5B are consistent with typical historical concentration fluctuations of TCE in that well. TCE was not detected at concentrations greater than the GPS in any other wells comprising the CA monitoring network during the calendar year 2010 monitoring events, and no daughter products of TCE were detected in the wells comprising the CA monitoring network. In accordance with the Permit, the effectiveness of the corrective action (monitored natural attenuation [MNA]) was assessed, found to be effective, and no additional action is required.

An Alternate Source Demonstration (ASD) for cobalt was submitted in October 2010. In correspondence dated December 20, 2010, the VDEQ stated that the ASD did not conclusively demonstrate that the cobalt concentrations detected in POC well 5WC21 were caused by natural variation in the groundwater. However, VDEQ agreed that no changes to the groundwater corrective action and monitoring program at Unit 5 are necessary.

HWMU-7

Based on an evaluation of the groundwater analytical data and additional information for HWMU-7, no constituents were detected in the point of compliance wells at concentrations greater than their respective GPSs during calendar year 2010. Therefore, no further action is recommended at this time.

The Appendix IX constituent chloroform was detected in upgradient well 7W12B and in point of compliance wells 7WCA and 7W11B during Second Quarter 2010. Chloroform will not be added to the Compliance Monitoring Constituent List for HWMU-7 based on the June 14,

2007 concurrence by the VDEQ with the ASD for chloroform at HWMU-7 submitted on January 31, 2007. No additional Appendix IX constituents were detected during Second Quarter 2010; therefore, no changes to the Groundwater Monitoring List for the Unit are required.

An evaluation of the plume monitoring well data indicates that the concentrations of total barium in plume monitoring wells 7W10B and 7W10C were greater than the site-specific background concentration. Additionally, the concentrations of total cobalt in plume monitoring well 7W13 were greater than the site-specific background concentration. As stated previously, higher total barium and total cobalt concentrations in downgradient plume monitoring wells relative to background at HWMU-7 may be the result of natural variations in trace element distribution in groundwater. In addition, these concentrations are consistent with previous barium and cobalt concentrations detected these wells. Therefore, no further action regarding the total barium concentrations detected in plume monitoring wells 7W10B and 7W10C or the total cobalt concentrations detected in plume monitoring well 7W13 is recommended at this time.

During Fourth Quarter 2010, total arsenic was initially detected in plume monitoring well 7W13 at a concentration of 20.2 µg/l, which is greater than the site-specific background concentration of 10 µg/l. On December 16, 2010, a verification sample and a blind field duplicate were collected from well 7W13 in order to confirm or refute the initial concentration. Based on the verification results and historical data, the final result for total arsenic in well 7W13 for Fourth Quarter 2010 was reported as not detected at or above the background value (and QL) of 10 µg/l. Therefore, no further action with respect to total arsenic in well 7W13 is necessary at this time. Total arsenic will continue to be monitored in plume monitoring well 7W13 during the upcoming semiannual monitoring event for HWMU-7.

In correspondence to the VDEQ dated August 9, 2007, Radford AAP submitted a Class 3 permit modification for the Post-Closure Care Permit for HWMUs 5, 7, 10, and 16. The permit modification included an amended closure plan for HMWU-7. Upon incorporation of the Class 3 permit modification into the Permit, Radford AAP will finalize the closure report for HWMU-7. The closure report will include a clean closure evaluation for soil and groundwater at the Unit.

HWMU-10

Based on an evaluation of the groundwater analytical data and additional information for HWMU-10, no constituents were detected at concentrations greater than their respective GPSs during calendar year 2010. Therefore, no further action is recommended at this time.

No additional Appendix IX constituents were detected during Second Quarter 2010; therefore, no changes to the Groundwater Monitoring List for the Unit are required.

HWMU-16

Based on an evaluation of the groundwater analytical data and additional information for HWMU-16, no constituents were detected at concentrations greater than their respective GPSs during calendar year 2010. Therefore, no further action is recommended at this time.

The Appendix IX constituents benzene, 1,1-dichloroethene, and tetrahydrofuran were detected in upgradient well 16C1 during Second Quarter 2010. However, as 16C1 is the background well for HWMU-16, the detected benzene, 1,1-dichloroethene, and tetrahydrofuran concentrations appear to be derived from a source upgradient of the Unit. As a result, benzene, 1,1-dichloroethene, and tetrahydrofuran will not be added to the Groundwater Monitoring List for the Unit. No additional Appendix IX constituents were confirmed in the point of compliance wells during Second Quarter 2010; therefore, no changes to the Groundwater Monitoring List for the Unit are required.

The evaluation of the plume monitoring well data indicated that the concentrations of total barium upgradient well 16C1 and in plume monitoring wells 16-1, 16-2, 16-3, 16-5, and 16SPRING were greater than the site-specific background concentration. As stated previously, higher total barium concentrations in downgradient plume monitoring wells relative to background are likely due to natural variations in trace element distribution in groundwater. Upgradient well 16C1 is screened in limestone while downgradient plume monitoring wells 16-1, 16-2, 16-3, and 16-5 are screened in shale and fault breccia. Such differing lithologic formations would be expected to contain very different trace element distributions. Therefore, no further action regarding the 2010 total barium concentrations detected in plume monitoring wells 16-1, 16-2, 16-3, and 16-5 and in spring sampling location 16SPRING is recommended at this time.

1.0 INTRODUCTION

This document presents the Annual Groundwater Monitoring Report for calendar year 2010 for Hazardous Waste Management Units (HWMUs) 5, 7, 10, and 16 located at the Radford Army Ammunition Plant (Radford AAP) in Radford, Virginia. The Annual Groundwater Monitoring Report was compiled in accordance with the requirements specified in the Final Hazardous Waste Post-Closure Care Permit dated October 4, 2002, for HWMUs 5, 7, 10, and 16.

The Annual Groundwater Monitoring Report presents the following set of information for each Unit: basic information and unit identification, a description of the groundwater monitoring plan, a discussion of groundwater movement, potentiometric surface maps, a table of groundwater elevations, and detailed statistical evaluations of the analytical data.

Please note that the sampling frequency for HWMUs 5, 7, 10, and 16 was changed from quarterly to semiannual in the VDEQ-approved Class 1 Permit Modification dated June 14, 2007. Therefore, this Annual Groundwater Monitoring Report evaluates the analytical data from Second Quarter 2010 and Fourth Quarter 2010 for each Unit. Copies of correspondence relating to groundwater monitoring activities conducted at HWMUs 5, 7, 10, and 16 during calendar year 2010 are included (on CD-ROM) in **Appendix G**.

1.1 HWMU-5

HWMU-5 is a closed lined neutralization pond. The Unit received certification for closure in 1989. As stated in Permit Condition I.K.1 of the Final Post-Closure Care Permit, the Compliance Period during which the Groundwater Protection Standard applies to HWMU-5 is 19 years, beginning on the effective date of the original Post-Closure Care Permit for HWMU-5 (October 28, 2001) and continuing until October 28, 2020. The Second Quarter 2010 groundwater monitoring event served as the first semiannual Corrective Action (CA) groundwater monitoring event for HWMU-5 conducted in accordance with Permit Module VI – Groundwater Corrective Action & Monitoring Program for Unit 5, which was approved by the VDEQ in the Final Class 3 Hazardous Waste Permit Modification dated November 5, 2009. This report is the ninth complete Annual Groundwater Monitoring Report submitted to the Virginia Department of Environmental Quality (VDEQ) for this Unit during the Compliance Period, and the first complete Annual Groundwater Monitoring Report submitted to the VDEQ under the Groundwater Corrective Action & Monitoring Program.

1.2 HWMU-7

HWMU-7 is a closed unlined holding and neutralization basin. The Unit received certification for closure in 1990. As stated in Permit Condition I.K.2, the Compliance Period during which the Groundwater Protection Standard applies to HWMU-7 is 18 years, beginning on the effective date of the original Post-Closure Care Permit for HWMU-7 (October 30, 1999) and continuing until October 30, 2017. This report is the eleventh complete Annual Groundwater Monitoring Report submitted to the VDEQ for this Unit during the Compliance Period.

1.3 HWMU-10

HWMU-10 is a closed equalization basin for the biological treatment system. The Unit received certification for closure in 1998. As stated in Permit Condition I.K.3, the Compliance Period during which the Groundwater Protection Standard applies to HWMU-10 is 18 years, beginning on the effective date of the Final Hazardous Waste Post-Closure Care Permit for Hazardous Waste Management Units 5, 7, 10, and 16 (October 4, 2002) and continuing until October 4, 2020. This report is the ninth Annual Groundwater Monitoring Report submitted to the VDEQ for this Unit during the Compliance Period.

1.4 HWMU-16

HWMU-16 is a closed hazardous waste landfill. The Unit received certification for closure in 1993. As stated in Permit Condition I.K.4, the Compliance Period during which the Groundwater Protection Standard applies to HWMU-16 is 13 years, beginning on the effective date of the Final Hazardous Waste Post-Closure Care Permit for Hazardous Waste Management Units 5, 7, 10, and 16 (October 4, 2002) and continuing until October 4, 2015. This report is the ninth Annual Groundwater Monitoring Report submitted to the VDEQ for this Unit during the Compliance Period.

2.0 HWMU-5 ANNUAL GROUNDWATER MONITORING REPORT

2.1 Waste Management Unit Information

Unit Name: Hazardous Waste Management Unit 5 (HWMU-5)
Owner/Operator: United States Army/Alliant Techsystems Inc.

Unit Location: Radford AAP Main Plant Area, Radford, Virginia

Class: Hazardous Waste Management Unit
Type: Closed Lined Neutralization Pond

2.2 Groundwater Monitoring Plan

Monitoring Network:

Upgradient Well:	5W8B
Point of Compliance Wells:	5W5B, 5W7B, 5WC21, 5WC22, 5WC23
Plume Monitoring Wells:	5W12A
Observation Wells:	S5W5, S5W7, 5W9A, 5W10A, 5W11A, 5WCA, S5W6, S5W8, 5WC11, 5WC22

Monitoring Status: Corrective Action Monitoring Program

CY 2010 Monitoring Events:

Second Quarter 2010:	April 21-22, 2010
Fourth Quarter 2010:	October 26-27, 2010

The calendar year 2010 groundwater monitoring events served as the first and second semiannual Corrective Action (CA) groundwater monitoring events for HWMU-5 conducted in accordance with Permit Module VI – *Groundwater Corrective Action & Monitoring Program for Unit 5*, which was approved by the Virginia Department of Environmental Quality (VDEQ) in the *Final Class 3 Hazardous Waste Permit Modification* dated November 5, 2009. As required by the *Final Class 3 Hazardous Waste Permit Modification*, plume monitoring well 5W12A was installed in February 2010 in support of the Natural Attenuation Remedy implemented as the CA method for trichloroethene (TCE) concentrations present in groundwater at the Unit. As part of the Natural Attenuation Remedy, plume monitoring well 5W12A replaces plume monitoring wells S5W5, S5W7, 5W9A, 5W10A, and 5W11A, which in turn were reclassified as observation wells used for the measurement of static water levels only. Copies of the November 5, 2009 *Final Class 3 Hazardous Waste Permit Modification* and the March 3, 2010 *Monitoring Well Installation Report* for well 5W12A are included (on CD-ROM) in **Appendix G**.

2.3 Groundwater Movement

The monitoring wells at HWMU-5 are screened entirely within either weathered carbonate bedrock residuum or alluvium or across the weathered residuum/carbonate bedrock interface. The static water level measurements gathered during the 2010 semiannual monitoring

events are summarized in **Table 1**. Groundwater fluctuations ranged from 0.17 to 2.72 feet during the 2010 groundwater monitoring events. As shown on the HWMU-5 Potentiometric Surface Maps (**Appendix A-1**), groundwater movement beneath the site is generally to the northeast.

Darcian flow conditions were assumed for the alluvium, residuum, and carbonate bedrock beneath HWMU-5. As a result, the groundwater velocities were calculated by multiplying the hydraulic conductivity (determined from previously conducted slug tests) by the average hydraulic gradient across the site and dividing by an assumed effective porosity for the aquifer. The average hydraulic gradient was determined by superimposing three evenly spaced flow line vectors over the potentiometric surface map, measuring their lengths, calculating the head differential over the distances measured, and dividing the head differential by the length of the flow line vectors. The three calculated gradients were then averaged to a single value. Using this method, the average groundwater hydraulic gradient across the site based on Fourth Quarter 2010 groundwater elevations was calculated to be 0.029 ft/ft. Historical slug test data for the site yielded an average hydraulic conductivity of 5.25×10^{-5} ft/second. This value is consistent with literature values for carbonate rock and for clayey, silty sand and gravel alluvium and residuum (Domenico and Schwartz, 1990).

The estimated groundwater velocity across the site was calculated to be approximately 0.33 ft/day or 120 ft/year based on the following:

- Average hydraulic conductivity of 5.25×10^{-5} ft/second.
- Average hydraulic gradient of 0.029 ft/ft.
- Assumed effective porosity of 0.40, based on a representative range of porosities for carbonate rock, weathered residuum, and clayey, silty sand and gravel alluvium (Domenico and Schwartz, 1990).

The actual groundwater flow velocities in the carbonate bedrock may vary as much as one to two orders of magnitude from the velocity presented above depending on water level conditions and the distribution of solution features.

2.4 Groundwater Analytical Data Evaluation

The calendar year 2010 groundwater monitoring events served as the first and second semiannual Corrective Action (CA) groundwater monitoring events for HWMU-5 conducted in accordance with Permit Module VI – *Groundwater Corrective Action & Monitoring Program for Unit 5*, which was approved by the VDEQ in the *Final Class 3 Hazardous Waste Permit Modification* dated November 5, 2009. Specifically, the Second Quarter 2010 and Fourth Quarter 2010 events served as the first and second semiannual monitoring events in which all of the wells in the CA groundwater monitoring network were sampled for the constituents listed in Appendix J to Permit Attachment 2 (Groundwater Corrective Action Targeted Constituents - GPS and Semiannual Monitoring List for HWMU-5). The Second Quarter 2010 event also served as the first annual monitoring event in which the point of compliance wells at HWMU-5 were sampled for the constituents listed in Appendix K to Permit Attachment 2 (Groundwater Corrective Action Annual Monitoring List).

The laboratory analytical results for the 2010 monitoring events are summarized in **Appendix A-2** (Groundwater Corrective Action Targeted Constituents - GPS and Semiannual Monitoring List) and in **Appendix A-3** (Groundwater Corrective Action Annual Monitoring List). The laboratory analytical results for the 2010 monitoring events are included on CD-ROM in **Appendix E**. The analytical data were validated in accordance with SW-846, *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review*, and *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*. Data validation reports are included in **Appendix E**. Copies of field notes recorded during sample collection are included on CD-ROM in **Appendix F**.

2.4.1 Semiannual Monitoring for Corrective Action Targeted Constituents

During the Second Quarter 2010 and Fourth Quarter 2010 monitoring events, groundwater samples collected from all of the wells in the CA groundwater monitoring network were analyzed for the constituents listed in Appendix J to Permit Attachment 2. The CA Targeted Constituents consist of TCE and its daughter products: 1,1-dichloroethene (1,1-DCE), *cis*-1,2-dichloroethene (*c*DCE), *trans*-1,2-dichloroethene (*t*DCE), and vinyl chloride (VC). Additionally, groundwater samples collected during the first year of CA monitoring are analyzed for the monitored natural attenuation (MNA) indicator parameters: ethane, ethene, methane, nitrate, nitrite, sulfate, sulfite, and total organic carbon (TOC). The laboratory analytical results for the MNA indicator parameters are summarized in **Appendix A-2**.

During Second Quarter 2010, TCE was detected in POC wells 5W5B, 5WC21, 5WC22, and 5WC23 at concentrations ranging from 2.6 µg/l to 4.4 µg/l, which are less than the GPS of 5 µg/l (**Appendix A-2**). TCE was not detected in any of the other wells in the CA groundwater monitoring network. Additionally, the TCE daughter products were not detected in any of the wells comprising the CA groundwater monitoring network.

During Fourth Quarter 2010, TCE was detected in POC wells 5WC21, 5WC22, and 5WC23 at concentrations ranging from 3.9 µg/l to 4 µg/l, which are less than the GPS of 5 µg/l (**Appendix A-2**). However, TCE was detected in POC well 5W5B at a concentration of 7.3 µg/l, which is greater than the GPS of 5 µg/l (**Appendix A-2**). TCE was not detected in any of the other wells in the CA groundwater monitoring network. Additionally, the TCE daughter products were not detected in any of the wells comprising the CA groundwater monitoring network.

Of the MNA indicator parameters, nitrate, sulfate, and TOC were detected in all of the wells comprising the CA groundwater monitoring network during both 2010 monitoring events; no other MNA indicator parameters were detected (**Appendix A-2**).

2.4.2 Annual Monitoring List - Comparison to Groundwater Protection Standards

During Second Quarter 2010, groundwater samples collected from the POC wells for HWMU-5 were analyzed for the constituents listed in Appendix K to Permit Attachment 2 (Groundwater Corrective Action Annual Monitoring List). Annual monitoring for the constituents listed in Appendix K is required in order to evaluate whether additional hazardous

constituents that are not the targets for the current Corrective Action (e.g., TCE and its daughter products) are present at concentrations greater than the Groundwater Protection Standards (GPS) for the Unit.

As part of the November 5, 2009 *Final Class 3 Hazardous Waste Permit Modification*, the GPS for HWMU-5 were revised to incorporate the January 2009 VDEQ Alternate Concentration Limits (ACLs). As a result, the GPS for total cobalt was reduced from the previous VDEQ ACL used in the original Permit (313 µg/l) to the HWMU-5 background concentration of 7 µg/l. During Second Quarter 2010, total cobalt was detected in point of compliance well 5WC21 at a concentration of 70.4 µg/l, which is greater than the revised GPS of 7 µg/l (**Appendix A-3**). Cobalt is an additional hazardous constituent that is not a target of the current Corrective Action for the Unit. Total cobalt has never been detected in groundwater at HWMU-5 at concentrations greater than the previous GPS. Furthermore, the total cobalt concentration detected in well 5WC21 is consistent with historical data for that well.

On October 8, 2010, Radford AAP submitted to the VDEQ an alternate source demonstration (ASD) evaluating whether total cobalt concentrations detected in POC well 5WC21 were due to natural variability in the groundwater. In correspondence dated December 20, 2010, the VDEQ stated that the ASD did not conclusively demonstrate that the cobalt concentrations detected in POC well 5WC21 were caused by natural variation in the groundwater. However, due to the declining cobalt concentrations and the fact that Radford AAP is already implementing a monitored natural attenuation program to address organics in the vicinity of several wells, including well 5WC21, the VDEQ agreed that the ongoing corrective action monitoring program is sufficient to address the cobalt concentrations detected in well 5WC21 which were greater than the proposed new GPS. Therefore, the VDEQ determined that no changes to the groundwater corrective action and monitoring program at Unit 5 were necessary, and directed Radford AAP to continue monitoring under the existing groundwater monitoring program. Copies of the October 8, 2010 ASD for cobalt and subsequent correspondence are included (on CD-ROM) in **Appendix G**.

No other additional hazardous constituents that are not targets for the current Corrective Action for the Unit were detected at concentrations greater than their respective GPS during Second Quarter 2010. TCE was not detected in any of the point of compliance wells at concentrations greater than its GPS. Additionally, no daughter products of TCE were detected in any of the point of compliance wells.

2.4.3 Annual Monitoring List – Verification of Estimated Values

A footnote presented in Appendix K to Permit Attachment 2 indicates that verification is required for constituents detected at concentrations less than the Quantitation Limit (QL) if their associated GPS are 1) based on background values equal to the QL, and 2) are greater than the applicable risk-based concentrations (i.e., ACL or RBC). In these instances, verification must be conducted using an alternate low-level analytical method in order to confirm or refute the observed initial detections. If a concentration greater than the low-level analytical method QL is observed, then the GPS for that constituent will be updated, if warranted.

During Second Quarter 2010, p-nitroaniline and nitrobenzene (which have GPS based on background values equal to their respective QLs) were detected in point of compliance wells 5WC21, 5WC22, and/or 5WC23 at concentrations less than their respective QLs (**Table 2**). As a result, Radford AAP conducted a verification event using an alternate low-level analytical method to confirm or refute the observed initial detections. The subject constituents were not detected in any of the verification samples at concentrations greater than their respective low-level analytical method QLs; therefore, no further action is warranted.

2.5 Annual Evaluation of Effectiveness of Corrective Action

In accordance with Sections VI.B.6, VI.J.4.f and VI.J.4.g and other applicable sections of the *Final Class 3 Hazardous Waste Permit Modification* dated November 5, 2009, Radford AAP performed an annual evaluation of the effectiveness of the Corrective Action Program (CAP) (monitored natural attenuation [MNA] program) for calendar year 2010. MNA is the current remedial measure implemented at the Unit to address TCE in groundwater at concentrations greater than the GPS. In accordance with the applicable sections of the Permit, the evaluation includes the following:

- Construction of long-term concentration plots of constituents of concern (COCs) detected at concentrations greater than their respective GPS.
- Calculation of a Point Attenuation Rate for each detected COC and determination of an updated compliance (MNA remedial) timeframe prediction based on revised point attenuation rates determined from concentration versus time graphs using the principles and methods presented in Section 7.4 of Permit Attachment 2, Appendix I (CAP).
- Comparison of updated MNA remedial timeframe to the 2019 MNA remedial timeframe (MNA goal per CAP).
- Determination of the effectiveness of the Current Remedial Measure.

2.5.1 Construction of Long-term Concentration Plots of COCs

In accordance with the Permit, graphs of natural-log concentration versus time for monitoring wells exhibiting current detections of TCE and degradation products (current COCs) at concentrations greater than their respective GPS values were constructed (**Appendix A-4**). During Second Quarter 2010, TCE was detected in point of compliance well 5W5B at a concentration less than the GPS of 5 µg/l. However, during Fourth Quarter 2010, TCE was detected in well 5W5B at a concentration greater than the GPS of 5 µg/l. TCE was not detected at concentrations greater than the GPS in any other wells comprising the CA monitoring network during the calendar year 2010 monitoring events. The observed concentration fluctuations of TCE in point of compliance well 5W5B are consistent with typical historical concentration fluctuations of TCE in that well. In accordance with the Permit, a long-term concentration plot of the natural-log concentration of TCE in well 5W5B versus time was constructed. A linear regression line shows clearly decreasing trends in TCE concentration in well 5W5B over time (**Appendix A-4**). An isoconcentration map illustrating TCE concentrations detected in groundwater during the Fourth Quarter 2010 event is included in **Appendix A-4**.

TCE was detected in monitoring wells 5WC21, 5WC22 and 5WC23 during both 2010 monitoring events at concentrations less than the GPS of 5 µg/l. Therefore, no concentration

plots were required for TCE in those wells. The TCE concentrations in 5WC21, 5WC22 and 5WC23 continue to show consistent decrease in comparison with their historical data (**Appendix A-4**).

To date no daughter products of TCE (i.e., other COCs) have been detected in the groundwater samples collected at from the wells comprising the CA monitoring network at HWMU-5.

Overall, the above evaluation shows that concentrations of TCE are decreasing in the groundwater at the Unit. Therefore, the current remedial measure (MNA) is performing effectively in addressing the TCE concentrations in groundwater at the Unit.

2.5.2 Calculation of Point Attenuation Rates and Updated Compliance (MNA Remedial) Timeframe

TCE is the only current COC detected at concentrations greater than its GPS at the Unit (specifically, in well 5W5B). Therefore an updated point attenuation rate was calculated for TCE concentration in well 5W5B. The updated point attenuation rate is 0.0006, which is based on a linear regression, where the slope of the regression represents the attenuation rate, k_{point} (see attached MNA Effectiveness Evaluation Concentration Trend Graph and Point Attenuation Rate Constant Calculation for TCE in Well 5W5B; **Appendix A-4**). The data set used to calculate the point attenuation rate encompasses TCE concentrations detected in well 5W5B from the last 16 monitoring events beginning with April 18, 2005 to the present (October 26, 2010).

The updated MNA Compliance timeframe was calculated using the following equation:

$$t = -[\ln(C_{goal}/C_{start})]/k_{point}$$

whereas:

t = predicted GPS remedial time frame
C_{goal} = GPS concentration (5 µg/l)
C_{start} = current constituent concentration (7.3 µg/l)
k_{point} = natural attenuation rate (0.0006)

$$t = -[\ln(5/7.3)]/0.0006$$
$$t = 1.73 \text{ years}$$

The calculated current MNA timeframe (date) is mid-2012.

The current MNA timeframe is less than that 2019 MNA goal (MNA remedial timeframe presented in the CAP) and less than the 2026 MNA ineffective date (as specified in the CAP). Therefore, the current remedy is considered effective and no additional action is required.

2.6 Recommendations

During Second Quarter 2010, trichloroethene (TCE) was detected in point of compliance well 5W5B at a concentration less than the GPS of 5 µg/l. However, during Fourth Quarter

2010, TCE was detected in well 5W5B at a concentration greater than the GPS of 5 µg/l. However, no daughter products of TCE were detected in well 5W5B during the 2010 monitoring events. The observed concentration fluctuations of TCE in point of compliance well 5W5B are consistent with typical historical concentration fluctuations of TCE in that well. TCE was not detected at concentrations greater than the GPS in any other wells comprising the CA monitoring network during the calendar year 2010 monitoring events, and no daughter products of TCE were detected in the wells comprising the CA monitoring network. In accordance with the Permit, a long-term concentration plot of the natural-log concentration of TCE in well 5W5B versus time was constructed. A linear regression line shows clearly decreasing trends in TCE concentration in well 5W5B over time. Based on the data collected to date, the current calculated compliance timeframe for corrective action (monitored natural attenuation [MNA]) is mid-2012, which is less than the MNA remedial timeframe goal of 2019 as presented in the Permit, and less than the 2026 MNA ineffective date as specified in the Permit. Therefore, the current remedial measure (MNA) is performing effectively in addressing the TCE concentrations in groundwater at the Unit, and no additional action is required.

In correspondence dated December 20, 2010, the VDEQ stated that the October 8, 2010 ASD for cobalt in groundwater did not conclusively demonstrate that the cobalt concentrations detected in POC well 5WC21 were caused by natural variation in the groundwater. However, due to the declining cobalt concentrations and the fact that Radford AAP is already implementing a monitored natural attenuation program to address organics in the vicinity of several wells, including well 5WC21, the VDEQ agreed that the ongoing corrective action monitoring program is sufficient to address the cobalt concentrations detected in well 5WC21 which were greater than the proposed new GPS. Therefore, the VDEQ determined that no changes to the groundwater corrective action and monitoring program at Unit 5 were necessary, and directed Radford AAP to continue monitoring under the existing groundwater monitoring program.

3.0 HWMU-7 ANNUAL GROUNDWATER MONITORING REPORT

3.1 Waste Management Unit Information

Unit Name: Hazardous Waste Management Unit 7 (HWMU-7)
Owner/Operator: United States Army/Alliant Techsystems Inc.

Unit Location: Radford AAP Main Plant Area, Radford, Virginia

Class: Hazardous Waste Management Unit
Type: Closed Unlined Holding and Neutralization Basin

3.2 Groundwater Monitoring Plan

Monitoring Network:

Upgradient Well:	7W12B
Point of Compliance Wells:	7WCA, 7MW6, 7W11B
Plume Monitoring Wells:	7W9C, 7W10B, 7W10C, 7W13
Observation Wells:	7MW5, 7W9B, 7W11

Monitoring Status: Compliance Monitoring Program

CY 2010 Monitoring Events:

Second Quarter 2010:	April 19-20, 2010
Fourth Quarter 2010:	October 25-26, 2010

3.3 Groundwater Movement

The monitoring wells at HWMU-7 are screened entirely within alluvium, weathered carbonate bedrock residuum, or carbonate bedrock or across the interfaces between two of the listed strata. The static water level measurements gathered during the 2010 semiannual monitoring events are summarized in **Table 2**. Groundwater fluctuations ranged from 0.49 to 3.07 feet annually. As shown on the HWMU-7 Potentiometric Surface Maps (**Appendix B-1**), groundwater movement beneath the site is generally to the west towards the New River and to the northeast and southwest toward the unnamed intermittent drainages that flow into the New River north and south of the site.

Darcian flow conditions were assumed for the alluvium, residuum, and carbonate bedrock beneath HWMU-7. As a result, the groundwater velocities were calculated by multiplying the hydraulic conductivity (determined from previously conducted slug tests) by the average hydraulic gradient across the site, and dividing by an assumed effective porosity for the aquifer materials. The average hydraulic gradient was determined by superimposing three evenly spaced flow line vectors over the potentiometric surface map, measuring their lengths, calculating the head differential over the distances measured, and dividing the head differential by the length of the flow line vectors. The three calculated gradients were then averaged to a single value. Using this method, the average groundwater hydraulic gradient across the site

based on the Fourth Quarter 2010 groundwater elevations was calculated to be 0.008 ft/ft. Historical slug test data for the site yielded an average hydraulic conductivity of 5.1 x 10^{-6} ft/second. This value is consistent with literature values for carbonate rock and for clayey, silty sand and gravel alluvium and residuum (Domenico and Schwartz, 1990).

The estimated groundwater velocity across the site was calculated to be approximately 8.81 x 10^{-3} ft/day or 3.2 ft/year, based on the following:

- Average hydraulic conductivity of 5.1 x 10^{-6} ft/second.
- Average hydraulic gradient of 0.008 ft/ft.
- Assumed effective porosity of 0.40, based on a representative range of porosities for carbonate rock, weathered residuum, and clayey, silty sand and gravel alluvium (Domenico and Schwartz, 1990).

The actual groundwater flow velocities in the carbonate bedrock may vary as much as one to two orders of magnitude from the velocity presented above depending on water level conditions and the distribution of solution features.

3.4 Groundwater Analytical Data Evaluation

The groundwater samples collected from the compliance monitoring network during the 2010 semiannual monitoring events were analyzed for the constituents listed in Appendix E to Attachment 3 of the Final Post-Closure Care Permit, plus copper (which was added to the constituent list for HWMU-7 following Third Quarter 2003) and zinc (which was added to the constituent list for HWMU-7 following Second Quarter 2004). In addition, groundwater samples were collected from the upgradient well and the point of compliance wells for the annual monitoring for the constituents listed in Appendix IX of 40 CFR Part 264. The laboratory analytical results for the 2010 monitoring events are included in **Appendix B-2** (point of compliance wells) and in **Appendix B-3** (plume monitoring wells). The laboratory analytical results for the 2010 monitoring events also are included in electronic format in **Appendix E**. The analytical data were validated in accordance with SW-846, *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review*, and *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*. Data validation reports are included in **Appendix E**. Copies of field notes recorded during sample collection are included on CD-ROM in **Appendix F**.

3.4.1 Comparison to Groundwater Protection Standards

As specified in Permit Condition V.J.2.i, the 2010 groundwater analytical data for the upgradient well and the point of compliance wells were compared to the GPSs for HWMU-7 listed in Appendix G of Permit Attachment 3. In accordance with Permit Condition V.I.2, Radford AAP performed a simple empirical comparison of the upgradient well and the point of compliance well data to the GPSs (**Appendix B-2**).

As shown in **Appendix B-2**, no constituents were detected at concentrations greater than their respective GPSs.

3.4.2 Comparison to Background Concentrations

As specified in Permit Condition V.O, the 2010 groundwater analytical data for the plume monitoring wells were compared to the background concentrations for HWMU-7. The original background concentrations as presented in the Groundwater Quality Assessment Report for HWMU-7 dated August 1998 are listed in Appendix F of Permit Attachment 3. However, in correspondence dated October 31, 2007, the VDEQ indicated that Radford AAP should statistically recalculate the background concentration values for HWMU-7 as part of the clean closure evaluation for the Unit. In February 2008, Draper Aden Associates recalculated background values for all plume monitoring well constituents at HWMU-7. For the calendar year 2010 semiannual monitoring events, Radford AAP performed a simple empirical comparison of the plume monitoring well data to the site-specific background concentrations presented in Appendix F of Permit Attachment 3, as well as the February 2008 revised background values presented in the pending Class 3 Permit Modification for HWMUs 5, 7, 10, and 16 (**Appendix B-3**).

As shown in **Appendix B-3**, total barium concentrations detected in plume monitoring well 7W10B during both 2010 semiannual monitoring events were greater than the Permit-specified background concentration of 64 µg/l as well as the February 2008 revised background concentration of 41 µg/l. Additionally, the total barium concentrations detected in plume monitoring well 7W10C during both 2010 semiannual monitoring events were greater than the February 2008 revised background concentration of 41 µg/l, but less than the Permit-specified background concentration of 64 µg/l. However, all of the total barium concentrations detected in wells 7W10B and 7W10C were more than an order of magnitude below the USEPA MCL for barium of 2,000 µg/l. Higher total barium concentrations in downgradient plume monitoring wells relative to background at HWMU-7 may be the result of natural variations in trace element distribution in groundwater. In addition, these concentrations are consistent with previous barium concentrations detected these wells.

As also shown in **Appendix B-3**, total cobalt concentrations detected in plume monitoring well 7W13 during both 2010 semiannual monitoring events were greater than the February 2008 revised background concentration of 5 µg/l, but less than the Permit-specified background concentration of 17 µg/l. A higher total cobalt concentration in downgradient plume monitoring well 7W13 relative to background at HWMU-7 may be the result of natural variations in trace element distribution in groundwater. In addition, the total cobalt concentrations detected in well 7W13 are consistent with previous cobalt concentrations detected in this well.

During Fourth Quarter 2010, total arsenic was initially detected in plume monitoring well 7W13 at a concentration of 20.2 µg/l, which is greater than the site-specific background concentration of 10 µg/l. On December 16, 2010, a verification sample and a blind field duplicate were collected from well 7W13 in order to confirm or refute the initial concentration. Total arsenic was detected in the verification sample and in the blind field duplicate at concentrations of 10.1 µg/l and 10.6 µg/l, respectively. However, the laboratory sample duplicate did not exhibit a total arsenic concentration greater than the quantitation limit (QL) of

10 µg/l. Radford AAP notified the VDEQ regarding these results on January 11, 2011; in electronic correspondence dated January 19, 2011, the VDEQ recommended the collection of four (4) independent samples from well 7W13 during the first semiannual monitoring event for 2011 in order to confirm the presence and concentration of total arsenic. However, further review of historical arsenic data for plume monitoring well 7W13 indicate that total arsenic has not been detected at concentrations greater than the site-specific background of 10 µg/l during the previous 23 monitoring events (since Second Quarter 2003; data collected prior to Second Quarter 2003 were not validated and are considered suspect). Based on the historical data, and due to the fact that total arsenic was not consistently detected at a concentration greater than 10 µg/l in the December 16, 2010 verification sample, blind field duplicate, and laboratory duplicate, the final result for total arsenic in well 7W13 for Fourth Quarter 2010 was reported as not detected at or above the background value (and QL) of 10 µg/l.

In summary:

- Total arsenic was detected in the verification sample from well 7W13 at a concentration of 10.1 µg/l;
- Total arsenic was not detected at a concentration equal to or greater than the QL of 10 µg/l in the laboratory duplicate obtained from the same container as the verification sample for well 7W13;
- Historical data for the previous 23 monitoring events indicate that total arsenic has not been detected in well 7W13 at concentrations equal to or greater than 10 µg/l.

Because total arsenic was not consistently detected at a concentration equal to or greater than the QL of 10 µg/l in two aliquots **obtained from the same container**, and historically has not been detected at a concentration equal to or greater than the QL in this well, Radford AAP concludes that total arsenic has not been reliably detected at a concentration greater than background in well 7W13. Therefore, no further action with respect to total arsenic in well 7W13 is necessary at this time.

No other constituent concentrations detected in the plume monitoring wells were greater than their respective background concentrations.

In accordance with the requirements of Permit Condition V.K.3, the established background values and the computations used to determine the background values are included in **Appendix B-4**. This includes both the background values and computations associated with Appendix F of Permit Attachment 3 (excerpted from the Groundwater Quality Assessment Report for HWMU-7 dated August 1998), as well as the February 2008 revised background values presented in the pending Class 3 Permit Modification for HWMUs 5, 7, 10, and 16.

3.4.3 Annual Monitoring for Constituents Listed in Appendix IX of 40 CFR Part 264

During Second Quarter 2009, the groundwater samples collected from the upgradient well and the point of compliance wells were analyzed for the constituents listed in Appendix IX to 40 CFR Part 264 in accordance with Permit Condition V.J.2.e. Upon receipt of the Second Quarter 2010 analytical data, Radford AAP notified the VDEQ of the detection of one additional

Appendix IX constituent (chloroform) that was not listed in Appendix E of Permit Attachment 3 (Unit 7 – Groundwater Compliance Monitoring (Quarterly) Constituent List). Chloroform was detected in upgradient well 7W12B and in point of compliance wells 7WCA and 7W11B. However, Radford AAP did not verify the chloroform concentrations detected in wells 7W12B, 7WCA, and 7W11B based on the June 14, 2007 concurrence by the VDEQ with the Alternate Source Demonstration (ASD) for chloroform at HWMU-7 submitted on January 31, 2007, which identified an upgradient off-site source for chloroform in groundwater. Therefore, chloroform will not be added to the Groundwater Monitoring List for the Unit.

No additional Appendix IX constituents were detected during Second Quarter 2010. Therefore, no changes to the Groundwater Monitoring List for the Unit are required.

3.5 Recommendations

Based on an evaluation of the groundwater analytical data and additional information for HWMU-7, no constituents were detected in the point of compliance wells at concentrations greater than their respective GPSs during calendar year 2010. Therefore, no further action is recommended at this time.

The Appendix IX constituent chloroform was detected in upgradient well 7W12B and in point of compliance wells 7WCA and 7W11B during Second Quarter 2010. Chloroform will not be added to the Compliance Monitoring Constituent List for HWMU-7 based on the June 14, 2007 concurrence by the VDEQ with the ASD for chloroform at HWMU-7 submitted on January 31, 2007. No additional Appendix IX constituents were detected during Second Quarter 2010; therefore, no changes to the Groundwater Monitoring List for the Unit are required.

An evaluation of the plume monitoring well data indicates that the concentrations of total barium in plume monitoring wells 7W10B and 7W10C were greater than the site-specific background concentration. Additionally, the concentrations of total cobalt in plume monitoring well 7W13 were greater than the site-specific background concentration. As stated previously, higher total barium and total cobalt concentrations in downgradient plume monitoring wells relative to background at HWMU-7 may be the result of natural variations in trace element distribution in groundwater. In addition, these concentrations are consistent with previous barium and cobalt concentrations detected these wells. Therefore, no further action regarding the total barium concentrations detected in plume monitoring wells 7W10B and 7W10C or the total cobalt concentrations detected in plume monitoring well 7W13 is recommended at this time.

During Fourth Quarter 2010, total arsenic was initially detected in plume monitoring well 7W13 at a concentration of 20.2 µg/l, which is greater than the site-specific background concentration of 10 µg/l. On December 16, 2010, a verification sample and a blind field duplicate were collected from well 7W13 in order to confirm or refute the initial concentration. Total arsenic was detected in the verification sample and in the blind field duplicate at concentrations of 10.2 µg/l and 10.6 µg/l, respectively. However, the laboratory sample duplicate did not exhibit a total arsenic concentration greater than the QL of 10 µg/l. Review of historical arsenic data for plume monitoring well 7W13 indicate that total arsenic has not been detected at concentrations greater than the site-specific background of 10 µg/l during the previous 23 monitoring events (since Second Quarter 2003; data collected prior to Second

Quarter 2003 were not validated and are considered suspect). Based on the historical data, and due to the fact that total arsenic was not consistently detected at a concentration greater than 10 µg/l in the December 16, 2010 verification sample, blind field duplicate, and laboratory duplicate, the final result for total arsenic in well 7W13 for Fourth Quarter 2010 was reported as not detected at or above the background value (and QL) of 10 µg/l.

In summary:

- Total arsenic was detected in the verification sample from well 7W13 at a concentration of 10.1 µg/l;
- Total arsenic was not detected at a concentration equal to or greater than the QL of 10 µg/l in the laboratory duplicate obtained from the same container as the verification sample for well 7W13;
- Historical data for the previous 23 monitoring events indicate that total arsenic has not been detected in well 7W13 at concentrations equal to or greater than 10 µg/l.

Because total arsenic was not consistently detected at a concentration equal to or greater than the QL of 10 µg/l in two aliquots **obtained from the same container**, and historically has not been detected at a concentration equal to or greater than the QL in this well, Radford AAP concludes that total arsenic has not been reliably detected at a concentration greater than background in well 7W13. Therefore, no further action with respect to total arsenic in well 7W13 is necessary at this time. Total arsenic will continue to be monitored in plume monitoring well 7W13 during the upcoming semiannual monitoring event for HWMU-7.

In correspondence to the VDEQ dated August 9, 2007, Radford AAP submitted a Class 3 permit modification for the Post-Closure Care Permit for HWMUs 5, 7, 10, and 16. The permit modification included an amended closure plan for HMWU-7. Upon incorporation of the Class 3 permit modification into the Permit, Radford AAP will finalize the closure report for HWMU-7. The closure report will include a clean closure evaluation for soil and groundwater at the Unit.

4.0 HWMU-10 ANNUAL GROUNDWATER MONITORING REPORT

4.1 Waste Management Unit Information

Unit Name: Hazardous Waste Management Unit 10 (HWMU-10)
Owner/Operator: United States Army/Alliant Techsystems Inc.

Unit Location: Radford AAP Main Plant Area, Radford, Virginia

Class: Hazardous Waste Management Unit
Type: Closed Equalization Basin for the Biological Treatment System

4.2 Groundwater Monitoring Plan

Monitoring Network:

Upgradient Well:	10D4
Point of Compliance Wells:	10MW1, 10DDH2R, 10D3, 10D3D
Plume Monitoring Wells:	none
Observation Wells:	none

Monitoring Status: Compliance Monitoring Program

CY 2010 Monitoring Events:

Second Quarter 2010:	April 27-28, 2010
Fourth Quarter 2010:	October 20, 2010

4.3 Groundwater Movement

The monitoring wells at HWMU-10 are screened either across the alluvium/limestone bedrock interface or entirely within bedrock. The static water level measurements gathered during the 2010 semiannual monitoring events are summarized in **Table 3**. Groundwater fluctuations ranged from 0.12 to 4.01 feet annually. As shown on the HWMU-10 Potentiometric Surface Maps (**Appendix C-1**), groundwater movement beneath the site is generally to the north towards the New River.

Darcian flow conditions were assumed for the alluvium and limestone bedrock beneath HWMU-10. As a result, the groundwater velocities were calculated by multiplying the hydraulic conductivity (determined from previously conducted slug tests) by the average hydraulic gradient across the site and dividing by an assumed effective porosity for the aquifer materials. The average hydraulic gradient was determined by superimposing three evenly spaced flow line vectors over the potentiometric surface map, measuring their lengths, calculating the head differential over the distances measured, and dividing the head differential by the length of the flow line vectors. The three calculated gradients were then averaged to a single value. Using this method, the average groundwater hydraulic gradient across the site based on Fourth Quarter 2010 groundwater elevations was calculated to be 0.017 ft/ft. Historical slug test data for the site yielded an average hydraulic conductivity of 4.9×10^{-4} ft/second. This value is consistent with

literature values for limestone and for clayey, silty sand and gravel alluvium (Domenico and Schwartz, 1990).

The estimated groundwater velocity across the site was calculated to be approximately 1.8 ft/day or 656 ft/year, based on the following:

- Average hydraulic conductivity of 4.9×10^{-4} ft/second.
- Average hydraulic gradient of 0.017 ft/ft.
- Assumed effective porosity of 0.40, based on a representative range of porosities for limestone and for clayey, silty sand and gravel alluvium (Domenico and Schwartz, 1990).

The actual groundwater flow velocities in the carbonate bedrock may vary as much as one to two orders of magnitude from the velocity presented above depending on water level conditions and the distribution of solution features.

4.4 Groundwater Analytical Data Evaluation

The groundwater samples collected from the compliance monitoring network during the 2010 semiannual monitoring events were analyzed for the constituents listed in Appendix E to Attachment 4 of the Final Post-Closure Care Permit, plus cobalt and vanadium (which were added to the constituent list for HWMU-10 following Second Quarter 2004) and acetone and 2-propanol (which were added to the constituent list for HMWU-10 following Second Quarter 2005). In addition, groundwater samples were collected from the upgradient well and the point of compliance wells for the annual monitoring for the constituents listed in Appendix IX of 40 CFR Part 264. The laboratory analytical results for the 2010 monitoring events are included in **Appendix C-2**. The laboratory analytical results for the 2010 monitoring events also are included in electronic format in **Appendix E**. The analytical data were validated in accordance with SW-846, *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review*, and *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*. Data validation reports are included in **Appendix E**. Copies of field notes recorded during sample collection are included on CD-ROM in **Appendix F**.

4.4.1 Comparison to Groundwater Protection Standards

As specified in Permit Condition V.J.3.i, the 2010 groundwater analytical data for the upgradient well and the point of compliance wells were compared to GPSs for HWMU-10 listed in Appendix G of Permit Attachment 4. In accordance with Permit Condition V.I.2, Radford AAP performed a simple empirical comparison of the upgradient well and the point of compliance well data to the GPSs (**Appendix C-2**). As shown in **Appendix C-2**, none of the constituent concentrations detected in the upgradient well and in the point of compliance wells were greater than their respective GPSs.

4.4.2 Comparison to Background Concentrations

Only the analytical data from plume monitoring wells are compared to background concentrations. However, the compliance monitoring network at HWMU-10 is composed entirely of point of compliance wells. Therefore, the analytical data from HWMU-10 is not compared to background concentrations.

4.4.3 Annual Monitoring for Constituents Listed in Appendix IX of 40 CFR Part 264

During Second Quarter 2010, the groundwater samples collected from the upgradient well and the point of compliance wells were analyzed for the constituents listed in Appendix IX to 40 CFR Part 264 in accordance with Permit Condition V.J.3.e. No additional Appendix IX constituents, which are not listed in Appendix E of Permit Attachment 4 (Unit 10 – Groundwater Compliance Monitoring (Quarterly) Constituent List), were detected during the Second Quarter 2010 groundwater monitoring event. Therefore, no changes to the Groundwater Monitoring List for the Unit are required.

4.5 Recommendations

Based on an evaluation of the groundwater analytical data and additional information for HWMU-10, no constituents were detected at concentrations greater than their respective GPSs during calendar year 2010. Therefore, no further action is recommended at this time.

No additional Appendix IX constituents were detected during Second Quarter 2010; therefore, no changes to the Groundwater Monitoring List for the Unit are required.

5.0 HWMU-16 ANNUAL GROUNDWATER MONITORING REPORT

5.1 Waste Management Unit Information

Unit Name: Hazardous Waste Management Unit 16 (HWMU-16)
Owner/Operator: United States Army/Alliant Techsystems Inc.

Unit Location: Radford AAP Main Plant Area, Radford, Virginia

Class: Hazardous Waste Management Unit
Type: Closed Hazardous Waste Landfill

5.2 Groundwater Monitoring Plan

Monitoring Network:

Upgradient Well:	16C1
Point of Compliance Wells:	16WC1A, 16WC1B, 16MW8, 16MW9
Plume Monitoring Wells:	16-1, 16-2, 16-3, 16-5, 16WC2B, 16SPRING
Observation Wells:	16WC2A, 16C3, 16CDH3

Monitoring Status: Compliance Monitoring Program

CY 2010 Monitoring Events:

Second Quarter 2010:	April 14-15, 2010
Fourth Quarter 2010:	October 13-14, 2010

5.3 Groundwater Movement

The monitoring wells at HWMU-16 are screened entirely within either carbonate bedrock or weathered carbonate bedrock residuum, or across the residuum/bedrock interface. The static water level measurements gathered during the 2010 semiannual monitoring events are summarized in **Table 4**. Groundwater fluctuations ranged from 0.02 to 11.35 feet annually. As shown on the HWMU-16 Potentiometric Surface Maps (**Appendix D-1**), groundwater movement beneath the site is generally to the northeast.

Darcian flow conditions were assumed for the weathered residuum and carbonate bedrock beneath HWMU-16. As a result, the groundwater velocities were calculated by multiplying the hydraulic conductivity (determined from previously conducted slug tests) by the average hydraulic gradient across the site and dividing by an assumed effective porosity for the aquifer materials. The average hydraulic gradient was determined by superimposing three evenly spaced flow line vectors over the potentiometric surface map, measuring their lengths, calculating the head differential over the distances measured, and dividing the head differential by the length of the flow line vectors. The three calculated gradients were then averaged to a single value. Using this method, the average groundwater hydraulic gradient across the site based on Fourth Quarter 2010 groundwater elevations was calculated to be 0.089 ft/ft. Historical slug test data for the site yielded an average hydraulic conductivity of 7.87×10^{-5} ft/second. This

value is consistent with literature values for carbonate rock and for clay and silt residuum (Domenico and Schwartz, 1990).

The estimated groundwater velocity across the site was calculated to be approximately 1.51 ft/day or 551 ft/year based on the following:

- Average hydraulic conductivity of 7.87 x 10^{-5} ft/second.
- Average hydraulic gradient of 0.089 ft/ft.
- Assumed effective porosity of 0.40, based on a representative range of porosities for carbonate rock and clay and silt residuum (Domenico and Schwartz, 1990).

The actual groundwater flow velocities in the carbonate bedrock may vary as much as one to two orders of magnitude from the velocity presented above depending on water level conditions and the distribution of solution features.

5.4 Groundwater Analytical Data Evaluation

The groundwater samples collected from the compliance monitoring network during the 2010 semiannual monitoring events were analyzed for the constituents listed in Appendix E to Attachment 5 of the Final Post-Closure Care Permit, plus chloroethane, diethyl ether, dimethyl ether, and methylene chloride (which were added to the constituent list for HWMU-16 following Third Quarter 2003), and 1,1,2-trichloro-1,2,2-trifluoroethane (which was added to the constituent list for HWMU-16 following Second Quarter 2004). In addition, groundwater samples were collected from the upgradient well and the point of compliance wells for the annual monitoring for the constituents listed in Appendix IX of 40 CFR Part 264. The laboratory analytical results for the 2010 monitoring events are included in **Appendix D-2** (point of compliance wells) and in **Appendix D-3** (plume monitoring wells). The laboratory analytical results for the 2010 monitoring events also are included in electronic format in **Appendix E**. The analytical data were validated in accordance with SW-846, *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review*, and *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*. Data validation reports are included in **Appendix E**. Copies of field notes recorded during sample collection are included on CD-ROM in **Appendix F**.

5.4.1 Comparison to Groundwater Protection Standards

As specified in Permit Condition V.J.4.i, the 2010 groundwater analytical data for the upgradient well and the point of compliance wells were compared to GPSs for HWMU-16 listed in Appendix G of Permit Attachment 5. In accordance with Permit Condition V.I.2, Radford AAP performed a simple empirical comparison of the upgradient well and the point of compliance well data to the GPSs (**Appendix D-2**).

As shown in **Appendix D-2**, no constituents were detected at concentrations greater than their respective GPSs.

5.4.2 Comparison to Background Concentrations

As specified in Permit Condition V.O, the 2010 groundwater analytical data for the plume monitoring wells were compared to the background concentrations for HWMU-16 listed in Appendix F of Permit Attachment 5. In accordance with Permit Condition V.I.2, Radford AAP performed a simple empirical comparison of the plume monitoring well data to the background concentrations (**Appendix D-3**).

As shown in **Appendix D-3**, total barium concentrations detected in upgradient well 16C1 during Second Quarter 2010 and in plume monitoring wells 16-1, 16-2, and 16-3 and in spring sampling location 16SPRING during both 2010 semiannual monitoring events were greater than the background concentration of 175.4 µg/l. In addition, the total barium concentration detected in plume monitoring well 16-5 during Fourth Quarter 2010 was greater than the background concentration of 175.4 µg/l. However, all of the total barium concentrations detected in the plume monitoring wells were well below the USEPA MCL for barium of 2,000 µg/l. Furthermore, higher barium concentrations in downgradient plume monitoring wells relative to background may be the result of natural variations in trace element distribution in groundwater. As illustrated in the boring logs for the compliance network monitoring wells (Appendix H of Permit Attachment 5), upgradient well 16C1 is screened in limestone while downgradient plume monitoring wells 16-1, 16-2, 16-3, and 16-5 are screened in shale and fault breccia. Such differing lithologic formations would be expected to contain very different trace element distributions.

No other constituent concentrations detected in the plume monitoring wells were greater than their respective background concentrations. In accordance with the requirements of Permit Condition V.K.3, the established background values and the computations used to determine the background values are included in **Appendix D-4**. The background values and associated computations are taken from the Groundwater Quality Assessment Report for HWMU-16 dated August 1999.

5.4.3 Annual Monitoring for Constituents Listed in Appendix IX of 40 CFR Part 264

During Second Quarter 2010, the groundwater samples collected from the upgradient well and the point of compliance wells were analyzed for the constituents listed in Appendix IX to 40 CFR Part 264 in accordance with Permit Condition V.J.4.e. Upon receipt of the Second Quarter 2010 analytical data, Radford AAP notified the VDEQ of the detection of four additional Appendix IX constituents (4,4'-DDD, benzene, 1,1-dichloroethene, and tetrahydrofuran) that were not listed in Appendix E of Permit Attachment 5 (Unit 16 – Groundwater Compliance Monitoring (Quarterly) Constituent List). Benzene, 1,1-dichloroethene, and tetrahydrofuran were detected in upgradient well 16C1. However, as 16C1 is the background well for HWMU-16, the benzene, 1,1-dichloroethene, and tetrahydrofuran concentrations detected in the well appear to be derived from a source upgradient of the Unit. Additionally, benzene and 1,1-dichloroethene were initially detected in point of compliance well 16MW9, and 4,4'-DDD was initially detected in point of compliance well 16WC1B. However, in accordance with Permit Condition V.J.4.e.(1), Radford AAP resampled well 16MW9 for benzene and 1,1-dichloroethene and well 16WC1B for 4,4'-DDD in order to confirm or refute the additional Appendix IX constituent detections in the point of compliance wells.

Benzene, 1,1-dichloroethene, and 4,4'-DDD were not confirmed in the subject point of compliance wells at concentrations greater than their respective detection limits. As a result, 4,4'-DDD, benzene, and 1,1-dichloroethene were not be added to the Groundwater Monitoring List for the Unit. Furthermore, sampling of well 16C1 for Appendix IX constituents is not required per the Post-Closure Care Permit for the Unit; therefore, tetrahydrofuran was not be added to the Groundwater Monitoring List for the Unit.

No additional Appendix IX constituents were detected during Second Quarter 2010. Therefore, no changes to the Groundwater Monitoring List for the Unit are required.

5.5 Recommendations

Based on an evaluation of the groundwater analytical data and additional information for HWMU-16, no constituents were detected at concentrations greater than their respective GPSs during calendar year 2010. Therefore, no further action is recommended at this time.

The Appendix IX constituents benzene, 1,1-dichloroethene, and tetrahydrofuran were detected in upgradient well 16C1 during Second Quarter 2010. However, as 16C1 is the background well for HWMU-16, the detected benzene, 1,1-dichloroethene, and tetrahydrofuran concentrations appear to be derived from a source upgradient of the Unit. As a result, benzene, 1,1-dichloroethene, and tetrahydrofuran will not be added to the Groundwater Monitoring List for the Unit. No additional Appendix IX constituents were confirmed in the point of compliance wells during Second Quarter 2010; therefore, no changes to the Groundwater Monitoring List for the Unit are required.

The evaluation of the plume monitoring well data indicated that the concentrations of total barium upgradient well 16C1 and in plume monitoring wells 16-1, 16-2, 16-3, 16-5, and 16SPRING were greater than the site-specific background concentration. As stated previously, higher total barium concentrations in downgradient plume monitoring wells relative to background are likely due to natural variations in trace element distribution in groundwater. Upgradient well 16C1 is screened in limestone while downgradient plume monitoring wells 16-1, 16-2, 16-3, and 16-5 are screened in shale and fault breccia. Such differing lithologic formations would be expected to contain very different trace element distributions. Therefore, no further action regarding the 2010 total barium concentrations detected in plume monitoring wells 16-1, 16-2, 16-3, and 16-5 and in spring sampling location 16SPRING is recommended at this time.

SIGNATURE/CERTIFICATION

Prepared by:

Name: Ross G. Miller, Senior Project Geologist

Signature: 

Company: Draper Aden Associates

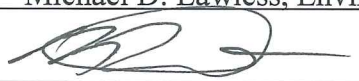
Address: 2206 South Main Street

City/State/Zip: Blacksburg, Virginia 24060-6600

Virginia Professional Certification:

I certify that I have prepared or supervised preparation of the attached report, that it has been prepared in accordance with industry standards and practices, and that the information contained herein is truthful and accurate to the best of my knowledge.

Name: Michael D. Lawless, Environmental Program Manager

Signature: 

Virginia Professional Certification Type and Number: PG 832

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Address: 2206 South Main Street

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TABLES

TABLE 1
HWMU-5
GROUNDWATER ELEVATIONS - 2010
RADFORD ARMY AMMUNITION PLANT
RADFORD, VIRGINIA

MONITORING WELL ID	ELEVATION TOP OF WELL	SECOND QUARTER 2010		FOURTH QUARTER 2010	
		DTW	GW ELEV	DTW	GW ELEV
5W8B	1789.58	14.76	1774.82	15.00	1774.58
5W5B	1775.13	9.39	1765.74	10.27	1764.86
5W7B	1774.78	9.12	1765.66	9.99	1764.79
5WC21	1774.43	9.44	1764.99	9.69	1764.74
5WC22	1774.45	9.45	1765.00	9.66	1764.79
5WC23	1773.84	8.86	1764.98	9.08	1764.76
5W12A	1772.46	11.20	1761.26	12.39	1760.07
S5W5	1772.31	8.24	1764.07	9.46	1762.85
S5W7	1776.08	11.50	1764.58	11.89	1764.19
5W9A	1762.20	1.87	1760.33	3.40	1758.80
5W10A	1771.40	13.32	1758.08	16.04	1755.36
5W11A	1766.20	10.37	1755.83	14.43	1751.77
5WC11	1788.92	16.01	1772.91	16.25	1772.67
5WC12	1788.96	15.68	1773.28	15.98	1772.98
5WCA	1779.05	13.25	1765.80	13.91	1765.14
S5W6	1771.43	7.08	1764.35	8.21	1763.22
S5W8	1783.68	12.14	1771.54	12.31	1771.37

NOTES:
DTW: Depth to water from top of casing.
GW ELEV: Groundwater elevation.
All elevations in feet above mean sea level.

TABLE 2
HWMU-7
GROUNDWATER ELEVATIONS - 2010
RADFORD ARMY AMMUNITION PLANT
RADFORD, VIRGINIA

MONITORING WELL ID	ELEVATION TOP OF WELL	SECOND QUARTER 2010		FOURTH QUARTER 2010	
		DTW	GW ELEV	DTW	GW ELEV
7W12B	1717.31	24.23	1693.08	24.86	1692.45
7WCA	1715.40	24.46	1690.94	25.03	1690.37
7MW6	1715.30	25.30	1690.00	26.58	1688.72
7W11B	1715.90	24.52	1691.38	25.19	1690.71
7W9C	1704.45	13.61	1690.84	14.55	1689.90
7W10B	1706.65	14.89	1691.76	15.67	1690.98
7W10C	1709.30	18.32	1690.98	21.39	1687.91
7W13	1705.42	17.79	1687.63	19.36	1686.06
7W9B	1712.49	22.30	1690.19	22.76	1689.73
7MW5	1716.20	24.52	1691.68	25.01	1691.19
7W11	1714.82	23.46	1691.36	24.25	1690.57

NOTES:
DTW: Depth to water from top of casing.
GW ELEV: Groundwater elevation.
All elevations in feet above mean sea level.

TABLE 3
HWMU-10
GROUNDWATER ELEVATIONS - 2010
RADFORD ARMY AMMUNITION PLANT
RADFORD, VIRGINIA

MONITORING WELL ID	ELEVATION TOP OF WELL	SECOND QUARTER 2010		FOURTH QUARTER 2010	
		DTW	GW ELEV	DTW	GW ELEV
10D4	1714.38	22.78	1691.60	22.90	1691.48
10DDH2R	1704.38	17.74	1686.64	21.42	1682.96
10D3	1702.95	16.07	1686.88	20.08	1682.87
10D3D	1702.64	16.38	1686.26	19.86	1682.78
10MW1	1703.62	15.81	1687.81	19.72	1683.90

NOTES:
DTW: Depth to water from top of casing.
GW ELEV: Groundwater elevation.
All elevations in feet above mean sea level.

TABLE 4
HWMU-16
GROUNDWATER ELEVATIONS - 2010
RADFORD ARMY AMMUNITION PLANT
RADFORD, VIRGINIA

MONITORING WELL ID	ELEVATION TOP OF WELL	SECOND QUARTER 2010		FOURTH QUARTER 2010	
		DTW	GW ELEV	DTW	GW ELEV
16C1	1840.14	48.42	1791.72	50.15	1789.99
16MW8	1815.82	70.67	1745.15	74.58	1741.24
16MW9	1808.88	62.14	1746.74	67.09	1741.79
16WC1A	1812.61	64.21	1748.40	70.28	1742.33
16WC1B	1812.95	64.34	1748.61	70.70	1742.25
16-1	1815.82	41.21	1774.61	47.40	1768.42
16-2	1810.99	55.75	1755.24	55.77	1755.22
16-3	1824.77	55.60	1769.17	56.94	1767.83
16-5	1742.60	3.38	1739.22	3.20	1739.40
16WC2B	1818.71	50.76	1767.95	54.92	1763.79
16WC2A	1820.05	DRY	DRY	DRY	DRY
16C3	1822.22	57.11	1765.11	68.46	1753.76
16CDH3	1825.60	DRY	DRY	DRY	DRY
SPRING	na	na	na	na	na

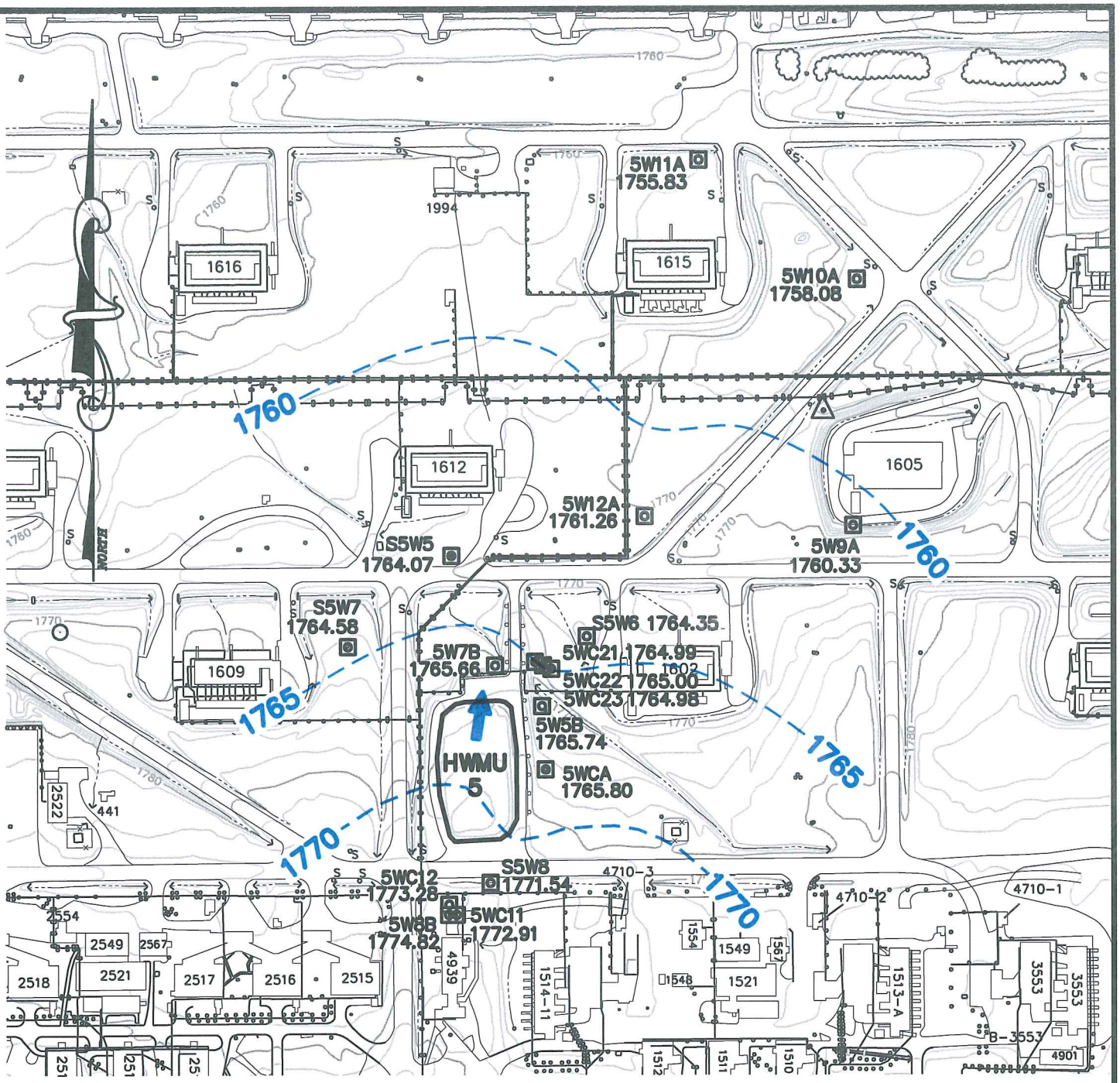
NOTES:
DTW: Depth to water from top of casing.
GW ELEV: Groundwater elevation.
All elevations in feet above mean sea level.
na: Not applicable.

APPENDIX A

HWMU-5

APPENDIX A-1

HWMU-5 POTENTIOMETRIC SURFACE MAPS
SECOND QUARTER 2010
FOURTH QUARTER 2010



GRAPHIC SCALE

200 0 100 200 400

(IN FEET)

1 inch = 200 ft.

LEGEND

5W7B — MONITORING WELL

1765.66 — GROUNDWATER ELEVATION (feet above mean sea level)

1770 — GROUNDWATER CONTOUR

GROUNDWATER FLOW DIRECTION

NOTE: TOPOGRAPHIC CONTOUR INTERVAL 2'

HWMU-5 POTENTIOMETRIC SURFACE MAP (2nd QUARTER 2010)

RADFORD ARMY AMMUNITION PLANT

RADFORD, VIRGINIA

SCALE: 1"=200'

PLAN NO. B03204-08

Draper Aden Associates

Engineering • Surveying • Environmental Services

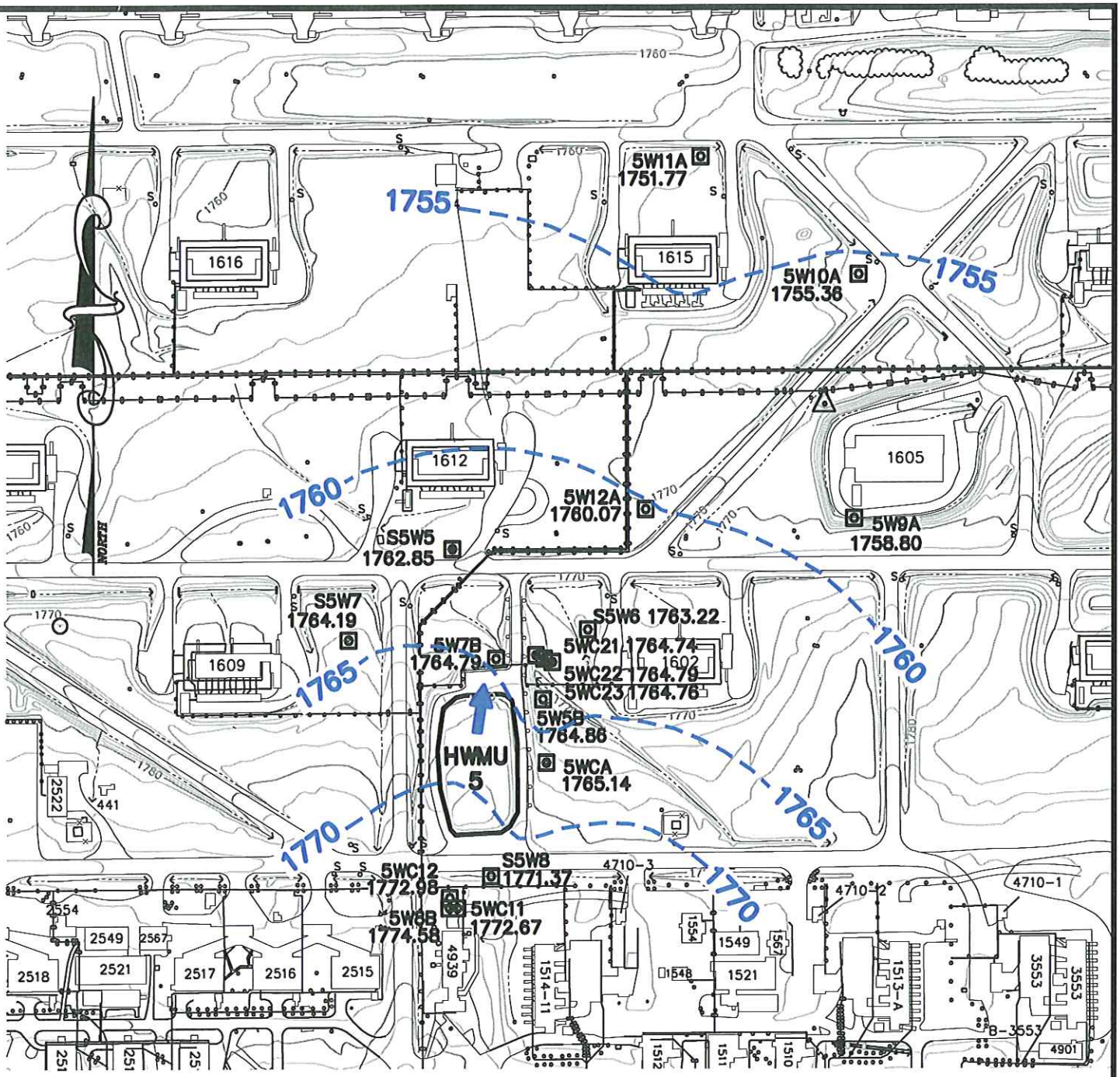
2206 South Main Street
Blacksburg, VA 24060
540-552-0444 Fax: 540-552-0291

Richmond, VA
Charlottesville, VA
Hampton Roads, VA

DESIGNED	RGM
DRAWN	JFF
CHECKED	MDL
DATE	07-27-10

FIGURE 1

P:\B03200\B03204\B03204-08\CAD\B03204-08 ENVdwg\B03204-08_FIG1.dwg Jul 27, 2010 2:57pm



LEGEND

5W7B ◎	MONITORING WELL
1764.79	GROUNDWATER ELEVATION (feet above mean sea level)
--1770--	GROUNDWATER CONTOUR
→	GROUNDWATER FLOW DIRECTION

NOTE: TOPOGRAPHIC CONTOUR INTERVAL 2'

GRAPHIC SCALE

200 0 100 200 400

(IN FEET)
1 inch = 200 ft.

HWMU-5 POTENTIOMETRIC SURFACE MAP (4th QUARTER 2010)

RADFORD ARMY AMMUNITION PLANT

RADFORD, VIRGINIA

SCALE: 1"=200'

PLAN NO. B03204-08

Draper Aden Associates
Engineering ♦ Surveying ♦ Environmental Services
2206 South Main Street
Blacksburg, VA 24060
540-552-0444 Fax: 540-552-0291
Richmond, VA
Charlottesville, VA
Hampton Roads, VA

DESIGNED	RGM
DRAWN	JFF
CHECKED	MDL
DATE	01-27-11

FIGURE 1

P:\B03200\B03204\B03204-08\CAD\B03204-08 ENV\dwg\B03204-08_FIG1.dwg Jan 27, 2011 10:01am

APPENDIX A-2

HWMU-5 2010 LABORATORY ANALYTICAL RESULTS
GROUNDWATER CORRECTIVE ACTION TARGETED CONSTITUENTS
GPS AND SEMIANNUAL MONITORING LIST

Summary of Semiannual Target Analyte Monitoring Results Appendix J
Corrective Action Monitoring Plan - Targeted Constituents
Hazardous Waste Management Unit 5
Radford Army Ammunition Plant, Radford, Virgini

Upgradient well = 5W8B

Analyte/Quarter	5W8B Q	5W5B Q	5W7B Q	5WC21 Q	5WC22 Q	5WC23 Q	5W12A Q	QL	Permit QL	GPS	DL	Permit DL	UNIT	Method
1,1-Dichloroethene						CAS # 75-35-4								
Second Quarter 2010	U	U	U	U	U	U	U	1	1	7	0.1	0.44	ug/l	8260B
Fourth Quarter 2010	U	U	U	U	U	U	U	1	1	7	0.1	0.44	ug/l	8260B
cis-1,2-Dichloroethene						CAS # 156-59-2								
Fourth Quarter 2010	U	U	U	U	U	U	U	1	1	70	0.1	0.1	ug/l	8260B
Second Quarter 2010	U	U	U	U	U	U	U	1	1	70	0.1	0.1	ug/l	8260B
trans-1,2-Dichloroethene						CAS # 156-60-5								
Second Quarter 2010	U	U	U	U	U	U	U	1	1	100	0.1	0.8	ug/l	8260B
Fourth Quarter 2010	U	U	U	U	U	U	U	1	1	100	0.1	0.8	ug/l	8260B
Trichloroethene						CAS # 79-01-6								
Second Quarter 2010	U	2.6	U	4.2	4.4	4.3	U	1	1	5	0.1	0.177	ug/l	8260B
Fourth Quarter 2010	U	7.3	U	4	4	3.9	U	1	1	5	0.1	0.177	ug/l	8260B
Vinyl chloride						CAS # 75-01-4								
Second Quarter 2010	U	U	U	U	U	U	U	1	1	2	0.1	0.1	ug/l	8260B
Fourth Quarter 2010	U	U	U	U	U	U	U	1	1	2	0.1	0.1	ug/l	8260B
Total Organic Carbon						CAS #								
Second Quarter 2010	0.17 J	0.71 J	0.34 J	0.6 J	0.42 J	0.56 J	0.57 J	1			0.13		mg/l	9060A
Fourth Quarter 2010	U	0.72 J	0.46 J	0.52 J	0.49 J	0.39 J	0.35 J	1			0.25		mg/L	9060A
Ethane						CAS # 74-84-0								
Fourth Quarter 2010	U	U	U	U	U	U	U	5			1		ug/l	RSK175M
Second Quarter 2010	U	U	U	U	U	U	U	5			1		ug/l	RSK175M
Ethene						CAS # 74-85-1								
Second Quarter 2010	U	U	U	U	U	U	U	5			1		ug/l	RSK175M
Fourth Quarter 2010	U	U	U	U	U	U	U	5			1		ug/l	RSK175M
Methane						CAS # 74-82-8								
Fourth Quarter 2010	U	U	U	U	U	U	U	15			5		ug/l	RSK175M
Second Quarter 2010	U	U	U	U	U	U	U	15			5		ug/l	RSK175M

See last page of this report for definitions.

Summary of Semiannual Target Analyte Monitoring Results Appendix J
Corrective Action Monitoring Plan - Targeted Constituents
Hazardous Waste Management Unit 5
Radford Army Ammunition Plant, Radford, Virgini

Upgradient well = 5W8B

Analyte/Quarter	5W8B Q	5W5B Q	5W7B Q	5WC21 Q	5WC22 Q	5WC23 Q	5W12A Q	QL	Permit QL	GPS	DL	Permit DL	UNIT	Method
Nitrate as N						CAS # 14797-65-0								
Second Quarter 2010	1.8	8.7	1.7	8.3	9.8	9.8	0.7	0.1			0.023		mg/l	9056A
Fourth Quarter 2010	1.4	12.8 J	2.3 J	7.7 J	8.9 J	9	0.6 J	0.1			0.023		mg/L	9056A
Nitrite as N						CAS # 14797-55-8								
Fourth Quarter 2010	U	U J	U J	U J	U J	U	U J	0.1			0.012		mg/L	9056A
Second Quarter 2010	U	U	U	U	U	U	U	0.1			0.012		mg/l	9056A
Sulfate						CAS # 18785-72-3								
Second Quarter 2010	2.5 J	257 J	30 J	234 J	221 J	217 J	6 J	1			0.12		mg/l	9056A
Fourth Quarter 2010	1.7	285	52.8	228	198	202	12.4	1			0.12		mg/L	9056A
Sulfide						CAS # 18496-25-8								
Fourth Quarter 2010	U	U	U	U	U	U	U	3000			2000		ug/L	9034
Second Quarter 2010	U	U	U	U	U	U	U	3000			2000		ug/l	9034

See last page of this report for definitions.

Summary of Semiannual Target Analyte Monitoring Results Appendix J
Corrective Action Monitoring Plan - Targeted Constituents
Hazardous Waste Management Unit 5
Radford Army Ammunition Plant, Radford, Virgini

Upgradient well = 5W8B

Analyte/Quarter	*5W8B Q*	*5W5B Q*	*5W7B Q*	*5WC21 Q*	*5WC22 Q*	*5WC23 Q*	*5W12A Q*	*QL*	*Permit QL*	*GPS*	*DL*	*Permit DL*	*UNIT*	*Method*

Definitions:

Results are reported to the permit detection limit.
First Corrective Action Monitoring Event Second Quarter 2010:

QL Denotes laboratory quantitation limit.
Permit QL Denotes permit quantitation limit.
DL Denotes laboratory detection limit.
Permit DL Denotes permit detection limit.
U denotes not detected at or above the permit detection limit or QL.
UA denotes not detected at or above the adjusted detection limit or adjusted QL.
J Denotes result is estimated. When used with "U" (i.e., "UJ"), denotes analyte not detected at or above the detection limit or QL and detection limit and QL are estimated. When used with "UA" (i.e., "UAJ"), denotes analyte not detected at or above adjusted detection limit and adjusted detection limit and QL are estimated.
UN Denotes analyte concentration is less than the QL and/or five times the blank concentration. Not reliably detected due to blank contamination.
R Denotes result rejected.
Q Denotes data validation qualifier. **X** Denotes mass spectral confirmation not obtained-result suspect.

CAS# Denotes Chemical Abstract Services registration number.
GPS Denotes Groundwater Protection Standards listed in Appendix J of Module VI-Groundwater Corrective Action & Monitoring Program for Unit 5 (approved by the VDEQ in the Final Class 3 Hazardous Waste Permit Modification dated November 5, 2009) which was incorporated into the Final Hazardous Waste Post-Closure Care Permit for Hazardous Waste Units 5, 7, 10, and 16 (October 4, 2002).
"–" denotes not sampled.

Note:
For 4Q 2010 - Samples 5W5B, 5WC21, 5WC22, 5WC23 were analyzed and reported in dilution; QL and DL do not reflect dilution factor.

See last page of this report for definitions.

Comprehensive Data Validation Report

Sample/Blind Field Duplicate Results Greater Than the Quantitation Limit

Facility: HWMU-5 Monitoring Event: Fourth Quarter 2010

Draper Aden Associates
Engineering ◆ Surveying ◆ Environmental Services

Analyte	Sample ID	Laboratory Result (ug/L)	Q	Validated Result (ug/L)	Q	QL (ug/L)	Validation Notes
Method: 8260B							
Laboratory: Lancaster Laboratories, Lancaster, PA							
Trichloroethene	5WC21	4		4		1	No action taken.
	5WDUP	3.9		3.9		1	No action taken. Blind field duplicate for 5WC21 (4.0 ug/l). RPD < 10.
Method: 9056A							
Laboratory: TestAmerica, North Canton, OH							
Nitrate as N	5WC21	7.7		7.7	J	0.1	Sample analyzed outside holding time criteria.
	5WDUP	7.6		7.6	J	0.1	Sample analyzed outside holding time criteria.
Sulfate	5WC21	228		228		1	Sample analyzed in dilution 1:2. Actual QL 2 ug/l; DL 0.24 ug/l.
	5WDUP	227		227		1	Sample analyzed in dilution 1:2. Actual QL 2 ug/l; DL 0.24 ug/l. Blind field duplicate for 5WC21.

Definitions:

Data Validation Qualifiers:

QL Denotes permit quantitation limit. **Q** Denotes data qualifier.

J Denotes analyte reported at or above quantitation limit and associated result is estimated.

APPENDIX A-3

HWMU-5 2010 LABORATORY ANALYTICAL RESULTS
GROUNDWATER CORRECTIVE ACTION ANNUAL MONITORING LIST

Summary of Annual Target Analyte Monitoring Results Appendix K
Corrective Action Monitoring Plan - Targeted Constituents
Hazardous Waste Management Unit 5
Radford Army Ammunition Plant, Radford, Virginia

Upgradient well = 5W8B

Analyte/Quarter	*5W8B Q*	*5W5B Q*	*5W7B Q*	*5WC21 Q*	*5WC22 Q*	*5WC23 Q*	*QL*	*Permit QL*	*GPS*	*DL*	*Permit DL*	*UNIT*	*Method*
Antimony						*CAS # 7440-36-0*							
Second Quarter 2010	-	U	U	U	U	U	1	1	6	0.4	0.4	ug/l	6020
Arsenic						*CAS # 7440-38-2*							
Second Quarter 2010	-	U	U	U	U	U	10	10	10	2	2	ug/l	6020
Barium						*CAS # 7440-39-3*							
Second Quarter 2010	-	37.7	41.6	15.2	27.9	23	10	10	2,000	1	1	ug/l	6020
Beryllium						*CAS # 7440-41-7*							
Second Quarter 2010	-	U	U	1.5	U	U	1	1	4	0.2	0.2	ug/l	6020
Cadmium						*CAS # 7440-43-9*							
Second Quarter 2010	-	U	U	0.53 J	0.24 J	U	1	1	5	0.2	0.2	ug/l	6020
Chromium						*CAS # 7440-47-3*							
Second Quarter 2010	-	U	1 J	5.6	U	U	5	5	100	1	1	ug/l	6020
Cobalt						*CAS # 7440-48-4*							
Second Quarter 2010	-	U	2.8 J	70.4	4.6 J	3.5 J	5	5	7	1	1	ug/l	6020
Copper						*CAS # 7440-50-8*							
Second Quarter 2010	-	U	1.3 J	5.3	U	U	5	5	1,300	1	1	ug/l	6020
Lead						*CAS # 7439-92-1*							
Second Quarter 2010	-	U	0.56 J	U	U	0.31 J	1	1	15	0.2	0.2	ug/l	6020
Mercury						*CAS # 7439-97-6*							
Second Quarter 2010	-	U	U	U	U	U	2	2	2	0.2	0.2	ug/l	7470A
Nickel						*CAS # 7440-02-0*							
Second Quarter 2010	-	U	U	31.7	6.5 J	5 J	10	10	313	2	2	ug/l	6020
Selenium						*CAS # 7782-49-2*							
Second Quarter 2010	-	12.3	U	U	U	U	10	10	50	3	3	ug/l	6020
Silver						*CAS # 7440-22-4*							
Second Quarter 2010	-	U	U	U	U	U	2	2	78.25	0.2	0.2	ug/l	6020
Thallium						*CAS # 7440-28-0*							
Second Quarter 2010	-	U	U	U	U	U	1	1	2	0.2	0.2	ug/l	6020
Vanadium						*CAS # 7440-62-2*							
Second Quarter 2010	-	U	U	U	U	U	10	10	109.55	1	1	ug/l	6020
Zinc						*CAS # 7440-66-6*							
Second Quarter 2010	-	U	8.7 J	40	U	U	10	10	4,695	3	3	ug/l	6020

See last page of this report for definitions.

Summary of Annual Target Analyte Monitoring Results Appendix K
Corrective Action Monitoring Plan - Targeted Constituents
Hazardous Waste Management Unit 5
Radford Army Ammunition Plant, Radford, Virginia

Upgradient well = 5W8B

Analyte/Quarter	*5W8B Q*	*5W5B Q*	*5W7B Q*	*5WC21 Q*	*5WC22 Q*	*5WC23 Q*	*QL*	*Permit QL*	*GPS*	*DL*	*Permit DL*	*UNIT*	*Method*
Acetone						*CAS # 67-64-1*							
Second Quarter 2010	-	U	U	U	U	U	10	10	8,750.2	3	3	ug/l	8260B
bis(2-Ethylhexyl)phthalate						*CAS # 117-81-7*							
Second Quarter 2010	-	U	U	U	U	U	6	6	10	1.5	1.5	ug/l	8270C
2-Butanone						*CAS # 78-93-3*							
Second Quarter 2010	-	U	U	U	U	U	10	10	2,667.6	1	1	ug/l	8260B
Chloroform						*CAS # 67-66-3*							
Second Quarter 2010	-	0.3 J	4.4	0.6 J	0.6 J	0.6 J	1	1	80	0.1	0.1	ug/l	8260B
Dichlorodifluoromethane						*CAS # 75-71-8*							
Second Quarter 2010	-	U	U	0.2 J	0.3 J	0.4 J	1	1	142.27	0.1	0.28	ug/l	8260B
1,2-Dichloroethane						*CAS # 107-06-2*							
Second Quarter 2010	-	U	U	U	U	U	1	1	5	0.1	0.147	ug/l	8260B
Diethyl ether						*CAS # 60-29-7*							
Second Quarter 2010	-	0.5 J	U	3.2 J	7 J	5.5 J	12	12	7,300	0.1	0.39	ug/l	8260B
Diethyl phthalate						*CAS # 84-66-2*							
Second Quarter 2010	-	U	U	U	U	U	10	10	12,520	0.56	0.5	ug/l	8270C
2,4-Dinitrotoluene						*CAS # 121-14-2*							
Second Quarter 2010	-	U	U	2 J	0.74 J	0.8 J	10	10	31.3	0.58	0.6	ug/l	8270C
2,6-Dinitrotoluene						*CAS # 606-20-2*							
Second Quarter 2010	-	U	U	U	U	U	10	10	15.65	0.66	0.7	ug/l	8270C
Methylene chloride						*CAS # 75-09-2*							
Second Quarter 2010	-	U	U	U	U	U	1	1	5	0.2	0.182	ug/l	8260B
o-Nitroaniline						*CAS # 88-74-4*							
Second Quarter 2010	-	U	U	U	1.7 J	2.2 J	10	10	110	0.69	0.7	ug/l	8270C
p-Nitroaniline						*CAS # 100-01-6*							
Second Quarter 2010	-	U	U	U	1.5 J	1.4 J	20	20	20	1.3	1.3	ug/l	8270C
Nitrobenzene						*CAS # 98-95-3*							
Second Quarter 2010	-	U J	U J	0.9 J	1.1 J	U J	10	10	10	0.8	0.8	ug/l	8270C
Toluene						*CAS # 108-88-3*							
Second Quarter 2010	-	U	U	U	U	U	1	1	1,000	0.1	0.1	ug/l	8260B
Xylenes (Total)						*CAS # 1330-20-7*							
Second Quarter 2010	-	U	U	U	U	U	3	3	10,000	0.1	0.208	ug/l	8260B

Summary of Annual Target Analyte Monitoring Results Appendix K
Corrective Action Monitoring Plan - Targeted Constituents
Hazardous Waste Management Unit 5
Radford Army Ammunition Plant, Radford, Virginia

Upgradient well = 5W8B

Analyte/Quarter	*5W8B Q*	*5W5B Q*	*5W7B Q*	*5WC21 Q*	*5WC22 Q*	*5WC23 Q*	*QL*	*Permit QL*	*GPS*	*DL*	*Permit DL*	*UNIT*	*Method*

Definitions:

Results are reported to the permit detection limit.
First Corrective Action Monitoring Event Second Quarter 2010:

QL Denotes laboratory quantitation limit.
Permit QL Denotes permit quantitation limit.
DL Denotes laboratory detection limit.
Permit DL Denotes permit detection limit.
U denotes not detected at or above the permit detection limit or QL.
UA denotes not detected at or above the adjusted detection limit or adjusted QL.
J Denotes result is estimated. When used with "U" (i.e., "UJ"), denotes analyte not detected at or above the detection limit or QL and detection limit and QL are estimated. When used with "UA" (i.e., "UAJ"), denotes analyte not detected at or above adjusted detection limit and and adjusted detection limit and QL are estimated.
UN Denotes analyte concentration is less than the QL and/or five times the blank concentration. Not reliably detected due to blank contamination.
R Denotes result rejected.
Q Denotes data validation qualifier. **X** Denotes mass spectral confirmation not obtained-result suspect.

CAS# Denotes Chemical Abstract Services registration number.
GPS Denotes Groundwater Protection Standards listed in Appendix K of Module VI-Groundwater Corrective Action & Monitoring Program for Unit 5 (approved by the VDEQ in the Final Class 3 Hazardous Waste Permit Modification dated November 5, 2009) which was incorporated into the Final Hazardous Waste Post-Closure Care Permit for Hazardous Waste Units 5, 7, 10, and 16 (October 4, 2002).
"–" denotes not sampled.

Event Notes:
Second Quarter 2010 – For nitrobenzene and/or p-nitroaniline detections in 5WC21, 5WC22 and 5WC23, less than the QL, a verification event was performed on 7/9/2010 using a low level method of analysis to verify the result. The verification result was less than the QL associated with the low level method and the original result was reported and no further action is required.

Comprehensive Data Validation Report

Draper Aden Associates
Engineering ◆ Surveying ◆ Environmental Services

Sample/Blind Field Duplicate Results Greater Than the Quantitation Limit

Facility: HWMU-5 Monitoring Event: Second Quarter 2010

Analyte	Sample ID	Laboratory Result (ug/L)	Q	Validated Result (ug/L)	Q	QL (ug/L)	Validation Notes
Method: 6020							
Laboratory: CompuChem, a Division of Liberty Analtyical, Cary, NC							
Barium	5WC21	15.2		15.2		10	No action taken. RPD <10.
	5WDUP	15.9		15.9		10	No action taken. Field duplicate of 5WC21. RPD <10.
Beryllium	5WC21	1.5		1.5		1	No action taken. RPD <10.
	5WDUP	1.6		1.6		1	No action taken. Field duplicate of 5WC21. RPD <10.
Chromium	5WC21	5.6		5.6		5	No action taken. RPD <10.
	5WDUP	5.9		5.9		5	No action taken. Field duplicate of 5WC21. RPD <10.
Cobalt	5WC21	70.4		70.4		5	No action taken. RPD <10.
	5WDUP	73.6		73.6		5	No action taken. Field duplicate of 5WC21. RPD <10.
Copper	5WC21	5.3		5.3		5	No action taken. RPD <10.
	5WDUP	5.5		5.5		5	No action taken. Field duplicate of 5WC21. RPD <10.
Nickel	5WC21	31.7		31.7		10	No action taken. RPD <10.
	5WDUP	32.7		32.7		10	No action taken. Field duplicate of 5WC21. RPD <10.
Zinc	5WC21	40		40		10	No action taken. RPD <10.
	5WDUP	41.8		41.8		10	No action taken. Field duplicate of 5WC21. No action taken. RPD <10.
Method: 8260B							
Laboratory: Lancaster Laboratories, Lancaster, PA							
Trichloroethene	5WC21	4.2		4.2		1	No action taken. No action taken. Field duplicate of 5WC21. RPD <10.
	5WDUP	4.3		4.3		1	No action taken. Field duplicate of 5WC21. RPD <10.
Method: 9056A							
Laboratory: TestAmerica, North Canton, OH							
Nitrate as N	5WC21	8.3		8.3		0.1	No action taken. Field duplicate of 5WC21. RPD <10.
	5WDUP	8.7		8.7		0.1	No action taken. Field duplicate of 5WC21. RPD <10.
Sulfate	5WC21	234		234	J	1	Field duplicate precision for sulfate was greater than 20 RPD (21 RPD). Reported result is estimated. Analyzed at a 1:2 dilution. Actual QL is 2 mg/l.
	5WDUP	289		289	J	1	Field duplicate of 5WC21. RPD 21. Field duplicate precision for sulfate was greater than 20 RPD (21 RPD). Reported result is estimated. Analyzed at a 1:2 dilution. Actual QL is 2 mg/l.

Comprehensive Data Validation Report

Sample/Blind Field Duplicate Results Greater Than the Quantitation Limit

Draper Aden Associates
Engineering ♦ Surveying ♦ Environmental Services

Facility: HWMU-5 Monitoring Event: Second Quarter 2010

Analyte	Sample ID	Laboratory Result (ug/L)	Q	Validated Result (ug/L)	Q	QL (ug/L)	Validation Notes

Definitions:

Data Validation Qualifiers:

QL Denotes permit quantitation limit. **Q** Denotes data qualifier.

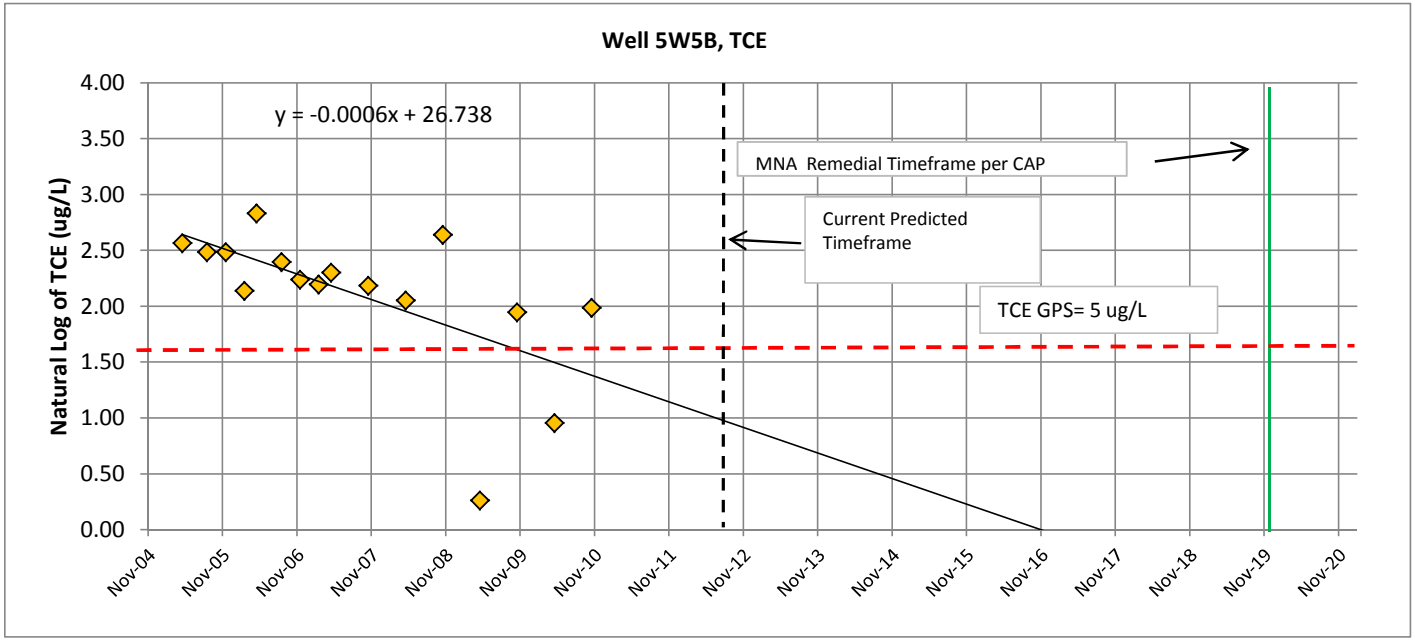
J Denotes analyte reported at or above quantitation limit and associated result is estimated.

APPENDIX A-4

MNA EFFECTIVENESS EVALUATION
(CONCENTRATION TREND GRAPH, POINT ATTENUATION RATE CALCULATION, DATA TREND GRAPHS, TCE ISOCONCENTRATION MAP)

MNA Effectiveness Evaluation - Concentration Trend Graph and Point Attenuation Rate Calculation

Sample Date	TCE (ug/L)	ln TCE (ug/L)
4/18/2005	13.00	2.56
8/15/2005	12.00	2.48
11/18/2005	12.00	2.48
2/14/2006	8.50	2.14
4/18/2006	17.00	2.83
8/18/2006	11.00	2.40
11/18/2006	9.40	2.24
2/14/2007	9.00	2.20
4/18/2007	10.00	2.30
10/30/2007	8.90	2.19
4/28/2008	7.80	2.05
10/27/2008	14.00	2.64
4/20/2009	1.30	0.26
10/26/2009	7.00	1.95
4/21/2010	2.60	0.96
10/26/2010	7.30	1.99
		#NUM!
		#NUM!
		#NUM!
		#NUM!
		#NUM!

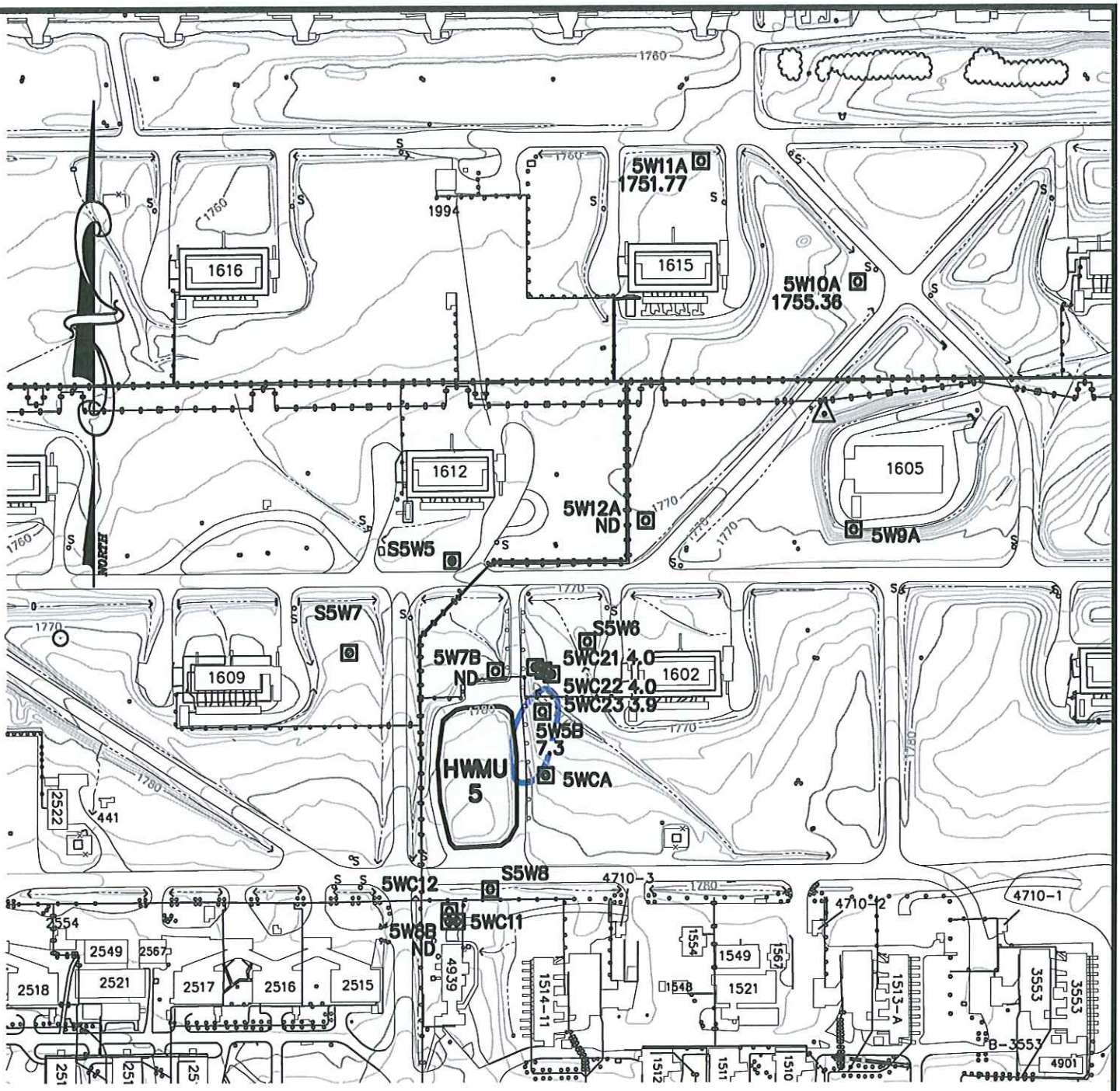


Last 16 rounds		TCE GPS	Estimated Rate and Time Required			Current MNA Timeframe Prediction	MNA Goal (per CAP)	MNA Ineffective Date (per CAP)
First Event	Last Event	ug/L	Rate (per day)	Rate (per year)	Time (years)			
4/18/2005	10/26/2010	5.000	0.0006	0.219	1.73	July-2012	October-2019	December-2026

Effectiveness Evaluation for MNA Remedy	Status	Condition
1) Is the current MNA remedial timeframe prediction less than the 2019 MNA Goal?	yes	If 'yes', then the remedy is considered effective and no additional action is required. If 'no' for three consecutive years, then contingency measures will be implemented as defined in the CAP.
2) Is the current MNA remedial timeframe prediction less than the 2026 MNA ineffective date?	yes	If 'yes', the remedy will be considered effective. If 'no' for three consecutive monitoring years, then an alternate remedial approach will be implemented as defined in the CAP.

Date of Evaluation	Predicted Remedial Timeframe				
	TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	VC
Well 5W5B					
4/22/2009	October-2010	NA	NA	NA	NA
10/1/2009	NP	NA	NA	NA	NA
10/26/2010	July-2012	NA	NA	NA	NA
10/3/2011					
10/3/2012					
10/4/2013					
10/5/2014					
10/6/2015					
10/6/2016					
10/7/2017					
10/8/2018					
10/9/2019					
Well ID					
4/22/2009					
10/1/2009					
10/2/2010					
10/3/2011					
10/3/2012					
10/4/2013					
10/5/2014					
10/6/2015					
10/6/2016					
10/7/2017					
10/8/2018					
10/9/2019					

Notes:
NA - Not Applicable
NP - Not Performed
Date of Evaluation - Refers to the date of the last monitoring event of the calendar year, the data for which was used in the evaluation



HWMU-5 TCE ISOCONCENTRATION MAP (4th QUARTER 2010)

RADFORD ARMY AMMUNITION PLANT

RADFORD, VIRGINIA

SCALE: 1"=200'

PLAN NO. B03204-08

Draper Aden Associates

Engineering • Surveying • Environmental Services

2206 South Main Street
Blacksburg, VA 24060
540-552-0444 Fax: 540-552-0291

Richmond, VA
Charlottesville, VA
Hampton Roads, VA

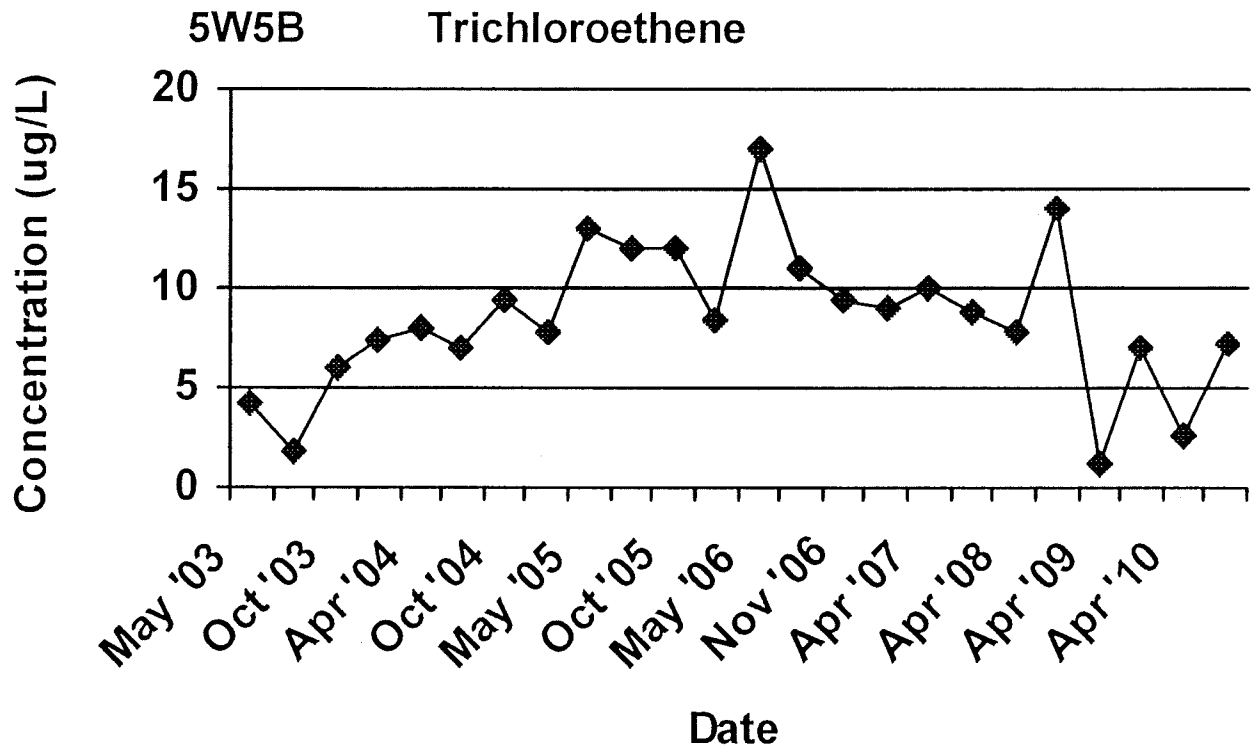
DESIGNED	RGM
DRAWN	JFF
CHECKED	MDL
DATE	01-27-11

FIGURE

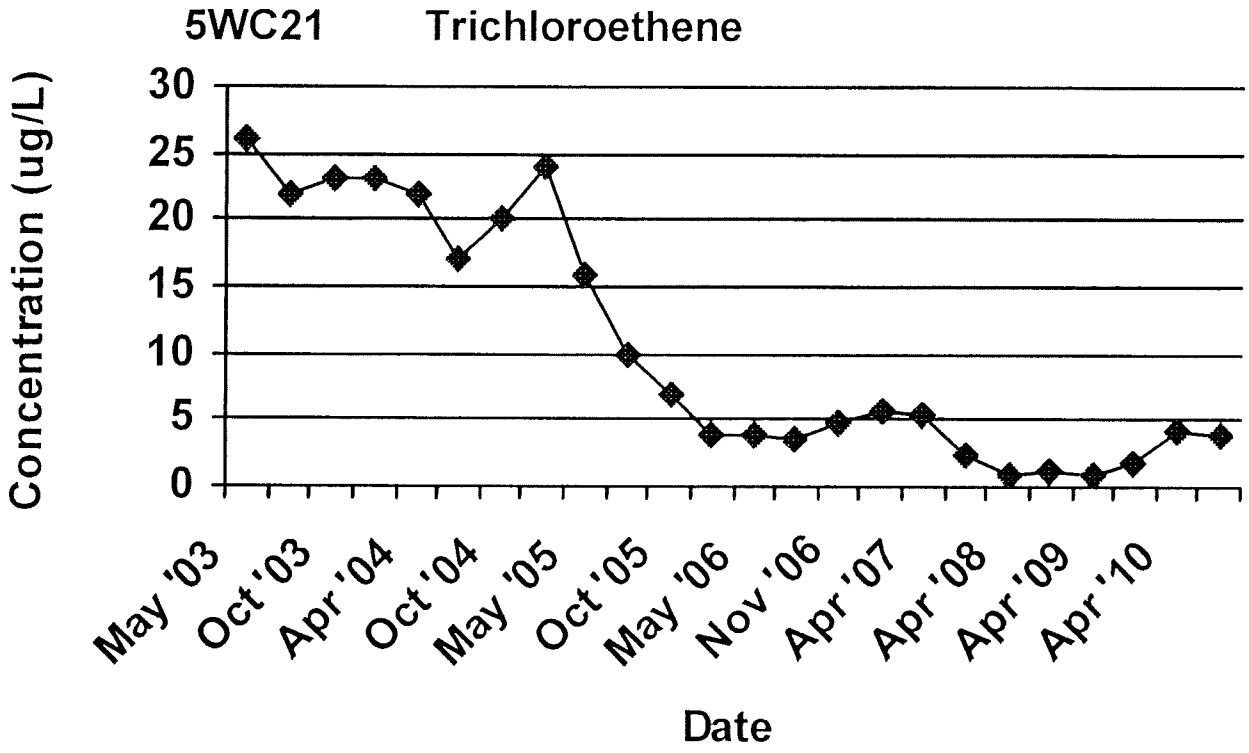
P:\B03200\B03204\B03204-08\CAD\B03204-08 ENV\dwg\B03204-08_FIG1.dwg Jan 31, 2011 11:07am

RADFORD ARMY AMMUNITION PLANT

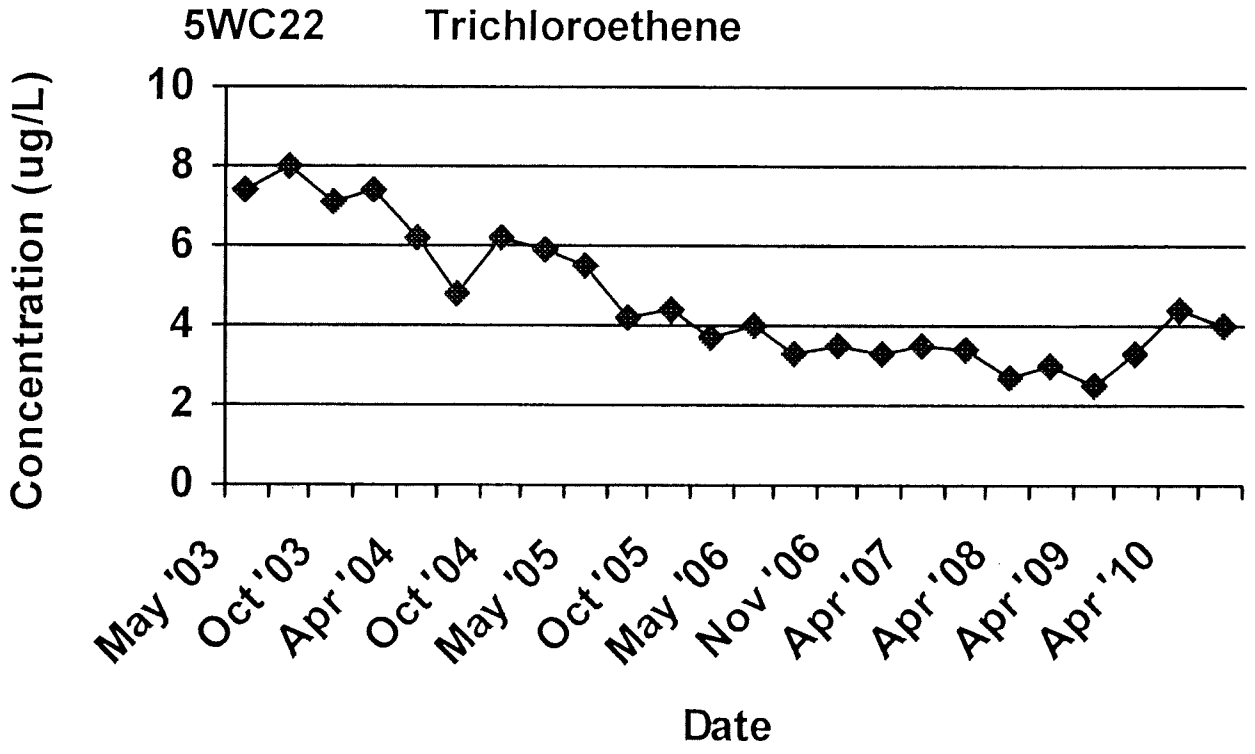
Target Analyte Concentration



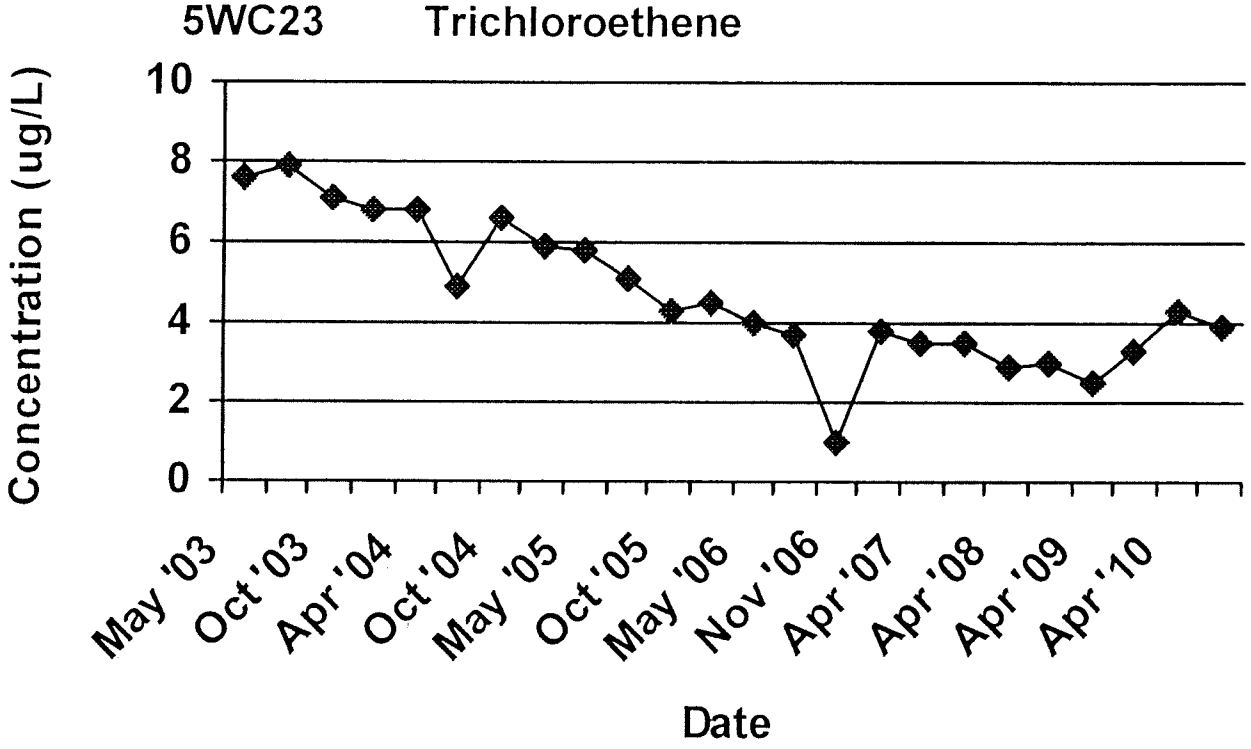
RADFORD ARMY AMMUNITION PLANT
Target Analyte Concentration



RADFORD ARMY AMMUNITION PLANT
Target Analyte Concentration



RADFORD ARMY AMMUNITION PLANT
Target Analyte Concentration

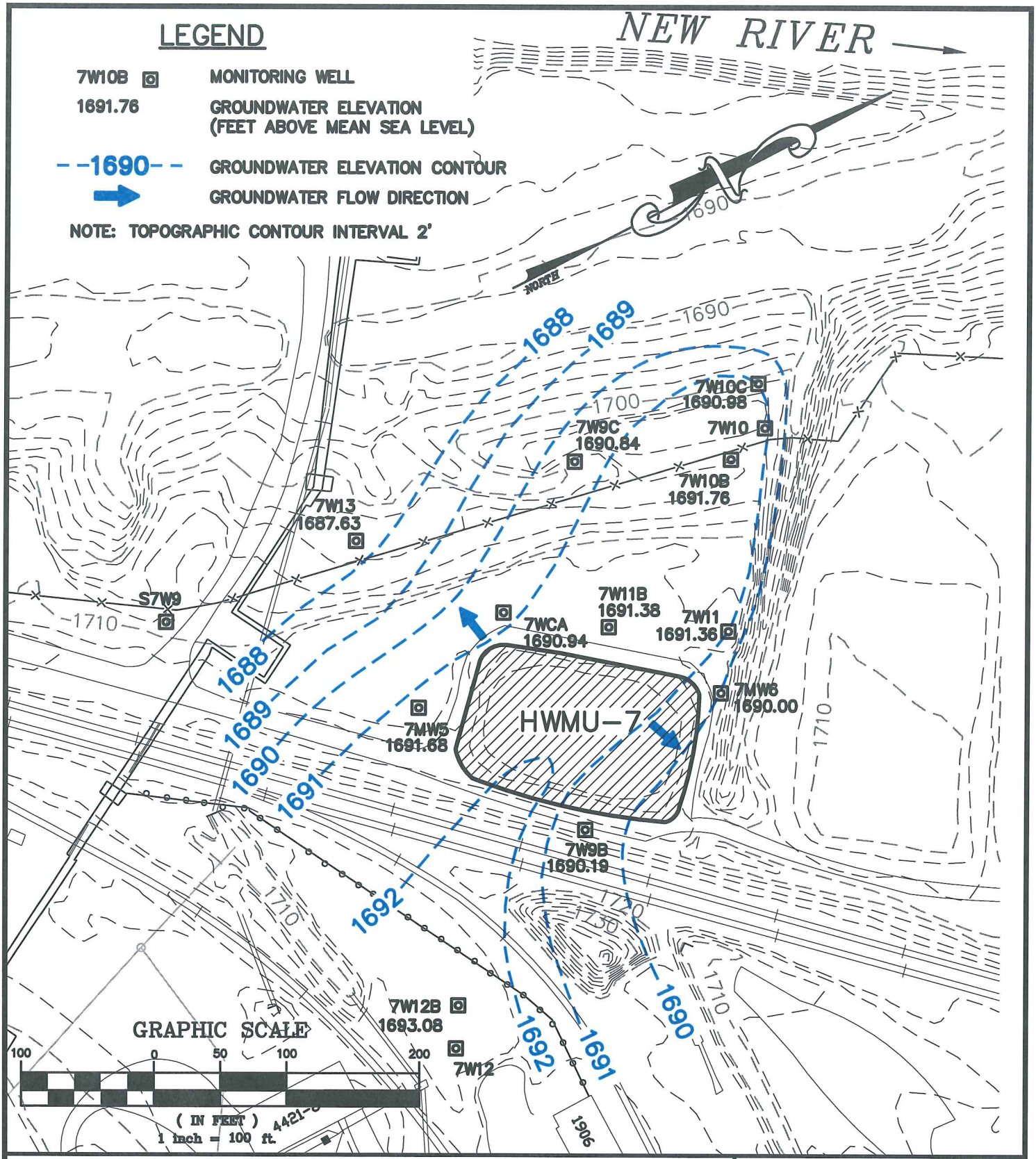


APPENDIX B

HWMU-7

APPENDIX B-1

HWMU-7 POTENTIOMETRIC SURFACE MAPS
SECOND QUARTER 2010
FOURTH QUARTER 2010



HWMU-7 POTENTIOMETRIC SURFACE MAP (2ND QUARTER 2010)

RADFORD ARMY AMMUNITION PLANT

RADFORD, VIRGINIA

SCALE: 1"=100'

PLAN NO. B03204-08

Draper Aden Associates

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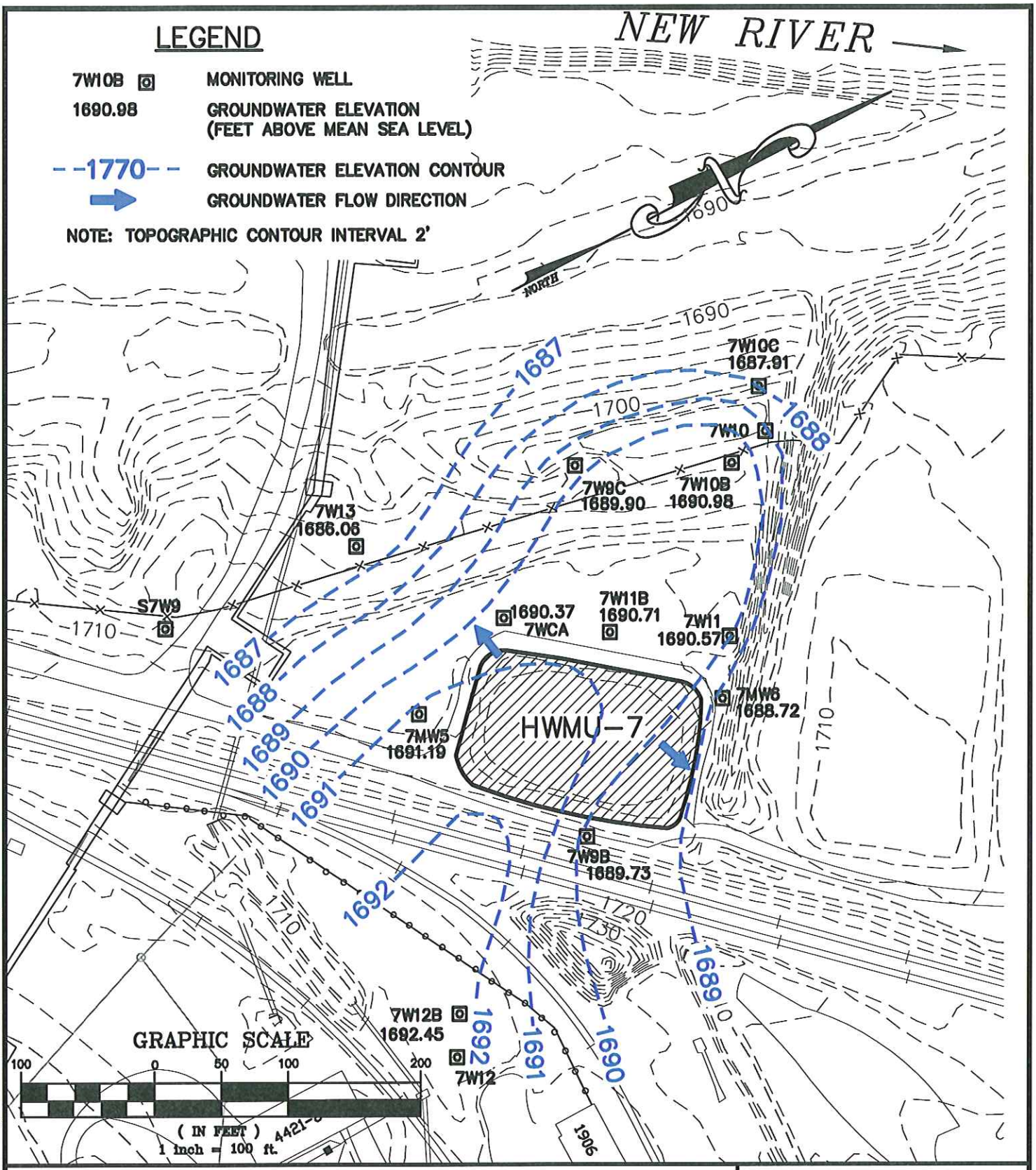
Richmond, VA
Charlottesville, VA
Hampton Roads, VA

DESIGNED	RGM
DRAWN	JFF
CHECKED	MDL
DATE	07/27/10

FIGURE 2

P:\B03\200\B03204\B03204-08\CAD\B03204-08 ENV\dwg\B03204-08_FIG2.dwg Aug 02, 2010 9:28am



HWMU-7 POTENTIOMETRIC SURFACE MAP (4TH QUARTER 2010)

RADFORD ARMY AMMUNITION PLANT

RADFORD, VIRGINIA

SCALE: 1"=100'

PLAN NO. B03204-08

Draper Aden Associates

Engineering • Surveying • Environmental Services

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Blacksburg, VA 24060
540-552-0444 Fax: 540-552-0291

Richmond, VA
Charlottesville, VA
Hampton Roads, VA

DESIGNED	RGM
DRAWN	JFF
CHECKED	MDL
DATE	01-27-11

FIGURE 2

P:\B03\200\B03204\B03204-08\CAD\B03204-08 ENV\dwg\B03204-08_FIG2.dwg Jan 27, 2011 4:02pm

APPENDIX B-2

HWMU-7 2010 LABORATORY ANALYTICAL RESULTS
POINT OF COMPLIANCE WELLS

Target Analyte Monitoring Results - HWMU-7 Point of Compliance Wells
Radford Army Ammunition Plant, Radford, Virginia
Upgradient well = 7W12B
All Results in ug/L.

Analtye/Quarter	*7W12B Q*	*7MW6 Q*	*7WCA Q*	*7W11B Q*	*QL*	*GPS*	*Background*	*Method*
Antimony						*CAS #*		7440-36-0
Second Quarter 2010	U	U	U	U	1	6	1	6020
Fourth Quarter 2010	U	U	U	1.1	1	6	1	6020
Arsenic						*CAS #*		7440-38-2
Second Quarter 2010	U	U	U	U	10	10	10	6020
Fourth Quarter 2010	U	U	U	U	10	10	10	6020
Barium						*CAS #*		7440-39-3
Second Quarter 2010	31	17.8	25.5	48	10	2000	41	6020
Fourth Quarter 2010	31.2	18.5	22	46	10	2000	41	6020
Beryllium						*CAS #*		7440-41-7
Second Quarter 2010	U	U	U	U	1	-		6020
Cadmium						*CAS #*		7440-43-9
Second Quarter 2010	U	U	U	U	1	5	1	6020
Fourth Quarter 2010	U	U	U	U	1	5	1	6020
Chromium						*CAS #*		7440-47-3
Second Quarter 2010	4.5 J	U	U	U	5	100	9.9	6020
Fourth Quarter 2010	7.2	U	U	U	5	100	9.9	6020
Cobalt						*CAS #*		7440-48-4
Second Quarter 2010	U	U	4.2 J	1.6 J	5	156.65	5	6020
Fourth Quarter 2010	U	U	U	U	5	156.65	5	6020
Copper						*CAS #*		7440-50-8
Second Quarter 2010	1.4 J	U	1.2 J	U	5	1300	5	6020
Fourth Quarter 2010	U	U	U	U	5	1300	5	6020
Lead						*CAS #*		7439-92-1
Second Quarter 2010	U	U	0.21 J	U	1	15	1	6020
Fourth Quarter 2010	U	U	U	U	1	15	1	6020
Mercury						*CAS #*		7439-97-6
Second Quarter 2010	U	U	U	U	2	2	2	7470A
Fourth Quarter 2010	U	U	U	U	2	2	2	7470A
Nickel						*CAS #*		7440-02-0
Second Quarter 2010	U	2.3 J	11.8	U	10	313	10	6020
Fourth Quarter 2010	U	U	14.4	U	10	313	10	6020
Selenium						*CAS #*		7782-49-2
Second Quarter 2010	U	U	U	U	10	50	10	6020
Fourth Quarter 2010	U	U	U	U	10	50	10	6020
Silver						*CAS #*		7440-22-4
Second Quarter 2010	U	U	U	U	2	78.25	2	6020
Fourth Quarter 2010	U	U	U	U	2	78.25	2	6020
Thallium						*CAS #*		7440-28-0
Second Quarter 2010	U	U	U	U	1	2	1	6020
Fourth Quarter 2010	U	U	U	U	1	2	1	6020
Tin						*CAS #*		7440-31-5
Second Quarter 2010	U	U	U	U	15	-		6010B
Vanadium						*CAS #*		7440-62-2
Second Quarter 2010	U	U	U	U	10	-		6020

Target Analyte Monitoring Results - HWMU-7 Point of Compliance Wells
Radford Army Ammunition Plant, Radford, Virginia
Upgradient well = 7W12B
All Results in ug/L.

Analtye/Quarter	*7W12B Q*	*7MW6 Q*	*7WCA Q*	*7W11B Q*	*QL*	*GPS*	*Background*	*Method*
Zinc						*CAS #*		7440-66-6
Second Quarter 2010	4.7 J	6 J	4.8 J	4.6 J	10	4695	10.9	6020
Fourth Quarter 2010	U	U	U	U	10	4695	10.9	6020
Cyanide						*CAS #*		57-12-5
Second Quarter 2010	U	U	U	U	20	200	20	9012A
Fourth Quarter 2010	U	U	U	U	20	200	20	9012A
Sulfide						*CAS #*		Q1314
Second Quarter 2010	U	U	U	U	3000	-		9034
Total Recoverable Phenolics						*CAS #*		C-020
Second Quarter 2010	U	U	U	U	50	-		9066
Acenaphthene						*CAS #*		83-32-9
Second Quarter 2010	U	U	U	U	10	-		8270C
Acenaphthylene						*CAS #*		208-96-8
Second Quarter 2010	U	U	U	U	10	-		8270C
Acetone						*CAS #*		67-64-1
Second Quarter 2010	U	U	U	U	10	-		8260B
Acetonitrile						*CAS #*		75-05-8
Second Quarter 2010	U	U	U	U	100	-		8260B
Acetophenone						*CAS #*		98-86-2
Second Quarter 2010	U	U	U	U	10	-		8270C
2-Acetylaminofluorene						*CAS #*		53-96-3
Second Quarter 2010	U	U	U	U	10	-		8270C
Acrolein						*CAS #*		107-02-8
Second Quarter 2010	U J	U J	U J	U J	25	-		8260B
Acrylonitrile						*CAS #*		107-13-1
Second Quarter 2010	U	U	U	U	10	-		8260B
Aldrin						*CAS #*		309-00-2
Second Quarter 2010	U	U	U	U	0.05	-		8081A
Allyl chloride						*CAS #*		107-05-1
Second Quarter 2010	U	U	U	U	10	-		8260B
4-Aminobiphenyl						*CAS #*		92-67-1
Second Quarter 2010	U	U	U	U	10	-		8270C
Aniline						*CAS #*		62-53-3
Second Quarter 2010	U J	U J	U J	U J	10	-		8270C
Anthracene						*CAS #*		120-12-7
Second Quarter 2010	U	U	U	U	10	-		8270C
Aramite						*CAS #*		140-57-8
Second Quarter 2010	U	U	U	U	10	-		8270C
Benzene						*CAS #*		71-43-2
Second Quarter 2010	U	U	U	U	1	-		8260B
Benzo[a]anthracene						*CAS #*		56-55-3
Second Quarter 2010	U	U	U	U	10	-		8270C
Benzo[b]fluoranthene						*CAS #*		205-99-2
Second Quarter 2010	U	U	U	U	10	-		8270C
Benzo[k]fluoranthene						*CAS #*		207-08-9
Second Quarter 2010	U	U	U	U	10	-		8270C

Target Analyte Monitoring Results - HWMU-7 Point of Compliance Wells
Radford Army Ammunition Plant, Radford, Virginia
Upgradient well = 7W12B
All Results in ug/L.

Analtye/Quarter	*7W12B Q*	*7MW6 Q*	*7WCA Q*	*7W11B Q*	*QL*	*GPS*	*Background*	*Method*
Benzo[ghi]perylene							*CAS #*	191-24-2
Second Quarter 2010	U	U	U	U	10	-		8270C
Benzo(a)pyrene							*CAS #*	50-32-8
Second Quarter 2010	U	U	U	U	10	-		8270C
1,4-Benzenediamine							*CAS #*	106-50-3
Second Quarter 2010	U J	U J	U J	U J	50	-		8270C
Benzyl alcohol							*CAS #*	100-51-6
Second Quarter 2010	U J	U J	U J	U J	10	-		8270C
alpha-BHC							*CAS #*	319-84-6
Second Quarter 2010	U	U	U	U	0.05	-		8081A
beta-BHC							*CAS #*	319-85-7
Second Quarter 2010	U	U	U	U	0.05	-		8081A
delta-BHC							*CAS #*	319-86-8
Second Quarter 2010	U J	U J	U J	U J	0.05	-		8081A
gamma-BHC							*CAS #*	58-89-9
Second Quarter 2010	U	U	U	U	0.05	-		8081A
bis(2-Chloroethoxy)methane							*CAS #*	111-91-1
Second Quarter 2010	U	U	U	U	5	-		8270C
bis(2-Chloroethyl)ether							*CAS #*	111-44-4
Second Quarter 2010	U	U	U	U	5	-		8270C
bis(2-Chloro-1-methylethyl)ether							*CAS #*	108-60-1
Second Quarter 2010	U	U	U	U	10	-		8270C
bis(2-Ethylhexyl)phthalate							*CAS #*	117-81-7
Second Quarter 2010	U	U	U	U	5	6	6	8270C
Fourth Quarter 2010	U	U	U	U	6	6	6	8270C
Bromobenzene							*CAS #*	108-86-1
Second Quarter 2010	U	U	U	U	1	-		8260B
Bromochloromethane							*CAS #*	74-97-5
Second Quarter 2010	U	U	U	U	1	-		8260B
Bromodichloromethane							*CAS #*	75-27-4
Second Quarter 2010	U	U	U	U	1	-		8260B
Bromoform							*CAS #*	75-25-2
Second Quarter 2010	U	U	U	U	1	-		8260B
4-Bromophenyl phenyl ether							*CAS #*	101-55-3
Second Quarter 2010	U	U	U	U	10	-		8270C
n-Butyl alcohol							*CAS #*	71-36-3
Second Quarter 2010	U	U	U	U	50	-		8260B
tert-Butyl alcohol							*CAS #*	75-65-0
Second Quarter 2010	U	U	U	U	200	-		8260B
n-Butylbenzene							*CAS #*	104-51-8
Second Quarter 2010	U	U	U	U	1	-		8260B
sec-Butylbenzene							*CAS #*	135-98-8
Second Quarter 2010	U	U	U	U	1	-		8260B
tert-Butylbenzene							*CAS #*	98-06-6
Second Quarter 2010	U	U	U	U	1	-		8260B

Target Analyte Monitoring Results - HWMU-7 Point of Compliance Wells
Radford Army Ammunition Plant, Radford, Virginia
Upgradient well = 7W12B
All Results in ug/L.

Analtye/Quarter	*7W12B Q*	*7MW6 Q*	*7WCA Q*	*7W11B Q*	*QL*	*GPS*	*Background*	*Method*
Butyl benzyl phthalate							*CAS #*	85-68-7
Second Quarter 2010	U	U	U	U	10	3130	10	8270C
Fourth Quarter 2010	U	U	U	U	10	3130	10	8270C
Carbon disulfide							*CAS #*	75-15-0
Second Quarter 2010	U	U	U	U	10	-		8260B
Carbon tetrachloride							*CAS #*	56-23-5
Second Quarter 2010	U	U	U	U	1	-		8260B
Chlordane							*CAS #*	57-74-9
Second Quarter 2010	U	U	U	U	0.86	-		8081A
p-Chloroaniline							*CAS #*	106-47-8
Second Quarter 2010	U	U	U	U	10	-		8270C
Chlorobenzene							*CAS #*	108-90-7
Second Quarter 2010	U	U	U	U	1	-		8260B
Chlorobenzilate							*CAS #*	510-15-6
Second Quarter 2010	U	U	U	U	10	-		8270C
p-Chloro-m-cresol							*CAS #*	59-50-7
Second Quarter 2010	U	U	U	U	10	-		8270C
Chloroethane							*CAS #*	75-00-3
Second Quarter 2010	U	U	U	U	1	-		8260B
Chloroform							*CAS #*	67-66-3
Second Quarter 2010	2.0	U	0.6 J	0.46 J	1	-		8260B
2-Chloroethyl vinyl ether							*CAS #*	110-75-8
Second Quarter 2010	U J	U J	U J	U J	20	-		8260B
2-Chloronaphthalene							*CAS #*	91-58-7
Second Quarter 2010	U	U	U	U	10	-		8270C
2-Chlorophenol							*CAS #*	95-57-8
Second Quarter 2010	U	U	U	U	10	-		8270C
4-Chlorophenyl phenyl ether							*CAS #*	7005-72-3
Second Quarter 2010	U	U	U	U	10	-		8270C
Chloroprene							*CAS #*	126-99-8
Second Quarter 2010	U	U	U	U	10	-		8260B
2-Chlorotoluene							*CAS #*	95-49-8
Second Quarter 2010	U	U	U	U	1	-		8260B
4-Chlorotoluene							*CAS #*	106-43-4
Second Quarter 2010	U	U	U	U	1	-		8260B
Chrysene							*CAS #*	218-01-9
Second Quarter 2010	U	U	U	U	10	-		8270C
Cyclohexane							*CAS #*	110-82-7
Second Quarter 2010	U	U	U	U	1	-		8260B
2,4-Dichlorophenoxyacetic acid							*CAS #*	94-75-7
Second Quarter 2010	U	U	U	U	5	-		8151A
4,4'-DDD							*CAS #*	72-54-8
Second Quarter 2010	U	U	U	U	0.1	-		8081A
4,4'-DDE							*CAS #*	72-55-9
Second Quarter 2010	U	U	U	U	0.1	-		8081A
4,4'-DDT							*CAS #*	50-29-3
Second Quarter 2010	U	U	U	U	0.1	-		8081A

Target Analyte Monitoring Results - HWMU-7 Point of Compliance Wells
Radford Army Ammunition Plant, Radford, Virginia
Upgradient well = 7W12B
All Results in ug/L.

Analtye/Quarter	*7W12B Q*	*7MW6 Q*	*7WCA Q*	*7W11B Q*	*QL*	*GPS*	*Background*	*Method*
Diallate							*CAS #*	2303-16-4
Second Quarter 2010	U	U	U	U	10	-		8270C
Dibenz(a,h)anthracene							*CAS #*	53-70-3
Second Quarter 2010	U	U	U	U	10	-		8270C
Dibenzofuran							*CAS #*	132-64-9
Second Quarter 2010	U	U	U	U	10	-		8270C
Dibromochloromethane							*CAS #*	124-48-1
Second Quarter 2010	U	U	U	U	1	-		8260B
1,2-Dibromo-3-chloropropane							*CAS #*	96-12-8
Second Quarter 2010	U	U	U	U	1	-		8260B
1,2-Dibromoethane							*CAS #*	106-93-4
Second Quarter 2010	U	U	U	U	1	-		8260B
Di-n-butyl phthalate							*CAS #*	84-74-2
Second Quarter 2010	U	U	U	U	10	-		8270C
1,2-Dichlorobenzene							*CAS #*	95-50-1
Second Quarter 2010	U	U	U	U	1	-		8260B
1,3-Dichlorobenzene							*CAS #*	541-73-1
Second Quarter 2010	U	U	U	U	1	-		8260B
1,4-Dichlorobenzene							*CAS #*	106-46-7
Second Quarter 2010	U	U	U	U	1	-		8260B
3,3'-Dichlorobenzidine							*CAS #*	91-94-1
Second Quarter 2010	U	U	U	U	10	-		8270C
trans-1,4-Dichloro-2-butene							*CAS #*	110-57-6
Second Quarter 2010	U	U	U	U	10	-		8260B
Dichlorodifluoromethane							*CAS #*	75-71-8
Second Quarter 2010	U	U	U	U	1	-		8260B
1,1-Dichloroethane							*CAS #*	75-34-3
Second Quarter 2010	U	U	U	U	1	-		8260B
1,2-Dichloroethane							*CAS #*	107-06-2
Second Quarter 2010	U	U	U	U	1	-		8260B
1,1-Dichloroethene							*CAS #*	75-35-4
Second Quarter 2010	U	U	U	U	1	-		8260B
trans-1,2-Dichloroethene							*CAS #*	156-60-5
Second Quarter 2010	U	U	U	U	1	-		8260B
2,4-Dichlorophenol							*CAS #*	120-83-2
Second Quarter 2010	U	U	U	U	10	-		8270C
2,6-Dichlorophenol							*CAS #*	87-65-0
Second Quarter 2010	U	U	U	U	10	-		8270C
1,2-Dichloropropane							*CAS #*	78-87-5
Second Quarter 2010	U	U	U	U	1	-		8260B
1,3-Dichloropropane							*CAS #*	142-28-9
Second Quarter 2010	U	U	U	U	1	-		8260B
2,2-Dichloropropane							*CAS #*	594-20-7
Second Quarter 2010	U	U	U	U	1	-		8260B
1,1-Dichloropropene							*CAS #*	563-58-6
Second Quarter 2010	U	U	U	U	1	-		8260B

Target Analyte Monitoring Results - HWMU-7 Point of Compliance Wells
Radford Army Ammunition Plant, Radford, Virginia
Upgradient well = 7W12B
All Results in ug/L.

Analtye/Quarter	7W12B Q	7MW6 Q	7WCA Q	7W11B Q	QL	GPS	Background	Method
cis-1,3-Dichloropropene							CAS #	10061-01-5
Second Quarter 2010	U	U	U	U	1	-		8260B
trans-1,3-Dichloropropene							CAS #	10061-02-6
Second Quarter 2010	U	U	U	U	1	-		8260B
Dieldrin							CAS #	60-57-1
Second Quarter 2010	U	U	U	U	0.1	-		8081A
Diethyl ether							CAS #	60-29-7
Second Quarter 2010	U	U	U	U	12.5	-		8260B
Diethyl phthalate							CAS #	84-66-2
Second Quarter 2010	U	U	U	U	10	-		8270C
O,O-Diethyl O-2-pyrazinyl							CAS #	297-97-2
Second Quarter 2010	U	U	U	U	10	-		8270C
Dimethoate							CAS #	60-51-5
Second Quarter 2010	U	U	U	U	10	-		8270C
Dimethyl ether							CAS #	115-10-6
Second Quarter 2010	U	U	U	U	12.5	-		8260B
p-(Dimethylamino)azobenzene							CAS #	60-11-7
Second Quarter 2010	U	U	U	U	10	-		8270C
7,12-Dimethylbenz[a]anthracene							CAS #	57-97-6
Second Quarter 2010	U	U	U	U	10	-		8270C
3,3'-Dimethylbenzidine							CAS #	119-93-7
Second Quarter 2010	U	U	U	U	10	-		8270C
a,a-Dimethylphenethylamine							CAS #	122-09-8
Second Quarter 2010	U J	U J	U J	U J	50	-		8270C
2,4-Dimethylphenol							CAS #	105-67-9
Second Quarter 2010	U	U	U	U	10	-		8270C
Dimethyl phthalate							CAS #	131-11-3
Second Quarter 2010	U	U	U	U	10	-		8270C
m-Dinitrobenzene							CAS #	99-65-0
Second Quarter 2010	U	U	U	U	10	-		8270C
4,6-Dinitro-o-cresol							CAS #	534-52-1
Second Quarter 2010	U	U	U	U	10	-		8270C
2,4-Dinitrophenol							CAS #	51-28-5
Second Quarter 2010	U J	U J	U J	U J	10	31.3	10	8270C
Fourth Quarter 2010	U J	U J	U J	U J	10	31.3	10	8270C
2,4-Dinitrotoluene							CAS #	121-14-2
Second Quarter 2010	U	U	U	U	10	31.3	10	8270C
Fourth Quarter 2010	U	U	U	U	10	31.3	10	8270C
2,6-Dinitrotoluene							CAS #	606-20-2
Second Quarter 2010	U	U	U	U	10	15.65	10	8270C
Fourth Quarter 2010	U	U	U	U	10	15.65	10	8270C
Dinoseb							CAS #	88-85-7
Second Quarter 2010	U	U	U	U	2.5	-		8151A
Di-n-octyl phthalate							CAS #	117-84-0
Second Quarter 2010	U	U	U	U	10	-		8270C
1,4-Dioxane							CAS #	123-91-1
Second Quarter 2010	U	U	U	U	200	-		8260B

Target Analyte Monitoring Results - HWMU-7 Point of Compliance Wells
Radford Army Ammunition Plant, Radford, Virginia
Upgradient well = 7W12B
All Results in ug/L.

Analtye/Quarter	*7W12B Q*	*7MW6 Q*	*7WCA Q*	*7W11B Q*	*QL*	*GPS*	*Background*	*Method*
Diphenylamine							*CAS #*	122-39-4
Second Quarter 2010	U	U	U	U	10	-		8270C
Disulfoton							*CAS #*	298-04-4
Second Quarter 2010	U	U	U	U	10	-		8270C
Endosulfan I							*CAS #*	959-98-8
Second Quarter 2010	U	U	U	U	0.05	-		8081A
Endosulfan II							*CAS #*	33213-65-9
Second Quarter 2010	U	U	U	U	0.1	-		8081A
Endosulfan sulfate							*CAS #*	1031-07-8
Second Quarter 2010	U	U	U	U	0.1	-		8081A
Endrin							*CAS #*	72-20-8
Second Quarter 2010	U	U	U	U	0.1	-		8081A
Ethyl acetate							*CAS #*	141-78-6
Second Quarter 2010	U	U	U	U	10	-		8260B
Endrin aldehyde							*CAS #*	7421-93-4
Second Quarter 2010	U J	U J	U J	U J	0.1	-		8081A
Ethanol							*CAS #*	64-17-5
Second Quarter 2010	U J	U J	U J	U J	250	-		8260B
Ethylbenzene							*CAS #*	100-41-4
Second Quarter 2010	U	U	U	U	1	-		8260B
Ethyl methacrylate							*CAS #*	97-63-2
Second Quarter 2010	U	U	U	U	10	-		8260B
Ethyl methanesulfonate							*CAS #*	62-50-0
Second Quarter 2010	U	U	U	U	10	-		8270C
Ethylene oxide							*CAS #*	75-21-8
Second Quarter 2010	U J	U J	U J	U J	100	-		8260B
Famphur							*CAS #*	52-85-7
Second Quarter 2010	U	U	U	U	10	-		8270C
Fluoranthene							*CAS #*	206-44-0
Second Quarter 2010	U	U	U	U	10	-		8270C
Fluorene							*CAS #*	86-73-7
Second Quarter 2010	U	U	U	U	10	-		8270C
Heptachlor							*CAS #*	76-44-8
Second Quarter 2010	U	U	U	U	0.05	-		8081A
Heptachlor epoxide							*CAS #*	1024-57-3
Second Quarter 2010	U	U	U	U	0.05	-		8081A
Hexachlorobenzene							*CAS #*	118-74-1
Second Quarter 2010	U	U	U	U	10	-		8270C
Hexachlorobutadiene							*CAS #*	87-68-3
Second Quarter 2010	U	U	U	U	1	-		8260B
Hexachlorocyclopentadiene							*CAS #*	77-47-4
Second Quarter 2010	U	U	U	U	10	-		8270C
Hexachloroethane							*CAS #*	67-72-1
Second Quarter 2010	U	U	U	U	10	-		8260B
Hexachlorophene							*CAS #*	70-30-4
Second Quarter 2010	U J	U J	U J	U J	40	-		8270C

Target Analyte Monitoring Results - HWMU-7 Point of Compliance Wells
Radford Army Ammunition Plant, Radford, Virginia
Upgradient well = 7W12B
All Results in ug/L.

Analtye/Quarter	*7W12B Q*	*7MW6 Q*	*7WCA Q*	*7W11B Q*	*QL*	*GPS*	*Background*	*Method*
Hexachloropropene							*CAS #*	1888-71-7
Second Quarter 2010	U	U	U	U	10	-		8270C
2-Hexanone							*CAS #*	591-78-6
Second Quarter 2010	U	U	U	U	10	-		8260B
Indeno[1,2,3-cd]pyrene							*CAS #*	193-39-5
Second Quarter 2010	U	U	U	U	5	-		8270C
Isobutyl alcohol							*CAS #*	78-83-1
Second Quarter 2010	U	U	U	U	200	-		8260B
Isodrin							*CAS #*	465-73-6
Second Quarter 2010	U	U	U	U	10	-		8270C
Isophorone							*CAS #*	78-59-1
Second Quarter 2010	U	U	U	U	10	-		8270C
Isopropylbenzene							*CAS #*	98-82-8
Second Quarter 2010	U	U	U	U	1	-		8260B
Isopropylether							*CAS #*	108-20-3
Second Quarter 2010	U	U	U	U	10	-		8260B
4-Isopropyltoluene							*CAS #*	99-87-6
Second Quarter 2010	U	U	U	U	1	-		8260B
Isosafrole							*CAS #*	120-58-1
Second Quarter 2010	U	U	U	U	10	-		8270C
Kepone							*CAS #*	143-50-0
Second Quarter 2010	U J	U J	U J	U J	10	-		8270C
Methacrylonitrile							*CAS #*	126-98-7
Second Quarter 2010	U	U	U	U	100	-		8260B
Methapyrilene							*CAS #*	91-80-5
Second Quarter 2010	U	U	U	U	10	-		8270C
Methoxychlor							*CAS #*	72-43-5
Second Quarter 2010	U	U	U	U	0.5	-		8081A
Bromomethane							*CAS #*	74-83-9
Second Quarter 2010	U	U	U	U	1	-		8260B
Chloromethane							*CAS #*	74-87-3
Second Quarter 2010	U	U	U	U	1	-		8260B
3-Methylcholanthrene							*CAS #*	56-49-5
Second Quarter 2010	U	U	U	U	10	-		8270C
2-Butanone							*CAS #*	78-93-3
Second Quarter 2010	U	U	U	U	10	-		8260B
Iodomethane							*CAS #*	74-88-4
Second Quarter 2010	U	U	U	U	10	-		8260B
Methyl methacrylate							*CAS #*	80-62-6
Second Quarter 2010	U	U	U	U	10	-		8260B
Methyl methane sulfonate							*CAS #*	66-27-3
Second Quarter 2010	U	U	U	U	10	-		8270C
2-Methylnaphthalene							*CAS #*	91-57-6
Second Quarter 2010	U	U	U	U	10	-		8270C
Methyl parathion							*CAS #*	298-00-0
Second Quarter 2010	U	U	U	U	10	-		8270C

Target Analyte Monitoring Results - HWMU-7 Point of Compliance Wells
Radford Army Ammunition Plant, Radford, Virginia
Upgradient well = 7W12B
All Results in ug/L.

Analtye/Quarter	*7W12B Q*	*7MW6 Q*	*7WCA Q*	*7W11B Q*	*QL*	*GPS*	*Background*	*Method*
4-Methyl-2-pentanone							*CAS #*	108-10-1
Second Quarter 2010	U	U	U	U	10	-		8260B
2-Methylphenol							*CAS #*	95-48-7
Second Quarter 2010	U	U	U	U	10	-		8270C
3 & 4-Methylphenol							*CAS #*	)8-39-4 p 106-44-5
Second Quarter 2010	U	U	U	U	20	-		8270C
Methyl tert-butyl ether							*CAS #*	1634-04-4
Second Quarter 2010	U	U	U	U	10	-		8260B
Dibromomethane							*CAS #*	74-95-3
Second Quarter 2010	U	U	U	U	1	-		8260B
Methylene chloride							*CAS #*	75-09-2
Second Quarter 2010	U	U	U	U	1	-		8260B
Naphthalene							*CAS #*	91-20-3
Second Quarter 2010	U	U	U	U	1	-		8260B
1,4-Naphthoquinone							*CAS #*	130-15-4
Second Quarter 2010	U	U	U	U	10	-		8270C
1-Naphthylamine							*CAS #*	134-32-7
Second Quarter 2010	U	U	U	U	10	-		8270C
2-Naphthylamine							*CAS #*	91-59-8
Second Quarter 2010	U	U	U	U	10	-		8270C
o-Nitroaniline							*CAS #*	88-74-4
Second Quarter 2010	U	U	U	U	10	-		8270C
m-Nitroaniline							*CAS #*	99-09-2
Second Quarter 2010	U	U	U	U	10	-		8270C
p-Nitroaniline							*CAS #*	100-01-6
Second Quarter 2010	U	U	U	U	10	-		8270C
Nitrobenzene							*CAS #*	98-95-3
Second Quarter 2010	U	U	U	U	10	-		8270C
o-Nitrophenol							*CAS #*	88-75-5
Second Quarter 2010	U	U	U	U	10	-		8270C
p-Nitrophenol							*CAS #*	100-02-7
Second Quarter 2010	U	U	U	U	10	50	20	8270C
Fourth Quarter 2010	U J	U J	U J	U J	10	50	20	8270C
4-Nitroquinoline-1-oxide							*CAS #*	56-57-5
Second Quarter 2010	U	U	U	U	50	-		8270C
N-Nitrosodi-n-butylamine							*CAS #*	924-16-3
Second Quarter 2010	U	U	U	U	10	-		8270C
N-Nitrosodiethylamine							*CAS #*	55-18-5
Second Quarter 2010	U	U	U	U	10	-		8270C
N-Nitrosodimethylamine							*CAS #*	62-75-9
Second Quarter 2010	U J	U J	U J	U J	10	-		8270C
N-Nitrosodiphenylamine							*CAS #*	86-30-6
Second Quarter 2010	U	U	U	U	10	-		8270C
N-Nitrosodipropylamine							*CAS #*	621-64-7
Second Quarter 2010	U	U	U	U	10	-		8270C
N-Nitrosomethylethylamine							*CAS #*	10595-95-6
Second Quarter 2010	U	U	U	U	10	-		8270C

Target Analyte Monitoring Results - HWMU-7 Point of Compliance Wells
Radford Army Ammunition Plant, Radford, Virginia
Upgradient well = 7W12B
All Results in ug/L.

Analtye/Quarter	*7W12B Q*	*7MW6 Q*	*7WCA Q*	*7W11B Q*	*QL*	*GPS*	*Background*	*Method*
N-Nitrosomorpholine							*CAS #*	59-89-2
Second Quarter 2010	U	U	U	U	10	-		8270C
N-Nitrosopiperidine							*CAS #*	100-75-4
Second Quarter 2010	U	U	U	U	10	-		8270C
N-Nitrosopyrrolidine							*CAS #*	930-55-2
Second Quarter 2010	U	U	U	U	10	-		8270C
5-Nitroso-o-toluidine							*CAS #*	99-55-8
Second Quarter 2010	U	U	U	U	10	-		8270C
Parathion							*CAS #*	56-38-2
Second Quarter 2010	U	U	U	U	10	-		8270C
Pentachlorobenzene							*CAS #*	608-93-5
Second Quarter 2010	U	U	U	U	10	-		8270C
Pentachloroethane							*CAS #*	76-01-7
Second Quarter 2010	U	U	U	U	10	-		8260B
Pentachloronitrobenzene							*CAS #*	82-68-8
Second Quarter 2010	U	U	U	U	10	-		8270C
Pentachlorophenol							*CAS #*	87-86-5
Second Quarter 2010	U	U	U	U	10	-		8270C
Phenacetin							*CAS #*	62-44-2
Second Quarter 2010	U	U	U	U	10	-		8270C
Phenanthrene							*CAS #*	85-01-8
Second Quarter 2010	U	U	U	U	10	-		8270C
Phenol							*CAS #*	108-95-2
Second Quarter 2010	U	U	U	U	10	-		8270C
Phorate							*CAS #*	298-02-2
Second Quarter 2010	U	U	U	U	10	-		8270C
2-Picoline							*CAS #*	109-06-8
Second Quarter 2010	U	U	U	U	10	-		8270C
Pronamide							*CAS #*	23950-58-5
Second Quarter 2010	U	U	U	U	10	-		8270C
1-Propanol							*CAS #*	71-23-8
Second Quarter 2010	U J	U J	U J	U J	100	-		8260B
2-Propanol							*CAS #*	67-63-0
Second Quarter 2010	U	U	U	U	100	-		8260B
Propionitrile							*CAS #*	107-12-0
Second Quarter 2010	U	U	U	U	100	-		8260B
n-Propylbenzene							*CAS #*	103-65-1
Second Quarter 2010	U	U	U	U	1	-		8260B
Pyrene							*CAS #*	129-00-0
Second Quarter 2010	U	U	U	U	10	-		8270C
Pyridine							*CAS #*	110-86-1
Second Quarter 2010	U J	U J	U J	U J	10	-		8270C
Safrole							*CAS #*	94-59-7
Second Quarter 2010	U	U	U	U	10	-		8270C
Silvex							*CAS #*	93-72-1
Second Quarter 2010	U	U	U	U	2.5	-		8151A

Target Analyte Monitoring Results - HWMU-7 Point of Compliance Wells
Radford Army Ammunition Plant, Radford, Virginia
Upgradient well = 7W12B
All Results in ug/L.

Analtye/Quarter	*7W12B Q*	*7MW6 Q*	*7WCA Q*	*7W11B Q*	*QL*	*GPS*	*Background*	*Method*
Styrene							*CAS #*	100-42-5
Second Quarter 2010	U J	U J	U J	U J	1	-		8260B
Sulfotep							*CAS #*	3689-24-5
Second Quarter 2010	U J	U J	U J	U J	5	-		8270C
2,4,5-Trichlorophenoxyacetic acid							*CAS #*	93-76-5
Second Quarter 2010	U	U	U	U	2.5	-		8151A
1,2,4,5-Tetrachlorobenzene							*CAS #*	95-94-3
Second Quarter 2010	U	U	U	U	10	-		8270C
1,1,1,2-Tetrachloroethane							*CAS #*	630-20-6
Second Quarter 2010	U	U	U	U	1	-		8260B
1,1,2,2-Tetrachloroethane							*CAS #*	79-34-5
Second Quarter 2010	U	U	U	U	1	-		8260B
Tetrachloroethene							*CAS #*	127-18-4
Second Quarter 2010	U	U	U	U	1	-		8260B
Tetrahydrofuran							*CAS #*	109-99-9
Second Quarter 2010	U	U	U	U	25	-		8260B
2,3,4,6-Tetrachlorophenol							*CAS #*	58-90-2
Second Quarter 2010	U	U	U	U	10	-		8270C
Toluene							*CAS #*	108-88-3
Second Quarter 2010	U	U	U	U	1	-		8260B
o-Toluidine							*CAS #*	95-53-4
Second Quarter 2010	U	U	U	U	10	-		8270C
Toxaphene							*CAS #*	8001-35-2
Second Quarter 2010	U	U	U	U	2.5	-		8081A
1,2,3-Trichlorobenzene							*CAS #*	87-61-6
Second Quarter 2010	U	U	U	U	1	-		8260B
1,2,4-Trichlorobenzene							*CAS #*	120-82-1
Second Quarter 2010	U	U	U	U	1	-		8260B
1,1,1-Trichloroethane							*CAS #*	71-55-6
Second Quarter 2010	U	U	U	U	1	-		8260B
1,1,2-Trichloroethane							*CAS #*	79-00-5
Second Quarter 2010	U	U	U	U	1	-		8260B
Trichloroethene							*CAS #*	79-01-6
Second Quarter 2010	U	U	U	U	1	-		8260B
Trichlorofluoromethane							*CAS #*	75-69-4
Second Quarter 2010	U	U	U	U	1	-		8260B
2,4,5-Trichlorophenol							*CAS #*	95-95-4
Second Quarter 2010	U	U	U	U	10	-		8270C
2,4,6-Trichlorophenol							*CAS #*	88-06-2
Second Quarter 2010	U	U	U	U	10	-		8270C
1,2,3-Trichloropropane							*CAS #*	96-18-4
Second Quarter 2010	U	U	U	U	1	-		8260B
1,1,2-Trichloro-1,2,2-Trifluoroethane							*CAS #*	76-13-1
Second Quarter 2010	U	U	U	U	1	-		8260B
O,O,O-Triethyl phosphorothioate							*CAS #*	126-68-1
Second Quarter 2010	U	U	U	U	10	-		8270C

Target Analyte Monitoring Results - HWMU-7 Point of Compliance Wells
Radford Army Ammunition Plant, Radford, Virginia
Upgradient well = 7W12B
All Results in ug/L.

Analtye/Quarter	*7W12B Q*	*7MW6 Q*	*7WCA Q*	*7W11B Q*	*QL*	*GPS*	*Background*	*Method*
1,2,4-Trimethylbenzene							*CAS #*	95-63-6
Second Quarter 2010	U	U	U	U	1	-		8260B
1,3,5-Trimethylbenzene							*CAS #*	108-67-8
Second Quarter 2010	U	U	U	U	1	-		8260B
sym-Trinitrobenzene							*CAS #*	99-35-4
Second Quarter 2010	U J	U J	U J	U J	10	-		8270C
Vinyl acetate							*CAS #*	108-05-4
Second Quarter 2010	U	U	U	U	10	-		8260B
Vinyl chloride							*CAS #*	75-01-4
Second Quarter 2010	U	U	U	U	1	-		8260B
Xylenes (Total)							*CAS #*	1330-20-7
Second Quarter 2010	U	U	U	U	3	-		8260B

Target Analyte Monitoring Results - HWMU-7 Point of Compliance Wells
Radford Army Ammunition Plant, Radford, Virginia
Upgradient well = 7W12B
All Results in ug/L.

Analtye/Quarter	*7W12B Q*	*7MW6 Q*	*7WCA Q*	*7W11B Q*	*QL*	*GPS*	*Background*	*Method*

Definitions:

The following definitions apply to results reported for Appendix IX monitoring events.
All Appendix IX monitoring results for compliance wells are reported to the detection limit.

QL Denotes permit required quantitation limit.
U denotes not detected at or above the detection limit.
UA denotes not detected at or above the adjusted detection limit.
J Denotes result is estimated. When used with "U" (i.e., "UJ"), denotes analyte not detected at or above the detection limit and detection limit and QL are estimated. When used with "UA" (i.e., "UAJ"), denotes analyte not detected at or above adjusted detection limit and adjusted detection limit and QL are estimated.
UN Denotes analyte concentration is less than the quantitation limit and/or five times the blank concentration. Not reliably detected due to blank contamination. This qualifier used only for Appendix IX monitoring event when compliance well results are reported to at or above the project detection limit.
R Denotes result rejected.
Q Denotes data validation qualifier.
Background Denotes background concentrations listed in the pending Class 3 Permit Modification for the Post-Closure Care Permit for HWMUs 5, 7, 10 and 16.
CAS# Denotes Chemical Abstract Services registration number.
GPS Denotes groundwater protection standard.

The following definitions apply to results reported for non-Appendix IX monitoring events.
All non-Appendix IX monitoring results for compliance wells are reported to at or above the quantitation limit.

QL Denotes permit required quantitation limit.
U Denotes analyte not detected at or above QL.
UA Denotes analyte not detected at or above adjusted sample QL.
J Denotes result is estimated. When used with "U" (i.e., "**UJ**"), denotes analyte not detected at or above QL and QL is estimated. When used with "UA" (i.e., "**UAJ**"), denotes analyte not detected at or above adjusted QL and adjusted QL is estimated.
R Denotes result rejected.
Q Denotes data validation qualifier.
Background Denotes background concentrations listed in the pending Class 3 Permit Modification for the Post-Closure Care Permit for HWMUs 5, 7, 10 and 16.
CAS# Denotes Chemical Abstract Services registration number.
GPS Denotes groundwater protection standard.

Notes:
-**Appendix IX Groundwater Monitoring Events**:
Third Quarter 2003, Second Quarter 2004, Second Quarter 2005, Third Quarter 2006, Second Quarter 2007, Second Quarter 2008, Second Quarter 2009, Second Quarter 2010
All Appendix IX results evaluated and reported to detection limit.
-9/29/2003: Verification sampling event for 7MW6, 7W11B, 7W12B, 7WCA (copper and zinc). Verification results reported in this table for copper and zinc.
-6/21-22/2004: Verification sampling event for 7MW6, 7W11B, 7W12B, 7WCA. Verification results reported in this table for chloroform (7W12B).
-3/23/2005: Verification sampling event for 7MW6. Verification results reported in this table for bis(2-ethylhexyl)phthalate).
-7/26/2005: Verification sampling event for 7MW6, 7W11B, 7W12B, 7WCA (ethyl acetate), 7W11B (beta-BHC), and 7MW6 (alpha-BHC). All Verification results reported as not detected. Verification results reported.
-Sept 2006: Verification sampling event for 7W12B and 7W11B 3Q2006 for chloroform. Initial results reported in this table for chloroform (7W11B,
-July 17, 2008: Verification sampling event for 7W13 arsenic and cobalt. 7W9C cobalt
-June 11, 2009, Verification sampling event for 7MW6 Diethyl ether. Analyte not detected. Verification results reported.

Comprehensive Data Validation Report

Sample/Blind Field Duplicate Results Greater Than the Quantitation Limit

Facility: HWMU-7 Monitoring Event: Second Quarter 2010

Draper Aden Associates
Engineering ♦ Surveying ♦ Environmental Services

Analyte	Sample ID	Laboratory Result (ug/L)	Q	Validated Result (ug/L)	Q	QL (ug/L)	Validation Notes
Method: 6020							
Laboratory: CompuChem, a Division of Liberty Analytical, Cary, NC							
Barium	7WCA	25.5		25.5		10	No action taken. Sample duplicate for 7WDUP. RPD <20.
	7WDUP	24.6		24.6		10	No action taken. Blind field duplicate for 7WCA. RPD <20.
Nickel	7WCA	11.8		11.8		10	No action taken. Sample duplicate for 7WDUP. RPD <20.
	7WDUP	11.3		11.3		10	No action taken. Blind field duplicate for 7WCA. RPD <20.

Definitions: **QL** Denotes permit quantitation limit. **Q** Denotes data qualifier. **J** Denotes analyte reported at or above QL limit and associated result is estimated.

Comprehensive Data Validation Report

Sample/Blind Field Duplicate Results Greater Than the Quantitation Limit

Facility: HWMU-7 Monitoring Event: Fourth Quarter 2010

Draper Aden Associates
Engineering ♦ Surveying ♦ Environmental Services

Analyte	Sample ID	Laboratory Result (ug/L)	Q	Validated Result (ug/L)	Q	QL (ug/L)	Validation Notes
Method: 6020							
Laboratory: CompuChem, a Division of Liberty Analytica, Cary, NC							
Barium	7WCA	22		22		10	No action taken. Field duplicate result was 22.7 ug/l. RPD <10.
	7WDUP	22.7		22.7		10	No action taken. Field duplicate of 7WCA. RPD <10.
Nickel	7WCA	14.4		14.4		10	No action taken. Field duplicate result was 14.7 ug/l. RPD <10.
	7WDUP	14.7		14.7		10	No action taken. Field duplicate of 7WCA. RPD <10.

Definitions: **QL** Denotes permit quantitation limit. **Q** Denotes data qualifier. **J** Denotes analyte reported at or above QL limit and associated result is estimated.

APPENDIX B-3

HWMU-7 2010 LABORATORY ANALYTICAL RESULTS
PLUME MONITORING WELLS

Target Analyte Monitoring Results At or Above Permit Quantitation Limit
HWMU 7 Plume Monitoring Wells
Radford Army Ammunition Plant, Radford, Virginia

All Results in ug/L. *Upgradient well = 7W12B*

Analyte/Quarter	*7W12B Q*	*7W9C Q*	*7W10B Q*	*7W10C Q*	*7W13 Q*	*QL*	*Background*	*GPS*	*Method*	*CAS #*
Antimony										
Second Quarter 2010	U	U	U	U	U	1	1	6	6020	7440-36-0
Fourth Quarter 2010	U	U	U	U	U	1	1	6	6020	7440-36-0
Arsenic										
Second Quarter 2010	U	U	U	U	U	10	10	10	6020	7440-38-2
Fourth Quarter 2010	U	U	U	U	U	10	10	10	6020	7440-38-2
Barium										
Second Quarter 2010	31	18.9	67.4	44.5	11.7	10	41	2000	6020	7440-39-3
Fourth Quarter 2010	31.2	20.6	71.7	46.9	20.1	10	41	2000	6020	7440-39-3
Cadmium										
Second Quarter 2010	U	U	U	U	U	1	1	5	6020	7440-43-9
Fourth Quarter 2010	U	U	U	U	U	1	1	5	6020	7440-43-9
Chromium										
Second Quarter 2010	4.5 J	U	U	U	U	5	9.9	100	6020	7440-47-3
Fourth Quarter 2010	7.2	U	U	U	U	5	9.9	100	6020	7440-47-3
Cobalt										
Second Quarter 2010	U	U	U	U	11.2	5	5	156.65	6020	7440-48-4
Fourth Quarter 2010	U	U	U	U	16.4	5	5	156.65	6020	7440-48-4
Copper										
Second Quarter 2010	1.4 J	U	U	U	U	5	5	1300	6020	7440-50-8
Fourth Quarter 2010	U	U	U	U	U	5	5	1300	6020	7440-50-8
Lead										
Second Quarter 2010	U	U	U	U	U	1	1	15	6020	7439-92-1
Fourth Quarter 2010	U	U	U	U	U	1	1	15	6020	7439-92-1
Mercury										
Second Quarter 2010	U	U	U	U	U	2	2	2	7470A	7439-97-6
Fourth Quarter 2010	U	U	U	U	U	2	2	2	7470A	7439-97-6
Nickel										
Second Quarter 2010	U	U	U	U	U	10	10	313	6020	7440-02-0
Fourth Quarter 2010	U	U	U	U	U	10	10	313	6020	7440-02-0
Selenium										
Second Quarter 2010	U	U	U	U	U	10	10	50	6020	7782-49-2
Fourth Quarter 2010	U	U	U	U	U	10	10	50	6020	7782-49-2
Silver										
Second Quarter 2010	U	U	U	U	U	2	2	78.25	6020	7440-22-4
Fourth Quarter 2010	U	U	U	U	U	2	2	78.25	6020	7440-22-4
Thallium										
Second Quarter 2010	U	U	U	U	U	1	1	2	6020	7440-28-0
Fourth Quarter 2010	U	U	U	U	U	1	1	2	6020	7440-28-0
Zinc										
Second Quarter 2010	4.7 J	U	U	U	U	10	10.9	4695	6020	7440-66-6
Fourth Quarter 2010	U	U	U	U	U	10	10.9	4695	6020	7440-66-6
Cyanide										
Second Quarter 2010	U	U	U	U	U	20	20	200	9012A	57-12-5
Fourth Quarter 2010	U	U	U	U	U	20	20	200	9012A	57-12-5
bis(2-Ethylhexyl)phthalate										
Second Quarter 2010	U	U	U	U	U	5	6	6	8270C	117-81-7
Fourth Quarter 2010	U	U	U	U	U	6	6	6	8270C	117-81-7
Butyl benzyl phthalate										
Second Quarter 2010	U	U	U	U	U	10	10	3130	8270C	85-68-7
Fourth Quarter 2010	U	U	U	U	U	10	10	3130	8270C	85-68-7

See last page of this report for definitions.

Target Analyte Monitoring Results At or Above Permit Quantitation Limit
HWMU 7 Plume Monitoring Wells
Radford Army Ammunition Plant, Radford, Virginia

All Results in ug/L. ***Upgradient well = 7W12B***

Analyte/Quarter	*7W12B Q*	*7W9C Q*	*7W10B Q*	*7W10C Q*	*7W13 Q*	*QL*	*Background*	*GPS*	*Method*	*CAS #*
2,4-Dinitrophenol										
Second Quarter 2010	U J	U	U	U	U	10	10	31.3	8270C	51-28-5
Fourth Quarter 2010	U J	U J	U J	U J	U J	10	10	31.3	8270C	51-28-5
2,4-Dinitrotoluene										
Second Quarter 2010	U	U	U	U	U	10	10	31.3	8270C	121-14-2
Fourth Quarter 2010	U	U	U	U	U	10	10	31.3	8270C	121-14-2
2,6-Dinitrotoluene										
Second Quarter 2010	U	U	U	U	U	10	10	15.65	8270C	606-20-2
Fourth Quarter 2010	U	U	U	U	U	10	10	15.65	8270C	606-20-2
p-Nitrophenol										
Second Quarter 2010	U	U	U	U	U	10	20	50	8270C	100-02-7
Fourth Quarter 2010	U J	U J	U J	U J	U J	10	20	50	8270C	100-02-7

Definitions:

All plume monitoring well results reported to at or above the permit quantitation limit except for the upgradient well during the Appendix IX monitoring Event. During the Appendix IX monitoring event, results for the upgradient well are reported to the c

Q Denotes data validation qualifier.
QL Denotes permit required quantitation limit.
U Denotes analyte not detected at or above QL.
UA Denotes analyte not detected at or above adjusted sample QL.
J Denotes result is estimated. When used with "U" (i.e., "**UJ**"), denotes analyte not detected at or above QL and QL is estimated. When used with "UA" (i.e., "**UAJ**"), denotes analyte not detected at or above adjusted QL and adjusted QL is estimated.
UN Denotes analyte concentration is less than the quantiation limit and five times the blank concentration. Not reliably detected due to blank contamination. This qualifier used only for Appendix IX monitoring event when compliance well results are reported to at or above the project detection limit.
R Denotes result rejected.
Background Denotes background concentrations listed in the pending Class 3 Permit Modification for the Post-Closure Care Permit for HWMUs 5, 7, 10 and 16.
CAS# Denotes Chemical Abstract Services registration number. **GPS** Denotes groundwater protection standard.

Notes:
-January 2005: Verification sampling event for 7MW13 4Q2004 arsenic. Verification results reported in this table for arsenic (7W13).
-March 2006: Verification sampling event for 7MW13 1Q2006 arsenic. Verification results reported in this table for arsenic (7W13).
-July 2006: Verification sampling event for 7MW13 2Q2006 arsenic. Verification results reported in this table for arsenic (7W13).
-Sept 2006: Verification sampling event for 7W12B 3Q2006 chloroform. Initial results reported in this table for chloroform (7W12B).
-July 17, 2007: Verification sampling event for 7W13 arsenic-verification event result reported, highest of four quadruplicate results, 7W13 cobalt-original result reported.. 7W9C cobalt- Verification result reported.

-Dec 17, 2008: Verification sampling event for 7W13 . cobalt- Original result reported.
-June 28, 2010 - Verification sampling event for 7W13 . cobalt- Original result reported.
Also, verification sampling event for 7W13 . cobalt- verification result reported.
-Dec 16, 2010 - Verification sampling event for 7W13 . arsenic- Verification result reported.

See last page of this report for definitions.

APPENDIX B-4

ESTABLISHED BACKGROUND VALUES AND COMPUTATIONS FOR HWMU-7

April 1995 letter from the DEQ to J. Redder, Hercules, Inc. (now Alliant TechSystems, Inc.). The lists incorporate requirements outlined in the Virginia Hazardous Waste Management Regulations (VR 672-10-1) Sections 9.5.C and 9.5.D. These include the Indicator Parameters, Ground Water Quality Parameters, EPA Interim Primary Drinking Water Standards, Known Hazardous Waste Constituents, and Detected VHWMR Appendix 10.6 Constituents. A demonstration was made to the DEQ that several hazardous waste constituents had not been detected for six consecutive quarters. As a result, these constituents have not been analyzed for on a regular basis. These are highlighted in the **Table 3-1.**

Additional parameters have not been detected in any of the wells. During the meeting between Alliant and DEQ on 21 May 1996, DEQ suggested that the recommendations to temporarily cease sampling additional constituents that had not been detected in six or more consecutive sampling events made in the GWQAP addendum submitted 3 November 1995 would better be addressed in the post closure permitting process. Therefore, those additional constituents will not be addressed in this report.

3.4 *UNIT 7 GROUND WATER BACKGROUND VALUES*

As requested in the DEQ's 23 July letter, background values were calculated for each parameter .

As discussed with DEQ, Alliant believes the analytical data to be questionable in some cases. DEQ has agreed in a 9 April 1996 letter to C. Jake (Alliant) that only total metals will be measured, as described in an EPA Region III guidance on ground water sampling in karst terrain. Another case of questionable data involves an increase in Total Organic Carbon (TOC) concentrations by a factor of 10. As such, the TOC concentrations from 1995 through 1997 were used to calculate the background values. **Table 3-2** presents the *Historical Maximum Values,* which were used to develop the isocontour maps.

As requested in the DEQ's 23 July 1998 letter, using the data from well 7W12B, background values were calculated for each parameter in the ground water monitoring program. However, as a result of the 21 May 1996 meeting and subsequent telephone conversations, these background values are being submitted in accordance with the regulations and shown on the isocontour maps but were not utilized for purposes of this report.

Additionally, calculations of background values based on the 95% confidence, 95% coverage upper tolerance limit require that data distributions be normal or lognormal. Some of the data do not fulfill this requirement

3.5 *UNIT 7 STATISTICAL ANALYSIS*

Statistical evaluations for Unit 7 are performed annually and submitted as part of the Annual Reporting requirements found in the VHWMR Section 9.5. As a result of the 21 May 1996 meeting between Alliant and DEQ, Alliant has established background ground water concentrations for the upgradient well, 7W12B utilizing the Virginia DEQ "*Guidance on Statistical Methods for Ground Water Data Analysis at a Solid Waste or Hazardous Waste Site, Version 2.0, 1995*". In response to Mr. Glenn von Gonten's letter dated 23 July, 1998, Alliant has revised the background concentrations to include sample data collected in 1997. These values can be found in **Table 3-3**. Methods used for background concentration computation and statsistical analysis are described below.

The following parameters were 100% Non-Detected in 20 or more sampling events. The downgradient well data points were compared to the laboratory PQLs in a nonparametric statistical manner or to the applicable MCL or VGWPS (if one exists). Background values were then estimated by using the laboratory PQL for that constituent.

Parameter	*PQL (ppb)*	*Sample Size*	*% Non-Detect*	*MCL or VGWPS (ppb)*
2,4-DNT	0.2	22	100	None
2,6-DNT	0.1	22	100	None
2,4 Dinitrophenol	11	11	100	None
Benzyl Alcohol	8	8	100	None
Cyanide	20	20	100	5
Bis(2- ethyl hexyl) phthalate	9	9	100	None
2 – Nitrophenol	9	9	100	None
4 – Nitrophenol	9	9	100	None
Acetone	100	14	100	None
Antimony	30	14	100	None
Vanadium	40	20	100	None

The following parameter has log-normally distributed data with between 15 and 50 percent Non-Detect values. As such, Cohen's Method was used as an adjustment for the mean and standard deviation, as recommended in the DEQ guidance. Results of the background analysis are summarized in **Table 3-4**

Parameter	*Sample Size*	*% Non-Detect*
Lead	23	34

The following parameters have data with greater than 50% Non-Detects, a minimum sample size of twenty (20). The data were non-normally distributed as indicated using a data distribution statistical method. According to Mr. Glenn von Gonten, DEQ in a 30 July 1996 telephone conversation, the maximum value detected will be used for plume delineation purposes for those constituents with greater than 50% non-detected values. An isocontour map for Total Organic Halides could not

be created because only one sampling point maximum concentration exceeded the background value.

Parameter	*Sample Size*	*% Non-Detect*
Arsenic	23	91.3
Cadmium	23	60.9
Chromium	23	56.5
Cobalt	20	65.5
Mercury	23	82.6
Nickel	20	85
Selenium	23	82.6
Thallium	20	70
Total Organic Halides	48	62.5

The following parameters do not have greater than four (4) sampling events and therefore could not be included in this (plume) evaluation:

- 2,4-D
- Gross Beta
- Radium
- Sulfate

The following parameters have between 15 and 50 percent Non-Detect values, and do not have normal or log-normal data distributions. Thus, Cohen's Method could not be used. Per the DEQ's 23 July letter, background concentrations were computed by calculating an upper tolerance limit based on 95% coverage, at a 95% confidence level. It should be noted that upper tolerance limits are not typically used unless the data are normally or log-normally distributed. Background concentration analysis data is summarized in **Table 3-4.**

Parameter	*Sample Size*	*% Non-Detects*
Total Organic Carbon	36	27.2%
Silver	23	47.8%

The remaining parameters have less than 15% Non-Detect values and no data manipulation was required. Computation data for barium, copper, specific conductivity, and zinc are summarized in **Table 3-4**

Parameter	*Sample Size*	*% Non-Detect*
Copper	20	0
PH	92	0
Barium	23	13
Specific Conductivity	92	0
Zinc	20	0

Table 3-3
Unit 7
Background Values

Parameter	*Units*	*Background Value*
2,4-DNT	Ppb	0.2
2,6-DNT	Ppb	0.1
Acetone	Ppb	100
Antimony	Ppb	30
Arsenic	Ppb	2.0
Barium	Ppb	64
Cadmium	Ppb	0.4
Chromium	Ppb	34
Cobalt	Ppb	17
Copper	Ppb	49
Cyanide	Ppb	5
Lead	Ppb	14
Mercury	Ppb	0.350
Nickel	Ppb	63
PH	SU	7
Selenium	Ppb	20
Silver	Ppb	2.13
Specific Conductivity	Umhos/sec	1,025
Thallium	Ppb	4
Total Organic Halides	ppb	21
Total Organic Carbon	Ppb	3930
Vanadium	Ppb	40
Zinc	Ppb	217

STATISTICAL SUMMARY OF BACKGROUND WATER QUALITY DATA

Date	Barium	Copper	Silver	Zinc	Lead	TOC	SpCon
3/31/92	1.00		0.10		0.50		730.00
6/30/92	1.00		0.10		0.50		706.00
9/30/92	1.00		0.10		0.50		370.00
12/31/92	35.00	50.00	0.30	253.00	19.00		798.00
3/31/93	27.00	16.00	0.40	17.00	0.50		722.00
6/30/93	31.00	10.00	0.10	126.00	0.50		715.00
9/30/93	38.00	6.00	0.30	81.00	4.00		895.00
12/31/93	40.00	7.00	0.10	144.00	0.50		918.00
3/31/94	27.00	10.00	0.30	29.00	2.00		723.00
6/30/94	35.00	3.00	0.70	26.00	5.00		750.00
9/30/94	59.00	2.00	0.50	26.00	12.00		891.00
12/31/94	44.00	2.00	3.10	55.00	3.00		880.00
3/30/95	40.00	10.00	0.10	10.20	1.00		822.00
6/29/95	36.00	9.30	0.10	20.00	1.40		740.00
9/30/95	30.00	2.00	0.10	11.00	0.50	1250.00	610.00
12/31/95	37.00	10.00	1.90	49.00	6.00	875.00	840.00
3/31/96	31.00	8.00	0.10	55.00	2.00	500.00	652.00
6/30/96	26.00	3.00	0.10	1.00	0.50	2000.00	608.00
9/30/96	35.00	14.00	0.10	24.00	4.00	500.00	758.00
12/31/96	32.00	3.00	0.30	113.00	6.00	2000.00	768.00
3/31/97	40.00	16.00	0.40	105.00	6.00	1000.00	750.00
6/30/97	32.00	55.00	0.30	135.00	3.00	3000.00	720.00
9/30/97	43.00	29.00	1.20	45.00	3.00	500.00	850.00
Number of Samples	23.00	20.00	23.00	20.00	23.00	9.00	23.00
Mean	31.35	13.27	0.47	66.26	3.54	1291.67	748.52
Standard Deviation	13.91	14.92	0.71	63.06	4.38	870.52	119.05
Shapiro-Wilk W	0.84	0.70	0.57	0.84	0.70	0.87	0.89
Normal Distribution	No	No	No	No	No	Yes	Yes
K	2.33	2.40	2.33	2.40	2.33	3.03	2.33
UTL	63.74	49.01	2.13	217.35	13.74	3930.23	1025.79

Notes: K = Tolerance factor for one-sided normal tolerance interval with probability level of 95% and 95% coverage.
ULT = Upper Tolerance Limit

Appendix IX Constituents Detected Since Permit Issuance
HWMUs 5, 7, 10, and 16
Radford Army Ammunition Plant

Unit	Quarter Initially Detected	Constituent	Background--Calculated or QL?	Background (ug/L)	GPS Required? (261 Appendix VIII)	Proposed GPS (ug/L)	Source
HMWU-5	Fourth Quarter 2003	Chromium	QL	5	yes	100	USEPA MCL
		Diethyl Ether	QL	12	no	NA	NA
		2-Nitroaniline	QL	20	no	NA	NA
		4-Nitroaniline	QL	20	yes	20	Background/QL
		Nitrobenzene	QL	10	yes	10	Background/QL
	Third Quarter 2006	Dichlorodifluoromethane	QL	1	yes	125.2	VDEQ ACL
HWMU-7	Third Quarter 2003	Copper	Calculated	49	no	NA	NA
	Second Quarter 2004	Zinc	Calculated	217	no	NA	NA
HWMU-10	First Quarter 2003	Cobalt	QL	5	no	NA	NA
	Second Quarter 2003	Vanadium	QL	10	no	NA	NA
	Second Quarter 2005	Acetone	QL	10	no	NA	NA
		2-Propanol	QL	50	no	NA	NA
HWMU-16	Second Quarter 2003	Chloroethane	Calculated	20.7	yes	20.7	Background/QL
		Diethyl Ether	Calculated	75.5	no	NA	NA
		Dimethyl Ether	Calculated	17.0	no	NA	NA
	Third Quarter 2003	Methylene Chloride	Calculated	13.95	no*	NA	NA
	Second Quarter 2004	1,1,2-Trichloro-1,2,2-trifluoroethane	Calculated	1.2	no*	NA	NA

HWMU-5: The additional Appendix IX constituents detected in the downgradient point of compliance wells were not detected above their respective Quantitation Limits (QLs) in the upgradient well. As a result, background concentrations for those constituents were set as equal to their respective QLs. In accordance with the Permit (Condition V.J.1.g.), GPS are proposed for those additional Appendix IX constituents that are listed in Appendix VIII of 40 CFR Part 261 (chromium, 4-nitroaniline, nitrobenzene, and dichlorodifluoromethane). No GPS are proposed for the additional Appendix IX constituents that are not listed in Appendix VIII of 40 CFR Part 261 (diethyl ether and 2-nitroaniline).

HWMU-7: Background concentrations for the additional Appendix IX constituents detected in the downgradient point of compliance wells (copper and zinc) were previously calculated and submitted to the VDEQ in the August 1998 *Groundwater Quality Assessment Report for HWMU-7* prepared by ERM, Inc. In accordance with the Permit (Condition V.J.2.g.), no GPS are proposed for the additional Appendix IX constituents (copper and zinc), as they are not listed in Appendix VIII of 40 CFR Part 261.

HWMU-10: The additional Appendix IX constituents detected in the downgradient point of compliance wells were not detected above their respective Quantitation Limits (QLs) in the upgradient well. As a result, background concentrations for those constituents were set as equal to their respective QLs. In accordance with the Permit (Condition V.J.3.g.), no GPS are proposed for the additional Appendix IX constituents (cobalt, vanadium, acetone, and 2-propanol), as they are not listed in Appendix VIII of 40 CFR Part 261.

HWMU-16: Background concentrations for additional Appendix IX constituents chloroethane, diethyl ether, dimethyl ether, and methylene chloride were calculated using data collected from upgradient well 16C1 during the period from Third Quarter 2003 through Third Quarter 2004. The background concentration for additional Appendix IX constituent 1,1,2-trichloro-1,2,2-trifluoroethane was calculated using data collected from upgradient well 16C1 during the period from Second Quarter 2004 through Third Quarter 2006.
In accordance with the Permit (Condition V.J.4.g.), GPS are proposed for additional Appendix IX constituents that are listed in Appendix VIII of 40 CFR Part 261 (chloroethane). No GPS are proposed for the additional Appendix IX constituents that are not listed in Appendix VIII of 40 CFR Part 261 (diethyl ether and dimethyl ether).
*Methylene chloride and 1,1,2-trichloro-1,2,2-trifluoroethane should not be added to the Groundwater Monitoring List for HWMU-16, as these constituents were only detected in the upgradient well for the Unit, and not in the downgradient point of compliance wells.

CONSTITUENT BACKGROUND VALUES
FOR THE
COMPLIANCE GROUNDWATER MONITORING PROGRAM

HWMU-7
RADFORD ARMY AMMUNITION PLANT
RADFORD, VIRGINIA

Prepared for:

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Route 114
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DAA Job No. B03204-122

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CONCLUSIONS PRESENTED BY DAA DO NOT REFLECT VARIATIONS IN SUBSURFACE GROUNDWATER QUALITY THAT MIGHT EXIST BETWEEN OR BEYOND SAMPLING POINTS OR BETWEEN SPECIFIC SAMPLE COLLECTIONS EVENTS. DAA SHALL INCUR NO LIABILITY RESULTING FROM INFORMATION SUPPLIED BY OTHERS.

RADFORD ARMY AMMUNITION PLANT – HWMU-7
CALCULATION OF CONSTITUENT BACKGROUND VALUES

Draper Aden Associates recalculated background values for the plume monitoring well constituents of the groundwater monitoring program for Hazardous Waste Management Unit No. 7 (HWMU-7) located at the Radford Army Ammunition Plant (Radford AAP) in Radford, Virginia. Background values were calculated for all plume monitoring well constituents.

The background values for HWMU-7 plume monitoring well constituents were calculated using the analytical data for upgradient well 7W12B using data from Second Quarter 2003 through Second Quarter 2007 (available most recent data with one exception-cyanide includes 4th Quarter 2007 data). Inter-well upper prediction limits (UPL) were calculated on the background data for the target parameters in accordance with the facility permit and VHWMR (40 CFR 264.97(h)). Where applicable, the background value calculations were based on site-wide 95% confidence, 95% coverage upper prediction intervals. The calculated background values for all target constituents are listed on **Table 1**.

Background Data and Background Value Calculations

The constituents listed below were 100% non-detected (<LOQ) in the background well. The background values for these constituents were established as equal to their quantitation limits (QL).

Background Value = Quantitation Limit (QL)				
Constituent	**Sample Size**	**% Non-Detects**	**QL (µg/l)**	**Background Value (µg/l)**
Antimony	17	100	1	1
Arsenic	17	100	10	10
Cadmium	17	100	1	1
Cobalt	17	100	5	5
Copper	16	100	5	5
Lead	17	100	1	1
Mercury	17	100	2	2
Nickel	17	100	10	10
Selenium	17	100	10	10
Silver	17	100	2	2
Thallium	17	100	1	1
Cyanide	18	100	20	20
Bis(2-ethylhexyl)phthalate	17	100	6	6
Butyl benzyl phthalate	17	100	10	10
2,4-Dinitrophenol	17	100	10	10
2,4-Dinitrotoluene	17	100	10	10
2,6-Dinitrotoluene	17	100	10	10
p-Nitrophenol	17	100	10	10

Non-parametric prediction intervals were computed for the constituents for which the data from upgradient well 7W-12B satisfied one of the following two criteria, per VDEQ regulations and guidance as well as USEPA guidance:

- Percentage of non-detects was greater than or equal to 50 and less than 100; or
- Percentage of non-detects was less than 50, but data was not normally distributed in original or log-transformed mode.

Only one result for zinc was reported above its LOQ. The reported result (10.9 µg/l) is the NUPL for zinc. The non-parametric prediction limit computation for chromium is presented in **Appendix A**.

Background Value = UPL of Non-parametric Prediction Interval (NUPL)					
Parameter	**Sample Size**	**% Non-Detects**	**QL (µg/l)**	**NUPL (µg/l)**	**Background Value (µg/l)**
Chromium	17	12	5	9.9	9.9
Zinc	14	93	10	10.9	10.9

The following constituent (barium) exhibited normally distributed background data with less than 0% non-detects. One sided parametric prediction interval was computed on the background data for barium. The background value for barium was set as equal to its UPL. The background concentration calculations were based on a site wide 95% confidence, 95% coverage upper prediction intervals. The background and relevant statistical data for barium is summarized below. The prediction interval computation is presented in **Appendix A**.

Background Value = UPL of one-sided Prediction Interval					
Parameter	**Sample Size**	**% Non-Detects**	**QL (µg/l)**	**UPL (µg/l)**	**Background Value (µg/l)**
Barium	17	0	10	41.0	41.0

TABLE 1

HWMU-7
CALCULATED BACKGROUND VALUES

Constituent	Background Value (µg/l unless otherwise noted)
Antimony	1
Arsenic	10
Barium	41.0
Cadmium	1
Chromium	9.9
Cobalt	5
Copper	5
Lead	1
Mercury	2
Nickel	10
Selenium	10
Silver	2
Thallium	1
Zinc	10.9
Cyanide	20
Bis(2-ethylhexyl)phthalate	6
Butyl benzyl phthalate	10
2,4-Dinitrophenol	10
2,4-Dinitrotoluene	10
2,6-Dinitrotoluene	10
p-Nitrophenol	10

APPENDIX A

HWMU-7
BACKGROUND VALUE CALCULATIONS
STATISTICAL COMPUTATIONS FOR BARIUM AND CHROMIUM

RAAP-HWMU-7 - Background Calculation - December 2007

17-Dec-07

Y2K Correction dates are as shown in table below.

Actual Event			Date Used in Stat Software
2003-Qtr2			8/1/1999
2003-Qtr3			8/2/1999
2003-Qtr4			8/3/1999
2004-Qtr1			8/4/1999
2004-Qtr2			8/5/1999
2004-Qtr3			8/6/1999
2004-Qtr4			8/7/1999
2005-Qtr1			8/8/1999
2005-Qtr2			8/9/1999
2005-Qtr3			8/10/1999
2005-Qtr4			8/11/1999
2006-Qtr1			8/12/1999
2006-Qtr2			8/13/1999
2006-Qtr3			8/14/1999
2006-Qtr4			8/15/1999
2007-Qtr1			8/16/1999
2007-Qtr2			8/17/1999

Notes:

1) Background data was computed for all target constituents using the 2Q 2003 - 2Q 2007 data for background well 7W12B. Background data was 100% <LOQ for all target parameters except barium, chromium and zinc. Zinc had only one reported result > LOQ.

Statistical computations using GRITS/STAT V5.0 performed only for barium and chromium, as applicable.

Normality Tests

Report Printed: 12-17-2007 16:02

Facility:RAAPHWMU7 Haz. Waste Unit 7 - RAAP

Address:

City:Radford ST:VA Zip:24141
County:MONTGOMERY

Contact:
Phone:( ) -

Permit Type:Detection

Constituent:Ba Barium, total

CAS Number: 7440-39-3
MCL: 0.000 ppb
ACL: 0.000 ppb
Detect Limit: 2.000 ppb

Start Date:Aug 01 1999
End Date:Aug 17 1999

Normality Test on Observations for wells listed below:

Well:7W12B Position:Upgradient Observations:17

Scale	Minimum	Maximum	Mean	Std Dev
Original:	32.800	39.800	36.253	1.875
Log:	3.490	3.684	3.589	0.052

Pooled Statistics
Observations: 17

Statistic	Original Scale	Log Scale
Mean:	36.253	3.589
Std Dev:	1.875	0.052
Skewness:	-0.019	-0.150
Kurtosis:	-0.236	-0.251
Minimum:	32.800	3.490
Maximum:	39.800	3.684
CV:	0.052	0.014

Shapiro-Wilk Statistics

Scale	Test Statistic	5% Critical Value	1% Critical Value
Original:	0.9602	0.8920	0.8510

Log:	0.9592	0.8920	0.8510

* Indicates statistically significant evidence of non-normality.
GRIT/STAT Version 5.0

Parametric Prediction Interval
Report Printed December 17,2007

Facility:Haz. Waste Unit 7 - RAAP
Parameter:Barium, total(CAS Number:7440-39-3)

ONE-TAILED UPPER PARAMETRIC PREDICTION INTERVAL

Observations (n):	17
Shapiro-Wilk (W):	0.9602
Critical W,α=0.01:	0.8510
Mean:	36.253 ppb
Std Dev:	1.875 ppb
DF:	16
Conf. Level (1-α):	0.9500
Future Samples (k):	4
$t_{\left[1-\frac{\alpha}{k}\right]}$:	2.4729
Kappa:	2.5446
UL:	41.024 ppb
LL:	-∞

Report Produced by GRITS/STAT 5.01

Normality Tests

Report Printed: 12-17-2007 16:05

Facility:RAAPHWMU7 Haz. Waste Unit 7 - RAAP

Address:

City:Radford ST:VA Zip:24141
County:MONTGOMERY

Contact:
Phone:( ) -

Permit Type:Detection

Constituent:Cr Chromium, total

CAS Number: 7440-47-3
MCL: 0.000 ppb
ACL: 0.000 ppb
Detect Limit: 1.000 ppb

Start Date:Aug 01 1999
End Date:Aug 17 1999

Normality Test on Observations for wells listed below:

Well:7W12B Position:Upgradient Observations:17

Scale	Minimum	Maximum	Mean	Std Dev
Original:	0.500	9.900	6.612	2.648
Log:	-0.693	2.293	1.672	0.909

Pooled Statistics
Observations: 17

Statistic	Original Scale	Log Scale
Mean:	6.612	1.672
Std Dev:	2.648	0.909
Skewness:	-1.317*	-2.191*
Kurtosis:	1.110	3.139
Minimum:	0.500	-0.693
Maximum:	9.900	2.293
CV:	0.401	0.543

Shapiro-Wilk Statistics

Scale	Test Statistic	5% Critical Value	1% Critical Value
Original:	0.8293*	0.8920	0.8510

Log:	0.5707*	0.8920	0.8510

* Indicates statistically significant evidence of non-normality.
GRIT/STAT Version 5.0

Nonparametric Prediction Interval
Report Printed December 17,2007

Facility:Haz. Waste Unit 7 - RAAP
Parameter:Chromium, total(CAS Number:7440-47-3)

ONE-TAILED UPPER PARAMETRIC PREDICTION INTERVAL

Observations (n): 17
Conf. Level (1-α): ~~94.440%~~ N/A

UL: 9.900 ppb
LL: 0.000

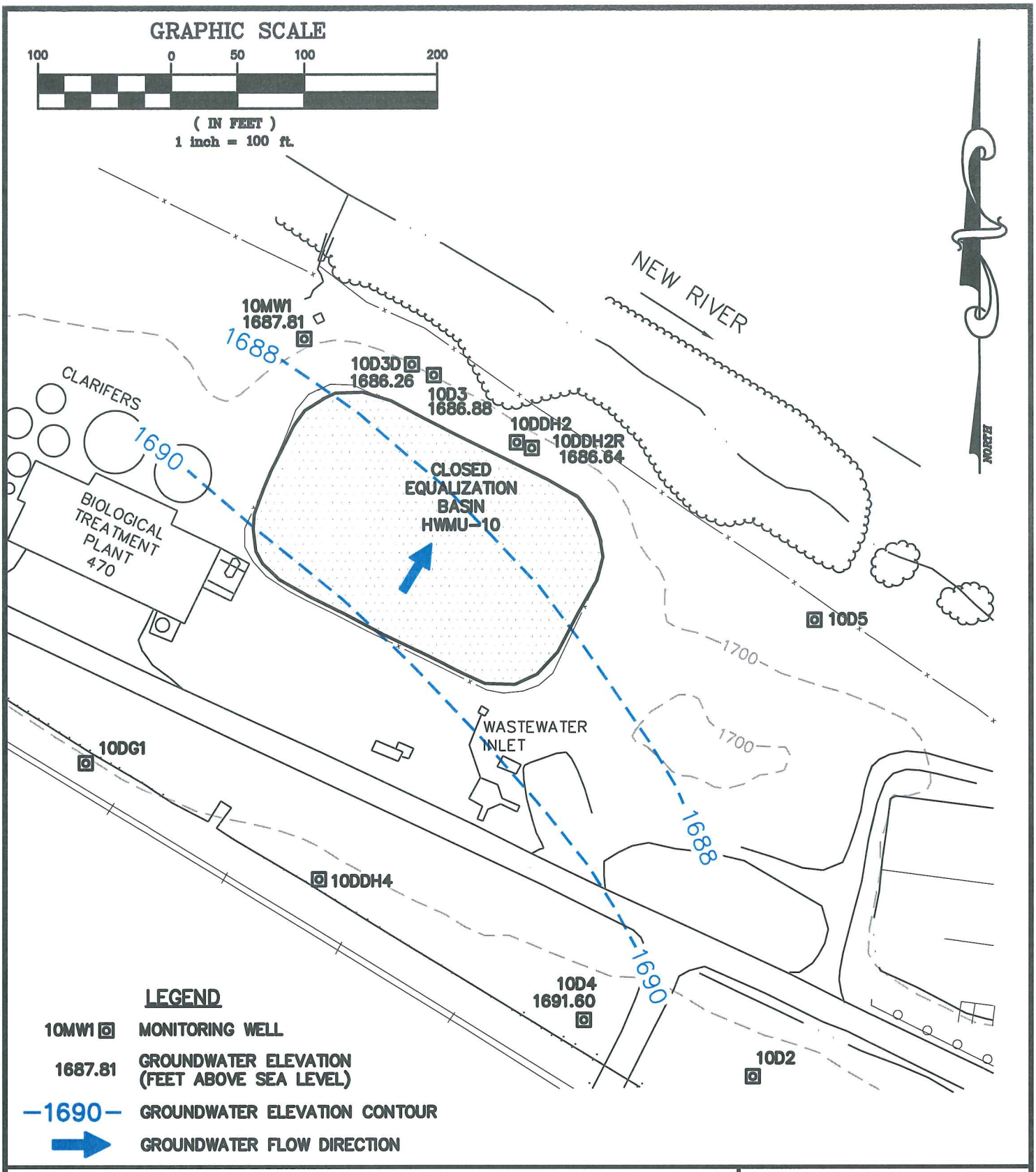
Report Produced by GRITS/STAT 5.01

APPENDIX C

HWMU-10

APPENDIX C-1

HWMU-10 POTENTIOMETRIC SURFACE MAPS
SECOND QUARTER 2010
FOURTH QUARTER 2010



HWMU-10 POTENTIOMETRIC SURFACE MAP (2ND QUARTER 2010)

RADFORD ARMY AMMUNITION PLANT

RADFORD, VIRGINIA

SCALE: 1"=100'

PLAN NO. B03204-08

Draper Aden Associates

Engineering ✦ Surveying ✦ Environmental Services

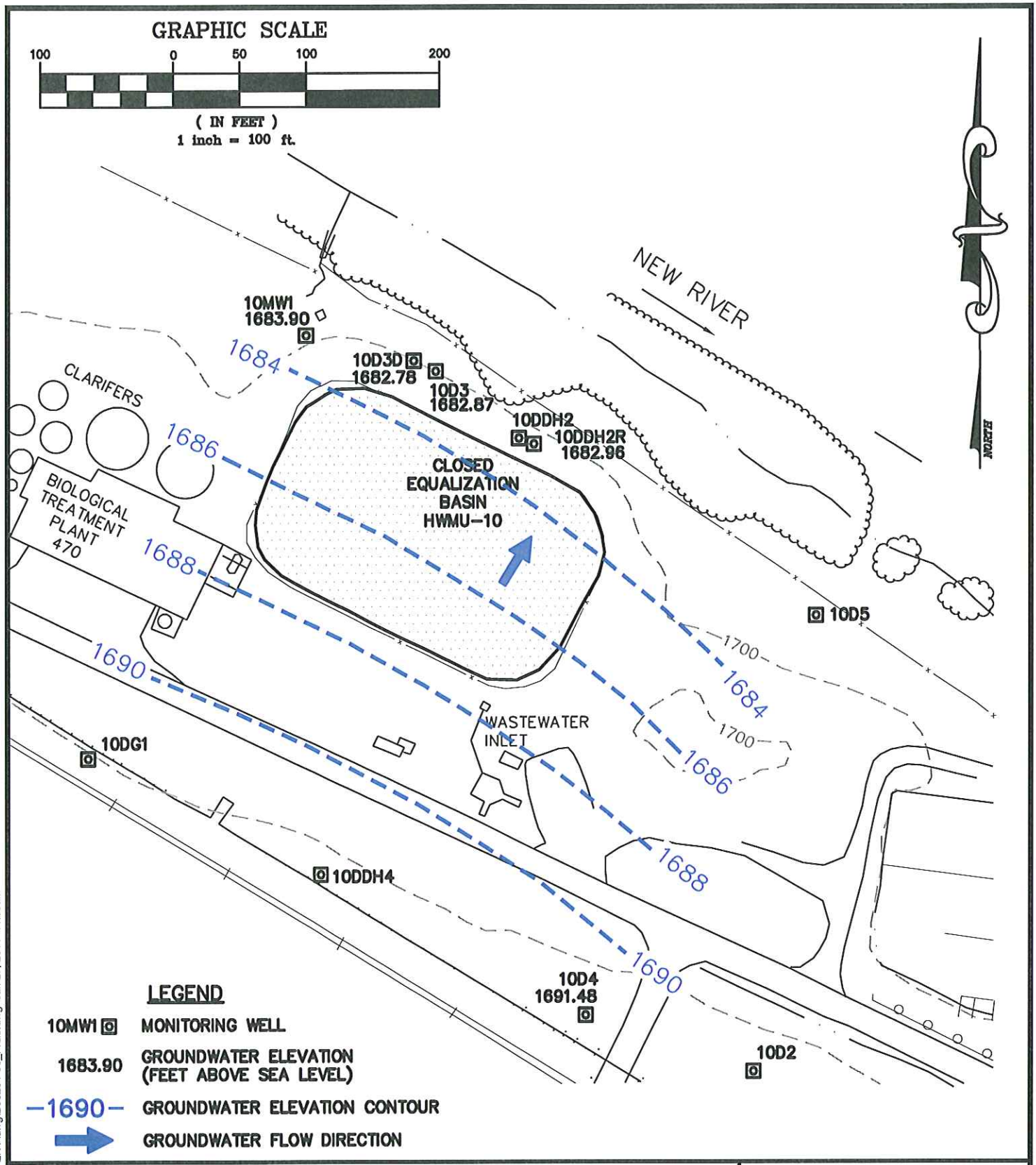
2206 South Main Street
Blacksburg, VA 24060
540-552-0444 Fax: 540-552-0291

Richmond, VA
Charlottesville, VA
Hampton Roads, VA

DESIGNED	RGM
DRAWN	JFF
CHECKED	MDL
DATE	07/27/10

FIGURE 3

P:\B03200\B03204\B03204-08\CAD\B03204-08 ENV\dwg\B03204-08_FIG3.dwg Jul 27, 2010 4:13pm



HWMU-10 POTENTIOMETRIC SURFACE MAP (4TH QUARTER 2010)

RADFORD ARMY AMMUNITION PLANT

RADFORD, VIRGINIA

SCALE: 1"=100'

PLAN NO. B03204-08

Draper Aden Associates

Engineering ♦ Surveying ♦ Environmental Services

2206 South Main Street
Blacksburg, VA 24060
540-552-0444 Fax: 540-552-0291

Richmond, VA
Charlottesville, VA
Hampton Roads, VA

DESIGNED	RGM
DRAWN	JFF
CHECKED	MDL
DATE	01/27/11

FIGURE 3

P:\B03200\B03204\E03204-08\CAD\B03204-08 ENV\dwg\B03204-08_FIG3.dwg Jan 27, 2011 11:03am

APPENDIX C-2

HWMU-10 2010 LABORATORY ANALYTICAL RESULTS
POINT OF COMPLIANCE WELLS

Target Analyte Monitoring Results - HWMU-10 Point of Compliance Wells

Radford Army Ammunition Plant, Radford, Virginia

Upgradient well = 10D4 ***All Results in ug/L.***

Analyte/Quarter	*10D4 Q*	*10D3 Q*	*10D3D Q*	*10DDH2R Q*	*10MW1 Q*	*QL*	*GPS*	*Method*
Antimony				*CAS # 7440-36-0*				
Second Quarter 2010	U	U	U	U	U	1	-	6020
Arsenic				*CAS # 7440-38-2*				
Second Quarter 2010	U	U	U	U	U	10	50	6020
Fourth Quarter 2010	U	U	U	U	U	10	50	6020
Barium				*CAS # 7440-39-3*				
Second Quarter 2010	117	87.9	43	44.3	69.2	10	2000	6020
Fourth Quarter 2010	127	92.6	53.3	49.1	86.2	10	2000	6020
Beryllium				*CAS # 7440-41-7*				
Second Quarter 2010	U	U	U	U	U	1	-	6020
Cadmium				*CAS # 7440-43-9*				
Second Quarter 2010	U	U	U	U	U	1	-	6020
Chromium				*CAS # 7440-47-3*				
Second Quarter 2010	5.6	2 J	U	1.4 J	2.8 J	5	100	6020
Fourth Quarter 2010	5.3	U	U	U	U	5	100	6020
Cobalt				*CAS # 7440-48-4*				
Second Quarter 2010	1.2 J	U	U	U	U	5	-	6020
Fourth Quarter 2010	U	U	U	U	U	5	-	6020
Copper				*CAS # 7440-50-8*				
Second Quarter 2010	3.1 J	U	U	U	U	5	1300	6020
Fourth Quarter 2010	U	U	U	U	U	5	1300	6020
Lead				*CAS # 7439-92-1*				
Fourth Quarter 2010	1	U	U	U	U	1	15	6020
Second Quarter 2010	1.9	U	U	U	U	1	15	6020
Mercury				*CAS # 7439-97-6*				
Fourth Quarter 2010	U	U	U	U	U	2	2	7470A
Second Quarter 2010	U	U	U	U	U	2	2	7470A
Nickel				*CAS # 7440-02-0*				
Fourth Quarter 2010	U	U	U	U	U	10	313	6020
Second Quarter 2010	2.3 J	U	U	U	U	10	313	6020
Selenium				*CAS # 7782-49-2*				
Fourth Quarter 2010	U	U	U	U	U	10	50	6020
Second Quarter 2010	U	U	U	U	U	10	50	6020
Silver				*CAS # 7440-22-4*				
Second Quarter 2010	U	U	U	U	U	2	78.25	6020
Fourth Quarter 2010	U	U	U	U	U	2	78.25	6020
Thallium				*CAS # 7440-28-0*				
Second Quarter 2010	U	U	U	U	U	1	-	6020
Tin				*CAS # 7440-31-5*				
Second Quarter 2010	U	U	U	U	U	15	-	6010B
Vanadium				*CAS # 7440-62-2*				
Second Quarter 2010	4.6 J	U	U	U	U	10	-	6020
Fourth Quarter 2010	U	U	U	U	U	10	-	6020
Zinc				*CAS # 7440-66-6*				
Second Quarter 2010	13.4	3.6 J	5.2 J	3.9 J	U	10	4695	6020
Fourth Quarter 2010	10 J	25.8 J	U J	U J	U J	10	4695	6020
Sulfide				*CAS # 18496-25-8*				
Second Quarter 2010	U	U	U	U	U	3000	-	9034

See last page of this report for definitions.

Target Analyte Monitoring Results - HWMU-10 Point of Compliance Wells

Radford Army Ammunition Plant, Radford, Virginia

Upgradient well = 10D4 ***All Results in ug/L.***

Analyte/Quarter	*10D4 Q*	*10D3 Q*	*10D3D Q*	*10DDH2R Q*	*10MW1 Q*	*QL*	*GPS*	*Method*
Cyanide				*CAS # 57-12-5*				
Second Quarter 2010	U	U	U	U	U	20	200	9012A
Fourth Quarter 2010	U	U	U	U	U	20	200	9012A
Total Recoverable Phenolics				*CAS # C-020*				
Second Quarter 2010	U	U N	U N	U N	U N	50	-	9066
Acenaphthene				*CAS # 83-32-9*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Acenaphthylene				*CAS # 208-96-8*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Acetone				*CAS # 67-64-1*				
Second Quarter 2010	U	U	260	U	U	10	-	8260B
Fourth Quarter 2010	U	U	17000	U	U	10	-	8260B
Acetonitrile				*CAS # 75-05-8*				
Second Quarter 2010	U	U	U	U	U	100	-	8260B
Acetophenone				*CAS # 98-86-2*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
2-Acetylaminofluorene				*CAS # 53-96-3*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Acrolein				*CAS # 107-02-8*				
Second Quarter 2010	U J	U J	U J	U J	U J	25	-	8260B
Acrylonitrile				*CAS # 107-13-1*				
Second Quarter 2010	U	U	U	U	U	10	-	8260B
Aldrin				*CAS # 309-00-2*				
Second Quarter 2010	U	U	U	U	U	0.05	-	8081A
Allyl chloride				*CAS # 107-05-1*				
Second Quarter 2010	U	U	U	U	U	10	-	8260B
4-Aminobiphenyl				*CAS # 92-67-1*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Aniline				*CAS # 62-53-3*				
Second Quarter 2010	U J	U J	U J	U J	U J	10	-	8270C
Anthracene				*CAS # 120-12-7*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Aramite				*CAS # 140-57-8*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Benzene				*CAS # 71-43-2*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Benzo[a]anthracene				*CAS # 56-55-3*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Benzo[b]fluoranthene				*CAS # 205-99-2*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Benzo[k]fluoranthene				*CAS # 207-08-9*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Benzo[ghi]perylene				*CAS # 191-24-2*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Benzo(a)pyrene				*CAS # 50-32-8*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
1,4-Benzenediamine				*CAS # 106-50-3*				
Second Quarter 2010	U J	U J	U J	U J	U J	50	-	8270C

Target Analyte Monitoring Results - HWMU-10 Point of Compliance Wells

Radford Army Ammunition Plant, Radford, Virginia

Upgradient well = 10D4 ***All Results in ug/L.***

Analyte/Quarter	*10D4 Q*	*10D3 Q*	*10D3D Q*	*10DDH2R Q*	*10MW1 Q*	*QL*	*GPS*	*Method*
Benzyl alcohol				*CAS # 100-51-6*				
Second Quarter 2010	U J	U J	U J	U J	U J	10	-	8270C
alpha-BHC				*CAS # 319-84-6*				
Second Quarter 2010	U	U	U	U	U	0.05	-	8081A
beta-BHC				*CAS # 319-85-7*				
Second Quarter 2010	U	U	U	U	U	0.05	-	8081A
delta-BHC				*CAS # 319-86-8*				
Second Quarter 2010	U	U	U	U	U	0.05	-	8081A
gamma-BHC				*CAS # 58-89-9*				
Second Quarter 2010	U	U	U	U	U	0.05	-	8081A
bis(2-Chloroethoxy)methane				*CAS # 111-91-1*				
Second Quarter 2010	U	U	U	U	U	5	-	8270C
bis(2-Chloroethyl)ether				*CAS # 111-44-4*				
Second Quarter 2010	U	U	U	U	U	5	-	8270C
bis(2-Chloro-1-methylethyl)ether				*CAS # 108-60-1*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
bis(2-Ethylhexyl)phthalate				*CAS # 117-81-7*				
Second Quarter 2010	U	U	U	U	U	5	-	8270C
Bromobenzene				*CAS # 108-86-1*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Bromochloromethane				*CAS # 74-97-5*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Bromodichloromethane				*CAS # 75-27-4*				
Fourth Quarter 2010	U	U	U	U	U	1	80	8260B
Second Quarter 2010	U	U	U	U	U	1	80	8260B
Bromoform				*CAS # 75-25-2*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
4-Bromophenyl phenyl ether				*CAS # 101-55-3*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
2-Butanone				*CAS # 78-93-3*				
Fourth Quarter 2010	U	U	U	U	U	10	691.08	8260B
Second Quarter 2010	U	U	U	U	U	10	691.08	8260B
n-Butyl alcohol				*CAS # 71-36-3*				
Second Quarter 2010	U	U	U	U	U	50	-	8260B
tert-Butyl alcohol				*CAS # 75-65-0*				
Second Quarter 2010	U	U	U	U	U	200	-	8260B
n-Butylbenzene				*CAS # 104-51-8*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
sec-Butylbenzene				*CAS # 135-98-8*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
tert-Butylbenzene				*CAS # 98-06-6*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Butyl benzyl phthalate				*CAS # 85-68-7*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Carbon disulfide				*CAS # 75-15-0*				
Second Quarter 2010	U	U	U	U	U	10	-	8260B
Carbon tetrachloride				*CAS # 56-23-5*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B

Target Analyte Monitoring Results - HWMU-10 Point of Compliance Wells

Radford Army Ammunition Plant, Radford, Virginia

Upgradient well = 10D4 ***All Results in ug/L.***

Analyte/Quarter	*10D4 Q*	*10D3 Q*	*10D3D Q*	*10DDH2R Q*	*10MW1 Q*	*QL*	*GPS*	*Method*
Chlordane				*CAS # 57-74-9*				
Second Quarter 2010	U	U	U	U	U	0.86	-	8081A
p-Chloroaniline				*CAS # 106-47-8*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Chlorobenzene				*CAS # 108-90-7*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Chlorobenzilate				*CAS # 510-15-6*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
p-Chloro-m-cresol				*CAS # 59-50-7*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Chloroethane				*CAS # 75-00-3*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Chloroform				*CAS # 67-66-3*				
Second Quarter 2010	15	6.5	6.1	0.8 J	13	1	80	8260B
Fourth Quarter 2010	8.7	4.7	U	U	10	1	80	8260B
2-Chloroethyl vinyl ether				*CAS # 110-75-8*				
Second Quarter 2010	U J	U J	U J	U J	U J	20	-	8260B
2-Chloronaphthalene				*CAS # 91-58-7*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
2-Chlorophenol				*CAS # 95-57-8*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
4-Chlorophenyl phenyl ether				*CAS # 7005-72-3*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Chloroprene				*CAS # 126-99-8*				
Second Quarter 2010	U	U	U	U	U	10	-	8260B
2-Chlorotoluene				*CAS # 95-49-8*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
4-Chlorotoluene				*CAS # 106-43-4*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Chrysene				*CAS # 218-01-9*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Cyclohexane				*CAS # 110-82-7*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
2,4-Dichlorophenoxyacetic acid				*CAS # 94-75-7*				
Second Quarter 2010	U	U	U	U	U	5	-	8151A
4,4'-DDD				*CAS # 72-54-8*				
Second Quarter 2010	U	U	U	U	U	0.1	-	8081A
4,4'-DDE				*CAS # 72-55-9*				
Second Quarter 2010	U	U	U	U	U	0.1	-	8081A
4,4'-DDT				*CAS # 50-29-3*				
Second Quarter 2010	U	U	U	U	U	0.1	-	8081A
Diallate				*CAS # 2303-16-4*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Dibenz(a,h)anthracene				*CAS # 53-70-3*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Dibenzofuran				*CAS # 132-64-9*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Dibromochloromethane				*CAS # 124-48-1*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B

Target Analyte Monitoring Results - HWMU-10 Point of Compliance Wells

Radford Army Ammunition Plant, Radford, Virginia

Upgradient well = 10D4 ***All Results in ug/L.***

Analyte/Quarter	*10D4 Q*	*10D3 Q*	*10D3D Q*	*10DDH2R Q*	*10MW1 Q*	*QL*	*GPS*	*Method*
1,2-Dibromo-3-chloropropane				*CAS # 96-12-8*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
1,2-Dibromoethane				*CAS # 106-93-4*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Di-n-butyl phthalate				*CAS # 84-74-2*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
1,2-Dichlorobenzene				*CAS # 95-50-1*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
1,3-Dichlorobenzene				*CAS # 541-73-1*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
1,4-Dichlorobenzene				*CAS # 106-46-7*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
3,3'-Dichlorobenzidine				*CAS # 91-94-1*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
trans-1,4-Dichloro-2-butene				*CAS # 110-57-6*				
Second Quarter 2010	U	U	U	U	U	10	-	8260B
Dichlorodifluoromethane				*CAS # 75-71-8*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
1,1-Dichloroethane				*CAS # 75-34-3*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
1,2-Dichloroethane				*CAS # 107-06-2*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
1,1-Dichloroethene				*CAS # 75-35-4*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
trans-1,2-Dichloroethene				*CAS # 156-60-5*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
2,4-Dichlorophenol				*CAS # 120-83-2*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
2,6-Dichlorophenol				*CAS # 87-65-0*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
1,2-Dichloropropane				*CAS # 78-87-5*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
1,3-Dichloropropane				*CAS # 142-28-9*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
2,2-Dichloropropane				*CAS # 594-20-7*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
1,1-Dichloropropene				*CAS # 563-58-6*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
cis-1,3-Dichloropropene				*CAS # 10061-01-5*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
trans-1,3-Dichloropropene				*CAS # 10061-02-6*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Dieldrin				*CAS # 60-57-1*				
Second Quarter 2010	U	U	U	U	U	0.1	-	8081A
Diethyl ether				*CAS # 60-29-7*				
Second Quarter 2010	U	U	U	U	U	12.5	-	8260B
Diethyl phthalate				*CAS # 84-66-2*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C

Target Analyte Monitoring Results - HWMU-10 Point of Compliance Wells

Radford Army Ammunition Plant, Radford, Virginia

Upgradient well = 10D4 ***All Results in ug/L.***

Analyte/Quarter	*10D4 Q*	*10D3 Q*	*10D3D Q*	*10DDH2R Q*	*10MW1 Q*	*QL*	*GPS*	*Method*
O,O-Diethyl O-2-pyrazinyl				*CAS # 297-97-2*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Dimethoate				*CAS # 60-51-5*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Dimethyl ether				*CAS # 115-10-6*				
Second Quarter 2010	U	U	U	U	U	12.5	-	8260B
p-(Dimethylamino)azobenzene				*CAS # 60-11-7*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
7,12-Dimethylbenz[a]anthracene				*CAS # 57-97-6*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
3,3'-Dimethylbenzidine				*CAS # 119-93-7*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
a,a-Dimethylphenethylamine				*CAS # 122-09-8*				
Second Quarter 2010	U J	U J	U J	U J	U J	50	-	8270C
2,4-Dimethylphenol				*CAS # 105-67-9*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Dimethyl phthalate				*CAS # 131-11-3*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
m-Dinitrobenzene				*CAS # 99-65-0*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
4,6-Dinitro-o-cresol				*CAS # 534-52-1*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
2,4-Dinitrophenol				*CAS # 51-28-5*				
Second Quarter 2010	U J	U J	U J	U J	U J	10	-	8270C
2,4-Dinitrotoluene				*CAS # 121-14-2*				
Second Quarter 2010	U	U	U	U	U	10	31.3	8270C
Fourth Quarter 2010	U	U	U	U	U	10	31.3	8270C
2,6-Dinitrotoluene				*CAS # 606-20-2*				
Fourth Quarter 2010	U	U	U	U	U	10	15.65	8270C
Second Quarter 2010	U	U	U	U	U	10	15.65	8270C
Dinoseb				*CAS # 88-85-7*				
Second Quarter 2010	U	U	U	U	U	2.5	-	8151A
Di-n-octyl phthalate				*CAS # 117-84-0*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
1,4-Dioxane				*CAS # 123-91-1*				
Second Quarter 2010	U	U	U	U	U	200	-	8260B
Diphenylamine				*CAS # 122-39-4*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Disulfoton				*CAS # 298-04-4*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Endosulfan I				*CAS # 959-98-8*				
Second Quarter 2010	U	U	U	U	U	0.05	-	8081A
Endosulfan II				*CAS # 33213-65-9*				
Second Quarter 2010	U	U	U	U	U	0.1	-	8081A
Endosulfan sulfate				*CAS # 1031-07-8*				
Second Quarter 2010	U J	U J	U J	U J	U J	0.1	-	8081A
Endrin				*CAS # 72-20-8*				
Second Quarter 2010	U	U	U	U	U	0.1	-	8081A

Target Analyte Monitoring Results - HWMU-10 Point of Compliance Wells

Radford Army Ammunition Plant, Radford, Virginia

Upgradient well = 10D4 ***All Results in ug/L.***

Analyte/Quarter	*10D4 Q*	*10D3 Q*	*10D3D Q*	*10DDH2R Q*	*10MW1 Q*	*QL*	*GPS*	*Method*
Ethyl acetate				*CAS # 141-78-6*				
Second Quarter 2010	U	U	U	U	U	10	-	8260B
Endrin aldehyde				*CAS # 7421-93-4*				
Second Quarter 2010	U J	U J	U J	U J	U J	0.1	-	8081A
Ethanol				*CAS # 64-17-5*				
Second Quarter 2010	U J	U J	U J	U J	U J	250	-	8260B
Ethylbenzene				*CAS # 100-41-4*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Ethyl methacrylate				*CAS # 97-63-2*				
Second Quarter 2010	U	U	U	U	U	10	-	8260B
Ethyl methanesulfonate				*CAS # 62-50-0*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Ethylene oxide				*CAS # 75-21-8*				
Second Quarter 2010	U J	U J	U J	U J	U J	100	-	8260B
Famphur				*CAS # 52-85-7*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Fluoranthene				*CAS # 206-44-0*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Fluorene				*CAS # 86-73-7*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Heptachlor				*CAS # 76-44-8*				
Second Quarter 2010	U	U	U	U	U	0.05	-	8081A
Heptachlor epoxide				*CAS # 1024-57-3*				
Second Quarter 2010	U	U	U	U	U	0.05	-	8081A
Hexachlorobenzene				*CAS # 118-74-1*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Hexachlorobutadiene				*CAS # 87-68-3*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Hexachlorocyclopentadiene				*CAS # 77-47-4*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Hexachloroethane				*CAS # 67-72-1*				
Second Quarter 2010	U	U	U	U	U	10	-	8260B
Hexachlorophene				*CAS # 70-30-4*				
Second Quarter 2010	U J	U J	U J	U J	U J	40	-	8270C
Hexachloropropene				*CAS # 1888-71-7*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
2-Hexanone				*CAS # 591-78-6*				
Second Quarter 2010	U	U	U	U	U	10	-	8260B
Indeno[1,2,3-cd]pyrene				*CAS # 193-39-5*				
Second Quarter 2010	U	U	U	U	U	5	-	8270C
Isobutyl alcohol				*CAS # 78-83-1*				
Second Quarter 2010	U	U	U	U	U	200	-	8260B
Isodrin				*CAS # 465-73-6*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Isophorone				*CAS # 78-59-1*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Isopropylbenzene				*CAS # 98-82-8*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B

Target Analyte Monitoring Results - HWMU-10 Point of Compliance Wells

Radford Army Ammunition Plant, Radford, Virginia

Upgradient well = 10D4 ***All Results in ug/L.***

Analyte/Quarter	*10D4 Q*	*10D3 Q*	*10D3D Q*	*10DDH2R Q*	*10MW1 Q*	*QL*	*GPS*	*Method*
Isopropylether				*CAS #* 108-20-3				
Second Quarter 2010	U	U	U	U	U	10	-	8260B
4-Isopropyltoluene				*CAS #* 99-87-6				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Isosafrole				*CAS #* 120-58-1				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Kepone				*CAS #* 143-50-0				
Second Quarter 2010	U J	U J	U J	U J	U J	10	-	8270C
Methacrylonitrile				*CAS #* 126-98-7				
Second Quarter 2010	U	U	U	U	U	100	-	8260B
Methapyrilene				*CAS #* 91-80-5				
Second Quarter 2010	U J	U J	U J	U J	U J	10	-	8270C
Methoxychlor				*CAS #* 72-43-5				
Second Quarter 2010	U	U	U	U	U	0.5	-	8081A
Bromomethane				*CAS #* 74-83-9				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Chloromethane				*CAS #* 74-87-3				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
3-Methylcholanthrene				*CAS #* 56-49-5				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Iodomethane				*CAS #* 74-88-4				
Second Quarter 2010	U	U	U	U	U	10	-	8260B
Methyl methacrylate				*CAS #* 80-62-6				
Second Quarter 2010	U	U	U	U	U	10	-	8260B
Methyl methane sulfonate				*CAS #* 66-27-3				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
2-Methylnaphthalene				*CAS #* 91-57-6				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Methyl parathion				*CAS #* 298-00-0				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
4-Methyl-2-pentanone				*CAS #* 108-10-1				
Second Quarter 2010	U	U	U	U	U	10	-	8260B
2-Methylphenol				*CAS #* 95-48-7				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
3 & 4-Methylphenol				*CAS #* m 108-39-4 p 106-44-				
Second Quarter 2010	U	U	U	U	U	20	-	8270C
Methyl tert-butyl ether				*CAS #* 1634-04-4				
Second Quarter 2010	U	U	U	U	U	10	-	8260B
Dibromomethane				*CAS #* 74-95-3				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Methylene chloride				*CAS #* 75-09-2				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Naphthalene				*CAS #* 91-20-3				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
1,4-Naphthoquinone				*CAS #* 130-15-4				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
1-Naphthylamine				*CAS #* 134-32-7				
Second Quarter 2010	U	U	U	U	U	10	-	8270C

Target Analyte Monitoring Results - HWMU-10 Point of Compliance Wells

Radford Army Ammunition Plant, Radford, Virginia

Upgradient well = 10D4 ***All Results in ug/L.***

Analyte/Quarter	*10D4 Q*	*10D3 Q*	*10D3D Q*	*10DDH2R Q*	*10MW1 Q*	*QL*	*GPS*	*Method*
2-Naphthylamine				*CAS # 91-59-8*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
o-Nitroaniline				*CAS # 88-74-4*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
m-Nitroaniline				*CAS # 99-09-2*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
p-Nitroaniline				*CAS # 100-01-6*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Nitrobenzene				*CAS # 98-95-3*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
o-Nitrophenol				*CAS # 88-75-5*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
p-Nitrophenol				*CAS # 100-02-7*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
4-Nitroquinoline-1-oxide				*CAS # 56-57-5*				
Second Quarter 2010	U	U	U	U	U	50	-	8270C
N-Nitrosodi-n-butylamine				*CAS # 924-16-3*				
Second Quarter 2010	U	U J	U J	U	U	10	-	8270C
N-Nitrosodiethylamine				*CAS # 55-18-5*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
N-Nitrosodimethylamine				*CAS # 62-75-9*				
Second Quarter 2010	U J	U J	U J	U J	U J	10	-	8270C
N-Nitrosodiphenylamine				*CAS # 86-30-6*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
N-Nitrosodipropylamine				*CAS # 621-64-7*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
N-Nitrosomethylethylamine				*CAS # 10595-95-6*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
N-Nitrosomorpholine				*CAS # 59-89-2*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
N-Nitrosopiperidine				*CAS # 100-75-4*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
N-Nitrosopyrrolidine				*CAS # 930-55-2*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
5-Nitroso-o-toluidine				*CAS # 99-55-8*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Parathion				*CAS # 56-38-2*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Pentachlorobenzene				*CAS # 608-93-5*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Pentachloroethane				*CAS # 76-01-7*				
Second Quarter 2010	U	U	U	U	U	10	-	8260B
Pentachloronitrobenzene				*CAS # 82-68-8*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Pentachlorophenol				*CAS # 87-86-5*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Phenacetin				*CAS # 62-44-2*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C

Target Analyte Monitoring Results - HWMU-10 Point of Compliance Wells

Radford Army Ammunition Plant, Radford, Virginia

Upgradient well = 10D4 ***All Results in ug/L.***

Analyte/Quarter	*10D4 Q*	*10D3 Q*	*10D3D Q*	*10DDH2R Q*	*10MW1 Q*	*QL*	*GPS*	*Method*
Phenanthrene				*CAS # 85-01-8*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Phenol				*CAS # 108-95-2*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Phorate				*CAS # 298-02-2*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
2-Picoline				*CAS # 109-06-8*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Pronamide				*CAS # 23950-58-5*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
1-Propanol				*CAS # 71-23-8*				
Second Quarter 2010	U J	U J	U J	U J	U J	100	-	8260B
2-Propanol				*CAS # 67-63-0*				
Second Quarter 2010	U	U	470	U	U	100	-	8260B
Fourth Quarter 2010	U	U	45000	U	U	100	-	8260B
Propionitrile				*CAS # 107-12-0*				
Second Quarter 2010	U	U	U	U	U	100	-	8260B
n-Propylbenzene				*CAS # 103-65-1*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Pyrene				*CAS # 129-00-0*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Pyridine				*CAS # 110-86-1*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Safrole				*CAS # 94-59-7*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Silvex				*CAS # 93-72-1*				
Second Quarter 2010	U	U	U	U	U	2.5	-	8151A
Styrene				*CAS # 100-42-5*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Sulfotep				*CAS # 3689-24-5*				
Second Quarter 2010	U J	U J	U J	U J	U J	5	-	8270C
2,4,5-Trichlorophenoxyacetic acid				*CAS # 93-76-5*				
Second Quarter 2010	U	U	U	U	U	2.5	-	8151A
1,2,4,5-Tetrachlorobenzene				*CAS # 95-94-3*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
1,1,1,2-Tetrachloroethane				*CAS # 630-20-6*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
1,1,2,2-Tetrachloroethane				*CAS # 79-34-5*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Tetrachloroethene				*CAS # 127-18-4*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Tetrahydrofuran				*CAS # 109-99-9*				
Second Quarter 2010	U	U	U	U	U	25	-	8260B
2,3,4,6-Tetrachlorophenol				*CAS # 58-90-2*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Toluene				*CAS # 108-88-3*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
o-Toluidine				*CAS # 95-53-4*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C

Target Analyte Monitoring Results - HWMU-10 Point of Compliance Wells

Radford Army Ammunition Plant, Radford, Virginia

Upgradient well = 10D4 ***All Results in ug/L.***

Analyte/Quarter	*10D4 Q*	*10D3 Q*	*10D3D Q*	*10DDH2R Q*	*10MW1 Q*	*QL*	*GPS*	*Method*
Toxaphene				*CAS # 8001-35-2*				
Second Quarter 2010	U	U	U	U	U	2.5	-	8081A
1,2,3-Trichlorobenzene				*CAS # 87-61-6*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
1,2,4-Trichlorobenzene				*CAS # 120-82-1*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
1,1,1-Trichloroethane				*CAS # 71-55-6*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
1,1,2-Trichloroethane				*CAS # 79-00-5*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Trichloroethene				*CAS # 79-01-6*				
Second Quarter 2010	U	U	U	U	U	1	5	8260B
Fourth Quarter 2010	U	U	U	U	U	1	5	8260B
Trichlorofluoromethane				*CAS # 75-69-4*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
2,4,5-Trichlorophenol				*CAS # 95-95-4*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
2,4,6-Trichlorophenol				*CAS # 88-06-2*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
1,2,3-Trichloropropane				*CAS # 96-18-4*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
1,1,2-Trichloro-1,2,2-Trifluoroethane				*CAS # 76-13-1*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
O,O,O-Triethyl phosphorothioate				*CAS # 126-68-1*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
1,2,4-Trimethylbenzene				*CAS # 95-63-6*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
1,3,5-Trimethylbenzene				*CAS # 108-67-8*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
sym-Trinitrobenzene				*CAS # 99-35-4*				
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Vinyl acetate				*CAS # 108-05-4*				
Second Quarter 2010	U	U	U	U	U	10	-	8260B
Vinyl chloride				*CAS # 75-01-4*				
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Xylenes (Total)				*CAS # 1330-20-7*				
Second Quarter 2010	U	U	U	U	U	3	10000	8260B
Fourth Quarter 2010	U	U	U	U	U	3	10000	8260B

Target Analyte Monitoring Results - HWMU-10 Point of Compliance Wells

Radford Army Ammunition Plant, Radford, Virginia

Upgradient well = 10D4 ***All Results in ug/L.***

Analyte/Quarter	*10D4 Q*	*10D3 Q*	*10D3D Q*	*10DDH2R Q*	*10MW1 Q*	*QL*	*GPS*	*Method*

Definitions:

QL Denotes permit required quantitation limit.
U Denotes analyte not detected at or above QL.
UA Denotes analyte not detected at or above adjusted sample QL.
J Denotes associated result is estimated. When used with "U" (i.e., "**UJ**"), denotes analyte not detected at or above QL and QL is estimated. When used with "UA" (i.e., "**UAJ**"), denotes analyte not detected at or above adjusted QL and adjusted QL is estimated.
UN Denotes analyte concentration is less than the quantiation limit and five times the blank concentration. Not reliably detected due to blank contamination. This qualifier used only for Appendix IX monitoring event when results are reported to at or above the detection limit.
R Denotes result rejected.
Q Denotes data validation qualifier.
CAS# Denotes Chemical Abstract Services registration number.
GPS Denotes Groundwater Protection Standards listed in Appendix G to Attachment 4 in the Final Hazardous Waste Post-Closure Care Permit for Hazardous Waste Units 5, 7, 10, and 16 (October 4, 2002).
For cobalt, vanadium, acetone and 2-propanol, these analytes are not listed in Appendix VIII to 40 CFR Part 261; therefore, GPSs will not be established for these constituents.
NS denotes not sampled.
NA denotes not analyzed.
"–" denotes not detected (pre-2nd Quarter 2003) or not available / not sampled (beginning 2nd Quarter 2003).

Appendix IX Monitoring Events:
First Quarter 2003, Second Quarter 2004, Second Quarter 2005,
Third Quarter 2006, Second Quarter 2007, Second Quarter 2008, Second Quarter 2009, Second Quarter 2010

For Appendix IX monitoring, compliance well results reported/evaluated to detection limit. See data validation Qualifier definitions noted below.

The following definitions apply to results reported for Appendix IX monitoring events.
All Appendix IX monitoring results for compliance wells are reported to the detection limit.

QL Denotes permit required quantitation limit.
U denotes not detected at or above the detection limit or QL.
UA denotes not detected at or above the adjusted detection limit or adjusted QL.
J Denotes result is estimated. When used with "U" (i.e., "UJ"), denotes analyte not detected at or above the detection limit or QL and detection limit and QL are estimated. When used with "UA" (i.e., "UAJ"), denotes analyte not detected at or above adjusted detection limit or adjusted QL and adjusted detection limit and adjusted QL are estimated.
UN Denotes analyte concentration is less than the quantitation limit and/or five times the blank concentration. Not reliably detected due to blank contamination. This qualifier used only for Appendix IX monitoring event when compliance well results are reported to at or above the project detection limit.

Verification events: 12/12/03, 06/17/04, 7/25/2005.
6/17/04. Verification event. Acetone: 10D3D was not detected during verification event. Verification event result reported.
7/25/05. Verification event. All wells: ethyl acetate. 10D3D: alpha-BHC, acetone and 2-propanol. All verification results: Not detected except for acetone and 2-propanol. Verification results presented in table.
7/17/2008. Verification event. 10MW1. Technical chlordane, diethyl phthalate. Verification results reported-all not detected.
6/11/2009 – Verification event, 10DDH2R, Diethyl ether, Verification results reported in table-all not detected.

Comprehensive Data Validation Report

Sample/Blind Field Duplicate Results Greater Than the Quantitation Limit

Facility: HWMU-10 Monitoring Event: Second Quarter 2010

Draper Aden Associates
Engineering ◆ Surveying ◆ Environmental Services

Analyte	Sample ID	Laboratory Result (ug/L)	Q	Validated Result (ug/L)	Q	QL (ug/L)	Validation Notes
Method: 6020							
Laboratory: CompuChem, a Division of Liberty Analytical, Cary, NC							
Barium	10D3	87.9		87.9		10	No action taken.
	10DUP	86.9		86.9		10	No action taken. Field duplicate for 10D3. RPD < 10.
Method: 8260B							
Laboratory: Lancaster Laboratories, Lancaster, PA							
Chloroform	10D3	6.5		6.5		1	No action taken.
	10DUP	6.3		6.3		1	No action taken. Field duplicate for 10D3. RPD <10.

Definitions:
QL Denotes permit quantitation limit.
Q Denotes data qualifier.
J Denotes analyte reported at or above QL and associated result is estimated.

Comprehensive Data Validation Report

Sample/Blind Field Duplicate Results Greater Than the Quantitation Limit

Facility: HWMU-10 Monitoring Event: Fourth Quarter 2010

Draper Aden Associates
Engineering ♦ Surveying ♦ Environmental Services

Analyte	Sample ID	Laboratory Result (ug/L)	Q	Validated Result (ug/L)	Q	QL (ug/L)	Validation Notes
Method: 6020							
Laboratory: CompuChem, a Division of Liberty Analytical, Cary, NC							
Barium	10D3	92.6		92.6		10	No action taken. Fiels duplicate RPD was <10.
	10DUP	89.1		89.1		10	No action taken. Field duplicate of 10D3. RPD <10.
Zinc	10D3	25.8		25.8	J	10	Zinc not detected in field duplicate. Result is estimated.
Method: 8260B							
Laboratory: Lancaster Laboratories, Lancaster, PA							
Chloroform	10D3	4.7		4.7		1	No action taken. Field duplicate result was 4.9 ug/l. RPD <10.
	10DUP	4.9		4.9		1	No action taken. Field duplicate of sample 10D3. RPD <10.

Definitions:
QL Denotes permit quantitation limit.
Q Denotes data qualifier.
J Denotes analyte reported at or above QL and associated result is estimated.

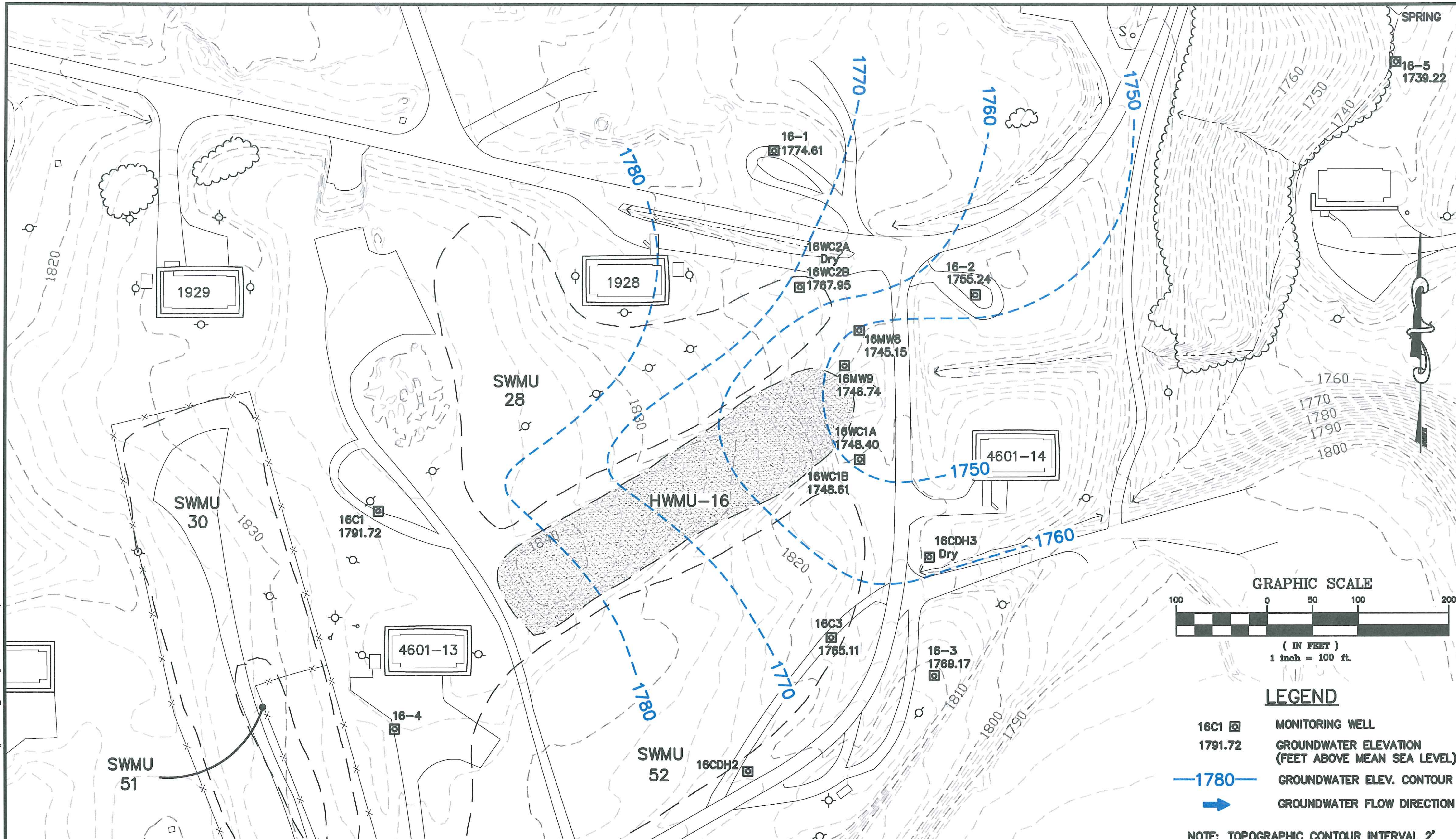
JC 1.26.2011

APPENDIX D

HWMU-16

APPENDIX D-1

HWMU-16 POTENTIOMETRIC SURFACE MAPS
SECOND QUARTER 2010
FOURTH QUARTER 2010



SPRING
16-5
1739.22
16-1
1774.61
1780
1770
1760
1750
1740
16WC2A
Dry
16WC2B
1767.95
16-2
1755.24
1929
1928
16MW8
1745.15
16MW9
1746.74
SWMU
28
16WC1A
1748.40
16WC1B
1748.61
4601-14
HWMU-16
SWMU
30
16C1
1791.72
16CDH3
Dry
1840
1830
1820
1810
1800
1790
16C3
1765.11
16-3
1769.17
4601-13
16-4
SWMU
51
SWMU
52
16CDH2
GRAPHIC SCALE
100 0 50 100 200
(IN FEET)
1 inch = 100 ft.
LEGEND
16C1 MONITORING WELL
1791.72 GROUNDWATER ELEVATION (FEET ABOVE MEAN SEA LEVEL)
—1780— GROUNDWATER ELEV. CONTOUR
GROUNDWATER FLOW DIRECTION
NOTE: TOPOGRAPHIC CONTOUR INTERVAL 2'

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Richmond, VA
Charlottesville, VA
Hampton Roads, VA

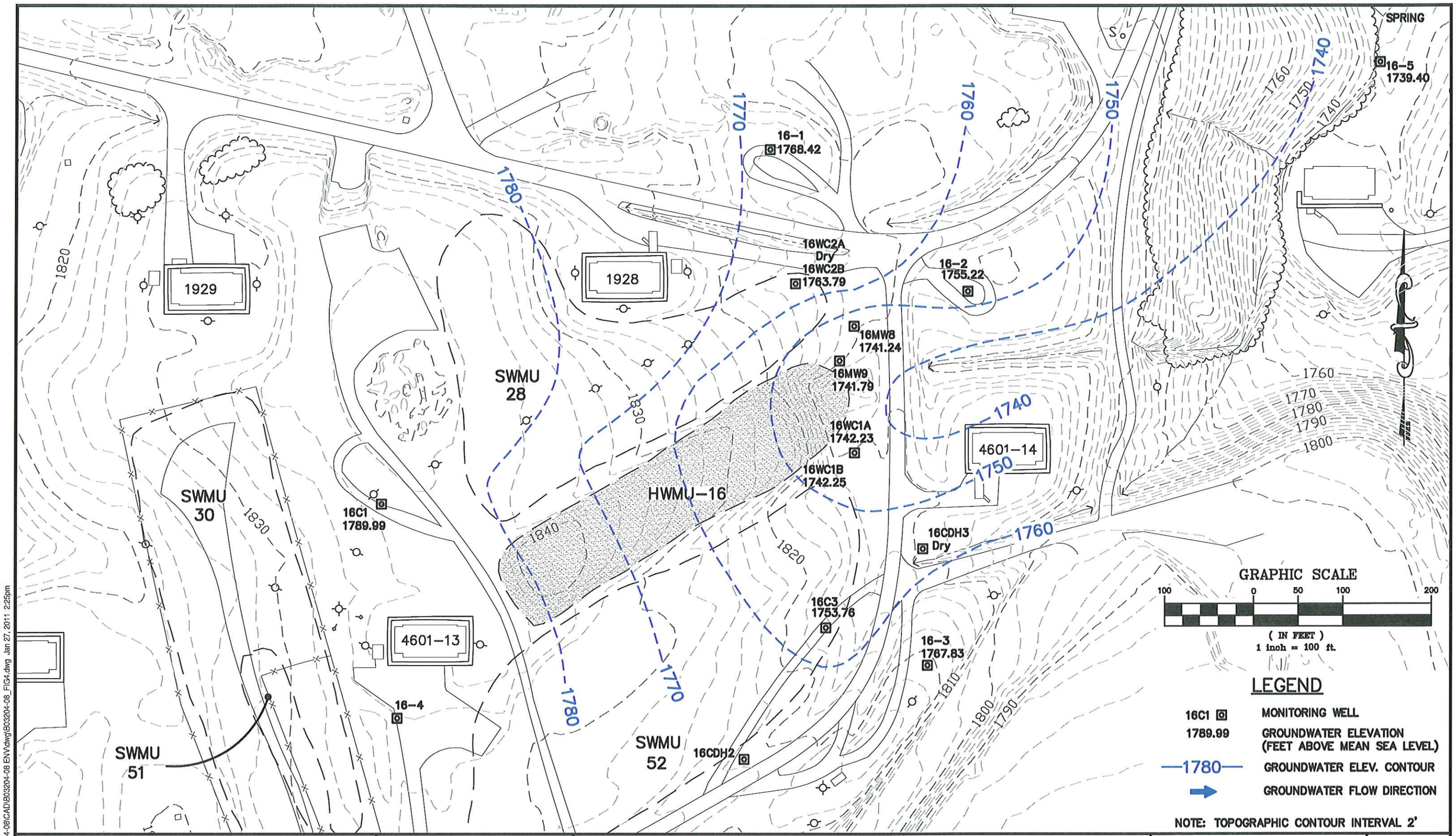
DESIGNED	RGM
DRAWN	JFF
CHECKED	MDL
DATE	07/27/10

HWMU-16 POTENTIOMETRIC SURFACE MAP (2ND QUARTER 2010)
RADFORD ARMY AMMUNITION PLANT
RADFORD, VIRGINIA

SCALE: 1"=100'
PLAN NO. B03204-08

FIGURE
4

P:\B03200\B03204\B03204-08\CAD\B03204-08 ENV\dwg\B03204-08_FIG4.dwg Jul 27, 2010 4:41pm



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Charlottesville, VA
Hampton Roads, VA

DESIGNED	RGM
DRAWN	JFF
CHECKED	MDL
DATE	01-27-11

HWMU-16 POTENTIOMETRIC SURFACE MAP (4TH QUARTER 2010)
RADFORD ARMY AMMUNITION PLANT
RADFORD, VIRGINIA

SCALE: 1"=100'

PLAN NO. B03204-08

FIGURE 4

P:\B03200\B03204\B03204-08\CAD\B03204-08 ENV.dwg\B03204-08_FIG4.dwg Jan 27, 2011 2:25pm

APPENDIX D-2

HWMU-16 2010 LABORATORY ANALYTICAL RESULTS
POINT OF COMPLIANCE WELLS

Target Analyte Monitoring Results - HWMU-16 Point of Compliance Wells
Radford Army Ammunition Plant, Radford, Virginia
Upgradient well = 16C1

All Results in ug/L.

Analtye/Quarter	*16C1*	*16MW8*	*16MW9*	*16WC1A*	*16WC1B*	*OL*	*GPS*	*Method*
Antimony					*CAS #*	*7440-36-0*		
Second Quarter 2010	U	U	U	U	U	1	6	6020
Fourth Quarter 2010	U	U	U	U	U	1	6	6020
Arsenic					*CAS #*	*7440-38-2*		
Second Quarter 2010	U	U	U	U	U	10	50	6020
Fourth Quarter 2010	U	U	U	U	U	10	50	6020
Barium					*CAS #*	*7440-39-3*		
Second Quarter 2010	148 J	85.9 J	572 J	208 J	136 J	10	2000	6020
Fourth Quarter 2010	200	98.9	563	199	103	10	2000	6020
Beryllium					*CAS #*	*7440-41-7*		
Second Quarter 2010	U	U	U	U	U	1	4	6020
Fourth Quarter 2010	U	U	U	U	U	1	4	6020
Cadmium					*CAS #*	*7440-43-9*		
Second Quarter 2010	U	0.22 J	U	U	0.22 J	1	5	6020
Fourth Quarter 2010	U	U	U	U	U	1	5	6020
Chromium					*CAS #*	*7440-47-3*		
Second Quarter 2010	U	U	U	U	U	5	100	6020
Fourth Quarter 2010	U	U	U	U	U	5	100	6020
Cobalt					*CAS #*	*7440-48-4*		
Second Quarter 2010	U	10.1	3.1 J	9	4.1 J	5	313	6020
Fourth Quarter 2010	U	U	U	5.6	U	5	313	6020
Copper					*CAS #*	*7440-50-8*		
Second Quarter 2010	U	11.1	U	U	U	5	1300	6020
Fourth Quarter 2010	U	22.7	U	U	U	5	1300	6020
Lead					*CAS #*	*7439-92-1*		
Second Quarter 2010	U	1.7	U	U	U	1	15	6020
Fourth Quarter 2010	U	3.4	U	U	U	1	15	6020
Mercury					*CAS #*	*7439-97-6*		
Second Quarter 2010	U	U	U	U	0.38 J	2	2	7470A
Fourth Quarter 2010	U	U	U	U	U	2	2	7470A
Nickel					*CAS #*	*7440-02-0*		
Second Quarter 2010	4 J	10.4	9.4 J	3.4 J	7.6 J	10	313	6020
Fourth Quarter 2010	U	U	U	U	U	10	313	6020
Selenium					*CAS #*	*7782-49-2*		
Second Quarter 2010	U	U	U	U	U	10	50	6020
Fourth Quarter 2010	U	U	U	U	U	10	50	6020
Silver					*CAS #*	*7440-22-4*		
Second Quarter 2010	U	0.6 J	U	U	U	2	78.25	6020
Fourth Quarter 2010	U	U	U	U	U	2	78.25	6020
Thallium					*CAS #*	*7440-28-0*		
Second Quarter 2010	U	U	U	U	U	1	-	6020
Tin					*CAS #*	*7440-31-5*		
Second Quarter 2010	U	U	U	U	U	15	-	6010B
Vanadium					*CAS #*	*7440-62-2*		
Second Quarter 2010	U	U	U	U	U	10	109.55	6020
Fourth Quarter 2010	U	U	U	U	U	10	109.55	6020
Zinc					*CAS #*	*7440-66-6*		
Second Quarter 2010	U	44.1	U	4 J	11.2	10	4695	6020
Fourth Quarter 2010	U	68.7	15	U	U	10	4695	6020
Sulfide					*CAS #*	*18496-25-8*		
Second Quarter 2010	U	U	U	U	U	3000	-	9034
Cyanide					*CAS #*	*57-12-5*		
Second Quarter 2010	U	U	U	U	U	20	-	9012A
Acenaphthene					*CAS #*	*83-32-9*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C

See last page of this report for definitions.

Target Analyte Monitoring Results - HWMU-16 Point of Compliance Wells
Radford Army Ammunition Plant, Radford, Virginia
Upgradient well = 16C1

All Results in ug/L.

Analtye/Quarter	*16C1*	*16MW8*	*16MW9*	*16WC1A*	*16WC1B*	*QL*	*GPS*	*Method*
Acenaphthylene					*CAS #*	*208-96-8*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Acetone					*CAS #*	*67-64-1*		
Second Quarter 2010	U	U	U	U	U	10	223.57	8260B
Acetonitrile					*CAS #*	*75-05-8*		
Second Quarter 2010	U	U	U	U	U	100	-	8260B
Acetophenone					*CAS #*	*98-86-2*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
2-Acetylaminofluorene					*CAS #*	*53-96-3*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Acrolein					*CAS #*	*107-02-8*		
Second Quarter 2010	U J	U J	U J	U J	U J	25	-	8260B
Acrylonitrile					*CAS #*	*107-13-1*		
Second Quarter 2010	U	U	U	U	U	10	-	8260B
Aldrin					*CAS #*	*309-00-2*		
Second Quarter 2010	U	U	U	U	U	0.05	-	8081A
Allyl chloride					*CAS #*	*107-05-1*		
Second Quarter 2010	U	U	U	U	U	10	-	8260B
4-Aminobiphenyl					*CAS #*	*92-67-1*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Aniline					*CAS #*	*62-53-3*		
Second Quarter 2010	U J	U J	U J	U J	U J	10	-	8270C
Anthracene					*CAS #*	*120-12-7*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Aramite					*CAS #*	*140-57-8*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Benzene					*CAS #*	*71-43-2*		
Second Quarter 2010	0.22 J	U	U	U	U	1	-	8260B
Benzo[a]anthracene					*CAS #*	*56-55-3*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Benzo[b]fluoranthene					*CAS #*	*205-99-2*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Benzo[k]fluoranthene					*CAS #*	*207-08-9*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Benzo[ghi]perylene					*CAS #*	*191-24-2*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Benzo(a)pyrene					*CAS #*	*50-32-8*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
1,4-Benzenediamine					*CAS #*	*106-50-3*		
Second Quarter 2010	U J	U J	U J	U J	U J	50	-	8270C
Benzyl alcohol					*CAS #*	*100-51-6*		
Second Quarter 2010	U J	U J	U J	U J	U J	10	-	8270C
alpha-BHC					*CAS #*	*319-84-6*		
Second Quarter 2010	U	U	U	U	U	0.05	-	8081A
beta-BHC					*CAS #*	*319-85-7*		
Second Quarter 2010	U	U	U	U	U	0.05	-	8081A
delta-BHC					*CAS #*	*319-86-8*		
Second Quarter 2010	U J	U J	U J	U J	U J	0.05	-	8081A
gamma-BHC					*CAS #*	*58-89-9*		
Second Quarter 2010	U	U	U	U	U	0.05	-	8081A
bis(2-Chloroethoxy)methane					*CAS #*	*111-91-1*		
Second Quarter 2010	U	U	U	U	U	5	-	8270C
bis(2-Chloroethyl)ether					*CAS #*	*111-44-4*		
Second Quarter 2010	U	U	U	U	U	5	-	8270C
bis(2-Chloro-1-methylethyl)ether					*CAS #*	*108-60-1*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C

Target Analyte Monitoring Results - HWMU-16 Point of Compliance Wells
Radford Army Ammunition Plant, Radford, Virginia
Upgradient well = 16C1

All Results in ug/L.

Analtye/Quarter	*16C1*	*16MW8*	*16MW9*	*16WC1A*	*16WC1B*	*OL*	*GPS*	*Method*
bis(2-Ethylhexyl)phthalate					*CAS #*	*117-81-7*		
Second Quarter 2010	U	U	U	U	U	10	10	8270C
Bromobenzene					*CAS #*	*108-86-1*		
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Bromochloromethane					*CAS #*	*74-97-5*		
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Bromodichloromethane					*CAS #*	*75-27-4*		
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Bromoform					*CAS #*	*75-25-2*		
Second Quarter 2010	U	U	U	U	U	1	-	8260B
4-Bromophenyl phenyl ether					*CAS #*	*101-55-3*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
2-Butanone					*CAS #*	*78-93-3*		
Second Quarter 2010	U	U	U	U	U	10	691.08	8260B
Fourth Quarter 2010	U	U	U	U	U	10	691.08	8260B
n-Butyl alcohol					*CAS #*	*71-36-3*		
Second Quarter 2010	U	U	U	U	U	50	-	8260B
tert-Butyl alcohol					*CAS #*	*75-65-0*		
Second Quarter 2010	U	U	U	U	U	200	-	8260B
n-Butylbenzene					*CAS #*	*104-51-8*		
Second Quarter 2010	U	U	U	U	U	1	-	8260B
sec-Butylbenzene					*CAS #*	*135-98-8*		
Second Quarter 2010	U	U	U	U	U	1	-	8260B
tert-Butylbenzene					*CAS #*	*98-06-6*		
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Butyl benzyl phthalate					*CAS #*	*85-68-7*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Carbon disulfide					*CAS #*	*75-15-0*		
Second Quarter 2010	U	U	U	U	U	10	-	8260B
Carbon tetrachloride					*CAS #*	*56-23-5*		
Second Quarter 2010	U	U	U	U	U	1	5	8260B
Fourth Quarter 2010	U	U	U	U	U	1	5	8260B
Chlordane					*CAS #*	*57-74-9*		
Second Quarter 2010	U	U	U	U	U	0.86	-	8081A
p-Chloroaniline					*CAS #*	*106-47-8*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Chlorobenzene					*CAS #*	*108-90-7*		
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Chlorobenzilate					*CAS #*	*510-15-6*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
p-Chloro-m-cresol					*CAS #*	*59-50-7*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Chloroethane					*CAS #*	*75-00-3*		
Second Quarter 2010	5.2	U	3.6	0.16 J	U	1	-	8260B
Fourth Quarter 2010	4.9	U	2.7	U	U	1	-	8260B
Chloroform					*CAS #*	*67-66-3*		
Second Quarter 2010	U	U	U	U	U	1	80	8260B
2-Chloroethyl vinyl ether					*CAS #*	*110-75-8*		
Second Quarter 2010	U J	U J	U J	U J	U J	20	-	8260B
2-Chloronaphthalene					*CAS #*	*91-58-7*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
2-Chlorophenol					*CAS #*	*95-57-8*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
4-Chlorophenyl phenyl ether					*CAS #*	*7005-72-3*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Chloroprene					*CAS #*	*126-99-8*		
Second Quarter 2010	U	U	U	U	U	10	-	8260B

See last page of this report for definitions.

Target Analyte Monitoring Results - HWMU-16 Point of Compliance Wells
Radford Army Ammunition Plant, Radford, Virginia
Upgradient well = 16C1

All Results in ug/L.

Analtye/Quarter	*16C1*	*16MW8*	*16MW9*	*16WC1A*	*16WC1B*	*OL*	*GPS*	*Method*
2-Chlorotoluene					*CAS #*	*95-49-8*		
Second Quarter 2010	U	U	U	U	U	1	-	8260B
4-Chlorotoluene					*CAS #*	*106-43-4*		
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Chrysene					*CAS #*	*218-01-9*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Cyclohexane					*CAS #*			
Second Quarter 2010	U	U	U	U	U	1	-	8260B
2,4-Dichlorophenoxyacetic acid					*CAS #*	*94-75-7*		
Second Quarter 2010	U	U	U	U	U	5	-	8151A
4,4'-DDD					*CAS #*	*72-54-8*		
Second Quarter 2010	U	U	U	U	U	0.1	-	8081A
4,4'-DDE					*CAS #*	*72-55-9*		
Second Quarter 2010	U	U	U	U	U	0.1	-	8081A
4,4'-DDT					*CAS #*	*50-29-3*		
Second Quarter 2010	U	U	U	U	U	0.1	-	8081A
Diallate					*CAS #*	*2303-16-4*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Dibenz(a,h)anthracene					*CAS #*	*53-70-3*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Dibenzofuran					*CAS #*	*132-64-9*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Dibromochloromethane					*CAS #*	*124-48-1*		
Second Quarter 2010	U	U	U	U	U	1	-	8260B
1,2-Dibromo-3-chloropropane					*CAS #*	*96-12-8*		
Second Quarter 2010	U	U	U	U	U	1	-	8260B
1,2-Dibromoethane					*CAS #*	*106-93-4*		
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Di-n-butyl phthalate					*CAS #*	*84-74-2*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
1,2-Dichlorobenzene					*CAS #*	*95-50-1*		
Second Quarter 2010	U	U	U	U	U	1	-	8260B
1,3-Dichlorobenzene					*CAS #*	*541-73-1*		
Second Quarter 2010	U	U	U	U	U	1	-	8260B
1,4-Dichlorobenzene					*CAS #*	*106-46-7*		
Second Quarter 2010	U	U	U	U	U	1	-	8260B
3,3'-Dichlorobenzidine					*CAS #*	*91-94-1*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
trans-1,4-Dichloro-2-butene					*CAS #*	*110-57-6*		
Second Quarter 2010	U	U	U	U	U	10	-	8260B
Dichlorodifluoromethane					*CAS #*	*75-71-8*		
Second Quarter 2010	0.49 J	U	U	U	U	1	46.5	8260B
Fourth Quarter 2010	U J	U J	U J	U J	U J	1	46.5	8260B
1,1-Dichloroethane					*CAS #*	*75-34-3*		
Second Quarter 2010	7.7	U	10	0.48 J	U	1	296.08	8260B
Fourth Quarter 2010	8.5	U	8.6	1.4	U	1	296.08	8260B
1,2-Dichloroethane					*CAS #*	*107-06-2*		
Second Quarter 2010	U	U	U	U	U	1	5	8260B
1,1-Dichloroethene					*CAS #*	*75-35-4*		
Second Quarter 2010	0.32 J	U	U	U	U	1	-	8260B
trans-1,2-Dichloroethene					*CAS #*	*156-60-5*		
Second Quarter 2010	U	U	U	U	U	1	-	8260B
2,4-Dichlorophenol					*CAS #*	*120-83-2*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
2,6-Dichlorophenol					*CAS #*	*87-65-0*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C

Target Analyte Monitoring Results - HWMU-16 Point of Compliance Wells
Radford Army Ammunition Plant, Radford, Virginia
Upgradient well = 16C1

All Results in ug/L.

Analtye/Quarter	*16C1*	*16MW8*	*16MW9*	*16WC1A*	*16WC1B*	*QL*	*GPS*	*Method*
1,2-Dichloropropane					*CAS #*	*78-87-5*		
Second Quarter 2010	U	U	U	U	U	1	-	8260B
1,3-Dichloropropane					*CAS #*	*142-28-9*		
Second Quarter 2010	U	U	U	U	U	1	-	8260B
2,2-Dichloropropane					*CAS #*	*594-20-7*		
Second Quarter 2010	U	U	U	U	U	1	-	8260B
1,1-Dichloropropene					*CAS #*	*563-58-6*		
Second Quarter 2010	U	U	U	U	U	1	-	8260B
cis-1,3-Dichloropropene					*CAS #*	*10061-01-5*		
Second Quarter 2010	U	U	U	U	U	1	-	8260B
trans-1,3-Dichloropropene					*CAS #*	*10061-02-6*		
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Dieldrin					*CAS #*	*60-57-1*		
Second Quarter 2010	U	U	U	U	U	0.1	-	8081A
Diethyl ether					*CAS #*	*60-29-7*		
Second Quarter 2010	22.8 J	U J	26.2	U J	U J	12.5	-	8260B
Fourth Quarter 2010	33	U	28	U	U	12.5	-	8260B
Diethyl phthalate					*CAS #*	*84-66-2*		
Second Quarter 2010	U	U	U	U	U	10	12,520	8270C
O,O-Diethyl O-2-pyrazinyl					*CAS #*	*297-97-2*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Dimethoate					*CAS #*	*60-51-5*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Dimethyl ether					*CAS #*	*115-10-6*		
Second Quarter 2010	7.7 J	U	12.6	0.46 J	0.35 J	12.5	-	8260B
Fourth Quarter 2010	U	U	U	U	U	12.5	-	8260B
p-(Dimethylamino)azobenzene					*CAS #*	*60-11-7*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
7,12-Dimethylbenz[a]anthracene					*CAS #*	*57-97-6*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
3,3'-Dimethylbenzidine					*CAS #*	*119-93-7*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
a,a-Dimethylphenethylamine					*CAS #*	*122-09-8*		
Second Quarter 2010	U J	U J	U J	U J	U J	50	-	8270C
2,4-Dimethylphenol					*CAS #*	*105-67-9*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Dimethyl phthalate					*CAS #*	*131-11-3*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
m-Dinitrobenzene					*CAS #*	*99-65-0*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
4,6-Dinitro-o-cresol					*CAS #*	*534-52-1*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
2,4-Dinitrophenol					*CAS #*	*51-28-5*		
Second Quarter 2010	U J	U J	U J	U J	U J	10	-	8270C
2,4-Dinitrotoluene					*CAS #*	*121-14-2*		
Second Quarter 2010	U	U	U	U	U	10	31.3	8270C
Fourth Quarter 2010	U	U	U	U	U J	10	31.3	8270C
2,6-Dinitrotoluene					*CAS #*	*606-20-2*		
Second Quarter 2010	U	U	U	U	U	10	15.65	8270C
Fourth Quarter 2010	U	U	U	U	U J	10	15.65	8270C
Dinoseb					*CAS #*	*88-85-7*		
Second Quarter 2010	U	U	U	U	U	2.5	-	8151A
Di-n-octyl phthalate					*CAS #*	*117-84-0*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
1,4-Dioxane					*CAS #*	*123-91-1*		
Second Quarter 2010	U	U	U	U	U	200	-	8260B

See last page of this report for definitions.

Target Analyte Monitoring Results - HWMU-16 Point of Compliance Wells
Radford Army Ammunition Plant, Radford, Virginia
Upgradient well = 16C1

All Results in ug/L.

Analtye/Quarter	*16C1*	*16MW8*	*16MW9*	*16WC1A*	*16WC1B*	*QL*	*GPS*	*Method*
Diphenylamine					*CAS #*	*122-39-4*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Disulfoton					*CAS #*	*298-04-4*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Endosulfan I					*CAS #*	*959-98-8*		
Second Quarter 2010	U	U	U	U	U	0.05	-	8081A
Endosulfan II					*CAS #*	*33213-65-9*		
Second Quarter 2010	U	U	U	U	U	0.1	-	8081A
Endosulfan sulfate					*CAS #*	*1031-07-8*		
Second Quarter 2010	U J	U J	U J	U J	U J	0.1	-	8081A
Endrin					*CAS #*	*72-20-8*		
Second Quarter 2010	U	U	U	U	U	0.1	-	8081A
Ethyl acetate					*CAS #*	*141-78-6*		
Second Quarter 2010	U	U	U	U	U	10	-	8260B
Endrin aldehyde					*CAS #*	*7421-93-4*		
Second Quarter 2010	U J	U J	U J	U J	U J	0.1	-	8081A
Ethanol					*CAS #*	*64-17-5*		
Second Quarter 2010	U J	U J	U J	U J	U J	250	-	8260B
Ethylbenzene					*CAS #*	*100-41-4*		
Second Quarter 2010	U	U	U	U	U	1	70	8260B
Fourth Quarter 2010	U	U	U	U	U	1	70	8260B
Ethyl methacrylate					*CAS #*	*97-63-2*		
Second Quarter 2010	U	U	U	U	U	10	-	8260B
Ethyl methanesulfonate					*CAS #*	*62-50-0*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Ethylene oxide					*CAS #*	*75-21-8*		
Second Quarter 2010	U J	U J	U J	U J	U J	100	-	8260B
Famphur					*CAS #*	*52-85-7*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Fluoranthene					*CAS #*	*206-44-0*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Fluorene					*CAS #*	*86-73-7*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Heptachlor					*CAS #*	*76-44-8*		
Second Quarter 2010	U	U	U	U	U	0.05	-	8081A
Heptachlor epoxide					*CAS #*	*1024-57-3*		
Second Quarter 2010	U	U	U	U	U	0.05	-	8081A
Hexachlorobenzene					*CAS #*	*118-74-1*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Hexachlorobutadiene					*CAS #*	*87-68-3*		
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Hexachlorocyclopentadiene					*CAS #*	*77-47-4*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Hexachloroethane					*CAS #*	*67-72-1*		
Second Quarter 2010	U	U	U	U	U	10	-	8260B
Hexachlorophene					*CAS #*	*70-30-4*		
Second Quarter 2010	U J	U J	U J	U J	U J	40	-	8270C
Hexachloropropene					*CAS #*	*1888-71-7*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
2-Hexanone					*CAS #*	*591-78-6*		
Second Quarter 2010	U	U	U	U	U	10	-	8260B
Indeno[1,2,3-cd]pyrene					*CAS #*	*193-39-5*		
Second Quarter 2010	U	U	U	U	U	5	-	8270C
Isobutyl alcohol					*CAS #*	*78-83-1*		
Second Quarter 2010	U	U	U	U	U	200	-	8260B
Isodrin					*CAS #*	*465-73-6*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C

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Target Analyte Monitoring Results - HWMU-16 Point of Compliance Wells
Radford Army Ammunition Plant, Radford, Virginia
Upgradient well = 16C1

All Results in ug/L.

Analtye/Quarter	*16C1*	*16MW8*	*16MW9*	*16WC1A*	*16WC1B*	*QL*	*GPS*	*Method*
Isophorone					*CAS #*	*78-59-1*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Isopropylbenzene					*CAS #*	*98-82-8*		
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Isopropylether					*CAS #*	*108-20-3*		
Second Quarter 2010	U	U	U	U	U	10	-	8260B
4-Isopropyltoluene					*CAS #*	*99-87-6*		
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Isosafrole					*CAS #*	*120-58-1*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Kepone					*CAS #*	*143-50-0*		
Second Quarter 2010	U J	U J	U J	U J	U J	10	-	8270C
Methacrylonitrile					*CAS #*	*126-98-7*		
Second Quarter 2010	U	U	U	U	U	100	-	8260B
Methapyrilene					*CAS #*	*91-80-5*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Methoxychlor					*CAS #*	*72-43-5*		
Second Quarter 2010	U	U	U	U	U	0.5	-	8081A
Bromomethane					*CAS #*	*74-83-9*		
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Chloromethane					*CAS #*	*74-87-3*		
Second Quarter 2010	U	U	U	U	U	1	2.11	8260B
Fourth Quarter 2010	U	U	U	U	U	1	2.11	8260B
3-Methylcholanthrene					*CAS #*	*56-49-5*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Iodomethane					*CAS #*	*74-88-4*		
Second Quarter 2010	U	U	U	U	U	10	-	8260B
Methyl methacrylate					*CAS #*	*80-62-6*		
Second Quarter 2010	U	U	U	U	U	10	-	8260B
Methyl methane sulfonate					*CAS #*	*66-27-3*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
2-Methylnaphthalene					*CAS #*	*91-57-6*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Methyl parathion					*CAS #*	*298-00-0*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
4-Methyl-2-pentanone					*CAS #*	*108-10-1*		
Second Quarter 2010	U	U	U	U	U	10	-	8260B
2-Methylphenol					*CAS #*	*95-48-7*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
3 & 4-Methylphenol					*CAS #*	*m 108-39-4 p 106-44-5*		
Second Quarter 2010	U	U	U	U	U	20	-	8270C
Methyl tert-butyl ether					*CAS #*	*1634-04-4*		
Second Quarter 2010	U	U	U	U	U	10	-	8260B
Dibromomethane					*CAS #*	*74-95-3*		
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Methylene chloride					*CAS #*	*75-09-2*		
Second Quarter 2010	4.9	U	U	U	U	1	-	8260B
Fourth Quarter 2010	5.5	U	U	U	U	1	-	8260B
Naphthalene					*CAS #*	*91-20-3*		
Second Quarter 2010	U	U	U	U	U	1	-	8260B
1,4-Naphthoquinone					*CAS #*	*130-15-4*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
1-Naphthylamine					*CAS #*	*134-32-7*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
2-Naphthylamine					*CAS #*	*91-59-8*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C

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Target Analyte Monitoring Results - HWMU-16 Point of Compliance Wells
Radford Army Ammunition Plant, Radford, Virginia
Upgradient well = 16C1

All Results in ug/L.

Analtye/Quarter	*16C1*	*16MW8*	*16MW9*	*16WC1A*	*16WC1B*	*QL*	*GPS*	*Method*
o-Nitroaniline					*CAS #*	*88-74-4*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
m-Nitroaniline					*CAS #*	*99-09-2*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
p-Nitroaniline					*CAS #*	*100-01-6*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Nitrobenzene					*CAS #*	*98-95-3*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
o-Nitrophenol					*CAS #*	*88-75-5*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
p-Nitrophenol					*CAS #*	*100-02-7*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
4-Nitroquinoline-1-oxide					*CAS #*	*56-57-5*		
Second Quarter 2010	U	U	U	U	U	50	-	8270C
N-Nitrosodi-n-butylamine					*CAS #*	*924-16-3*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
N-Nitrosodiethylamine					*CAS #*	*55-18-5*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
N-Nitrosodimethylamine					*CAS #*	*62-75-9*		
Second Quarter 2010	U J	U J	U J	U J	U J	10	-	8270C
N-Nitrosodiphenylamine					*CAS #*	*86-30-6*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
N-Nitrosodipropylamine					*CAS #*	*621-64-7*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
N-Nitrosomethylethylamine					*CAS #*	*10595-95-6*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
N-Nitrosomorpholine					*CAS #*	*59-89-2*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
N-Nitrosopiperidine					*CAS #*	*100-75-4*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
N-Nitrosopyrrolidine					*CAS #*	*930-55-2*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
5-Nitroso-o-toluidine					*CAS #*	*99-55-8*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Parathion					*CAS #*	*56-38-2*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Pentachlorobenzene					*CAS #*	*608-93-5*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Pentachloroethane					*CAS #*	*76-01-7*		
Second Quarter 2010	U	U	U	U	U	10	-	8260B
Pentachloronitrobenzene					*CAS #*	*82-68-8*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Pentachlorophenol					*CAS #*	*87-86-5*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Phenacetin					*CAS #*	*62-44-2*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Phenanthrene					*CAS #*	*85-01-8*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Phenol					*CAS #*	*108-95-2*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Total Recoverable Phenolics					*CAS #*	*C-020*		
Second Quarter 2010	U	U	U	U	U	50	-	9066
Phorate					*CAS #*	*298-02-2*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
2-Picoline					*CAS #*	*931-19-1*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C

Target Analyte Monitoring Results - HWMU-16 Point of Compliance Wells
Radford Army Ammunition Plant, Radford, Virginia
Upgradient well = 16C1

All Results in ug/L.

Analtye/Quarter	*16C1*	*16MW8*	*16MW9*	*16WC1A*	*16WC1B*	*QL*	*GPS*	*Method*
Pronamide					*CAS #*	*23950-58-5*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
1-Propanol					*CAS #*	*71-23-8*		
Second Quarter 2010	U J	U J	U J	U J	U J	100	-	8260B
2-Propanol					*CAS #*	*67-63-0*		
Second Quarter 2010	U	U	U	U	U	100	-	8260B
Propionitrile					*CAS #*	*107-12-0*		
Second Quarter 2010	U	U	U	U	U	100	-	8260B
n-Propylbenzene					*CAS #*	*103-65-1*		
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Pyrene					*CAS #*	*129-00-0*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Pyridine					*CAS #*	*110-86-1*		
Second Quarter 2010	U J	U J	U J	U J	U J	10	-	8270C
Safrole					*CAS #*	*94-59-7*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Silvex					*CAS #*	*93-72-1*		
Second Quarter 2010	U	U	U	U	U	2.5	-	8151A
Styrene					*CAS #*	*100-42-5*		
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Sulfotep					*CAS #*	*3689-24-5*		
Second Quarter 2010	U J	U J	U J	U J	U J	5	-	8270C
2,4,5-Trichlorophenoxyacetic acid					*CAS #*	*93-76-5*		
Second Quarter 2010	U	U	U	U	U	2.5	-	8151A
1,2,4,5-Tetrachlorobenzene					*CAS #*	*95-94-3*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
1,1,1,2-Tetrachloroethane					*CAS #*	*630-20-6*		
Second Quarter 2010	U	U	U	U	U	1	-	8260B
1,1,2,2-Tetrachloroethane					*CAS #*	*79-34-5*		
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Tetrachloroethene					*CAS #*	*127-18-4*		
Second Quarter 2010	0.40 J	U	U	U	U	1	5	8260B
Fourth Quarter 2010	U	U	U	U	U	1	5	8260B
Tetrahydrofuran					*CAS #*	*109-99-9*		
Second Quarter 2010	13.7 J	U	U	U	U	25	-	8260B
2,3,4,6-Tetrachlorophenol					*CAS #*	*58-90-2*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Toluene					*CAS #*	*108-88-3*		
Second Quarter 2010	U	U	U	U	U	1	1000	8260B
Fourth Quarter 2010	U	U	U	U	U	1	1000	8260B
o-Toluidine					*CAS #*	*95-53-4*		
Second Quarter 2010	U	U	U	U	U	10	-	8270C
Toxaphene					*CAS #*	*8001-35-2*		
Second Quarter 2010	U	U	U	U	U	2.5	-	8081A
1,2,3-Trichlorobenzene					*CAS #*	*87-61-6*		
Second Quarter 2010	U	U	U	U	U	1	-	8260B
1,2,4-Trichlorobenzene					*CAS #*	*120-82-1*		
Second Quarter 2010	U	U	U	U	U	1	-	8260B
1,1,1-Trichloroethane					*CAS #*	*71-55-6*		
Second Quarter 2010	0.79 J	U	U	U	U	1	200	8260B
Fourth Quarter 2010	U	U	U	U	U	1	200	8260B
1,1,2-Trichloroethane					*CAS #*	*79-00-5*		
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Trichloroethene					*CAS #*	*79-01-6*		
Second Quarter 2010	0.23 J	U	U	U	U	1	5	8260B
Fourth Quarter 2010	U	U	U	U	U	1	5	8260B

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Target Analyte Monitoring Results - HWMU-16 Point of Compliance Wells
Radford Army Ammunition Plant, Radford, Virginia
Upgradient well = 16C1 ***All Results in ug/L.***

Analtye/Quarter	*16C1*	*16MW8*	*16MW9*	*16WC1A*	*16WC1B*	*QL*	*GPS*	*Method*
Trichlorofluoromethane					*CAS #* 75-69-4			
Second Quarter 2010	U	U	U	U	U	1	469.5	8260B
Fourth Quarter 2010	U	U	U	U	U	1	469.5	8260B
2,4,5-Trichlorophenol					*CAS #* 95-95-4			
Second Quarter 2010	U	U	U	U	U	10	-	8270C
2,4,6-Trichlorophenol					*CAS #* 88-06-2			
Second Quarter 2010	U	U	U	U	U	10	-	8270C
1,2,3-Trichloropropane					*CAS #* 96-18-4			
Second Quarter 2010	U	U	U	U	U	1	-	8260B
1,1,2-Trichloro-1,2,2-Trifluoroethane					*CAS #* 76-13-1			
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Fourth Quarter 2010	U	U	U	U	U	1	-	8260B
O,O,O-Triethyl phosphorothioate					*CAS #* 126-68-1			
Second Quarter 2010	U	U	U	U	U	10	-	8270C
1,2,4-Trimethylbenzene					*CAS #* 95-63-6			
Second Quarter 2010	U	U	U	U	U	1	-	8260B
1,3,5-Trimethylbenzene					*CAS #* 108-67-8			
Second Quarter 2010	U	U	U	U	U	1	-	8260B
sym-Trinitrobenzene					*CAS #* 99-35-4			
Second Quarter 2010	U J	U J	U J	U J	U J	10	-	8270C
Vinyl acetate					*CAS #* 108-05-4			
Second Quarter 2010	U	U	U	U	U	10	-	8260B
Vinyl chloride					*CAS #* 75-01-4			
Second Quarter 2010	U	U	U	U	U	1	-	8260B
Xylenes (Total)					*CAS #* 1330-20-7			
Second Quarter 2010	U	U	U	U	U	3	10000	8260B
Fourth Quarter 2010	U	U	U	U	U	3	10000	8260B

See last page of this report for definitions.

Target Analyte Monitoring Results - HWMU-16 Point of Compliance Wells
Radford Army Ammunition Plant, Radford, Virginia

Upgradient well = 16C1 ***All Results in ug/L.***

Analtye/Quarter	*16C1*	*16MW8*	*16MW9*	*16WC1A*	*16WC1B*	*QL*	*GPS*	*Method*

Definitions:

The following definitions apply to results reported for Appendix IX monitoring events.
All Appendix IX monitoring results for compliance wells are reported to the detection limit.

Appendix IX Monitoring Events: 3Q2003, 2Q-2004, 2Q-2005, 3Q2006, 2Q2007, 2Q2008, 2Q2009, 2Q 2010

QL Denotes permit required quantitation limit.
U denotes not detected at or above the detection limit.
UA denotes not detected at or above the adjusted detection limit.
J Denotes result is estimated. When used with "U" (i.e., "UJ"), denotes analyte not detected at or above the detection limit and detection limit and QL are estimated. When used with "UA" (i.e., "UAJ"), denotes analyte not detected at or above adjusted detection limit and adjusted detection limit and QL are estimated.
UN Denotes analyte concentration is less than the quantitation limit and/or five times the blank concentration. Not reliably detected due to blank contamination. This qualifier used only for Appendix IX monitoring event when compliance well results are reported to at or above the project detection limit.
R Denotes result rejected.
Q Denotes data validation qualifier. **X** Denotes mass spectral confirmation not obtained-result suspect.
Background Denotes background concentrations listed in Appendix F to Attachment 5 in the Final Hazardous Waste Post-Closure Care Permit for Hazardous Waste Units 5, 7, 10, and 16 (October 4, 2002), where applicable.
CAS# Denotes Chemical Abstract Services registration number.
GPS Denotes Groundwater Protection Standards listed in Appendix G to Attachment 5 in the Final Hazardous Waste Post-Closure Care Permit for Hazardous Waste Units 5, 7, 10, and 16 (October 4, 2002).
NS denotes not sampled. **NA** denotes not analyzed.
"–" denotes not detected (pre-2nd Quarter 2003) or not available / not sampled (beginning 2nd Quarter 2003).

The following definitions apply to results reported for non-Appendix IX monitoring events.
All non-Appendix IX monitoring results for compliance wells are reported at or above the quantitation limit.

QL Denotes permit required quantitation limit.
U Denotes analyte not detected at or above QL.
UA Denotes analyte not detected at or above adjusted sample QL.
J Denotes result is estimated. When used with "U" (i.e., "**UJ**"), denotes analyte not detected at or above QL and QL is estimated. When used with "UA" (i.e., "**UAJ**"), denotes analyte not detected at or above adjusted QL and adjusted QL is estimated.
R Denotes result rejected.
Q Denotes data validation qualifier.
Background Denotes background concentrations listed in Appendix F to Attachment 5 in the Final Hazardous Waste Post-Closure Care Permit for Hazardous Waste Units 5, 7, 10, and 16 (October 4, 2002), where applicable.
CAS# Denotes Chemical Abstract Services registration number.
GPS Denotes Groundwater Protection Standards listed in Appendix G to Attachment 5 in the Final Hazardous Waste Post-Closure Care Permit for Hazardous Waste Units 5, 7, 10, and 16 (October 4, 2002).

NOTE:

Fourth Quarter 2008:
Due to laboratory error all HWMU 16 samples were analyzed using Method 8260B 5 ml purge instead of a 25 ml purge which resulted in a higher QL. For these samples, all results were evaluated to the detection limit, which is comparable to the permit QL. Results below the laboratory QL but at or above the permit QL are reported and qualified as estimated.
Second Quarter 2009:
Verification event 6/11/2009 - 16MW8 for acetone. Verification result reported as not detected.
4/ 2010 event -Per DEQ, tin analyzed by Method 6010B instead of Method 6020. Verification event: 16MW9 1,1-dichloroethene and benzene. 16WC1B 4,4-DDD. Verification result reported as not detected.

Comprehensive Data Validation Report

Sample/Blind Field Duplicate Results Greater Than the Quantitation Limit

Facility: HWMU-16 Monitoring Event: Second Quarter 2010

Draper Aden Associates
Engineering ♦ Surveying ♦ Environmental Services

Analyte	Sample ID	Laboratory Result (ug/L)	Q	Validated Result (ug/L)	Q	QL (ug/L)	Validation Notes
Method: 6020							
Laboratory: CompuChem, Cary, NC							
Barium	16WC1A	208		208	J	10	Serial dilution result > 10 % difference (11%). Result is estimated.
	16WDUP	210		210	J	10	Serial dilution result > 10 % difference (11%). Result is estimated. Field duplicate for 16WC1A. RPD <10.
Cobalt	16WC1A	9		9		5	No action taken.
	16WDUP	7.6		7.6		5	No action taken. Field duplicate for 16WC1A. RPD <20.

Definitions:

Data Validation Qualifiers:

QL Denotes permit quantitation limit. **Q** Denotes data qualifier.

J Denotes analyte reported at or above quantitation limit and associated result is estimated.

Comprehensive Data Validation Report

Draper Aden Associates
Engineering ◆ Surveying ◆ Environmental Services

Sample/Blind Field Duplicate Results Greater Than the Quantitation Limit

Facility: HWMU-16 Monitoring Event: Fourth Quarter 2010

Analyte	Sample ID	Laboratory Result (ug/L)	Q	Validated Result (ug/L)	Q	QL (ug/L)	Validation Notes
Method: 6020							
Laboratory: CompuChem, a Division of Liberty Analytical, Cary, NC							
Barium	16WC1A	199		199		10	No action taken. Field duplicate result was 202 ug/l. RPD <10.
	16WDUP	202		202		10	No action taken. Field duplicate of 16WC1A. RPD <10.
Cobalt	16WC1A	5.6		5.6		5	No action taken. Field duplicate result was 5.4 ug/l. RPD <10.
	16WDUP	5.4		5.4		5	No action taken. Field duplicate of 16WC1A. RPD <10.
Method: 8260B							
Laboratory: Lancaster Laboratories, Lancaster, PA							
1,1-Dichloroethane	16WC1A	1.4		1.4		1	No action taken.
	16WDUP	1.5		1.5		1	No action taken. Field duplicate of 16WC1A. RPD <10.

Definitions:

Data Validation Qualifiers:

QL Denotes permit quantitation limit. **Q** Denotes data qualifier.

J Denotes analyte reported at or above quantitation limit and associated result is estimated.

APPENDIX D-3

HWMU-16 2010 LABORATORY ANALYTICAL RESULTS
PLUME MONITORING WELLS

Target Analyte Monitoring Results At Or Above Permit Quantitation Limit
HWMU-16 Plume Monitoring Wells
Radford Army Ammunition Plant, Radford, Virginia

All Results in ug/L.

Upgradient well = 16C1

Analtye/Quarter	*16C1 Q*	*16-1 Q*	*16-2 Q*	*16-3 Q*	*16-5 Q*	*16WC2B Q*	*16SPRING Q*	*QL*	*Background*	*Method*
Antimony						*CAS # 7440-36-0*				
Second Quarter 2010	U	U	U	U	U	U	U	1	3	6020
Fourth Quarter 2010	U	U	U	U	U	U	U	1	3	6020
Arsenic						*CAS # 7440-38-2*				
Second Quarter 2010	U	U	U	U	U	U	U	10	1	6020
Fourth Quarter 2010	U	U	U	U	U	U	U	10	1	6020
Barium						*CAS # 7440-39-3*				
Second Quarter 2010	148 J	183	238	694	171	113	195	10	175.4	6020
Fourth Quarter 2010	200	195	276	737	182	128	300	10	175.4	6020
Beryllium						*CAS # 7440-41-7*				
Second Quarter 2010	U	U	U	U	U	U	U	1	0.7	6020
Fourth Quarter 2010	U	U	U	U	U	U	U	1	0.7	6020
Cadmium						*CAS # 7440-43-9*				
Second Quarter 2010	U	U	U	U	U	U	U	1	0.2	6020
Fourth Quarter 2010	U	U	U	U	U	U	U	1	0.2	6020
Chromium						*CAS # 7440-47-3*				
Second Quarter 2010	U	U	U	U	U	U	U	5	6.2	6020
Fourth Quarter 2010	U	U	U	U	U	U	U	5	6.2	6020
Cobalt						*CAS # 7440-48-4*				
Second Quarter 2010	U	U	U	U	U	U	U	5	5	6020
Fourth Quarter 2010	U	U	U	U	U	U	U	5	5	6020
Copper						*CAS # 7440-50-8*				
Second Quarter 2010	U	U	U	U	U	U	U	5	13	6020
Fourth Quarter 2010	U	U	U	U	U	U	U	5	13	6020
Lead						*CAS # 7439-92-1*				
Second Quarter 2010	U	U	U	U	U	U	U	1	10	6020
Fourth Quarter 2010	U	U	U	U	U	U	U	1	10	6020
Mercury						*CAS # 7439-97-6*				
Second Quarter 2010	U	U	U	U	U	U	U	2	0.2	7470A
Fourth Quarter 2010	U	U	U	U	U	U	U	2	0.2	7470A
Nickel						*CAS # 7440-02-0*				
Second Quarter 2010	4 J	U	U	U	U	U	U	10	16	6020
Fourth Quarter 2010	U	U	U	U	U	U	U	10	16	6020
Selenium						*CAS # 7782-49-2*				
Second Quarter 2010	U	U	U	U	U	U	U	10	1	6020
Fourth Quarter 2010	U	U	U	U	U	U	U	10	1	6020
Silver						*CAS # 7440-22-4*				
Second Quarter 2010	U	U	U	U	U	U	U	2	0.5	6020
Fourth Quarter 2010	U	U	U	U	U	U	U	2	0.5	6020
Vanadium						*CAS # 7440-62-2*				
Second Quarter 2010	U	U	U	U	U	U	U	10	151	6020
Fourth Quarter 2010	U	U	U	U	U	U	U	10	151	6020
Zinc						*CAS # 7440-66-6*				
Second Quarter 2010	U	U	U	U	U	U	U	10	51	6020
Fourth Quarter 2010	U	U	U	U	U	U	U	10	51	6020
2-Butanone						*CAS # 78-93-3*				
Second Quarter 2010	U	U	U	U	U	U	U	10	1.1	8260B
Fourth Quarter 2010	U	U	U	U	U	U	U	10	1.1	8260B

See last page of this report for definitions.

Target Analyte Monitoring Results At Or Above Permit Quantitation Limit
HWMU-16 Plume Monitoring Wells
Radford Army Ammunition Plant, Radford, Virginia

All Results in ug/L.

Upgradient well = 16C1

Analtye/Quarter	*16C1 Q*	*16-1 Q*	*16-2 Q*	*16-3 Q*	*16-5 Q*	*16WC2B Q*	*16SPRING Q*	*QL*	*Background*	*Method*
Carbon tetrachloride						*CAS # 56-23-5*				
Second Quarter 2010	U	U	U	U	U	U	U	1	0.2	8260B
Fourth Quarter 2010	U	U	U	U	U	U	U	1	0.2	8260B
Chloroethane						*CAS # 75-00-3*				
Second Quarter 2010	5.2	U	U	U	U	U	U	1	20.7	8260B
Fourth Quarter 2010	4.9	U	U	U	U	U	U	1	20.7	8260B
Dichlorodifluoromethane						*CAS # 75-71-8*				
Second Quarter 2010	0.49 J	U	U	U	U	U	U	1	46.5	8260B
Fourth Quarter 2010	U J	U J	U J	U J	U J	U J	U J	1	46.5	8260B
1,1-Dichloroethane						*CAS # 75-34-3*				
Second Quarter 2010	7.7	U	U	U	U	U	U	1	9.5	8260B
Fourth Quarter 2010	8.5	U	U	U	U	U	U	1	9.5	8260B
Diethyl ether						*CAS # 60-29-7*				
Second Quarter 2010	22.8 J	U	U	U	U	U J	U	12.5	75.5	8260B
Fourth Quarter 2010	33	U	U	U	U	U	U	12.5	75.5	8260B
Dimethyl ether						*CAS # 115-10-6*				
Second Quarter 2010	7.7 J	U	U	U	U	U	U	12.5	17.0	8260B
Fourth Quarter 2010	U	U	U	U	U	U	U	12.5	17.0	8260B
2,4-Dinitrotoluene						*CAS # 121-14-2*				
Second Quarter 2010	U	U	U	U	U	U	U	10	0.1	8270C
Fourth Quarter 2010	U	U	U	U	U	U	U	10	0.1	8270C
2,6-Dinitrotoluene						*CAS # 606-20-2*				
Second Quarter 2010	U	U	U	U	U	U	U	10	0.11	8270C
Fourth Quarter 2010	U	U	U	U	U	U	U	10	0.11	8270C
Ethylbenzene						*CAS # 100-41-4*				
Second Quarter 2010	U	U	U	U	U	U	U	1	0.1	8260B
Fourth Quarter 2010	U	U	U	U	U	U	U	1	0.1	8260B
Chloromethane						*CAS # 74-87-3*				
Second Quarter 2010	U	U	U	U	U	U	U	1	0.3	8260B
Fourth Quarter 2010	U	U	U	U	U	U	U	1	0.3	8260B
Methylene chloride						*CAS # 75-09-2*				
Second Quarter 2010	4.9	U	U	U	U	U	U	1	13.95	8260B
Fourth Quarter 2010	5.5	U	U	U	U	U	U	1	13.95	8260B
Tetrachloroethene						*CAS # 127-18-4*				
Second Quarter 2010	0.40 J	U	U	U	U	U	U	1	0.7	8260B
Fourth Quarter 2010	U	U	U	U	U	U	U	1	0.7	8260B
Toluene						*CAS # 108-88-3*				
Second Quarter 2010	U	U	U	U	U	U	U	1	0.1	8260B
Fourth Quarter 2010	U	U	U	U	U	U	U	1	0.1	8260B
1,1,1-Trichloroethane						*CAS # 71-55-6*				
Second Quarter 2010	0.79 J	U	U	U	U	U	U	1	9.2	8260B
Fourth Quarter 2010	U	U	U	U	U	U	U	1	9.2	8260B
Trichloroethene						*CAS # 79-01-6*				
Second Quarter 2010	0.23 J	U	U	U	U	U	U	1	0.1	8260B
Fourth Quarter 2010	U	U	U	U	U	U	U	1	0.1	8260B
Trichlorofluoromethane						*CAS # 75-69-4*				
Second Quarter 2010	U	U	U	U	U	U	U	1	11.3	8260B
Fourth Quarter 2010	U	U	U	U	U	U	U	1	11.3	8260B

See last page of this report for definitions.

Target Analyte Monitoring Results At Or Above Permit Quantitation Limit
HWMU-16 Plume Monitoring Wells
Radford Army Ammunition Plant, Radford, Virginia

All Results in ug/L. ***Upgradient well = 16C1***

Analtye/Quarter	*16C1 Q*	*16-1 Q*	*16-2 Q*	*16-3 Q*	*16-5 Q*	*16WC2B Q*	*16SPRING Q*	*QL*	*Background*	*Method*
1,1,2-Trichloro-1,2,2-Trifluoroethane						*CAS # 76-13-1*				
Second Quarter 2010	U	U	U	U	U	U	U	1	1.2	8260B
Fourth Quarter 2010	U	U	U	U	U	U	U	1	1.2	8260B
Xylenes (Total)						*CAS # 1330-20-7*				
Second Quarter 2010	U	U	U	U	U	U	U	3	0.2	8260B
Fourth Quarter 2010	U	U	U	U	U	U	U	3	0.2	8260B

Definitions:

All plume monitoring well results reported to at or above the permit quantitation limit except for the upgradient well during the Appendix IX monitoring Event. During this event, results for the upgradient well are reported to the detection limit.

Q Denotes data validation qualifier.
QL Denotes permit required quantitation limit.
U Denotes analyte not detected at or above QL.
UA Denotes analyte not detected at or above adjusted sample QL.
J Denotes result is estimated. When used with "U" (i.e., "**UJ**"), denotes analyte not detected at or above QL and QL is estimated. When used with "UA" (i.e., "**UAJ**"), denotes analyte not detected at or above adjusted QL and adjusted QL is estimated.
UN Denotes analyte concentration is less than the quantiation limit and five times the blank concentration. Not reliably detected due to blank contamination. This qualifier used only for Appendix IX monitoring event when compliance well results are reported to at or above the project detection limit.
R Denotes result rejected.
Background Denotes background concentrations listed in Appendix F to Attachment 5 in the Final Hazardous Waste Post-Closure Care Permit for Hazardous Waste Units 5, 7, 10, and 16 (October 4, 2002).
CAS# Denotes Chemical Abstract Services registration number.
GPS Denotes groundwater protection standard.

NS denotes not sampled. **NA** denotes not analyzed. "–"denotes not detected (pre-2nd Quarter 2003) or not available / not sampled (beginning 2nd Quarter 2003).

Notes:
4Q2004. No data for 16-1 8270C-semivolatiles. Well dry-insufficient sample volume.
4Q2006 - No data for 16-1; well dry.
4Q2008- No data for 16-1; well dry.
2Q2009- No data for 16-1; well dry.

NOTE:
Fourth Quarter 2008
Due to laboratory error all HWMU 16 samples were analyzed using Method 8260B 5 ml purge instead of a 25 ml purge which resulted in a higher QL. For these samples, all results were evaluated to the detection limit, which is comparable to the permit QL. Results below the laboratory QL but at or above the permit QL are reported and qualified as estimated.

APPENDIX D-4

ESTABLISHED BACKGROUND VALUES AND COMPUTATIONS FOR HWMU-16

- It was not understood why the majority of fluorescein detections were considered false positive detections. The basis of this observation is unclear considering a lack of background and laboratory confirmation results.

- It was not apparent why certain samples were selected for laboratory confirmation and others were not. There was no apparent consistency in the selection of samples for laboratory confirmation.

- Samples were submitted for confirmation laboratory analyses three months or more following the collection of the samples in the field. No information was provided regarding the custody and/or storage of the samples. The samples were submitted to the analytical laboratory with incomplete chain-of-custody (COC), and the COC documentation was not completed by the laboratory.

In summary, the data from the study do not provide the basis for meaningful interpretation. Any attempt to formulate conclusions from the data as presented regarding the presence of preferred or predominant groundwater flow patterns is not warranted or recommended.

3.3 HWMU-16 GROUNDWATER MONITORING ANALYTE LIST

The groundwater monitoring analyte list for HWMU-16 is presented in **Table 1 (Appendix B)**. The list represents the subset of the constituents listed in Appendix III of 40 CFR Part 261 that previously have been detected in the groundwater and/or that are reasonably expected to be in or derived from waste contained in HWMU-16. As discussed in Section 3.5.2 below, 12 inorganic constituents and two explosive/propellant constituents have been detected in the groundwater monitoring network for HWMU-16 at statistically significant concentrations above the Unit's calculated background concentrations. The inorganic constituents may be derived from the aquifer formation materials; however, the two explosive/propellant constituents (2,4-Dinitrotoluene and 2,6-Dinitrotoluene) are byproducts of wastes derived from explosives. Therefore, the two explosive/propellant constituents detected could only be from HWMU-16.

The concentration limits established for the hazardous constituents also are listed in **Table 1**. The concentration limits represent either background concentrations calculated for the constituents in this GWQAR, Maximum Concentrations of Constituents for Ground-water Protection listed in Table 1 of 40 CFR 264.94, USEPA Drinking Water Standard Maximum Contaminant Levels (MCLs), or alternate concentration limits (ACLs) established by the VDEQ (July 1998). Certain organic constituents on the list do not have USEPA MCLs or VDEQ ACLs; they also do not have calculated background concentrations because they have not been detected in the Unit's upgradient well. Therefore, the concentration limits for these constituents are equal to their respective method detection limits.

As Alliant discussed with the VDEQ in the past, the reliability of previous laboratory analytical data - particularly dissolved metals data - appeared to be questionable in some cases. In an April 9, 1996 letter to C. Jake (Alliant), the VDEQ agreed that only total metals concentrations in groundwater would be measured, as described in a USEPA Region III guidance on groundwater sampling in karst terrain. Therefore, all references to metals concentrations in this GWQAR refer to <u>total</u> metals concentrations.

3.4 HWMU-16 GROUNDWATER BACKGROUND CONCENTRATIONS

Background concentrations were calculated for each constituent in the groundwater monitoring program using the analytical data from 1996 through 1998 for upgradient well 16C1.

The background concentration calculations were based on site wide 95% confidence, 95% coverage upper prediction intervals. The calculated background concentrations are listed in **Table 2 (Appendix B)**. The background concentrations were used to construct the outermost closing contours on the Isoconcentration Maps (**Appendix A**).

3.5 HWMU-16 STATISTICAL ANALYSIS

Statistical evaluations for HWMU-16 are performed annually and submitted to the VDEQ in accordance with the annual reporting requirements specified in 40 CFR 265.94. As part of this GWQAR, statistical evaluations were performed on Fourth Quarter 1998 analytical data in accordance with the procedures and guidance provided in the following documents:

- Title 40 of the Code of Federal Regulations, 40 CFR 264.97 and 264.98;
- VDEQ Guidance for statistical analysis titled "Data Analysis Plan," undated;
- Interim Final Guidance for Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, USEPA, April 1989;
- Addendum to Interim Final Guidance for Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, USEPA, July 1992; and
- Statistical Methods for Groundwater Monitoring, Gibbons, R.D., 1994.

Statistical threshold values were computed for the 54 constituents for which HWMU-16 is currently monitored based on the concentrations of those constituents in upgradient (background) well 16C1. All data starting with First Quarter 1996 to Fourth Quarter 1998 were used for this purpose. The 1996 through 1998 monitoring data have been submitted previously to the VDEQ by Alliant in quarterly monitoring reports; therefore, the data are not listed in this GWQAR. Statistical comparisons were performed for the Fourth Quarter 1998 data set. Comparison statistical analyses were performed for all constituents which were detected in any downgradient well during that event.

3.5.1 Background Data and Statistical Comparisons

Statistical analyses were performed using the analytical results from upgradient well 16C1 data as background data. Based on the percentage of non-detects and the distribution of the background data, methods of statistical comparisons varied. Background average, standard deviation and other descriptive statistical data were computed for all constituents and are presented in **Appendix C**.

The constituents listed below were 100% non-detected in the background data. The background threshold levels (BTLs) for these constituents were established as equal to their detection limits (DL). Detections of these constituents in the downgradient wells during Fourth Quarter 1998 were compared to these BTLs.

Background Threshold Level (BTL) = Detection Limit (DL)				
Parameter	Sample Size	% Non-Detects	DL (µg/l)	BTL (µg/l)
Antimony	12	100	3	3
Arsenic	12	100	1	1
Bromoform	12	100	0.3	0.3
Carbon tetrachloride	12	100	0.2	0.2
Chlorobenzene	12	100	0.1	0.1
Chloromethane	12	100	0.3	0.3
Cyanide	12	100	10	10

Background Threshold Level (BTL) = Detection Limit (DL)				
Parameter	Sample Size	% Non-Detects	DL (µg/l)	BTL (µg/l)
Di-n-butyl phthalate	12	100	5	5
1,2-Dichloroethane	12	100	0.1	0.1
trans-1,2-Dichloroethene	12	100	0.1	0.1
1,4-Dichlorobenzene	12	100	0.1	0.1
Ethylbenzene	12	100	0.1	0.1
Mercury	12	100	0.2	0.2
Methyl ethyl ketone	12	100	1.1	1.1
Selenium	12	100	1	1
1,1,2,2-Tetrachloroethane	12	100	0.3	0.3
1,1,2-Trichloroethane	12	100	0.5	0.5
Trichloroethene	12	100	0.1	0.1
Toluene	12	100	0.1	0.1
2378-TCDF	12	100	0.0485 ppt	0.0485 ppt
12378-PECDF	12	100	0.0439 ppt	0.0439 ppt
23478-PECDF	12	100	0.0417 ppt	0.0417 ppt
123478-HXCDF	12	100	0.0390 ppt	0.0390 ppt
123678-HXCDF	12	100	0.0377 ppt	0.0377 ppt
234678-HXCDF	12	100	0.0428 ppt	0.0428 ppt
123789-HXCDF	12	100	0.0415 ppt	0.0415 ppt
1234678-HPCDF	12	100	0.0615 ppt	0.0615 ppt
1234789-HPCDF	12	100	0.0709 ppt	0.0709 ppt
OCDF	12	100	0.1307 ppt	0.1307 ppt

Non-parametric prediction intervals were computed for all of the constituents for which the data from background well 16C1 satisfied one of the following two criteria, per VDEQ regulations and guidance as well as USEPA guidance:

- Percentage of non-detects was greater than or equal to 50 and less than 100; or
- Percentage of non-detects was less than 50, but data was not normally distributed in original or log-transformed mode.

The background threshold levels for these constituents were set as equal to their upper prediction limits (UPLs). The background and relevant statistical data for these constituents are summarized below. The confidence level and false positive rate were calculated based on the number of background data points available and number of future comparisons. For all constituents, the confidence level was determined to be equal to 0.933, and the false positive rate was equal to 0.067. Since the upper control limit of a non-parametric interval cannot be adjusted for multiple comparisons and inadequate number of background data, the number of resampling events required was adjusted to account for the high error rates inherent in those situations. The number of confirmation resamples required for all constituents is 2. The background and relevant statistical data for these constituents are summarized below. Associated statistical computations are presented in **Appendix C**.

BTL = Upper Prediction Limit of Non-parametric Prediction Interval w/false positive rate=0.067				
Parameter	Sample Size	% Non-Detects	DL (µg/l)	BTL (µg/l)
Beryllium	12	75	0.2	0.7
Cadmium	12	75	0.1	0.2
Cobalt	12	75	1	5
Copper	12	50	1	13
1,1-Dichloroethane	12	0	0.2	9.5
2,4-Dinitrotoluene	12	92	0.08	0.10

BTL = Upper Prediction Limit of Non-parametric Prediction Interval w/false positive rate=0.067				
Parameter	Sample Size	% Non-Detects	DL (µg/l)	BTL (µg/l)
2,6-Dinitrotoluene	12	75	0.08	0.11
Lead	12	42	1	10
Nickel	12	92	15	16
Silver	12	75	0.2	0.5
Thallium	12	67	1	6
TOC	12	75	1000	7000
1,1,1-Trichloroethane	12	17	0.3	9.2
Vanadium	12	83	4	151
Vinyl Chloride	12	92	0.1	0.1
Xylene (total)	12	92	0.1	0.2
Zinc	12	50	5	51

Chromium exhibited normally distributed data (excluding non-detects) with between 25% and 50% non-detects in the background well. The mean and standard deviation of the background data for chromium were adjusted using Cohen's Maximum Likelihood Estimator Method (1959, 1961). A one-sided parametric prediction interval was then computed for chromium based on the adjusted mean and standard deviation. The Upper Prediction Limit was set as the BTL for chromium. The background and relevant statistical data for chromium are summarized below. Cohen's adjustment computations and prediction interval computations are presented in **Appendix C**.

BTL = Upper Prediction Limit of Prediction Interval w/false positive rate=0.05 Original Mean = 3.54, Original SD = 1.933 Adjusted Mean = 3.642. Adjusted SD = 1.95				
Parameter	Sample Size	% Non-Detects	DL (µg/l)	BTL (µg/l)
Chromium	12	25	1	6.2

The following constituents exhibited normally distributed background data with less than 25% non-detects. One sided parametric prediction intervals were computed on the background data for all of these constituents. The UPLs for these constituents were set as their respective BTLs, with one exception. For pH, a two-sided parametric prediction interval was computed; therefore, the BTL for pH consisted of a range between the lower prediction limit (LPL) and the upper prediction limit. The background concentration calculations were based on a site wide 95% confidence, 95% coverage upper prediction intervals. When adjusted for multiple comparisons of the background data, the minimum required false positive rate was below 1% (0.01). A 99% confidence level (0.01 false positive rate) was used for all individual comparisons, which with the most conservative assumptions provided a site-wide false positive rate of >0.05 for all constituents. The background and relevant statistical data for these constituents are summarized below. The prediction interval computations for these constituents are presented in **Appendix C**.

BTL = UPL of one-sided Prediction Interval (exception pH) w/site-wide false positive rate>0.05 (individual comparisons false positive rate=0.01) BTL for pH = LPL – UPL of two-sided Prediction Interval				
Parameter	Sample Size	% Non-Detects	DL (µg/l)	BTL (µg/l)
Barium	12	0	2	175.4
Dichlorodifluoromethane	12	8	0.3	46.5
Tetrachloroethene	12	17	0.1	0.7
TOX	12	17	5	42.2

BTL = UPL of one-sided Prediction Interval (exception pH) w/site-wide false positive rate>0.05 (individual comparisons false positive rate=0.01) BTL for pH = LPL – UPL of two-sided Prediction Interval				
Parameter	Sample Size	% Non-Detects	DL (µg/l)	BTL (µg/l)
Trichlorofluoromethane	12	0	0.5	11.3
Specific Conductivity	8	0	1 µS/cm	672 µS/cm
pH	8	0	0.1 pH units	5.7 to 7.9 pH units

3.5.2 Results of Statistical Comparisons

The following table lists the constituents which were detected during the Fourth Quarter 1998 event at concentrations exceeding their respective background threshold levels (BTLs), and the downgradient wells in which they were detected.

Parameter	Monitoring Well(s)
Arsenic	16-5, 16WC2B
Barium	16-2, 16-3, 16-5, 16WC1A, 16WC1B, 16WC2B, 16SPRING
Beryllium	16WC1B, 16WC2B
Cadmium	16WC1B
Chromium	16-3, 16-5, 16WC1B, 16WC2B
Cobalt	16-5, 16WC1B, 16WC2B
Copper	16-5, 16WC1B, 16WC2B
Lead	16WC1B
Mercury	16WC1B
Nickel	16-5, 16WC1A, 16WC2B
Selenium	16-5, 16WC1B, 16WC2B
Zinc	16WC1B
2,4-Dinitrotoluene	16-3, 16-5, 16WC1B, 16WC2B, 16SPRING
2,6-Dinitrotoluene	16WC1A, 16WC1B

Any HWMU-16 target constituents not listed above were not detected in the downgradient monitoring wells at concentrations exceeding their respective BTLs.

3.6 HWMU-16 PLUME DELINEATIONS

In accordance with VDEQ instructions presented during the May 19, 1999 meeting between Alliant and the VDEQ, Isoconcentration Maps were produced to depict constituent plumes in the groundwater beneath the site (**Appendix A**). In order to evaluate the shape and position of constituent plumes over time, historical Isoconcentration Maps were developed using the historical maximum concentrations for the constituents monitored at the site for the time periods of 1992 through 1995 and 1996 through 1998. The historical maximum concentrations for these time periods are listed in **Tables 3** and **4**, respectively (**Appendix B**).

Groundwater analytical data collected prior to 1992 were not included in the evaluation of historical maximum concentrations. The data collected prior to 1992 are considered unreliable due to "order-of-magnitude" variations in parameter concentrations from quarter to quarter, as well as a general lack of laboratory QA/QC. Additionally, the groundwater monitoring analyte lists prior to 1992 did not include many of the parameters on the current groundwater monitoring analyte list for HWMU-16.

TABLE 2
HWMU-16
Calculated Background Values

Constituent	Background Concentration (µg/l unless otherwise noted)
Antimony	3
Arsenic	1
Barium	175.4
Beryllium	0.7
Cadmium	0.2
Chromium	6.2
Cobalt	5
Copper	13
Lead	10
Mercury	0.2
Nickel	16
Selenium	1
Silver	0.5
Thallium	6
Vanadium	151
Zinc	51
Bromoform	0.3
Carbon Tetrachloride	0.2
Chlorobenzene	0.1
Chloromethane	0.3
1,4-Dichlorobenzene	0.1
Dichlorodifluoromethane	46.5
1,1-Dichloroethane	9.5
1,2-Dichloroethane	0.1
trans-1,2-Dichloroethene	0.1
Ethylbenzene	0.1
Methyl Ethyl Ketone	1.1
1,1,2,2-Tetrachloroethane	0.3
Tetrachloroethene	0.7
Toluene	0.1
1,1,1-Trichloroethane	9.2
1,1,2-Trichloroethane	0.5
Trichloroethene	0.1
Trichlorofluoromethane	11.3
Vinyl Chloride	0.1
Xylenes (total)	0.2

TABLE 2
HWMU-16
Calculated Background Values

Constituent	Background Concentration (µg/l unless otherwise noted)
Di-n-butylphthalate	5
2,4-Dinitrotoluene	0.10
2,6-Dinitrotoluene	0.11
2378-TCDF	0.0485 ppt
12378-PECDF	0.0439 ppt
23478-PECDF	0.0417 ppt
123478-HXCDF	0.0390 ppt
123678-HXCDF	0.0377 ppt
234678-HXCDF	0.0428 ppt
123789-HXCDF	0.0415 ppt
1234678-HPCDF	0.0615 ppt
1234789-HPCDF	0.0709 ppt
OCDF	0.1307 ppt
Cyanide	10
Total Organic Carbon (x4)	7000
Total Organic Halides (x4)	42.2
Specific Conductivity	672 µS/cm
pH	5.7 to 7.9 pH units

Appendix IX Constituents Detected Since Permit Issuance
HWMUs 5, 7, 10, and 16
Radford Army Ammunition Plant

Unit	Quarter Initially Detected	Constituent	Background--Calculated or QL?	Background (ug/L)	GPS Required? (261 Appendix VIII)	Proposed GPS (ug/L)	Source
HMWU-5	Fourth Quarter 2003	Chromium	QL	5	yes	100	USEPA MCL
		Diethyl Ether	QL	12	no	NA	NA
		2-Nitroaniline	QL	20	no	NA	NA
		4-Nitroaniline	QL	20	yes	20	Background/QL
		Nitrobenzene	QL	10	yes	10	Background/QL
	Third Quarter 2006	Dichlorodifluoromethane	QL	1	yes	125.2	VDEQ ACL
HWMU-7	Third Quarter 2003	Copper	Calculated	49	no	NA	NA
	Second Quarter 2004	Zinc	Calculated	217	no	NA	NA
HWMU-10	First Quarter 2003	Cobalt	QL	5	no	NA	NA
	Second Quarter 2003	Vanadium	QL	10	no	NA	NA
	Second Quarter 2005	Acetone	QL	10	no	NA	NA
		2-Propanol	QL	50	no	NA	NA
HWMU-16	Second Quarter 2003	Chloroethane	Calculated	20.7	yes	20.7	Background/QL
		Diethyl Ether	Calculated	75.5	no	NA	NA
		Dimethyl Ether	Calculated	17.0	no	NA	NA
	Third Quarter 2003	Methylene Chloride	Calculated	13.95	no*	NA	NA
	Second Quarter 2004	1,1,2-Trichloro-1,2,2-trifluoroethane	Calculated	1.2	no*	NA	NA

HWMU-5: The additional Appendix IX constituents detected in the downgradient point of compliance wells were not detected above their respective Quantitation Limits (QLs) in the upgradient well. As a result, background concentrations for those constituents were set as equal to their respective QLs. In accordance with the Permit (Condition V.J.1.g.), GPS are proposed for those additional Appendix IX constituents that are listed in Appendix VIII of 40 CFR Part 261 (chromium, 4-nitroaniline, nitrobenzene, and dichlorodifluoromethane). No GPS are proposed for the additional Appendix IX constituents that are not listed in Appendix VIII of 40 CFR Part 261 (diethyl ether and 2-nitroaniline).

HWMU-7: Background concentrations for the additional Appendix IX constituents detected in the downgradient point of compliance wells (copper and zinc) were previously calculated and submitted to the VDEQ in the August 1998 *Groundwater Quality Assessment Report for HWMU-7* prepared by ERM, Inc. In accordance with the Permit (Condition V.J.2.g.), no GPS are proposed for the additional Appendix IX constituents (copper and zinc), as they are not listed in Appendix VIII of 40 CFR Part 261.

HWMU-10: The additional Appendix IX constituents detected in the downgradient point of compliance wells were not detected above their respective Quantitation Limits (QLs) in the upgradient well. As a result, background concentrations for those constituents were set as equal to their respective QLs. In accordance with the Permit (Condition V.J.3.g.), no GPS are proposed for the additional Appendix IX constituents (cobalt, vanadium, acetone, and 2-propanol), as they are not listed in Appendix VIII of 40 CFR Part 261.

HWMU-16: Background concentrations for additional Appendix IX constituents chloroethane, diethyl ether, dimethyl ether, and methylene chloride were calculated using data collected from upgradient well 16C1 during the period from Third Quarter 2003 through Third Quarter 2004. The background concentration for additional Appendix IX constituent 1,1,2-trichloro-1,2,2-trifluoroethane was calculated using data collected from upgradient well 16C1 during the period from Second Quarter 2004 through Third Quarter 2006.
In accordance with the Permit (Condition V.J.4.g.), GPS are proposed for additional Appendix IX constituents that are listed in Appendix VIII of 40 CFR Part 261 (chloroethane). No GPS are proposed for the additional Appendix IX constituents that are not listed in Appendix VIII of 40 CFR Part 261 (diethyl ether and dimethyl ether).
*Methylene chloride and 1,1,2-trichloro-1,2,2-trifluoroethane should not be added to the Groundwater Monitoring List for HWMU-16, as these constituents were only detected in the upgradient well for the Unit, and not in the downgradient point of compliance wells.

Statistical Computations – RAAP HWMU-16 – 1,1,2-Trichloro-1,2,2-Trifluoroethane

In accordance with the facility permit and VHWMR, statistical background concentration is being established for 1,1,1-Trichloro-1,2,2-Trifluoroethane. Inter-well upper prediction limits (UPL) were calculated on the background data for this target parameter in accordance with the facility permit and VHWMR (40 CFR 264.97(h)). Background data for this target parameter consisted of all data for the background well 16C1 collected from 2nd quarter 2004 through 3rd quarter 2006.

Discussion of Tests for Normality

The power of a statistical tool to account for false positive and false negative results, while accurately detecting true statistical variations for a facility under scrutiny depends on numerous factors, one of which is the distribution of the data. A great number of statistical tools are based on the assumption that data are normally distributed. Hence the distribution of the sample population for parameters evaluated under this statistical analysis is first determined. Sample populations are tested for normal distribution using several normality tests. "Groundwater Information Tracking System with Statistical Analysis Capability" (GRITS/STAT) v5.0 was the software used to run these statistical tests. GRITS/STAT is an analytical software package provided by the USEPA. The distributions of the data sets were verified in the original mode as well as in log-transformed mode. The normality of the data set was evaluated using the Shapiro-Wilk test for normality.

Discussion of Prediction Interval Tests

Normality tests are performed prior to running parametric tests (tests that require that the data be normal). Results of the normality tests show that the background data for 1,1,2-Trichloro-1,2,2-Trifluoroethane is non-normally distributed. Non-parametric UPL (NUPL) was constructed on the background data for this parameter. The confidence levels of NUPLs are typically approximate and estimated to be around 91%.

Summary of UPL

Parameter	Background Data Distribution	Type of UPL	Multiple Comparisons/year	UPL (µg/l)
1,1,2-Trichloro-1,2,2-Trifluoroethane	Non-Normal	NUPL	N/A	1.2

Statistical Computations – RAAP HWMU-16

In accordance with the facility permit and VHWMR, statistical background concentrations are being established for the four new target parameters chloroethane, diethyl ether, dimethyl ether and methylene chloride. These four target parameters were added to the facility monitoring program during the 3rd quarter 2003 monitoring event. Inter-well upper prediction limits (UPL) were calculated on the background data for the target parameters in accordance with the facility permit and VHWMR (40 CFR 264.97(h)). Background data for these target parameters consisted of all data for the background well 16C1 collected from 3rd quarter 2003 through 3rd quarter 2004.

Discussion of Tests for Normality

The power of a statistical tool to account for false positive and false negative results, while accurately detecting true statistical variations for a facility under scrutiny depends on numerous factors, one of which is the distribution of the data. A great number of statistical tools are based on the assumption that data are normally distributed. Hence the distribution of the sample population for parameters evaluated under this statistical analysis is first determined. Sample populations were tested for normal distribution using several normality tests. "Groundwater Information Tracking System with Statistical Analysis Capability" (GRITS/STAT) v5.0 was the software used to run these statistical tests. GRITS/STAT is an analytical software package provided by the USEPA. The distributions of the data sets were verified in the original mode as well as in log-transformed mode. The normality of the data sets was evaluated using the Shapiro-Wilk test for normality.

Discussion of Prediction Interval Tests

Normality tests are performed prior to running parametric tests (tests that require that the data be normal). A 99% confidence parametric inter-well UPL was computed for each of the four target parameters that showed normally distributed background data. Results of the normality tests show that the background data for chloroethane, diethyl ether and methylene chloride are normally distributed, and the background data for dimethyl ether is non-normally distributed. Non-parametric UPL (NUPL) was constructed on the background data for dimethyl ether, and parametric UPLs (PUPL) were constructed on the background data for chloroethane, diethyl ether and methylene chloride. No adjustments to the error rates were made to the NUPLs for multiple comparisons. Adjustment for 10 comparisons per year (considering 10 compliance monitoring wells at the facility and 4 quarters of data for each year, and considering historic detects, 10 is considered a representative number for multiple comparisons per year) was made to the PUPLs. The confidence levels of NUPLs are well less than 95%. Any statistically significant increase (SSI) must be confirmed by verification sampling.

Summary of UPLs

Parameter	Background Data Distribution	Type of UPL	Multiple Comparisons/year	UPL (µg/l)
Chloroethane	Normal	PUPL	10	20.7
Diethyl ether	Normal	NUPL	10	75.5
Dimethyl ether	Non-normal	PUPL	N/A	17.0
Methylene Chloride	Normal	PUPL	10	13.95

RAAP-HWMU-16 - Statistical Analysis - Notes

1) Y2K Correction dates are as shown in table below.

Actual Event	Date Used in Stat Software
2000-Qtr1	12/13/1999
2000-Qtr2	12/14/1999
2000-Qtr3	12/15/1999
2000-Qtr4	12/16/1999
2001-Qtr1	12/17/1999
2003-Qtr3	12/18/1999
2003-Qtr4	12/19/1999
2004-Qtr1	12/20/1999
2004-Qtr2	12/21/1999
2004-Qtr3	12/22/1999

Interwell Tests:
2) Background data for target parameters chloroethane, diethyl ether, dimethyl ether and methylene chloride were evaluated using Shapiro-Wilk test. Background data showed normal distribution for chloroethane, diethyl ether and methylene chloride. Parametric interwell 99% confidence upper prediction limits were computed for parameters with normally distributed background data. Dimethyl ether background data was non-normally distributed. Therefore non-parametric Upper Prediction Limit (UPL) was computed for dimethyl ether.

3) No adjustments for multiple comparisons could be made for non-parametric UPLs. Adjustments were made to the parametric UPLs for 10 future comparisons per year to account for multiple compliance monitoring wells and quarterly event data.
Any Statistically significant increase (SSI) must be confirmed by verification sampling.

E:\Ross Work\Radford AAP Archives\HWMU-16\[HWMU16StatDate correction.xls]Sheet1

Normality Tests

Report Printed: 02-02-2005 13:49

Facility:RAAPHWMU16 Haz. Waste Unit 16 - RAAP

Address:

City:Radford ST:VA Zip:24141
County:PULASKI

Contact:
Phone:( ) -

Permit Type:Detection

Constituent:ClEthane Chloroethane

CAS Number: 75-00-3
MCL: 0.000 ppb
ACL: 0.000 ppb
Detect Limit: 2.000 ppb

Start Date:Mar 31 1996
End Date:Dec 22 1999

Normality Test on Observations for wells listed below:

Well:16C1 Position:Upgradient Observations:5

Scale	Minimum	Maximum	Mean	Std Dev
Original:	1.000	6.400	4.340	2.078
Log:	0.000	1.856	1.303	0.749

Pooled Statistics
Observations: 5

Statistic	Original Scale	Log Scale
Mean:	4.340	1.303
Std Dev:	2.078	0.749
Skewness:	-0.810	-1.296*
Kurtosis:	-0.555	-0.011
Minimum:	1.000	0.000
Maximum:	6.400	1.856
CV:	0.479	0.575

Shapiro-Wilk Statistics

Scale	Test Statistic	5% Critical Value	1% Critical Value
Original:	0.9037	0.7620	0.6860

Log:	0.7615*	0.7620	0.6860

* Indicates statistically significant evidence of non-normality.
GRIT/STAT Version 5.0

Parametric Prediction Interval
Report Printed February 2,2005

Facility:Haz. Waste Unit 16 - RAAP
Parameter:Chloroethane(CAS Number:75-00-3)

ONE-TAILED UPPER PARAMETRIC PREDICTION INTERVAL

Observations (n):	5
Shapiro-Wilk (W):	0.9037
Critical W,α=0.01:	0.6860
Mean:	4.340 ppb
Std Dev:	2.078 ppb
DF:	4
Conf. Level (1-α):	~~0.9500~~ 0.99
Future Samples (k):	10
$t_{\left[1-\frac{\alpha}{k}\right]}$:	7.1732
Kappa:	7.8579
UL:	20.669 ppb
LL:	-∞

Report Produced by GRITS/STAT 5.01

Normality Tests

Report Printed: 02-02-2005 13:49

Facility:RAAPHWMU16 Haz. Waste Unit 16 - RAAP

Address:

City:Radford ST:VA Zip:24141
County:PULASKI

Contact:
Phone:( ) -

Permit Type:Detection

Constituent:DEthEth Diethyl ether

CAS Number: - -
MCL: 0.000 ppb
ACL: 0.000 ppb
Detect Limit: 24.000 ppb

Start Date:Mar 31 1996
End Date:Dec 22 1999

Normality Test on Observations for wells listed below:

Well:16C1 Position:Upgradient Observations:5

Scale	Minimum	Maximum	Mean	Std Dev
Original:	12.000	30.000	21.200	6.907
Log:	2.485	3.401	3.007	0.355

Pooled Statistics
Observations: 5

Statistic	Original Scale	Log Scale
Mean:	21.200	3.007
Std Dev:	6.907	0.355
Skewness:	-0.122	-0.491
Kurtosis:	-1.140	-1.024
Minimum:	12.000	2.485
Maximum:	30.000	3.401
CV:	0.326	0.118

Shapiro-Wilk Statistics

Scale	Test Statistic	5% Critical Value	1% Critical Value
Original:	0.9768	0.7620	0.6860

Log:	0.9507	0.7620	0.6860

* Indicates statistically significant evidence of non-normality.
GRIT/STAT Version 5.0

Parametric Prediction Interval
Report Printed February 2,2005

Facility:Haz. Waste Unit 16 - RAAP
Parameter:Diethyl ether(CAS Number:- -)

ONE-TAILED UPPER PARAMETRIC PREDICTION INTERVAL

Observations (n):	5
Shapiro-Wilk (W):	0.9768
Critical W, α=0.01:	0.6860
Mean:	21.200 ppb
Std Dev:	6.907 ppb
DF:	4
Conf. Level (1-α):	~~0.9500~~ 0.99
Future Samples (k):	10
$t_{\left[1-\frac{\alpha}{k}\right]}$:	7.1732
Kappa:	7.8579
UL:	75.470 ppb
LL:	-∞

Report Produced by GRITS/STAT 5.01

Normality Tests

Report Printed: 02-02-2005 13:53

Facility:RAAPHWMU16 Haz. Waste Unit 16 - RAAP

Address:

City:Radford ST:VA Zip:24141
County:PULASKI

Contact:
Phone:( ) -

Permit Type:Detection

Constituent:DMethEth Dimethyl ether

CAS Number: - -
MCL: 0.000 ppb
ACL: 0.000 ppb
Detect Limit: 24.000 ppb

Start Date:Mar 31 1996
End Date:Dec 22 1999

Normality Test on Observations for wells listed below:

Well:16C1 Position:Upgradient Observations:5

Scale	Minimum	Maximum	Mean	Std Dev
Original:	12.000	17.000	13.000	2.236
Log:	2.485	2.833	2.555	0.156

Pooled Statistics
Observations: 5

Statistic	Original Scale	Log Scale
Mean:	13.000	2.555
Std Dev:	2.236	0.156
Skewness:	1.500*	1.500*
Kurtosis:	0.250	0.250
Minimum:	12.000	2.485
Maximum:	17.000	2.833
CV:	0.172	0.061

Shapiro-Wilk Statistics

Scale	Test Statistic	5% Critical Value	1% Critical Value
Original:	0.5521*	0.7620	0.6860

Log:	0.5521*	0.7620	0.6860

* Indicates statistically significant evidence of non-normality.
GRIT/STAT Version 5.0

Nonparametric Prediction Interval
Report Printed February 2,2005

Facility:Haz. Waste Unit 16 - RAAP
Parameter:Dimethyl ether(CAS Number:- -)

ONE-TAILED UPPER PARAMETRIC PREDICTION INTERVAL

Observations (n):	5
Conf. Level (1-α):	33.330%

UL: 17.000 ppb
LL: 0.000

Normality Tests

Report Printed: 02-02-2005 13:54

Facility:RAAPHWMU16 Haz. Waste Unit 16 - RAAP

Address:

City:Radford ST:VA Zip:24141
County:PULASKI

Contact:
Phone:( ) -

Permit Type:Detection

Constituent:MeCl Dichloromethane (Methylene chloride)

CAS Number: 75-09-2
MCL: 0.000 ppb
ACL: 0.000 ppb
Detect Limit: 2.000 ppb

Start Date:Mar 31 1996
End Date:Dec 22 1999

Normality Test on Observations for wells listed below:

Well:16C1 Position:Upgradient Observations:5

Scale	Minimum	Maximum	Mean	Std Dev
Original:	4.100	6.800	5.800	1.037
Log:	1.411	1.917	1.743	0.197

Pooled Statistics
Observations: 5

Statistic	Original Scale	Log Scale
Mean:	5.800	1.743
Std Dev:	1.037	0.197
Skewness:	-0.925	-1.088*
Kurtosis:	-0.436	-0.263
Minimum:	4.100	1.411
Maximum:	6.800	1.917
CV:	0.179	0.113

Shapiro-Wilk Statistics

Scale	Test Statistic	5% Critical Value	1% Critical Value
Original:	0.8964	0.7620	0.6860

Log:	0.8519	0.7620	0.6860

* Indicates statistically significant evidence of non-normality.
GRIT/STAT Version 5.0

Parametric Prediction Interval
Report Printed February 2,2005

Facility:Haz. Waste Unit 16 - RAAP
Parameter:Dichloromethane (Methylene chloride(CAS Number:75-09-2)

ONE-TAILED UPPER PARAMETRIC PREDICTION INTERVAL

Observations (n):	5
Shapiro-Wilk (W):	0.8964
Critical W, α=0.01:	0.6860
Mean:	5.800 ppb
Std Dev:	1.037 ppb
DF:	4
Conf. Level (1-α):	~~0.9500~~ 0.99
Future Samples (k):	10
$t_{\left[1-\frac{\alpha}{k}\right]}$:	7.1732
Kappa:	7.8579
UL:	13.947 ppb
LL:	-∞

Report Produced by GRITS/STAT 5.01

Target Analyte Monitoring Results - HWMU-16 Point of Compliance Wells
Radford Army Ammunition Plant, Radford, Virginia
Upgradient well = 16C1

All Results in ug/L.

Analtye/Quarter	*16C1*	*16MW8*	*16MW9*	*16WC1A*	*16WC1B*	*QL*	*GPS*	*Method*
Chloroethane					*CAS #*	*75-00-3*		
Third Quarter 2003	6.4	U	4.8	U	U	1	20.7	8260B
Fourth Quarter 2003	5.7	U	2.6	1.1	U	1	20.7	8260B
First Quarter 2004	U J	U J	U J	U J	U J	1	20.7	8260B
Second Quarter 2004	4.4	U	2.4	0.63 J	U	1	20.7	8260B
Third Quarter 2004	4.2	U	2	U	U	1	20.7	8260B
Fourth Quarter 2004	4.9	U	2.5	U	U	1	20.7	8260B
First Quarter 2005	7.6 J	U J	3.7 J	U J	U J	1	20.7	8260B
Second Quarter 2005	U J	U	U J	U	U	1	20.7	8260B
Third Quarter 2005	4.7 J	U J	U	U J	U J	1	20.7	8260B
Fourth Quarter 2005	4.6 J	U	2.6 J	U	U	1	20.7	8260B
First Quarter 2006	5.3	U	U	U	U	1	20.7	8260B
Second Quarter 2006	5 J	U	2 J	U	U	1	20.7	8260B
Third Quarter 2006	5	U	0.7 J	0.7 J	U	1	20.7	8260B
Fourth Quarter 2006	5.8	U	1	U	U	1	20.7	8260B
First Quarter 2007	6.1	U	1	U	U	1	20.7	8260B
Second Quarter 2007	5.2	U	1.4	U	U	1	20.7	8260B
Diethyl ether					*CAS #*	*60-29-7*		
Third Quarter 2003	12 J	U	12 J	U	U	12	-	8260B
Fourth Quarter 2003	30	U	14	U	U	12	-	8260B
First Quarter 2004	24	U	U	U	U	12	-	8260B
Second Quarter 2004	23 J	U J	13 J	U J	U J	12	-	8260B
Third Quarter 2004	17	U	U	U	U	12	-	8260B
Fourth Quarter 2004	24	U J	U	U	U J	12	-	8260B
First Quarter 2005	29	U	14	U	U	12	-	8260B
Second Quarter 2005	20	U J	9.2	U J	U J	12	-	8260B
Third Quarter 2005	30	U	15	U	U	12	-	8260B
Fourth Quarter 2005	25	U	18	U	U	12	-	8260B
First Quarter 2006	19	U	U	U	U	12	-	8260B
Second Quarter 2006	17	U	U	U	U	12.5	-	8260B
Third Quarter 2006	33	1.5 J	4.3 J	4.6 J	U	12.5	-	8260B
Fourth Quarter 2006	20	U	U	U	U	12.5	-	8260B
First Quarter 2007	21	U	U	U	U	12.5	-	8260B
Second Quarter 2007	17 J	1.5 J	5.7 J	2.1 J	U J	12.5	-	8260B
Dimethyl ether					*CAS #*	*115-10-6*		
Third Quarter 2003	6.6 J	U	9.9 J	U	U	12	-	8260B
Fourth Quarter 2003	U	U	U	U	U	12	-	8260B
First Quarter 2004	17 J	U J	13 J	U J	U J	12	-	8260B
Second Quarter 2004	U J	U J	6.6 J	U J	U J	12	-	8260B
Third Quarter 2004	U J	U J	U J	U J	U J	12	-	8260B
Fourth Quarter 2004	16 J	U J	12 J	U	U J	12	-	8260B
First Quarter 2005	26	U	25	U	U	12	-	8260B
Second Quarter 2005	15	U	14	U	U	12	-	8260B
Third Quarter 2005	13	U	U	U	U	12	-	8260B
Fourth Quarter 2005	U	U	U	U	U	12	-	8260B
First Quarter 2006	U	U	U	U	U	12	-	8260B
Second Quarter 2006	U	U	U	U	U	12.5	-	8260B
Third Quarter 2006	11 J	U J	3.2 J	2.8 J	U J	12.5	-	8260B
Fourth Quarter 2006	U	U	U	U	U	12.5	-	8260B
First Quarter 2007	U	U	U	U	U	12.5	-	8260B
Second Quarter 2007	11 J	U	7 J	2.6 J	1.2 J	12.5	-	8260B

See last page of this report for definitions.

Target Analyte Monitoring Results - HWMU-16 Point of Compliance Wells
Radford Army Ammunition Plant, Radford, Virginia

Upgradient well = 16C1 *All Results in ug/L.*

Analtye/Quarter	*16C1*	*16MW8*	*16MW9*	*16WC1A*	*16WC1B*	*QL*	*GPS*	*Method*
Methylene chloride					*CAS #* 75-09-2			
Third Quarter 2003	4.1	U	U	U	U	1	13.95	8260B
Fourth Quarter 2003	6.8	U	U	U	U	1	13.95	8260B
First Quarter 2004	6.4	U	U	U	U	1	13.95	8260B
Second Quarter 2004	5.7	U	U	U	U	1	13.95	8260B
Third Quarter 2004	6	U A	U A	U A	U A	1	13.95	8260B
Fourth Quarter 2004	6.4	U	U	U	U	1	13.95	8260B
First Quarter 2005	6.8 J	U	U	U	U	1	13.95	8260B
Second Quarter 2005	6.3	U	U	U	U	1	13.95	8260B
Third Quarter 2005	6.2	U	U	U	U	1	13.95	8260B
Fourth Quarter 2005	4.7	U	U	U	U	1	13.95	8260B
First Quarter 2006	4.9	U	U	U	U	1	13.95	8260B
Second Quarter 2006	7	U	U	U	U	1	13.95	8260B
Third Quarter 2006	U N	U N	U N	U N	U N	1	13.95	8260B
Fourth Quarter 2006	U A	U	U	U A	U	1	13.95	8260B
First Quarter 2007	6.3	U	U	U	U	1	13.95	8260B
Second Quarter 2007	3.4	U	U	U	U	1	13.95	8260B
1,1,2-Trichloro-1,2,2-Trifluoroethane					*CAS #* 76-13-1			
Third Quarter 2003	U	U	U	U	U	1	-	8260B
Second Quarter 2004	1.2	U J	U J	U J	U J	1	-	8260B
Third Quarter 2004	U	U	U	U	U	1	-	8260B
Fourth Quarter 2004	U	U	U	U	U	1	-	8260B
First Quarter 2005	1	U	U	U	U	1	-	8260B
Second Quarter 2005	U	U	U	U	U	1	-	8260B
Third Quarter 2005	U	U	U	U	U	1	-	8260B
Fourth Quarter 2005	U	U	U	U	U	1	-	8260B
First Quarter 2006	U	U	U	U	U	1	-	8260B
Second Quarter 2006	U	U	U	U	U	1	-	8260B
Third Quarter 2006	U	U	U	U	U	1	-	8260B
Fourth Quarter 2006	U	U	U	U	U	1	-	8260B
First Quarter 2007	U	U	U	U	U	1	-	8260B
Second Quarter 2007	U	U	U	U	U	1	-	8260B

See last page of this report for definitions.

Target Analyte Monitoring Results - HWMU-16 Point of Compliance Wells
Radford Army Ammunition Plant, Radford, Virginia

Upgradient well = 16C1 *All Results in ug/L.*

Analtye/Quarter	*16C1*	*16MW8*	*16MW9*	*16WC1A*	*16WC1B*	*QL*	*GPS*	*Method*

Definitions: **QL** Denotes permit required quantitation limit. **U** Denotes analyte not detected at or above QL. **UA** Denotes analyte not detected at or above adjusted sample QL. **J** Denotes associated result is estimated. When used with "U" (i.e., "**UJ**"), denotes analyte not detected at or above QL and QL is estimated. When used with "UA" (i.e., "**UAJ**"), denotes analyte not detected at or above adjusted QL and adjusted QL is estimated. **UN** Denotes analyte concentration is less than the quantiation limit and five times the blank concentration. Not reliably detected due to blank contamination. This qualifier used only for Appendix IX monitoring event when results are reported to at or above the project detection limit. **R** Denotes result rejected. **Q** Denotes data validation qualifier. **CAS#** Denotes Chemical Abstract Services registration number. **X** Denotes mass spectral confirmation not obtained-result suspect.

GPS Denotes Groundwater Protection Standards listed in Appendix G to Attachment 5 in the Final Hazardous Waste Post-Closure Care Permit for Hazardous Waste Units 5, 7, 10, and 16 (October 4, 2002).
NS denotes not sampled. **NA** denotes not analyzed. "–" denotes not detected (pre-2nd Quarter 2003) or not available / not sampled (beginning 2nd Quarter 2003).

Notes:
-Appendix IX Groundwater Monitoring Events:
Third Quarter 2003, Second Quarter 2004, Second Quarter 2005, Third Quarter 2006, Second Quarter 2007
For Appendix IX monitoring events, all results evaluated to detection limit. See laboratory data deliverable for detection limit.

-9/30/2003: Verification sampling event for 16C1 (heptachlor) and 16C1B (Endrin). Verification results: all results reported not detected to detection limit. Original results 0.067 µg/l and 0.39 µg/l, respectively. Confirmation results reported in this table.
-9/30/2003: Verification sampling event for 16C1 (chloroethane, ethyl ether, methyl ether, methylene chloride) and 16MW9 (chloroethane, ethyl ether, methyl ether). Verification results: all results confirmed original analysis. Original results reported in this table.
-June 21, 2004: Verification event for 8260B 16C1 (1,1-dichloroethene and 1,1,2-trichloro-1,2,2-trifluoroethane). Verification results: all not detected except 1,1,2-trichloro-1,2,2-trifluoroethane added to quarterly analyte list beginning 3Q 2004. Due to laboratory error, Appendix IX results for semivolatiles (Method 8270C) will be presented in 3Q 2004. Verification event results for 16WC1B and 16C1 (8081A) – all verification results were not confirmed.
-07/27-28/2005. Verification event for 16WC1B (Mercury Method 7470A.) Not detected in verification sample. Also, verification event for 16C1, 16WC1B-8081A. and 16C1, 16MW9, 16WC1A-ethanol. All verification results not detected. Verification results used.
-06/19/2007. Verification event for 16WC1B and 16MW9 thallium Not detected in verification sample. Verification results used.

APPENDIX E

LABORATORY ANALYTICAL RESULTS – YEAR 2010
(CD-ROM)

APPENDIX F

FIELD NOTES (CD-ROM)

APPENDIX G

CORRESPONDENCE (CD-ROM)

APPENDIX E

LABORATORY ANALYTICAL RESULTS – YEAR 2010
(CD-ROM)

Summary of Quantitation Limits and Detection Limits

Draper Aden Associates
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Appendix IX Monitoring Event

Monitoring Event: Second Quarter 2010

Analyte	Quantitation Limit/QL (ug/L)	Detection Limit/DL (ug/L)
Method: 6010B		
Laboratory: CompuChem, a Division of Liberty Analytical, Cary, NC		
Tin	15	4.8
Method: 6020		
Laboratory: CompuChem, a Division of Liberty Analytical, Cary, NC		
Antimony	1	0.4
Arsenic	10	2
Barium	10	1
Beryllium	1	0.2
Cadmium	1	0.2
Chromium	5	1
Cobalt	5	1
Copper	5	1
Lead	1	0.2
Nickel	10	2
Selenium	10	3
Silver	2	0.2
Thallium	1	0.2
Vanadium	10	1
Zinc	10	3
Method: 7470A		
Laboratory: CompuChem, a Division of Liberty Analytical, Cary, NC		
Mercury	2	0.2
Method: 8081A		
Laboratory: CompuChem, a Division of Liberty Analytical, Cary, NC		
Aldrin	0.05	0.005
alpha-BHC	0.05	0.0049
beta-BHC	0.05	0.005
delta-BHC	0.05	0.005
gamma-BHC	0.05	0.006
Chlordane	0.86	0.86
4,4'-DDD	0.1	0.005
4,4'-DDE	0.1	0.005
4,4'-DDT	0.1	0.005
Dieldrin	0.1	0.0026
Endosulfan I	0.05	0.005
Endosulfan II	0.1	0.0043
Endosulfan sulfate	0.1	0.005
Endrin	0.1	0.0055
Endrin aldehyde	0.1	0.005
Heptachlor	0.05	0.045
Heptachlor epoxide	0.05	0.0055
Methoxychlor	0.5	0.025
Toxaphene	2.5	1

Summary of Quantitation Limits and Detection Limits

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Appendix IX Monitoring Event

Monitoring Event: Second Quarter 2010

Analyte	Quantitation Limit/QL (ug/L)	Detection Limit/DL (ug/L)
Method: 8151A		
Laboratory: CompuChem, a Division of Liberty Analytical, Cary, NC		
2,4-Dichlorophenoxyacetic acid	5	3
Dinoseb	2.5	0.9
Silvex	2.5	0.6
2,4,5-Trichlorophenoxyacetic acid	2.5	0.7

Summary of Quantitation Limits and Detection Limits

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Appendix IX Monitoring Event

Monitoring Event: Second Quarter 2010

Analyte	Quantitation Limit/QL (ug/L)	Detection Limit/DL (ug/L)
Method: 8260B		
Laboratory: Lancaster Laboratory, Lancaster, PA		
Acetone	10	3
Acetonitrile	100	31.67
Acrolein	25	5
Acrylonitrile	10	1
Allyl chloride	10	0.82
Benzene	1	0.1
Bromobenzene	1	0.1
Bromochloromethane	1	0.18
Bromodichloromethane	1	0.1
Bromoform	1	0.106
n-Butyl alcohol	50	20
tert-Butyl alcohol	200	50
n-Butylbenzene	1	0.1
sec-Butylbenzene	1	0.1
tert-Butylbenzene	1	0.108
Carbon disulfide	10	0.4
Carbon tetrachloride	1	0.16
Chlorobenzene	1	0.1
Chloroethane	1	0.1
Chloroform	1	0.1
2-Chloroethyl vinyl ether	20	0.45
Chloroprene	10	0.46
2-Chlorotoluene	1	0.1
4-Chlorotoluene	1	0.1
Cyclohexane	1	0.18
Dibromochloromethane	1	0.1
1,2-Dibromo-3-chloropropane	1	0.204
1,2-Dibromoethane	1	0.1
1,2-Dichlorobenzene	1	0.1
1,3-Dichlorobenzene	1	0.1
1,4-Dichlorobenzene	1	0.1
trans-1,4-Dichloro-2-butene	10	1
Dichlorodifluoromethane	1	0.148
1,1-Dichloroethane	1	0.135
1,2-Dichloroethane	1	0.147
1,1-Dichloroethene	1	0.223
trans-1,2-Dichloroethene	1	0.162
1,2-Dichloropropane	1	0.107
1,3-Dichloropropane	1	0.1
2,2-Dichloropropane	1	0.283
1,1-Dichloropropene	1	0.132
cis-1,3-Dichloropropene	1	0.1
trans-1,3-Dichloropropene	1	0.1
Diethyl ether	12.5	1.11
Dimethyl ether	12.5	0.1
1,4-Dioxane	200	45.48
Ethyl acetate	10	1
Ethanol	250	52
Ethylbenzene	1	0.1
Ethyl methacrylate	10	0.81
Ethylene oxide	100	20
Hexachlorobutadiene	1	0.1

Summary of Quantitation Limits and Detection Limits

Draper Aden Associates
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Appendix IX Monitoring Event

Monitoring Event: Second Quarter 2010

Analyte	Quantitation Limit/QL (ug/L)	Detection Limit/DL (ug/L)
Method: 8260B		
Laboratory: Lancaster Laboratory, Lancaster, PA		
Hexachloroethane	10	0.11
2-Hexanone	10	1
Isobutyl alcohol	200	10
Isopropylbenzene	1	0.1
Isopropylether	10	0.6
4-Isopropyltoluene	1	0.1
Methacrylonitrile	100	9.75
Bromomethane	1	0.542
Chloromethane	1	0.2
2-Butanone	10	1
Iodomethane	10	0.58
Methyl methacrylate	10	3.58
4-Methyl-2-pentanone	10	1
Methyl tert-butyl ether	10	0.39
Dibromomethane	1	0.1
Methylene chloride	1	0.2
Naphthalene	1	0.126
Pentachloroethane	10	0.8
1-Propanol	100	20
2-Propanol	100	50
Propionitrile	100	10.22
n-Propylbenzene	1	0.1
Styrene	1	0.1
1,1,1,2-Tetrachloroethane	1	0.1
1,1,2,2-Tetrachloroethane	1	0.184
Tetrachloroethene	1	0.1
Tetrahydrofuran	25	2
Toluene	1	0.1
1,2,3-Trichlorobenzene	1	0.1
1,2,4-Trichlorobenzene	1	0.13
1,1,1-Trichloroethane	1	0.13
1,1,2-Trichloroethane	1	0.1
Trichloroethene	1	0.177
Trichlorofluoromethane	1	0.176
1,2,3-Trichloropropane	1	0.3
1,1,2-Trichloro-1,2,2-Trifluoroethane	1	0.2
1,2,4-Trimethylbenzene	1	0.201
1,3,5-Trimethylbenzene	1	0.152
Vinyl acetate	10	3.29
Vinyl chloride	1	0.153
Xylenes (Total)	3	0.208

Summary of Quantitation Limits and Detection Limits

Draper Aden Associates
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Appendix IX Monitoring Event

Monitoring Event: Second Quarter 2010

Analyte	Quantitation Limit/QL (ug/L)	Detection Limit/DL (ug/L)
Method: 8270C		
Laboratory: CompuChem, a Division of Liberty Analytical, Cary, NC		
Acenaphthene	10	0.63
Acenaphthylene	10	0.75
Acetophenone	10	0.83
2-Acetylaminofluorene	10	0.51
4-Aminobiphenyl	10	0.53
Aniline	10	0.75
Anthracene	10	0.54
Aramite	10	0.73
Benzo[a]anthracene	10	1.3
Benzo[b]fluoranthene	10	1.4
Benzo[k]fluoranthene	10	0.76
Benzo[ghi]perylene	10	1.2
Benzo(a)pyrene	10	1.3
1,4-Benzenediamine	50	50
Benzyl alcohol	10	0.58
bis(2-Chloroethoxy)methane	5	1.3
bis(2-Chloroethyl)ether	5	0.92
bis(2-Chloro-1-methylethyl)ether	10	0.64
bis(2-Ethylhexyl)phthalate	5	1.5
4-Bromophenyl phenyl ether	10	0.54
Butyl benzyl phthalate	10	1.5
p-Chloroaniline	10	0.7
Chlorobenzilate	10	0.51
p-Chloro-m-cresol	10	0.53
2-Chloronaphthalene	10	0.87
2-Chlorophenol	10	0.95
4-Chlorophenyl phenyl ether	10	0.59
Chrysene	10	1.3
Diallate	10	0.62
Dibenz(a,h)anthracene	10	1.2
Dibenzofuran	10	0.57
Di-n-butyl phthalate	10	1.4
3,3'-Dichlorobenzidine	10	0.52
2,4-Dichlorophenol	10	0.74
2,6-Dichlorophenol	10	0.82
Diethyl phthalate	10	0.56
O,O-Diethyl O-2-pyrazinyl	10	0.54
Dimethoate	10	0.58
p-(Dimethylamino)azobenzene	10	0.57
7,12-Dimethylbenz[a]anthracene	10	0.57
3,3'-Dimethylbenzidine	10	4
a,a-Dimethylphenethylamine	50	25
2,4-Dimethylphenol	10	1.1
Dimethyl phthalate	10	0.55
m-Dinitrobenzene	10	0.73
4,6-Dinitro-o-cresol	10	0.55
2,4-Dinitrophenol	10	1.1
2,4-Dinitrotoluene	10	0.58
2,6-Dinitrotoluene	10	0.66
Di-n-octyl phthalate	10	1.3
Diphenylamine	10	1
Disulfoton	10	0.46

Summary of Quantitation Limits and Detection Limits

Draper Aden Associates
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Appendix IX Monitoring Event

Monitoring Event: Second Quarter 2010

Analyte	Quantitation Limit/QL (ug/L)	Detection Limit/DL (ug/L)
Method: 8270C		
Laboratory: CompuChem, a Division of Liberty Analytical, Cary, NC		
Ethyl methanesulfonate	10	0.85
Famphur	10	5
Fluoranthene	10	0.6
Fluorene	10	0.69
Hexachlorobenzene	10	0.63
Hexachlorocyclopentadiene	10	0.68
Hexachlorophene	40	20
Hexachloropropene	10	0.74
Indeno[1,2,3-cd]pyrene	5	0.5
Isodrin	10	0.51
Isophorone	10	1.1
Isosafrole	10	1.3
Kepone	10	5
Methapyrilene	10	5
3-Methylcholanthrene	10	0.7
Methyl methane sulfonate	10	0.56
2-Methylnaphthalene	10	0.62
Methyl parathion	10	0.54
2-Methylphenol	10	0.51
3 & 4-Methylphenol	20	0.63
1,4-Naphthoquinone	10	0.13
1-Naphthylamine	10	1.4
2-Naphthylamine	10	0.94
o-Nitroaniline	10	0.69
m-Nitroaniline	10	0.63
p-Nitroaniline	10	1.3
Nitrobenzene	10	0.8
o-Nitrophenol	10	0.99
p-Nitrophenol	10	0.5
4-Nitroquinoline-1-oxide	50	0.42
N-Nitrosodi-n-butylamine	10	0.33
N-Nitrosodiethylamine	10	0.81
N-Nitrosodimethylamine	10	0.63
N-Nitrosodiphenylamine	10	0.62
N-Nitrosodipropylamine	10	1.1
N-Nitrosomethylethylamine	10	1
N-Nitrosomorpholine	10	0.6
N-Nitrosopiperidine	10	0.69
N-Nitrosopyrrolidine	10	0.55
5-Nitroso-o-toluidine	10	0.55
Parathion	10	0.57
Pentachlorobenzene	10	0.67
Pentachloronitrobenzene	10	0.69
Pentachlorophenol	10	0.84
Phenacetin	10	0.46
Phenanthrene	10	0.55
Phenol	10	0.56
Phorate	10	0.74
2-Picoline	10	0.83
Pronamide	10	0.53
Pyrene	10	1.4
Pyridine	10	0.98

Summary of Quantitation Limits and Detection Limits
Appendix IX Monitoring Event
Monitoring Event: Second Quarter 2010

Draper Aden Associates
Engineering ♦ Surveying ♦ Environmental Services

Analyte	Quantitation Limit/QL (ug/L)	Detection Limit/DL (ug/L)
Method: 8270C		
Laboratory: CompuChem, a Division of Liberty Analytical, Cary, NC		
Safrole	10	0.64
Sulfotep	5	0.67
1,2,4,5-Tetrachlorobenzene	10	0.8
2,3,4,6-Tetrachlorophenol	10	0.65
o-Toluidine	10	0.73
2,4,5-Trichlorophenol	10	0.75
2,4,6-Trichlorophenol	10	0.57
O,O,O-Triethyl phosphorothioate	10	0.9
sym-Trinitrobenzene	10	5
Method: 9012A		
Laboratory: CompuChem, a Division of Liberty Analytical, Cary, NC		
Cyanide	20	3.5
Method: 9034		
Laboratory: TestAmerica, North Canton, OH		
Sulfide	3000	2000
Method: 9066		
Laboratory: CompuChem, a Division of Liberty Analytical, Cary, NC		
Total Recoverable Phenolics	50	5

APPENDIX F

FIELD NOTES (CD-ROM)

4/14/10 RAAP 803204-08 DAS/KFC FB#9

FAL-2 (Cont.) (Cond(us) DO%L pH ORP(mv)
(1150) Readings Stable
(1200) 13.68 681 7.65 6.75 77.5 Post Purge Readings
Sample Time (1155)
Samples Collected: (3)8260, (2)8011, (1)TM

FAL-3 ✓
DTW-57.75 Begin Purge (1208)
Post Purge DTW-58.11 Initial Purge-Clear

Time	Temp(°)	Cond(us)	DO mg/L	pH	ORP(mv)	Purge L	Desc
(1210)	14.65	1182	4.60	6.63	65.8	0.3 gal/min	Clear
(1215)	14.86	1204	3.70	6.60	66.4	"	Clear
(1220)	14.90	1181	2.94	6.59	63.6	"	Sl. Cloudy
(1225)	15.28	1161	2.64	6.60	61.7	"	Sl. Cloudy
(1230)	15.44	1154	2.56	6.60	60.8	"	Sl. Cloudy
(1235)	15.42	1151	2.49	6.59	61.0	"	Sl. Cloudy
(1240)	15.32	1153	2.41	6.59	60.7	"	Sl. Cloudy
(1240) Readings Stable							
(1255)	15.46	1157	2.64	6.58	61.5	Post Purge Reading	

Sample Time (1245)
Samples Collected: (3)8260, (2)8011, (1)TM

WELL-7 ✓
DTW-25.64 Begin Purge (1309)
Post Purge DTW-25.71 Initial Purge-Clear

Time	Temp(°)	Cond(us)	DO mg/L	pH	ORP(mv)	Purge L	Desc
(1310)	13.67	598	7.52	6.24	57.4	0.3 gal/min	Clear
(1315)	13.09	573	6.30	5.98	64.3	"	Clear
(1320)	12.73	536	5.92	5.91	69.4	"	Clear
(1325)	12.65	525	5.91	5.92	70.3	"	Clear
(1330)	12.55	DO 283518	5.92	5.93	71.7	"	Clear
(1335)	12.37	511	5.99	6.00	70.4	"	Clear
(1340)	12.30	520	6.03	6.05	69.6	"	Clear

(39)

4/14/10 RAAP 803204-08 DAS/KFC FB# 9

WELL-7 (Cont.)
(1340) Readings Stable
(1350) 12.41 530 6.25 6.13 68.9 Post Purge Readings
Sample Time (1345)
Samples Collected: (3)8260, (2)8011, (1)TM

STATIC WATER LEVEL TABLE - Unit 16

WELL	DTW	Post Purge DTW	Notes
16-1	41.21 ✓	48.10	
16-2	55.75 ✓	55.79	
16-3	55.60 ✓	60.93	
16-5	3.38 ✓	13.32	
16WC2B	50.76 ✓	55.85	
16mw8	70.67 ✓	71.65	
16WC1B	64.34 ✓		
16WC1A	64.21 ✓	66.34	
16mw9	62.14 ✓	63.54	
16C1			
16C3	57.11		SWL ONLY
16DDH3	DRY		"
16WC2A			"

16-3 ✓
DTW-55.60 Begin Purge (1403)
Post Purge DTW-60.93 Initial Purge-Clear

Time	Temp(°)	Cond(us)	DO mg/L	pH	ORP(mv)	Purge L	Desc
(1405)	14.25	247	7.94	7.74	46.4	0.3 gal/min	Clear
(1410)	14.27	248	6.81	7.77	46.1	"	Clear
(1415)	14.28	248	6.67	7.77	46.4	"	Clear
(1420)	14.50	246	6.42	7.78	46.0	"	Clear
(1425)	14.39	247	6.45	7.80	46.6	"	Clear
(1430)	14.54	248	6.54	7.81	47.3	"	Clear

(40)

16-3 (Cont.)

(1430) Readings Stable

(1445)	14.76	247	6.69	7.79	47.6	Post Purge Reading

Sample Time (1435)

Samples Collected: (6) 8260, (2) 8011, (2) 8270, (6) TM

16-1 ✓

DTW - 41.21 Begin Purge (1503)

Post Purge DTW - 48.10 Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mV)	Purge L/min	Desc
(1505)	13.93	452	8.61	7.07	66.9	0.3	Clear
(1510)	14.35	456	7.95	7.00	66.0	"	Clear
(1515)	14.37	462	7.26	7.05	61.1	"	Clear
(1520)	13.86	462	7.10	7.10	57.6	"	Clear
(1525)	13.74	461	7.13	7.09	57.4	"	Clear
(1530)	13.63	465	7.07	7.09	56.2	"	Clear
(1530)	Readings Stable						
(1542)	13.52	452	7.39	7.07	54.7	Post Purge Reading	

Sample Time (1535)

Samples Collected: (3) 8260, (2) 8270, (1) TM

16-2 ✓

DTW - 55.75 Begin Purge (1554)

Post Purge DTW - 55.79 Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mV)	Purge L/min	Desc
(1555)	13.56	648	9.92	7.13	54.0	0.3	Clear
(1600)	13.73	644	6.84	6.97	56.0	"	Clear
(1605)	13.81	633	6.45	6.97	55.8	"	Clear
(1610)	13.93	608	6.34	6.98	54.6	"	Clear
(1615)	14.13	598	6.21	6.98	53.8	"	Clear
(1620)	14.02	595	6.26	6.97	54.0	"	Clear
(1620)	Readings Stable						
(1634)	13.89	582	6.47	7.10	52.4	Post Purge Reading	

16-2 (Cont)

Sample Time (1625)

Samples Collected: (3) 8260, (2) 8270, (1) TM

16-5 ✓

DTW - 3.38 Begin Purge (1648)

Post Purge DTW - 13.32 Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mV)	Purge L/min	Desc
(1650)	12.61	521	4.54	7.34	42.1	0.3	Clear
(1655)	12.19	524	3.05	7.17	48.6	"	Clear
(1700)	12.10	524	3.30	7.18	51.1	"	Clear
(1705)	12.09	524	3.03	7.21	43.4	"	Clear
(1710)	11.97	523	2.91	7.23	42.5	"	Clear
(1715)	11.96	523	2.77	7.23	42.1	"	Clear
(1715)	Readings Stable						
(1729)	12.14	524	3.30	7.21	48.1	Post Purge Reading	

Sample Time (1720)

Samples Collected: (3) 8260, (2) 8270, (1) TM

16 Spring

Temp(C)	Cond(us)	DO mg/L	pH	ORP(mV)
12.32	559	7.94	7.08	45.4

Sample Time (1735)

Samples Collected: (3) 8260, (2) 8270, (1) TM

General Notes

Weather -

PPE- Eye Protection, Nitrile gloves

Calibrations - YSI 650 MDS

- pH: 4.00 = 4.01 , 7.00 = 7.00 , 10.00 = 9.91
- Conductivity reads 1413 us in 1413 us std.
- DO % = 100

Dedicated tubing and well skirts used at each well

All equipment deconed between each well

Purge water disposed of at dedicated location onsite

All Samples collected stored and transported on ice in coolers

16WC2B ✓

DTW - 50.76 Begin Purge (0842)

Post Purge DTW - 55.85 Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(MV)	Purge K	Desc
0845	12.05	368	8.38	7.49	55.7	0.3 L/min	Clear
0850	12.20	344	3.70	6.51	51.4	"	Clear
0855	12.43	337	2.72	6.51	44.3	"	Clear
0900	12.67	332	1.66	6.54	39.1	"	Clear
0905	12.62	332	1.14	6.57	37.9	"	Clear
0910	12.51	331	1.07	6.56	37.5	"	Clear
0915	12.47	331	1.02	6.55	36.8	"	Clear
(0915)	Readings Stable						
(0929)	12.65	324	1.16	6.52	36.4	Post Purge Reading	

Sample Time (0920)

Samples Collected: (3) 8260, (2) 8270, (1) TM

* Replaced water level port Hole plugs for FAL-3 and 16-3

16MW8 ✓

DTW - 70.67 Begin Purge (0954)

Post Purge DTW - 71.65 Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(MV)	Purge K	Desc
(0955)	12.49	129	5.91	5.32	99.8	≤0.3 L/min	Clear
(1000)	12.59	127	5.18	5.28	102.9	"	Clear
(1005)	12.62	128	2.51	5.36	90.3	"	Clear
(1010)	12.67	127	1.88	5.37	88.7	"	Clear
(1015)	12.84	128	1.40	5.37	86.9	"	Clear
(1020)	13.04	129	1.02	5.38	84.6	"	Clear
(1025)	13.19	129	0.95	5.38	81.7	"	Clear
(1030)	13.28	128	0.91	5.38	82.5	"	Clear
(1030)	Readings Stable						
(1059)	14.28	134	1.18	5.35	67.3	Post Purge Reading	

Sample Time (1035)

Samples Collected: (3) 8260, (2) Sulfide, (1) TM, (1) CN, (1) 9065, (2) 8151, (2) 8270, (2) 8081

16MW9 ✓

DTW - 62.14 Begin Purge (1114)

Post Purge DTW - 63.54 Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(MV)	Purge K	Desc
1115	13.35	695	7.80	6.54	22.5	0.3 L/min	Clear
1120	13.05	859	2.76	6.40	26.1	"	Clear
1125	13.11	896	1.60	6.37	23.8	"	Clear
1130	13.35	930	1.32	6.35	29.3	"	Clear
1135	13.48	935	1.23	6.34	32.2	"	Clear
1140	13.37	947	1.23	6.31	35.3	"	Clear
1145	13.27	951	1.25	6.30	34.8	"	Clear
(1145)	Readings Stable						
(1214)	13.98	943	1.50	6.33	24.1	Post Purge Reading	

Sample Time (1150)

Samples Collected: (3) 8260, (2) Sulfide, (1) TM, (1) CN, (1) 9065, (2) 8151, (3) 8270, (2) 8081

4/15/10 RAAP B032004-08 DAS/CJB FB#9

16WC1A ✓

DTW - 64.21 Begin Purge (1227)

Post Purge DTW - 66.34 Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(MV)	Purge L	Desc
(1230)	13.38	555	9.00	6.81	30.7	0.3 L/min	Clear
(1235)	13.52	620	6.71	6.65	34.5	"	Clear
(1240)	13.43	667	4.20	6.60	33.4	"	Clear
(1245)	13.38	696	2.15	6.58	38.6	"	Clear
(1250)	13.30	711	2.01	6.60	36.1	"	Clear
(1255)	13.27	716	1.96	6.62	35.6	"	Clear
(1255)	Readings Stable						
(1406)	14.03	747	1.31	6.80	12.8	Post Purge Reading	

Sample Time (1300)

Samples Collected: (9)8260, (4) Sulfide, (3) TM, (3) CN, (3) 9065
(6)8151, (6)8270, (6)8081

16WDUP

Sample Time (1315)

Samples Collected: (3)8260, (2) Sulfide, (1) TM, (1) TOC, (1) 9065
(2)8151, (2)8270, (2)8081

16WC1B ✓

DTW - 64.34 Begin Purge (1415)

Post Purge DTW - 64.73 Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(MV)	Purge L	Desc
(1416)	14.66	394	8.15	6.34	55.1	0.3 L/min	Clear
(1420)	15.23	350	4.96	5.99	67.3	"	Clear
(1425)	15.95	327	2.64	5.86	68.7	"	Clear
(1430)	16.14	322	1.96	5.83	66.4	"	Clear
(1435)	15.93	310	1.87	5.81	64.3	"	Clear
(1440)	15.86	306	1.79	5.78	62.0	"	Clear
(1445)	15.75	302	1.70	5.77	61.1	"	Clear
(1445)	Readings Stable						
(1508)	15.48	303	1.95	5.88	50.7		

4/15/10 RAAP B032004-08 DAS/CJB FB#7

16WC1B

Sample Time (1450)

Samples Collected: (3)8260, (2) Sulfide, (1) TM, (1) CN
(1)9065, (2)8151, (2)8270, (2)8081

16C1 ✓

DTW - 48.42 Begin Purge (1520)

Post Purge DTW - Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(MV)	Purge L	Desc
(1525)	15.72	667	4.78	6.21	41.4	0.3 L/min	Clear
(1530)	15.57	645	3.43	6.19	39.4	"	Clear
(1535)	14.81	605	2.88	6.16	37.4	"	Clear
(1540)	15.54	556	2.09	6.08	36.6	"	Clear
(1545)	15.47	548	2.10	6.08	34.8	"	Clear
(1550)	15.51	547	2.04	6.08	33.2	"	Clear
(1555)	15.56	546	2.00	6.08	32.9	"	Clear
(1555)	Readings stable						
(1630)	15.48	539	2.04	6.17	35.2	Post Purge Readin	

Sample Time: (1600)

Samples Collected: (3)8260, (2) Sulfide, (1) TM, (1)
(1)9065, (2)8151, (2)8270, (2)8081

4/19/10 RAAP B03204-08 DAS/TOE FB# 9

General Notes

Weather - Sunny, 60's

PPE - Eye Protection, Nitrile gloves, Hard Hats

Calibrations - YSI 650 MDS

pH: 4.00 = 4.00, 7.00 = 6.99, 10.00 = 10.00

Conductivity reads 1413 us in 1413 us std

DO % = 100

Static Water Level Table - Unit 7

WELL	DTW	Post Purge DTW	Notes
7W12B	24.23 ✓	24.28	
7W9C	13.61 ✓	16.76	
7W10B	14.89 ✓	15.58	
7W10C	18.32 ✓	21.42	
7W13	17.79 ✓	20.15	
7MW6	25.30 ✓	29.66	
7W11B	24.52 ✓	24.53	
7WCA	24.46 ✓		
• 7W9B	22.30 ✓	DTW ONLY	
• 7W11	23.46	"	
• 7MW5	24.52	"	
•			

7W12B ✓

DTW - 24.23 Begin Purge (1012)

Post Purge DTW - 24.28 Initial Purge - Clear

Time	Temp(°)	Cond(us)	pH	DO mg/L	ORP(mV)	Purge K	Desc
(1015)	14.31	700	7.25	8.42	141.3	0.3 gal/min	Clear
(1020)	14.50	690	7.26	7.80	134.6	"	Clear
(1025)	14.75	667	7.34	7.36	126.5	"	Clear
(1030)	14.96	662	7.22	7.40	123.3	"	Clear
(1035)	15.18	658	7.15	7.42	121.9	"	Clear
(1040)	15.26	657	7.12	7.45	119.8	"	Clear
(1040)	Readings Stable					"	

(47)

4/19/10 RAAP B03204-08 DAS/TOE FB#

7W12B

(1103) 15.15 651 7.13 7.50 100.3 Post Purge Readin

Sample Time (1045)

Samples Collected: (3) 8260, (2) Sulfide, (1) TM, (1) CN, (1) 9

(2) 8270, (2) 8151, (2) 8081

7W9C ✓

DTW - 13.61 Begin Purge (1133)

Post Purge DTW - 16.76 Initial Purge - Clear

Time	Temp(°)	Cond(us)	DO mg/L	pH	ORP(mV)	Purge K	Desc
(1135)	13.41	1102	4.17	7.00	89.1	0.3 gal/min	Clear
(1140)	13.33	1120	2.15	6.96	91.6	"	Clear
(1145)	13.23	1140	1.74	6.91	92.9	"	Clear
(1150)	13.09	1155	1.50	6.85	95.5	"	Clear
(1155)	13.17	1165	1.46	6.83	96.7	"	Clear
(1200)	13.22	1174	1.40	6.83	97.0	"	Clear
(1205)	13.30	1177	1.38	6.83	97.3	"	Clear
(1205)	Readings Stable						
(1218)	13.09	1189	1.36	6.93	94.0	Post Purge Reading	

Sample Time (1210)

Samples Collected: (1) TM, (1) CN, (2) 8270

7W10B ✓

DTW - 14.89 Begin Purge (1235)

Post Purge DTW - 15.58 Initial Purge - Clear

Time	Temp(°)	Cond(us)	DO mg/L	pH	ORP(mV)	Purge K	Desc
(1240)	12.47	860	2.91	6.98	98.2	0.3 gal/min	Clear
(1245)	12.22	844	1.85	6.88	101.3	"	Clear
(1250)	12.24	841	1.64	6.86	101.8	"	Clear
(1255)	12.27	841	1.39	6.86	102.0	"	Clear
(1300)	12.33	843	1.30	6.86	101.9	"	Clear
(1305)	12.44	844	1.27	6.83	101.5	"	Clear
(1310)	12.58	845	1.28	6.83	101.3	"	Clear

(48)

7/14/10 KAAP B03204-08 DAS/TQE FB# 9

7W10B (Cont.)

(1310) Readings Stable

(1322) 12.98 844 1.39 6.79 100.0 Post Purge Reading

Sample Time (1315)

Samples Collected: (1) TM, (1) CN, (2) 8270

7W10C ✓

DTW - 18.32 Begin Purge (1349)

Post Purge DTW - 21.42 Initial Purge -

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(MV)	Purge K	Desc
(1350)	13.50	785	1.89	7.20	91.6	0.3 gal/min	Clear
(1355)	13.23	785	0.94	7.18	92.7	"	Clear
(1400)	13.16	783	0.82	7.18	92.0	"	Clear
(1405)	13.05	783	0.74	7.18	91.5	"	Clear
(1410)	13.04	781	0.65	7.18	90.8	"	Clear
(1415)	13.15	782	0.59	7.17	93.9	"	Clear
(1420)	13.08	781	0.57	7.18	90.7	"	Clear
(1425)	13.01	782	0.59	7.18	90.1	"	Clear
(1425)	Readings Stable						
(1440)	13.15	784	0.61	7.21	90.4	Post Purge Reading	

Sample Time (1430)

Samples Collected: (1) TM, (1) CN, (2) 8270

4/20/10 KAAP B03204-08 DAS/TQE FB#

General Notes

Weather - Sunny, 60's

PPE - Eye Protection, Nitrile gloves, Hard Hats

Calibrations - YSI 650 MDS

- pH: 4.00 = 4.00, 7.00 = 6.99, 10.00 = 9.99 (Myron L)
- Conductivity reads 1413 us in 1413 us std
- DO % = 100

- Dedicated tubing and well skirts used at each well
- All equipment deconed between each well
- Purge water disposed of at dedicated location onsite
- All samples collected stored and transported in coolers on ice

7W13 ✓

DTW - 17.79 Begin Purge (0939)

Post Purge DTW - 20.15 Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(MV)	Purge K	Desc
(0940)	12.49	1424	4.88	7.47	69.3	0.3 gal/min	Clear
(0945)	12.97	1434	4.54	7.42	-5.0	"	Clear
(0950)	13.26	1439	2.90	7.39	-23.1	"	Clear
(0955)	13.19	1430	2.53	7.36	-27.6	"	Clear
(1000)	13.10	1428	2.39	7.36	-20.3	"	Clear
(1005)	13.20	1425	2.31	7.33	-18.5	"	Clear
(1010)	13.23	1424	2.30	7.32	-16.3	"	Clear
(1010)	Readings Stable						
(1028)	13.38	1430	2.45	7.33	-3.4	Post Purge Reading	

Sample Time (1015)

Samples Collected: (1) TM, (1) CN, (2) 8270

pH probe malfunction on YSI 650 MDS.
Continued pH and ORP readings with Myron L Ultra

TMW6 ✓

DTW - 25.30
Post Purge DTW - 29.66

Begin Purge (1128)
Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(MV)	Purge K	Desc
(1130)	13.86	1761	2.98	7.50	-62	0.3 L/min	Clear
(1135)	13.93	1834	1.87	7.36	-115	"	Clear
(1140)	14.12	1850	1.41	7.27	-119	"	Clear
(1145)	14.11	1855	1.07	7.20	-120	"	Clear
(1150)	14.17	1844	0.95	7.19	-120	"	Clear
(1155)	14.23	1839	1.10	7.25	-118	"	Clear
(1155)	Readings Stable						
(1218)	14.10	1786	1.12	7.36	-97	Post Purge Reading	

Sample Time (1200)
Samples Collected: (3)8260, (2)Sulfide, (1)TIC, (1)ON, (1)9065
(2)8270, (2)8151, (2)8081

TW11R ✓

DTW - 24.52
Post Purge DTW - 24.53

Begin Purge (1242)
Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(MV)	Purge K	Desc
(1245)	13.87	801	3.82	6.58	56	0.3 L/min	Clear
(1250)	13.66	590	1.53	6.41	77	"	Clear
(1255)	13.69	535	1.07	6.37	84	"	Clear
(1300)	13.51	534	0.98	6.38	50	"	Clear
(1305)	13.55	534	0.95	6.35	52	"	Clear
(1310)	13.76	539	1.02	6.35	51	"	Clear
(1315)	13.75	550	1.05	6.37	47	"	Clear
(1315)	Readings Stable						
(1404)	14.14	5160	1.37	6.48	26	Post Purge Reading	

Sample Time (1320)
Samples Collected: (9)8260, (

TWGA ✓

DTW - 24.46
Post Purge DTW - 25.09

Begin Purge (1420)
Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(MV)	Purge K	Desc
(1425)	13.98	1145	2.41	6.85	44	0.3 L/min	Clear
(1430)	13.91	1282	1.34	6.84	50	"	Clear
(1435)	14.06	1315	1.10	6.82	66	"	Clear
(1440)	13.81	1325	0.99	6.83	76	"	Clear
(1445)	13.95	1307	1.03	6.82	84	"	Clear
(1450)	13.96	1295	1.03	6.80	89	"	Clear
(1455)	14.17	1286	1.06	6.80	91	"	Clear
(1455)	Readings Stable						
(1530)	14.32	1266	1.20	6.87	91	Post Purge Reading	

Sample Time (1500)
Samples Collected: (3)8260, (2)Sulfide, (1)TIC, (1)CH
(1)9065, (2)8270, (2)8151, (2)808

TW DUP

Sample Time (1515)
Samples Collected: (3)8260, (2)Sulfide, (1)TIC, (1)CH
(1)9065, (2)8270, (2)8151, (2)8081

General Notes

Weather - Sunny, 60's, turning Partly Sunny
PPE - Eye Protection, Nitrile gloves, Hard Hats, Cotton Suits
Calibrations - YSI 650 MDS / Myron L Ultrameter
- pH: 4.00 = 4.00, 7.00 = 7.00, 10.00 = 10.01
- Conductivity reads 1413 us in 1413 us std.
- DO% = 100

- Dedicated tubing and well skirts used at each well
- All equipment deconed between each well.
- Purge water disposed of at dedicated location onsite.
- All samples collected stored and transported in coolers on ice

Static Water Level Table - UNIT 5

WELL	DTW	Post Purge DTW	Notes
5W8B	14.76 ✓	15.33	
5W7B	9.12 ✓	9.16	
5W5B	9.39 ✓	10.19	
5WC21	9.44 ✓	9.49	
5WC22	9.45 ✓	9.52	
5WC23	8.86 ✓	8.89	
5W12A	11.20	11.22	
55W7	11.50 ✓	DTW ONLY	
55W5	8.24 ✓	"	
5W9A	1.87 ✓	"	
5W10A	13.32 ✓	"	
5W11A	10.37 ✓	"	
5WCA	13.25	"	
55W6	7.08	"	
55W8	12.14	"	
5WC11	16.01	"	
5WC12	15.68	"	

5W8B ✓

DTW - 14.76 — Begin Purge (1016)
Post Purge DTW - 15.33 — Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mV)	Purge K	Desc
(1020)	13.48	68	8.02	5.18	181	~0.3 L/min	Clear
(1025)	13.57	65	7.41	4.94	179	"	Clear
(1030)	13.52	65	7.46	4.82	171	"	Clear
(1035)	13.44	65	7.42	4.80	168	"	Clear
(1040)	13.23	65	7.44	4.80	167	"	Clear
(1045)	13.17	64	7.38	4.80	166	"	Clear
(1050)	12.94	64	7.44	4.81	164	"	Clear
(1050)	Readings Stable						
(1111)	13.06	63	7.48	4.77	163	Post Purge Reading	

Sample Time (1055)
Samples Collected: (3) 8260, (3) RSK175, (1) Sulfide, (1) 9056, (2) TOC

5W5B ✓

DTW - 9.39 — Begin Purge (1141)
Post Purge DTW - 10.19 — Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mV)	Purge K	Desc
(1145)	11.94	635	5.55	5.48	225	0.3 L/min	Clear
(1150)	11.46	671	3.49	5.53	212	"	Clear
(1155)	11.53	682	3.20	5.56	212	"	Clear
(1200)	11.49	684	3.18	5.57	213	"	Clear
(1205)	11.25	687	3.21	5.58	210	"	Clear
(1210)	11.12	686	3.19	5.58	208	"	Clear
(1215)	11.01	688	3.18	5.59	206	"	Clear
(1215)	Readings Stable						
(1238)	10.94	686	3.43	5.63	206	Post Purge Reading	

Sample Time (1220)
Samples Collected: (3) 8260, (3) RSK175, (1) Sulfide, (1) 90
(1) TM, (2) 8270, (2) TOC

4/21/10 RAAP B03204-08 DAS/TQE FB#9

5W7B

DTW - 9.12 Begin Purge (1258)

Post Purge DTW - 9.16 Initial Purge - Clear

Time	Temp(°C)	Cond(us)	DO mg/L	pH	ORP(mV)	Purge K	Desc
(1300)	10.30	145	8.84	5.26	235	0.3 L/min	Clear
(1305)	10.35	140	8.15	5.09	242	"	Clear
(1310)	10.36	137	8.10	5.06	238	"	Clear
(1315)	10.50	135	8.00	5.06	237	"	Clear
(1320)	11.18	135	7.89	5.07	236	"	Clear
(1325)	11.33	134	7.82	5.10	239	"	Clear
(1330)	11.21	134	7.85	5.07	241	"	Clear
(1330)	Readings Stable						
(1403)	10.87	137	8.19	5.20	237	Post Purge Reading	

Sample Time (1335)

Samples Collected: (9) 8260, (9) RSK175, (3) Sulfide (3) 9056, (6) TOC, (3) TIM, (6) 8270

5W12A

DTW - 11.20 Begin Purge (1433)

Post Purge DTW - 11.22 Initial Purge - Clear

Time	Temp(°C)	Cond(us)	DO mg/L	pH	ORP(mV)	Purge K	Desc
(1435)	13.09	400	9.29	6.60	180	0.3 L/min	Clear
(1440)	12.58	304	8.60	6.90	163	"	Clear
(1445)	12.54	176	8.47	7.01	160	"	Clear
(1450)	12.47	158	8.46	6.90	161	"	Clear
(1455)	12.52	145	8.44	6.83	162	"	Clear
(1500)	12.41	140	8.45	6.86	160	"	Clear
(1505)	12.43	137	8.45	6.82	162	"	Clear
(1505)	Readings Stable						
(1522)	12.69	137	8.43	6.81	161	Post Purge Reading	

Sample Time (1510)

Samples Collected: (3) 8260, (3) RSK175, (1) Sulfide, (1) 9056 (2) TOC

4/22/10 KAHN B03204-08 DAS/TQE FB#4

General Notes

Weather - Sunny, 60's

PPE - Eye Protection, Nitrile gloves, Hard Hats, Cotton Suits

Calibrations - YSI 650 MDS, Myron L Ultrameter

- pH: 4.00 = 4.00, 7.00 = 7.00, 10.00 = 10.00
- Conductivity reads 1413 us in 1413 us std
- DO% = 100

- Dedicated tubing and well skirts used at each well
- All equipment decored between each well
- Purge water disposed of at dedicated location onsite
- All samples collected stored and transported in coolers on ice.

5WC21

DTW - 9.44 Begin Purge (0936)

Post Purge DTW - 9.49 Initial Purge - Clear

Time	Temp(°C)	Cond(us)	DO mg/L	pH	ORP(mV)	Purge K	Desc
(0940)	12.53	597	3.40	3.86	262	0.3 L/min	Clear
(0945)	12.95	615	1.92	3.62	325	"	Clear
(0950)	13.23	613	1.80	3.67	325	"	Clear
(0955)	13.37	619	1.55	3.63	323	"	Clear
(1000)	13.39	620	1.46	3.68	320	"	Clear
(1005)	13.35	621	1.42	3.65	325	"	Clear
(1010)	13.47	622	1.38	3.66	325	"	Clear
(1010)	Readings Stable						
(1053)	13.73	640	1.25	3.64	337	Post Purge Reading	

Sample Time (1015)

Samples Collected: (3) 8260, (3) RSK175, (1) Sulfide, (1) 9056 (1) TIM, (2) 8270, (2) TOC

5W DUP

Sample Time (1030)

Samples Collected: (3) 8260, (3) RSK175, (1) Sulfide, (1) 9056 (1) TIM, (2) 8270, (2) TOC

4/22/10 RAAP B03204-08 DAS/TOE FB#9

SWC22 ✓

DTW - 9.45 Begin Purge (1107)

Post Purge DTW - 9.52 Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mV)	Purge K	Desc
(1110)	13.66	873	2.19	6.56	235	0.3 L/min	Clear
(1115)	13.79	926	0.99	6.77	201	"	Clear
(1120)	13.81	960	0.76	6.80	187	"	Clear
(1125)	13.92	967	0.75	6.80	183	"	Clear
(1130)	14.00	968	0.73	6.82	176	"	Clear
(1135)	14.13	971	0.76	6.83	173	"	Clear
(1140)	14.20	971	0.76	6.83	169	"	Clear
(1140)	Readings Stable						
(1204)	14.59	983	0.80	6.90	162	Post Purge Reading	

Sample Time (1145)

Samples Collected: (3)8260, (2)RSK175, (1)Sulfide, (1)9056 (1)TIM, (2)8270, (2)TOC

SWC23 ✓

DTW - 8.86 Begin Purge (1220)

Post Purge DTW - 8.89 Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mV)	Purge K	Desc
(1225)	13.06	921	5.67	7.22	156	0.3 L/min	Clear
(1230)	12.79	988	1.25	6.90	167	"	Clear
(1235)	12.85	996	1.12	6.88	167	"	Clear
(1240)	13.15	997	1.05	6.86	164	"	Clear
(1245)	13.32	1001	1.08	6.84	164	"	Clear
(1250)	13.46	1001	1.06	6.86	160	"	Clear
(1255)	13.51	1002	1.06	6.85	158	"	Clear
(1255)	Readings Stable						
(1318)	13.74	1007	1.10	6.88	155	Post Purge Reading	

Sample Time (1300)

Samples Collected: (3)8260, (3)RSK175, (1)Sulfide, (1)9056 (1)TIM, (2)8270, (2)TOC

4/27/10 RAAP B03204-08 DAS/TOE FB#C

General Notes

Weather - Partly Sunny, Scattered Showers, 50-60's

PPE - Eye Protection, Nitrile gloves, Cotton Suits,

Calibrations - YSI 650 MDS / Myron L Ultrameter

- pH - 4.00 = 4.00, 7.00 = 7.00, 10.00 = 10.00
- Conductivity reads 1413 us in 1413 us std.
- DO% = 100

- Dedicated tubing and well skirts used at each well
- All equipment deconed between each well
- Purge water disposed of at dedicated location onsite
- All samples collected, stored and transported on ice in cool

Static Water Level Table

WELL	DTW	Post Purge DTW	Notes
13MW1	20.19 ✓	20.35	
13MW2	20.08 ✓	20.85	
13MW3	12.92 ✓	12.97	
13MW4	16.37 ✓	16.43	
13MW5	15.92 ✓	16.46	
13MW6	15.51 ✓	16.05	
13MW7	15.54 ✓	15.66	

13MW3 ✓

DTW - 12.92 Begin Purge (0711)

Post Purge DTW - 12.97 Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mV)	Purge K	Desc
(0715)	11.72	615	7.28	7.30	134	0.3 L/min	Clear
(0720)	11.76	639	6.70	7.10	135	"	Clear
(0725)	11.76	647	6.60	6.98	134	"	Clear
(0730)	11.79	654	6.51	6.96	137	"	Clear
(0735)	11.77	656	6.46	6.98	135	"	Clear
(0740)	11.74	657	6.46	6.96	134	"	Clear
(0740)	Readings Stable						

4/27/10 KHH B03204-08 DAS/TQE FB# 4

13MW3 (Cont.)	(Cond (us)	DO mg/L	pH	ORP	
(0810) 11.88	656	6.56	6.98	142	Post Purge Reading

Sample Time (0745)

Samples Collected: (3) 8260, (2) Sulfide, (2) 8280, (2) 8332/8330
(2) 8081/8082, (2) 8151, (1) 314.0, (1) TM, (1) CN, (2) 8270

13MW4 ✓

DTW - 16.37 Begin Purge (0823)

Post Purge DTW - 16.43 Initial Purge - Clear

Time	Temp (C)	Cond (us)	DO mg/L	pH	ORP (mv)	Purge K	Desc
(0825)	12.15	453	6.70	6.98	145	0.3 l/min	Clear
(0830)	12.16	482	6.56	6.82	145	"	Clear
(0835)	12.15	492	6.59	6.82	149	"	Clear
(0840)	12.17	496	6.60	6.81	152	"	Clear
(0845)	12.20	497	6.60	6.78	151	"	Clear
(0850)	12.19	497	6.61	6.78	149	"	Clear
(0850) Readings Stable							
(0929)	12.16	475	6.83	6.78	157	Post Purge Reading	

Sample Time (0855)

Samples Collected: (3) 8260, (2) Sulfide, (2) 8280, (1) TM, (1) 314.0
(1) CN, (2) 8270, (2) 8151, (2) 8081/8082, (2) 8330/8332

13MW Dup

Sample Time (0910)

Samples Collected: (3) 8260, (2) Sulfide, (2) 8280, (1) TM, (1) 314.0
(1) CN, (2) 8270, (2) 8151, (2) 8081/8082, (2) 8330/8332

4/27/10 KHH B03204-08 DAS/TQE FB#

10MW2 ✓

DTW - 15.81 Begin Purge (1014)

Post Purge DTW - 16.03 Initial Purge - Clear

Time	Temp (C)	Cond (us)	DO mg/L	pH	ORP (mv)	Purge K	Desc
(1015)	13.02	426	9.92	7.25	157	0.3 l/min	Clear
(1020)	12.88	427	9.51	7.29	153	"	Clear
(1025)	12.91	426	9.50	7.28	157	"	Clear
(1030)	12.87	427	9.49	7.32	145	"	Clear
(1035)	12.68	428	9.52	7.43	142	"	Clear
(1040)	12.56	427	9.52	7.40	143	"	Clear
(1045)	12.74	427	9.51	7.35	148	"	Clear
(1045) Readings Stable							
(1208)	13.10	428	9.63	7.40	147	Post Purge Reading	

Sample Time (1050)

Samples Collected: (18) 8260, (3) TM, (3) CN, (3) 9065, (6) 8151
(6) 8270, (6) 8081, (4) 8081, (4) Sulfide

Static Water Level Table - Unit 10

Well	DTW	Post Purge DTW	Notes
10DDH2R	17.74 ✓	17.76	
10D3			
10D3D	16.38 ✓	16.45	
10MW1	15.81 ✓	16.03	
10D4			

4/27/10 RAAP B03204-08 DAS/TOE FB#9

10DDH2R ✓

DTW- 17.74 Begin Purge (1228)

Post Purge DTW-17.76 Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mv)	Purge L	Desc
(1230)	11.56	599	3.11	7.13	159	0.3 L/min	Clear
(1235)	11.19	654	1.00	7.24	142	"	Clear
(1240)	10.98	644	0.95	7.20	122	"	Clear
(1245)	10.89	626	0.98	7.16	116	"	Clear
(1250)	10.85	593	1.15	7.09	116	"	Clear
(1255)	10.86	569	1.49	6.96	118	"	Clear
(1300)	10.97	555	1.62	6.94	120	"	Clear
(1305)	10.98	546	1.68	6.96	120	"	Clear
(1310)	11.02	539	1.74	6.97	122	"	Clear
(1310)	Readings Stable						
(1334)	10.92	515	1.96	6.85	127		

Sample Time (1315)

Samples Collected: (4)8260, (2)Sulfide, (1)TM, (1)CN, (1)9065
(2)8151, (2)8270, (2)8081, (2)8081

(61)

4/28/10 RAAP B03204-08 DAS/TOE FB#10

General Notes

Weather - Heavy fog/light rain

PPE - Eye Protection, Nitrile gloves, Cotton Suits, Rubber boots, Face Shield

Calibrations - YSI 650 MDS / Myron L Ultrameter

- pH: 4.00 = 4.00, 7.00 = 7.01, 10.00 = 10.00
- Conductivity reads 1413 us in 1413 us std
- DO% = 100

- Dedicated tubing and well skirts used at each well
- All equipment deconed between each well
- Purge water disposed of at dedicated location onsite
- All samples collected stored and transported on ice in cooler

13MW06 ✓

DTW - 15.51 Begin Purge (0704)

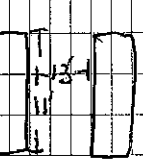
Post Purge DTW-16.05 Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mv)	Purge L	Desc
(0705)	11.56	791	4.34	7.12	137	0.3 L/min	Clear
(0710)	11.95	825	3.54	7.00	139	"	Clear
(0715)	12.10	831	3.44	7.05	140	"	Clear
(0720)	12.16	831	3.44	7.04	143	"	Clear
(0725)	12.19	830	3.39	7.02	144	"	Clear
(0730)	12.17	828	3.37	7.00	144	"	Clear
(0730)	Readings Stable						
(0800)		820	3.53	7.05	146	Post Purge Reading	

Sample Time (0735)

Samples Collected: (3)8260, (2)Sulfide, (2)8480, (1)TM, (1)CN
(2)8270, (1)314.0, (2)8081/8082, (2)8151, (2)8332/8321

PAD-1



Sample Time (0750)

Samples Collected:
(4) 8290

DUP-1

Sample Time (0800)

Samples Collected:
(4) 8290

(62)

4/28/10 RAAP FB# 9
B03204-08
DAS/TQE

10D3D ✓

DTW - 16.38 Begin Purge (1351)

Post Purge DTW - 16.45 Initial Purge - Clear w/rotten "egg" odor

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mv)	Purge k	Desc
(1355)	14.15	646	2.78	7.71	~~-187~~ -187 DC	0.3 L/min	Clear w/rotten odor
(1400)	14.22	647	2.07	7.46	-190	"	"
(1405)	14.47	643	2.89	7.45	-180	"	"
(1410)	14.61	642	3.08	7.43	-174	"	"
(1415)	14.39	642	3.14	7.42	-160	"	"
(1420)	14.20	642	3.15	7.41	-157	"	"
(1425)	14.07	638	3.21	7.41	-155	"	"
(1425)	Readings Stable						
(1448)	14.35	638	3.51	7.45	-149		

Sample Time (1430) Post Purge Reading

Samples Collected: (6)8260, (2)Sulfide, (2)8081, (1)TM, (1)CN
(2)8151, (2)8270, (2)8081, (1)9065

10D3 ✓

DTW - 16.07 Begin Purge (1503)

Post Purge DTW - 16.14 Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mv)	Purge k	Desc
(1505)	13.95	536	4.64	7.42	-85	0.3 L/min	Clear
(1510)	15.20	537	4.02	7.35	1	"	Clear
(1515)	14.76	539	3.40	7.42	30	"	Clear
(1520)	14.57	539	3.22	7.41	54	"	Clear
(1525)	14.68	538	3.22	7.36	63	"	Clear
(1530)	14.66	540	3.20	7.36	66	"	Clear
(1535)	14.80	539	3.25	7.37	70	"	Clear
(1535)	Readings Stable						
(1612)	14.73	550	3.47	7.45	82	Post Purge Reading	

Sample Time (1540)

Samples Collected: (6)8260, (2)Sulfide, (2)8081, (1)TM, (1)CN
(2)8151, (2)8270, (2)8081, (1)9065

4/28/10 RAAP FB#
B03204-08
DAS/TQE

10D4P

Sample Time (1555)

Samples Collected: (6)8260, (2)Sulfide, (2)8081, (1)TM, (1)CN
(2)8151, (2)8270, (2)8081, (1)9065

10D4 ✓

DTW - 22.78 Begin Purge (1626)

Post Purge DTW - Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mv)	Purge k	Desc
(1630)	14.22	337	6.37	7.10	80	0.3 L/min	Clear
(1635)	14.36	332	4.80	7.02	90	"	Sl. Cloud
(1640)	14.51	328	3.69	6.93	101	"	Sl. Cloud
(1645)	14.30	326	3.63	6.91	104	"	Sl. Cloud
(1650)	13.90	325	3.63	6.91	107	"	Sl. Cloud
(1655)	13.96	324	3.66	6.93	108	"	Sl. Cloud
(1655)	Readings Stable						
(1716)	14.23	328	3.78	7.00	112	Post Purge Reading	

Sample Time (1700)

Samples Collected: (6)8260, (2)Sulfide, (2)8081, (1)TM
(1)CN, (1)9065, (2)8151, (2)8270
(2)8081

COMPLETED
5/20/10 FBL

6/28/10 KAAV FB# 9

803204-08
DAS/KFC

General Notes

Weather - Partly Cloudy, 80's
PPE - Eye Protection, Nitrile gloves, Hard Hats
Calibrations - YSI 650 MDS
- pH: 4.00 = 4.00 7.00 = 7.00 10.00 =
- Conductivity reads 1412 us in 1413us std
- DO % = 100%
- Dedicated tubing and wellskirts used at each well.
- All equipment decon'ed between each well.
- Purge water disposed of at dedicated location onsite.
- All samples collected, stored and transported in coolers on ice.

TW13

DTW - 19.30
Post Purge DTW - 25.76

Begin Purge (1045)
Initial Purge - Clear

Time	Temp(C°)	Cond(ms)	DO mg/L	pH	ORP(mv)	Purge(K)	Desc.
(1050)	13.70	1359	1.63	7.01	225.0	0.3 L/min	clear
(1055)	13.91	1357	1.53	6.99	178.3	"	Slt. Cloudy
(1100)	13.65	1366	1.36	7.00	136.2	"	CLEAR
(1105)	13.74	1360	1.17	6.96	122.0	"	CLEAR
(1110)	13.76	1358	1.24	6.94	116.2	"	CLEAR
(1115)	13.80	1356	1.30	6.93	116.2	"	Clear
(1120)	13.78	1353	1.34	6.94	116.3	"	Clear
(1120)	Readings Stable						
	Sample Time (1125)						
	Samples Collected: (2) TW						
(1135)	13.87	1350	1.64	6.95	117.8	Post Purge Readings	

(69)

6/28/10 KAAV FB# 9

803204-09
Verification
DAS/KFC

NewMW9

DTW - 65.65
Post Purge DTW - 66.30

Begin Purge (1156)
Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mv)	Purge K(gpm)	Desc
(1200)	17.58	809	9.24	6.55	201.0	0.3 L/min	Clear
(1205)	17.08	896	5.00	6.37	178.2	"	Clear
(1210)	16.71	913	2.40	6.38	148.0	"	Clear
(1215)	16.83	907	1.68	6.40	137.0	"	Clear
(1220)	17.13	902	1.49	6.39	132.8	"	Clear
(1225)	16.30	892	1.25	6.40	128.9	"	Clear
(1230)	15.96	863	1.20	6.40	126.2	"	Clear
(1235)	15.85	866	1.18	6.39	129.6	"	Clear
(1235)	Readings Stable						
	Sample Time (1240)						
	Samples Collected: (6) 8260						
(1245)	16.18	860	1.26	6.40	131.9	Post Purge Readings	

16WC18

DTW - 68.66
Post Purge DTW - 68.86

Begin Purge (1254)
Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mv)	Purge K(gpm)	Desc
(1255)	17.24	353	5.39	6.03	182.0	0.3 L/min	Clear
(1300)	16.16	291	1.75	5.79	194.9	"	Clear
(1305)	15.74	280	1.30	5.75	197.4	"	Clear
(1310)	15.90	273	1.08	5.75	198.7	"	Clear
(1315)	16.34	273	0.93	5.76	199.9	"	Clear
(1320)	15.98	274	0.86	5.79	202.1	"	Clear
(1325)	16.07	273	0.81	5.80	201.6	"	Clear
(1325)	Readings Stable						
	Sample Time (1330)						
	Samples Collected: (2) 8081						
(1345)	16.90	278	1.25	5.30	232.1	Post Purge Readings	

(70)

6/28/10 RAAP FB#9
B03204-08
DAS/KFC

16 DUP

Sample Time (1340)
Samples Collected: (2) 8081

10MW01 ✓

DTW — 18.13 Begin Purge (1406)
Post Purge DTW - 18.38 Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mV)	Purge K	Desc
(1410)	18.20	391	9.44	7.20	197.6	0.3 L/min	Clear
(1415)	18.34	393	8.90	7.14	241.5	"	Clear
(1420)	18.16	392	8.70	7.07	260.4	"	Clear
(1425)	18.28	392	8.73	7.02	270.5	"	Clear
(1430)	18.00	394	8.76	7.01	276.7	"	Clear
(1435)	17.96	391	8.45	6.94	281.9	"	Clear
(1440)	17.95	392	8.45	6.91	283.7	"	Clear
(1445)	17.90	391	8.41	6.87	285.3	"	Clear
(1445)	Readings Stable						
(1503)	17.78	394	8.70	6.76	286.6	Post Purge Readings	

Sample Time (1450)
Samples Collected: (1) 9066

10-DUP1

Sample Time (1500)
Samples Collected: (1) 9066

6/28/10 RAAP FB#
B03204-08
DAS/KFC

10DDH2R ✓

DTW - 17.76 Begin Purge (1515)
Post Purge DTW - 19.85 Initial / Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mV)	Purge K	Desc
(1515)	17.43	492	6.99	6.81	160.6	0.8 L/min	Clear
(1520)	18.24	575	5.20	6.89	180.7	"	Clear
(1525)	18.10	615	4.95	6.89	185.3	"	Clear
(1530)	17.87	619	4.46	6.88	186.1	"	Clear
(1535)	16.78	592	4.14	6.73	184.0	"	Clear
(1540)	16.48	550	3.89	6.62	185.2	"	Clear
(1545)	16.27	525	3.90	6.57	188.9	"	Clear
(1550)	16.34	520	4.01	6.57	190.8	"	Clear
(1550)	Readings Stable						
(1612)	16.48	517	3.43	6.47	197.9	Post Purge Readings	

Sample Time (1555)
Samples Collected: (1) 9066

10 DUP-2

Sample Time (1605)
Samples Collected: (1) 9066

General Notes
- weather: Sunny 80s - 90s
- PPE: Eye Protection, Nitrile Gloves
- Calibrations: YSI 650 MDS
  pH: 4.00 = 4.00, 7.00 = 7.00, 10.00 = 9.96
  Conductivity reads 1412 us in 1413 us std
  DO% = 100
- Dedicated Tubing and well skirts used at each well
- All equipment deconed between each well
- Purge water disposed of at dedicated location onsite
- All samples collected, stored, and transported in coolers on ice

SWC 24 ✓

DTW: 10.21 Begin Purge (0915)
Post Purge DTW: 10.29 Initial Purge: Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mV)	Purge	Desc
(0920)	17.09	595	3.37	3.55	325.4	≤0.34/min	Clear
(0925)	17.10	589	2.21	3.49	362.2	"	clear
(0930)	17.27	590	1.56	3.47	376.6	"	Clear
(0935)	17.51	589	1.42	3.47	384.1	"	clear
(0940)	17.68	588	1.12	3.47	389.9	"	clear
(0945)	18.17	589	0.96	3.47	392.2	"	clear
(0950)	18.66	589	0.84	3.48	393.2	"	clear
(0955)	18.75	589	0.79	3.50	389.4	"	clear
(1000)	18.87	589	0.80	3.51	388.4	"	Clear
(1000)	Readings Stable					Post Purge Reading	
(1017)	18.57	599	1.00	3.48	378.4		

Sample Time (1005)
Samples Collected: (4) 8270

SWC 22 ✓

DTW: 10.23 Begin Purge (1031)
Post Purge DTW: 10.26 Initial Purge: Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mV)	Purge	Desc
(1035)	16.73	913	1.26	6.15	316.5	≤0.34/min	clear
(1040)	16.53	906	0.72	6.18	285.6	"	clear
(1045)	16.48	903	0.59	6.22	260.4	"	Clear
(1050)	16.88	899	0.45	6.17	251.0	"	Clear
(1055)	17.24	901	0.40	6.17	237.0	"	clear
(1100)	17.25	901	0.35	6.19	228.0	"	Clear
(1105)	17.25	901	0.33	6.20	217.6	"	Clear
(1110)	17.32	901	0.32	6.21	209.4	"	Clear
(1115)	17.41	900	0.31	6.20	204.4	"	Clear
(1120)	17.65	900	0.31	6.18	199.5	"	Clear
(1125)	17.71	901	0.31	6.18	195.1	"	Clear
(1125)	Readings Stable						
(1141)	16.95	905	0.42	5.89	209.4	Post Purge R	

Sample Time (1130)
Samples Collected: (4) 8270

SWC 23 ✓

DTW: 9.65 Begin Purge (1158)
Post Purge DTW: Initial Purge: Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mV)	Purge	Desc
(1200)	20.11	965	5.07	6.98	171.6	≤0.34/min	clear
(1205)	18.87	957	2.92	6.79	193.2	"	clear
(1210)	18.94	947	2.64	6.53	204.9	"	clear
(1215)	18.96	929	1.34	6.42	208.4	"	clear
(1220)	18.64	923	1.18	6.40	209.2	"	clear
(1225)	18.37	911	0.92	6.40	208.0	"	Clear
(1230)	17.01	910	0.82	6.38	206.4	"	clear
(1235)	17.37	908	0.75	6.34	206.0	"	Clear

7/9/10

RAAP
BO3204-08
C3B1RDE

FB#9

SWC 23 cont

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mV)	purge	Desc
(1240)	17.41	912	0.69	6.35	203.9	F0.34 min	Clear
(1245)	17.54	908	0.71	6.36	203.1	"	Clear
(1250)	17.60	910	0.73	6.37	201.0	"	Clear
(1250)	Readings Stable						
(1310)	18.01	915	1.02	6.42	208.7	Post Purge Reading	

Sample Time (1255)
Samples Collected: (4) 8270

COMPLETED
7/13/10 RAH

(75)

07/23/10

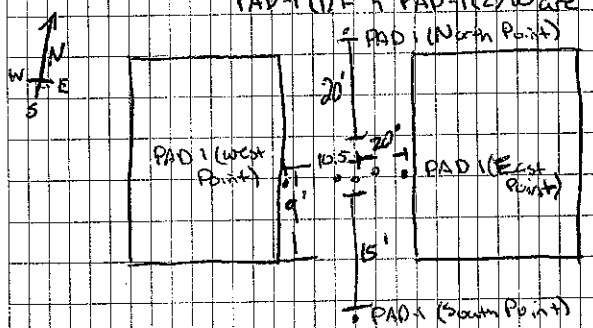
RAAP-OBG
BO3204-203E
TQE/CSB

FB#

General Notes
- Weather - Sunny 80°
- PPE: Eye Protection, Nitrile Gloves, Chemical Resistant Boo
  White Cotton Flame Retardant Coveralls,
- All equipment deconned after sampling
- Dedicated equipment used at each sampling location
- Decon water containerized & disposed of at dedicated
  location onsite
- Samples collected, stored and transported in coolers
  on ice

PAD-1

PAD-1 (1) E & PAD-1 (2) W are collocated duplicate samples
located 6' to th
east & west of th
original location
Sampling location (P



PAD-1 (1) E Sample Time (0850)
Samples Collected: (2) 8290 soil/cinder mix

PAD-1 (2) W Sample Time (0840)
Samples Collected: (2) 8290 soil/cinder mix

PAD-1 Sample Time (0830)
Samples Collected: (2) 8290 soil/cinder mix

PAD-1 (West Point) Sample Time (0815)
Samples Collected: (2) 8290 cinders

PAD-1 (East Point) Sample Time (0755)
Samples Collected: (2) 8290 cinders

PAD-1 (North Point) Sample Time (0745)
Samples Collected: (2) 8290 soil/cinder mix

PAD-1 (South Point)
Sample Time (0805)
Samples Collected: (2)
soil/cinder mix

(76)

10/13/10 RAAP FB#9

B03204-08
CJB/~~KFC~~ ~~TQE~~ KFC
CTD 10/13/10

General Notes

- Weather - Mostly cloudy, stormy, 60°s
- PPE - Nitrile gloves, Eye protection
- Calibrations - YSI 650 MDS
  - pH: 4.00 = 4.00, 7.00 = 7.00, 10.00 = 9.98
  - Conductivity: 1,413 µS = 1,413 µS
  - DO % = 100 %
- Dedicated tubing and well skirts used at all wells
- All equipment decanned between wells
- Purge water disposed at dedicated location on site
- All samples collected, then stored and transported in ice.

Static Water Level Table - Unit 16

Well	DTW	Post Purge DTW	Notes
16-1	47.40	51.80	
16-2	55.77	55.87	
16-3	56.94	71.05	
16-5	3.20	3.22	
16WC2B	54.92	66.68	
16MW8	74.58	Below top of pump	
16WC1B	70.70	71.32	
16WC1A	70.28	71.11	
16MW9	67.09	67.54	
16C1	50.15	50.17	
16C3	68.46	—	GW Not sampled
16DDH3	Dry	—	" " "
16WC2A	Dry	—	" " "

10/13/10 RAAP FB#9

B03204-08
CJB/KFC

16-3 ✓

DTW - 56.94 Begin Purge: (10:15)
Post Purge DTW - 71.05 Initial Purge: (Clear)

Time	Temp(C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge(L/min) K	Desc
(1020)	14.27	251	6.83	7.62	215.6	0.3	Clear
(1025)	14.52	247	6.59	7.75	219.4	"	"
(1030)	14.65	245	6.54	7.77	223.7	"	"
(1035)	15.02	241	6.71	7.81	231.8	"	"
(1040)	14.32	239	6.53	7.80	241.8	"	"
(1045)	14.16	238	6.45	7.83	249.2	"	"
(1050)	14.12	236	6.46	7.85	256.2	"	"
(1055)	14.30	235	6.61	7.81	263.8	"	"
(1100)	14.27	237	6.76	7.79	271.0	"	"
(1105)	14.23	234	6.78	7.78	275.8	"	"
(1105)	READINGS STABLE						Post Purge Readings
(1126)	14.30	235	6.76	7.86	279.2	"	"

SAMPLE TIME (1110)

*Samples Collected: (6) 8260, (2) 8011, (2) 8270D (1) TM, (1) TM + Hg

*(Samples collected for both units 353 & 16 from this shared well)

16-1 ✓

DTW - 47.40 Begin Purge (11:40)
Postpurge DTW - 51.80 Initial Purge: Clear

Time	Temp(C)	Cond(ms)	DO(mg/L)	pH	ORP(mv)	4/min Purge	K	Desc.
(1150)	15.07	465	7.04	7.07	317.8	0.3 L/min		Clear
(1155)	15.49	477	7.02	7.09	318.0	"		"
(1200)	15.23	482	7.06	7.10	318.8	"		"
(1205)	14.97	484	7.07	7.09	319.4	"		"
(1210)	15.00	484	7.06	7.09	319.7	"		"
(1215)	15.18	483	7.07	7.07	320.8	"		"

16-1 - continued from page 90

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc
(1220)	15.22	484	7.09	7.08	314.7	0.3 L/min	Clear
(1220)	Readings stable					"	"
(1230)	15.22	486	7.17	7.03	317.7	"	"

Sample Time: (1225)
Samples Collected: (3) 8260, (2) 8270, (1) TM

16-2 ✓

DTW - 55.77 Begin Purge: (1245)
Post Purge DTW - 55.87 Initial Purge: Clear

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc
(12:50)	14.41	644	5.34	6.69	319.5	0.3 L/min	Clear
(12:55)	14.26	670	4.71	6.64	316.1	"	"
(13:00)	14.96	673	4.64	6.65	312.7	"	"
(13:05)	15.22	675	4.72	6.61	309.9	"	"
(13:10)	15.21	677	4.79	6.60	308.2	"	"
(13:15)	14.98	674	4.77	6.62	309.4	"	"
(13:20)	15.51	677	4.84	6.69	307.9	"	"
(13:25)	15.25	675	4.91	6.69	308.8	"	"
(13:30)	15.18	672	4.93	6.69	310.1	"	"
(13:30)	Readings stable		CJB 10/13/10	~~6.56~~	~~312.8~~	"	"
~~(13:45)~~ 13:45		654	5.17	6.56	312.8	"	"

Sample Time: (1335)
Samples Collected: (3) 8260, (2) 8270, (1) TM

16-5 ✓

DTW - 3.20 Begin Purge: (1400)
Post Purge DTW - 3.22 Initial Purge: Clear

- continued to page 92

16-5 - continued from page 91

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc.
(1405)	14.14	520	2.14	7.17	224.4	0.3	Clear
(1410)	14.15	523	2.23	7.16	223.5	"	"
(1415)	14.07	522	2.04	7.13	222.7	"	"
(1420)	14.06	522	1.89	7.14	221.7	"	"
(1425)	14.01	522	1.83	7.14	223.2	"	"
(1430)	13.93	522	1.63	7.14	222.1	"	"
(1435)	13.90	522	1.49	7.13	222.0	"	"
(1440)	13.80	521	1.42	7.14	221.6	"	"
(1445)	13.75	521	1.38	7.14	221.3	"	"
(1445)	Readings stable						
(1500)	14.13	521	1.60	7.15	222.0	"	"

Sample Time: (1450)
Samples Collected: (3) 8260, (2) 8270, (1) TM

Spring 16

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	~~Purge K (L/min)~~	~~Desc~~
(1504)	14.32	571	8.09	7.10	113.2	CJB 10/13/10	

Sample Time: (1505)
Samples Collected: (3) 8260, (2) 8270, (1) TM

16WC2B ✓

DTW - 54.92 Begin Purge: (1510)
Post Purge DTW - 66.68 Initial Purge: Clear

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc
(1515)	15.59	324	9.09	7.55	235.9	0.3 L/min	Clear
(1520)	15.27	323	4.31	7.59	204.3	"	"
(1525)	14.85	321	1.07	7.67	177.1	"	"
(1530)	15.06	322	0.87	7.64	153.9	"	"
(1535)	15.67	324	0.96	7.64	127.4	"	"

- continued on page 93

10/13/10 — RAAP B03204-08 CJB/KFC — FB #9

16WC2B – continued from page 92

Time	Temp(°C)	Cond(µS)	DO (mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc.
(1540)	14.93	321	0.78	7.57	106.7	0.3	Clear
(1545)	14.92	321	0.68	7.54	94.4	"	"
(1550)	14.86	322	0.69	7.53	90.4	"	"
(1555)	14.99	321	0.71	7.55	89.9	"	"
(1600)	14.94	322	0.70	7.54	83.8	"	"
(1600)	Readings stable.						
(1610)	15.03	322	0.94	7.57	80.1	"	" Post Purge

Sample Time: (1605)

Samples Collected: (3) 8260, (2) 8270, (1) TM

10/14/10 — RAAP B03204-08 CJB/TQE — FB #9

General Notes

- Weather - Cloudy, steady wind, 60's
- PPE - Nitrile Gloves, Eye Protection
- Calibrations - YSI 650 MDS
  - pH: 4.00 = 4.00, 7.00 = 7.00, 10.00 = 9.98
  - Conductivity: 1,413 µS = 1,413 µS
  - DO % = 100 %
- Dedicated tubing and well skirts used at all wells.
- All equipment decanned b/n wells
- Purge water disposed at dedicated location on site.
- All samples collected, then stored and transported on ice.

16MW8 ✓

DTW - 74.58 — Begin Purge: (1000)

Post Purge DTW - Below top of pump — Initial Purge: Clear

Time	Temp(°C)	Cond(µS)	DO (mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc
(1005)	13.56	89	1.27	4.87	237.4	≤ 0.3	Clear
(1010)	13.75	98	1.12	4.93	226.1	≤ 0.3	Clear
(1015)	13.77	100	1.08	4.94	215.7	≤ 0.3	"
(1020)	13.79	101	1.05	4.94	210.7	"	"
(1025)	13.82	102	1.03	4.93	208.8	"	"
(1030)	13.83	103	1.01	4.95	219.9	"	"
(1035)	13.99	105	1.06	4.96	198.6	"	"
(1040)	14.09	105	0.98	4.86	197.0	"	"
(1045)	14.15	105	0.97	4.84	196.7	"	"
(1050)	14.19	105	0.97	4.82	195.8	"	"
(1055)	14.23	105	0.95	4.82	193.2	"	"
(1055)	Readings stable						
(1140)	14.55	105	1.23	4.91	199.8	"	" Post Purge Reading

Sample Time: (11:00)

Samples Collected: (3) 8260, (2) 8270, (1) TM

Low flow at end, difficult to collect sample.

16MW9 ✓

DTW - 67.09 Begin Purge: (1200)
Post Purge DTW - 67.54 Initial Purge: Clear

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc.
(1205)	14.98	712	8.31	6.75	289.1	0.3	Clear
(1210)	14.54	782	7.89	6.70	299.5	"	"
(1215)	14.40	811	7.19	6.65	298.4	"	"
(1220)	15.07	879	5.25	6.54	207.6	"	"
(1225)	15.73	930	1.73	6.49	145.1	"	"
(1230)	15.86	935	1.58	6.49	132.0	"	"
(1235)	15.77	939	1.44	6.50	117.9	"	"
(1240)	14.45	937	1.40	6.51	109.3	"	"
(1245)	15.03	930	1.25	6.49	104.3	"	"
(1250)	15.13	926	1.13	6.49	100.0	"	"
(1255)	15.23	927	1.18	6.50	98.6	"	"
(1255)	Readings stable.						
(1305)	15.46	938	1.44	6.50	103.7	"	"

Sample Time: (1300)
Samples Collected: (3) 8260, (2) 8270, (1) TM

16WC1A ✓

DTW - 70.28 Begin Purge: (1315)
Post Purge DTW - 71.11 Initial Purge: Clear

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc.
(1320)	15.62	578	9.40	7.34	233.4	0.3	Clear
(1325)	14.77	707	3.41	6.86	232.4	"	Clear
(1330)	14.73	713	2.55	6.86	224.1	"	"
(1335)	14.86	718	1.90	6.87	149.1	"	"
(1340)	14.62	719	1.55	6.88	105.0	"	"
(1345)	14.37	717	1.04	6.89	56.5	"	"
(1350)	14.45	717	0.99	6.90	49.9	"	"
(1355)	14.52	718	1.03	6.91	47.8	"	"

- continued on page 96

16WC1A - continued from page 95

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc.
(1355)	Readings stable						
(1440)	15.12	724	1.75	7.03	38.1	0.3	Clear

Sample Time: (1400)
Samples Collected: (9) 8260, (6) 8270, (3) TM

16W-Dup (From 16WC1A)
Sample Time: (1445)
Samples Collected: (3) 8260, (2) 8270, (1) TM

16WC1B ✓

DTW - 70.70 Begin Purge: (1500)
Post Purge DTW - 71.32 Initial Purge: Clear

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc
(1505)	15.35	468	5.24	6.58	243.5	0.3	Clear
(1510)	15.26	527	2.41	6.52	239.3	"	"
(1515)	15.00	492	1.82	6.44	234.1	"	"
(1520)	14.86	461	1.55	6.37	230.0	"	"
(1525)	14.81	445	1.40	6.34	227.5	"	"
(1530)	14.87	446	1.02	6.29	223.7	"	"
(1535)	14.98	448	1.08	6.34	222.7	"	"
(1540)	15.01	449	1.12	6.33	222.1	"	"
(1540)	Readings stable.						
(1550)	15.97	454	1.52	6.38	243.4	"	"

Sample Time: (15:45)
Samples Collected: (3) 8260, (2) 8270, (1) TM

B03204-08
CJB/TQE

16C1 ✓

DTW - 50.15 Begin Purge: (1600)
Post Purge DTW - 50.17 Initial Purge: Clear

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc.
(1605)	15.19	488	9.25	6.80	269.6	0.3	Clear
(1610)	14.44	669	2.53	6.44	272.4	"	"
(1615)	14.94	706	1.84	6.45	265.7	"	"
(1620)	15.06	722	1.57	6.45	262.6	"	"
(1625)	15.26	730	1.44	6.44	259.3	"	"
(1630)	15.29	731	1.42	6.44	258.4	"	"
(1635)	15.27	735	1.42	6.44	258.0	"	"
(1635)	Readings stable.						
(1645)	15.52	742	1.70	6.58	271.1	"	"

Sample Time: (1640)
Samples Collected: (3) 8260, (2) 8270, (1) TM

COMPLETED
11/9/10 EDL

B03204-08
CJB/KFC

GENERAL NOTES:
- Weather - Clear - 40°s
- PPE - White cotton flame retardant coveralls, Nitrile Gloves, Eye Protection, Steel toed boots
- Calibrations: YSI 600 MDS
  pH: 4.00 = 4.00 7.00 = 7.00 10.00 = 10.00
  Conductivity reads 1413 µs in a 1413 µs standard
  DO% = 100 %
- Dedicated tubing and well skirts used at all wells.
- All equipment decanned between wells.
- Purge water disposed of at dedicated location on-site.
- All samples collected, then stored and transported on ice.

BMW3 ✓

DTW - 12.30 Begin Purge: (0725)
Post Purge DTW - 13.70 Initial Purge: Clear

TIME	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Clear
(0725)	15.92	604	7.19	6.87	374.9	0.3	clear

Note: Debris from stormwater over flowing well head during flooding has caused a dense mat of pine needles and other small fines of plant matter to form a layer at the surface of the water column. It took a bailer and several deployments of the bailer to bust through the fibarous mat in order to ~~take~~ collect the water level.

(0730)	16.02	605	4.85	6.94	285.0	0.3	Clear
(0735)	16.07	605	4.75	6.97	264.1	"	"
(0740)	16.20	608	4.84	6.97	237.8	"	"
(0745)	16.17	608	4.88	6.99	230.1	"	"
(0750)	16.20	608	4.91	6.98	229.7	"	"
(0755)	16.23	608	4.92	6.96	229.6	"	"
(0755)	Readings stable.						
(0810)	16.68	610	4.92	6.96	233.2	"	"

- continued on page 99.

CJB 10/19/10

~~W~~16-2 Repaired defective pump fitting on well head due to stress crack in existing hardware. Removed defective part, applied ~~pipe dope~~ teflon tape to fitting and secured onto well cap. (back) CJB 10/19/10

Event took approx. 1 hour.

- Weather - Overcast, rainy, 50's
- PPE - Nitrile gloves, eye protection, work boots
- CALIBRATIONS: 451 650

pH: 4.00 = 4.00, 7.00 = 7.00, 10.00 = 10.00

Conductivity reads 1413 µS in a 1413 µS standard.

DO % = 99.8 %

- Dedicated tubing and well skirts used at all wells.
- All equipment deconned between wells.
- Purge water disposed of at dedicated location on-site.
- All samples collected, stored and transported on ice.

Static Water Level Table - Unit 10

Well	DTW	Post Purge DTW	Notes
10DDH2R	21.42	22.14	
10D3	20.08	20.12	
10D3D	19.84	19.87	
10MW1	19.72	20.00	
10D4	22.90	22.94	

10MW1 ✓

DTW - 19.72 Begin Purge: (10:25)

PostPurge DTW - 20.00 Initial Purge: Clear

Time	Temp (C°)	Cond (µS)	DO (mg/L)	pH	ORP (mv)	Purge Rate (L/min)	Desc.
(10:35)	14.66	429	6.74	7.33	279.0	0.3	Clear
(10:40)	14.67	429	6.01	7.35	283.9	"	"
(10:45)	14.68	430	5.77	7.36	291.1	"	"
(10:50)	14.68	430	5.70	7.36	299.3	"	"
(10:55)	14.69	429	5.70	7.35	303.0	"	"
(11:00)	14.70	429	5.69	7.37	306.9	"	"
(11:05)	14.78	430	5.68	7.37	310.8	"	"
(11:05)	Readings stable						
~~11:30~~ 11:20 CJB 10/20/10	14.80	430	5.69	7.39	322.0	"	" Post Purge

10MW1

Sample Time: (11:10)
Samples Collected: (6) 8260, (1) TM, (2) 8270, (1) CN

10DDH2R ✓

DTW: 21.42 Begin Purge: (11:25)
Post Purge DTW: 22.16 Initial Purge:

Time	Temp(°C)	Cond(µs)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc
(11:30)	13.67	665	1.60	7.20	299.2	0.3	Clear
(11:35)	13.74	662	1.84	7.14	291.1	"	"
(11:40)	13.76	663	1.94	7.12	288.9	"	"
(11:45)	13.77	664	2.13	7.12	287.9	"	"
(11:50)	13.76	666	2.41	7.13	287.9	"	"
(11:55)	13.76	668	2.66	7.14	289.2	"	"
(12:00)	13.83	670	2.90	7.13	291.3	"	"
(12:05)	13.89	671	2.97	7.12	291.8	"	"
(12:10)	13.96	672	3.09	7.12	292.6	"	"
(12:15)	14.20	673	3.06	7.12	292.8	"	"
(12:15)	Readings stable						
(12:50)	14.06	679	3.15	7.11	286.1	"	" Post Sample

Sample Time: (12:20)
Samples Collected: (18) 8260, (3) TM, (6) 8270, (3) CN

10D3D ✓

DTW: 19.86 Begin Purge: (12:55)
Post Purge DTW: 19.87 Initial Purge: Clear

Time	Temp(°C)	Cond(µs)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc.
(13:00)	14.59	670	2.04	7.27	-114.0	0.3	Clear
(13:05)	14.44	675	2.25	7.35	-76.7	"	"
(13:10)	14.48	684	2.08	7.37	-121.5	"	"
(13:15)	14.72	686	2.08	7.35	-132.1	"	"
(13:20)	15.29	688	2.19	7.37	-133.9	"	"
(13:25)	15.61	691	2.18	7.35	-133.9	"	"

10D3D

Time	Temp(°C)	Cond(µs)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc
(1330)	15.53	690	2.30	7.37	-135.8	0.3	"
(1335)	15.72	689	2.18	7.37	-138.6	"	"
(1335)	Readings stable.						
(1350)	16.01	694	2.29	7.34	-134.6	"	" Post sample

Sample Time: (1340), Samples Collected: (6) 8260, (1) TM, (2) 8270 (1) CN

10D3 ✓

DTW: 20.08 Begin Purge: (14:00)
Post Purge DTW: 20.12 Initial Purge: Clear

Time	Temp(°C)	Cond(µs)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc.
(1405)	14.96	619	4.99	7.14	-13.4	0.3	Clear
(1410)	15.13	639	3.69	7.15	68.6	"	"
(1415)	14.95	651	3.36	7.18	89.9	"	"
(1420)	14.57	658	3.22	7.19	101.1	"	"
(1425)	14.36	663	3.04	7.22	110.9	"	"
(1430)	14.29	662	2.94	7.22	120.5	"	"
(1435)	14.54	665	2.93	7.22	129.9	"	"
(1440)	14.64	667	2.95	7.22	134.8	"	"
(1445)	14.57	666	3.01	7.22	144.1	"	"
(1450)	14.58	668	2.90	7.22	150.4	"	"
(1455)	14.70	668	2.91	7.23	153.9	"	"
(1500)	14.71	669	2.88	7.23	158.7	"	"
(1505)	14.67	670	3.01	7.24	162.0	"	"
(1505)	Readings stable.						
(1510)	14.79	673	3.52	7.24	176.7	"	" Post Sample

Sample Time: (1510)
Samples Collected: (6) 8260, (1) TM, (2) 8270, (1) CN

10DUP

Sample Time: (1520)
Samples Collected: (6) 8260, (1) TM, (2) 8270 (1) CN

10/20/10 — RAAP — FB#9

1004 ✓

B03204-08
CSB/TGE

DTW: 22.90 — Begin Purge: (1535)

Post Purge DTW: 22.94 — Initial Purge: Clear

Time	Temp (°C)	Cond (µS)	DO (mg/L)	pH	ORP (mV)	Purge K (L/min)	Desc.
(1540)	16.50	381	3.52	6.88	202.9	0.3 L/min	Cloudy
(1545)	16.67	394	3.24	6.83	203.2	"	"
(1550)	16.75	396	3.34	6.86	201.4	"	"
(1555)	16.81	395	3.52	6.87	200.9	"	"
(1600)	16.52	396	3.50	6.85	202.1	"	Sl. Cloudy
(1605)	16.46	396	3.49	6.83	204.7	"	Clear
(1610)	16.43	397	3.48	6.82	213.9	"	"
(1615)	16.48	397	3.47	6.80	215.3	"	"
(1620)	16.46	397	3.46	6.82	217.9	"	"
(1625)	16.59	397	3.40	6.80	220.0	"	"
(1625)	Readings stable						
(1635)	16.91	395	3.56	6.77	227.8	"	" Post Sample

Sample Time: (1630)

Samples Collected: (6) 8260, (1) TM, (2) 8270, (1) CN

COMPLETED
11/9/10 ESW

10/25/10 — RAAP — F.B.#9

B03204-08
CSB/TGE

- Weather: Overcast
- PPE: Nitrile Gloves, Eye Protection
- Calibrations: 451'650
  pH: 4.00 = 4.00, 7.00 = 7.00, 10.00 = 9.99
  Conductivity: reads 1413 µs in a 1413 µs standard.
  DO% = 99.8%
- Dedicated tubing and well skirts used at all wells.
- All equipment decon'ed between wells
- Purge water disposed of at dedicated location on-site.
- All samples collected and stored/transported on ice.

STATIC WATER-LEVEL TABLE-UNIT 7

Well	DTW	Post Purge DTW	Notes
7W12B	24.86	24.94	
7W9C	14.55	16.89	
7W10B	15.67	16.08	
7W10C	21.39	21.55	
7W13	19.36	21.42	
7MW6	26.58	26.98	
7W11B	25.19	25.23	
7WCA	25.03	25.70	

- other wells on page 114

7W12B ✓

DTW - 24.86 — Begin Purge: (0955)

Post Purge DTW - 24.94 — Initial Purge: Clear

Time	Temp (C°)	Cond (µS)	DO (mg/L)	pH	ORP (mV)	Purge K (L/min)	DESC
~~1456~~ 1000	14.56	662	12.30	7.05	316.1	0.3	Clear
1005	14.39	670	8.63	7.09	324.1	"	"
1010	14.33	676	7.26	7.10	331.0	"	"
1015	14.31	677	6.93	7.09	334.7	"	"
1020	14.35	676	6.83	7.11	339.7	"	"
1025	14.36	675	6.71	7.13	341.2	"	"
1030	14.43	674	6.68	7.14	343.0	"	"

10/25/10 RAAP B032404-08 CSB/TQE F.B.#9

TW12B - cont

Time	Temp(C)	Cond(µs)	DO mg/L	pH	ORP(mV)	purge L	Desc
(1035)	14.44	672	6.66	7.12	346.7	0.3 L/min	clear
(1040)	14.46	674	6.69	7.11	344.6	"	"
(1040)	Readings Stable						
(1103)	14.35	670	7.01	7.10	329.7	post sample Reading	

Sample Time (1045)
Samples Collected: (1) TM, (2) 8270, (1) CN
↑ Heavy rain during purge / light rain during sample

TW9C ✓
DTW - 14.55
Post Purge DTW - 16.89

Begin Purge (11:30)
Initial Purge - Clear

Time	Temp(C)	Cond(µs)	DO mg/L	pH	ORP(mV)	purge L	Desc
(11:35)	14.02	1208	8.84	7.09	224.9	0.3	Clear
(11:40)	13.99	1212	8.62	7.08	223.7	"	"
(1145)	13.96	1214	8.31	7.06	221.1	0.3	"
(1150)	13.94	1216	8.01	7.01	221.6	"	" Air bubble on PO
(1155)	13.97	1216	7.02	7.00	221.7	0.3	Clear
(1200)	13.74	1242	5.54	6.97	212.0	"	"
(1205)	13.62	1254	4.94	6.93	199.8	"	"
(1210)	13.72	1254	4.45	6.96	190.2	"	"
(1215)	13.99	1256	4.46	6.97	169.1	"	"
(1220)	14.11	1256	4.26	6.97	157.8	"	"
(1225)	14.19	1254	4.21	6.97	147.0	"	"
(1230)	14.26	1251	4.15	6.97	144.1	"	"
(1235)	14.31	1247	4.19	6.97	141.0	"	"
(1240)	14.39	1242	4.14	6.94	140.1	"	"
(1240)	Readings Stable						
(1252)	14.20	1239	4.52	6.96	128.1	post sample	

Sample Time (1245)
Samples Collected: (1) TM, (2) 8270, (1) CN

10/25/10 RAAP B032404-08 CTB/TQE F.B.#9

TW10B ✓
DTW - 15.67
Post Purge DTW - 16.08

Begin Purge (1305)
Initial Purge - Clear

Time	Temp(C)	Cond(µs)	DO mg/L	pH	ORP(mV)	purge L	Desc
(1310)	14.44	957	4.82	6.98	278.1	0.3	Clear
(1315)	14.64	970	4.50	6.98	279.0	"	"
(1320)	14.95	977	4.34	6.98	281.2	"	"
(1325)	14.98	979	4.32	6.98	282.6	"	"
(1330)	15.15	981	4.31	6.99	288.4	"	"
(1335)	15.26	989	4.08	6.97	294.7	"	"
(1340)	15.44	989	4.18	7.00	289.1	"	"
(1345)	15.52	989	4.17	7.00	289.4	"	"
(1350)	15.60	990	4.17	7.00	288.9		
(1350)	Readings stable						
(1400)	15.76	981	4.47	6.98	285.5	Post sample Readings	

Sample Time: (1355)
Samples Collected: (1) TM, (2) 8270, (1) CN

TW10C ✓
DTW - 21.39
Post Purge DTW - 21.35

Begin Purge: (1410)
Initial Purge: Clear

Time	Temp(C)	Cond(µs)	DO mg/L	pH	ORP(mV)	purge L	Desc
(1415)	14.11	808	2.48	7.28	-26.3	0.3	Clear
(1420)	13.78	810	2.70	7.26	+10.2	"	"
(1425)	13.64	808	2.79	7.23	24.2	"	"
(1430)	13.52	808	2.80	7.25	24.4	"	"
(1435)	13.56	808	3.04	7.26	35.0	"	"
(1440)	13.63	807	3.19	7.25	29.7	"	"
(1445)	13.40	807	3.36	7.26	29.2	"	"
(1450)	13.21	806	3.24	7.26	29.7	"	"
(1455)	14.00	804	3.39	7.27	30.5	"	"
(1500)	14.13	804	3.38	7.24	30.2	"	"

continued on page 113

7W10C - continued from page 112

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc.
(1505)	14.38	803	3.38	7.27	32.1	0.3	Clear
(1505)	Readings stable.						
(1520)	14.57	808	4.17	7.23	35.6		Post Sample Reading

Sample Time: (1510)
Samples Collected: (1) TM, (2) 8270, (1) CN

7MW16 ✓

DTW: 26.58
Begin Purge: (1535)
Initial Purge: Clear
Post Purge DTW:

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc.
(1540)	15.60	1714	2.81	7.36	-3.9	0.3	Clear
(1545)	15.78	1698	2.89	7.34	-32.5	"	"
(1550)	16.00	1681	2.99	7.33	-48.6	"	"
(1555)	15.97	1636	3.11	7.35	-58.9	"	"
(1600)	15.87	1616	3.27	7.33	-56.1	"	"
(1605)	15.71	1590	3.18	7.41	-57.9	"	"
(1610)	15.77	1581	5.01	7.44	-55.8	"	"
(1615)	15.56	1589	3.44	7.43	-50.9	"	"
(1620)	15.46	1591	3.43	7.44	-47.8	"	"
(1625)	15.74	1603	3.45	7.42	-45.5	"	"
(1625)	Readings stable						
(1645)	15.93	1613	3.98	7.47	-54.9		Post ~~Purge~~ Sample Reading 10/25/10

Sample Time: (1630)
Samples Collected: (1) TM, (2) 8270, (1) CN

General Notes:
- Weather: Sunny 70s
- PPE: Nitrile gloves, eye protection
- Calibrations: YSI 650 MDS
  pH: 4.00 = 4.00, 7.00 = 7.00, 10.00 = 9.98
  Conductivity: 1,413µS = 1,413µS
  DO % = 99.9 %
- Dedicated tubing and well skirts used at all wells.
- All equipment decanned between wells
- Purge water disposed of at dedicated location on-site.
- All samples collected and stored/transported on ice.

Static Water-Level Table - Unit 7

Well	DTW	Post Purge DTW	Notes
7W9B	22.76	DTW only	no sampling
7W11	24.25	"	"
7MW5	25.01	"	"

7W13 TQE 10/26/10
~~7W11B~~

DTW: 19.36
Begin Purge: 1003
Post Purge DTW: 21.42
Initial Purge: Cloudy/milky

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc
(1005)	14.03	1321	10.21	7.30	169.1	0.3	milky/cloudy
(1010)	14.16	1303	7.18	7.29	110.4	"	"
(1015)	14.24	1294	6.31	7.30	99.0	"	"
(1020)	14.33	1271	5.42	7.30	89.1	"	"
(1025)	14.61	1258	4.78	7.29	87.1	"	"
(1030)	14.85	1249	4.20	7.29	89.7	"	sl. cloudy
(1035)	15.15	1242	3.96	7.30	93.1	"	"
(1040)	15.37	1243	3.80	7.30	99.5	"	sl cloudy
(1045)	15.46	1240	3.51	7.30	109.1	"	clear

Continued on page 115

10/26/10 RAAP B03204-08 CJB/TQE FB#9

TW13 Cont

Time	Temp(C)	Cond(µS)	DO mg/L	pH	ORP(mV)	purge(L/min)	Desc.
(1050)	16.61	1245	3.31	7.30	110.0	0.3L/min	Clear
(1055)	15.81	1245	3.35	7.30	109.1	"	clear
(1100)	15.78	1247	3.25	7.30	106.9	"	Clear
(1100)	Reading Stable						
(1125)	15.97	1249	3.28	7.31	102.1	post sample	

Sample Time (1105)
Samples Collected: (1) TM, (2) 8270, (1) CN

TW11B ✓

DTW: 25.19 Begin Purge: (1140)
Post Purge DTW: 25.23 Initial Purge: Clear

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc.
(1145)	16.58	819	5.61	6.57	258.7	0.3	Clear
(1150)	16.36	829	4.34	6.59	264.2	"	"
(1155)	16.64	830	4.01	6.59	261.7	"	"
(1200)	16.75	836	3.81	6.60	260.6	"	"
(1205)	16.95	838	3.66	662	258.4	"	"
(1210)	17.32	839	3.57	6.62	256.0	"	"
(1215)	16.90	844	3.42	6.65	255.0	"	"
(1220)	16.91	847	3.32	6.65	252.8	"	"
(1225)	17.05	843	3.27	6.66	252.1	"	"
(1230)	17.38	844	3.25	6.66	250.9	"	"
(1235)	17.43	848	3.22	6.67	247.9	"	"
(1235)	Readings stable.						
~~(1240)~~ (1315)	17.67	846	3.48	6.62	246.3	Post Sample Reading	

Sample Time: (1240)
Samples Collected: (3) TM, (6) 8270, (3) CN

10/26/10 RAAP B03204-08 CJB/TQE FB#9

TWCA ✓

(CJB 10/26/10 Wrong time tripod to correct start @ 1350 and purge @ 1445)

DTW: Begin Purge: (1350)
Post Purge DTW: 25.70 Initial Purge:

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc.
(1355)	15.48	1063	2.79	6.95	294.4	0.3	Clear
(1400)	16.02	989	2.74	6.93	289.0	"	"
(1405)	15.97	941	2.72	6.92	284.9	"	"
(1410)	16.13	890	2.59	6.92	274.8	"	"
(1415)	16.27	881	2.59	6.92	268.0	"	"
(1420)	16.21	882	2.67	6.92	258.2	"	"
(1425)	16.30	875	2.66	6.92	254.8	"	"
(1430)	16.27	876	2.68	6.92	245.8	"	"
(1435)	16.67	877	3.06	6.92	234.4	"	"
(1440)	16.79	877	2.94	6.90	232.3		
(1445)	16.84	877	2.98	6.92	229.0		
(1445)	Readings stable.						
(1520)	17.03	878	3.23	6.93	232.0	Post Sample Time	

Sample Time: (1450)
Samples Collected: (1) TM, (2) 8270, (1) CN

TMW Dup

Sample Time: (1500)
Samples Collected: (1) TM, (2) 8270, (1) CN

COMPLETED 11/19/10 esk

Unit 5 - Static Water Level Table

Well	DTW	Post Purge DTW	Notes
5W8B	15.00	15.49	
5W7B	9.99	10.03	
5W5B	10.27	11.01	
5WC21	9.69	9.69	
5WC22	9.66	9.66	
5WC23	9.08	9.13	
5W12A	12.39	12.40	
S5W7	11.89	DTW Only - No sampling	
S5W5	9.46	" " " "	
5W9A	3.40	" " " "	
5W10A	16.04	" " " "	
5W11A	14.43	" " " "	
5WCA	13.91	" " " "	
S5W6	8.21	" " " "	
S5W8	12.31	" " " "	
5WC11	16.25	" " " "	
5WC12	15.98	" " " "	

5W5B ✓

DTW: 10.27 Begin Purge: (1540)

Post Purge DTW: 11.01 Initial Purge: Clear

Time	Temp(°C)	Cond(µs)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc.
(1545)	16.55	693	10.29	5.67	279.7	0.3	Clear
(1550)	16.86	688	5.48	5.67	282.6	0.3	Clear
(1555)	16.78	687	5.69	5.69	285.4	"	"
(1600)	16.70	691	4.29	5.70	287.7	"	"
(1605)	16.57	696	4.05	5.71	289.5	"	"
(1610)	16.58	699	3.89	5.72	290.9	"	"
(1615)	16.54	704	3.75	5.72	292.8	"	"

5W5B

Time	Temp(°C)	Cond(µs)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc
(1620)	16.57	705	3.71	5.72	293.3	0.3	Clear
(1626)	Readings Stable						
(1630)	16.60	713	3.89	5.71	295.7	Post Sample Reading	

Sample Time: (1630)

Samples Collected: (3) 8260, (2) RSK, (2) TOC, (1) Sulfide
(1) Nitrate, Sulfate, 9056 Nitrite

5W7B ✓

DTW: 9.99 Begin Purge: (1700)

Post Purge DTW: 10.03 Initial Purge: Clear

Time	Temp(°C)	Cond(µs)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc.
(1705)	20.63	163	3.45	4.47	322.5	0.3	Clear
(1710)	20.80	165	3.14	4.40	330.4	"	"
(1715)	20.81	166	3.07	4.37	334.4	"	"
(1720)	20.93	166	2.95	4.35	340.1	"	"
(1725)	20.90	165	2.92	4.34	341.3	"	"
(1730)	20.88	164	2.92	4.34	343.1	"	"
(1735)	20.84	164	2.93	4.29	346.5	"	"
(1740)	20.84	165	2.92	4.27	349.2	"	"
(1740)	Readings stable						
(1800)	20.43	166	3.12	4.31	355.2	Post Sample Reading	

Sample Time: (1745)

Samples Collected: (9) 8260, (6) RSK, (6) TOC, (3) Sulfide
(3) 9056 Nitrate, Nitrite, Sulfate

General Notes:
- Weather:
- PPE: Nitrile gloves, eye protection
- Calibrations: YSI 650 MDS
  pH: 4.00 = 4.00, 7.00 = 7.00, 10.00 = 9.98
  Conductivity: 1,413 µS = 1,413 µS
  DO % = 99.9 %
- Dedicated tubing and well skirts used at all wells.
- All equipment decanned between wells.
- Purge water disposed of at dedicated location on-site.
- All samples collected and stored/transported on ice.

5WC21 ✓

DTW: 9.69 Begin Purge (0800)

Post Purge DTW: 9.69 Initial Purge: cloudy

Time	Temp(C)	Cond(µs)	DO(mg/L)	pH	ORP(mV)	Purge(L/min)	Desc
(0805)	15.29	573	6.41	3.68	240.6	0.3	Cloudy
(0810)	15.38	572	6.32	3.67	241.7	"	"
(0815)	15.40	572	6.27	3.66	243.1	"	"
(0820)	15.41	572	5.99	3.70	245.4	"	"
(0825)	15.43	572	5.72	3.70	249.7	"	"
(0830)	15.43	572	5.42	3.71	252.9	"	"
(0835)	15.49	572	5.23	3.71	259.2	"	"
(0840)	15.59	572	4.68	3.71	269.1	"	Clear
(0845)	15.64	572	4.47	3.75	277.6	"	"
(0850)	15.70	572	4.36	3.75	282.3	"	"
(0855)	15.90	571	4.25	3.77	290.2	"	"
(0900)	16.14	572	4.11	3.78	295.1	"	"
(0905)	16.17	572	4.03	3.76	297.9	"	"
(0910)	16.23	571	4.00	3.79	298.9	"	"
(0915)	16.29	571	4.16	3.80	299.8	"	"

- continued to page 120

5WC21 - continued from page 119

Time	Temp(C)	Cond(µs)	DO(mg/L)	pH	ORP(mV)	Purge(L/min)	Desc
(0920)	16.37	571	3.94	3.80	309.6	0.3	Clear
(0925)	16.42	571	3.86	3.81	312.5	0.3	Clear
(0930)	16.41	571	3.84	3.81	313.6	"	"
(0935)	16.35	571	3.81	3.81	314.1	"	"
(0940)	16.20	571	3.71	3.81	317.6	"	"
(0940)	Readings stable						
(1020)	16.37	572	4.08	3.82	328.6	"	"

Sample Time: (0945)
Samples Collected: (3) 8260, (2) RSK, (2) TOC, (1) Sulfide, (1) Nitrite/Nitrate/Sulfate 9056

5WDup

Sample Time: (1000)
Samples Collected: (3) 8260 (2) RSK, (2) TOC, (1) Sulfide, (1) Nitrite, Nitrate, Sulfate 9056

5WC22

DTW: 9.66 Begin Purge: (10:30)

Post Purge DTW: 9.66 Initial Purge: (51. Cloudy)

Time	Temp(C)	Cond(µs)	DO(mg/L)	pH	ORP(mV)	Purge(L/min)	Desc
(1035)	15.52	864	3.46	6.74	320.1	0.3	51. Cloudy
(1040)	15.37	864	2.64	6.70	315.0	"	"
(1045)	15.40	863	2.63	6.73	308.5	"	"
(1050)	16.00	862	2.64	6.73	297.7	"	"
(1055)	16.36	862	2.70	6.73	290.3	"	"
(1100)	16.64	863	2.64	6.73	282.6	"	Clear
(1105)	16.67	863	2.67	6.73	275.0	"	"
(1110)	16.66	863	2.63	6.73	271.2	"	"
(1115)	16.68	862	2.70	6.71	263.1	"	"
(1120)	16.95	861	2.69	6.73	260.7	"	"

- continued on page 121

5WC22 - continued from page 120

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc
(1125) ~~17.16~~	17.16	862 ~~2.77~~	2.79	6.71	258.2	0.3	Clear
(1130)	17.56	861	2.78	6.70	251.3	0.3	Clear
(1130)	Readings stable						
(1150)	17.68	861	3.12	6.69	242.1	Post Sample Reading	

Sample Time: (1135)

Samples Collected: (3) 8260, (2) RSK, (2) TOC, (1) Sulfide
(1) Nitrate, Nitrite, Sulfate 9056

5WC23 ✓

DTW: 9.08 Begin Purge: (1155)

Post Purge DTW: 9.13 Initial Purge: Clear

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc
(1200)	17.71	888	4.67	6.97	274.5	0.3	Clear
(1205)	17.81	882	2.94	6.71	270.7	"	"
(1210)	18.36	879	2.87	6.68	258.3	"	"
(1215)	18.86	880	2.77	6.66	248.3	"	"
(1220)	18.87	878	2.81	6.66	243.5	"	"
(1225)	18.36	878	2.81	6.65	239.1	"	"
(1230)	18.22	875	2.78	6.66	235.0	"	"
(1235)	17.95	876	2.71	6.66	230.2	"	"
(1240)	17.94	876	2.71	6.66	222.0	"	"
(1245)	18.02	874	2.74	6.66	220.1	"	"
(1250)	18.04	874	2.73	6.66	117.7	"	"
(1250)	Readings stable.						
(1310)	18.21	876	3.01	6.67	213.1	"	"

Sample Time: (1255)

Samples Collected: (3) 8260, (2) RSK, (2) TOC, (1) Sulfide
(1) Nitrate, Nitrite, Sulfate 9056

5W12A ✓

DTW: 12.39 Begin Purge: (1320)

Post Purge DTW: 12.40 Initial Purge: ~~Clear~~ Sl. Milky

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc.
(1325)	17.74	175	4.39	7.11	267.9	0.3	Sl. Milky
(1330)	17.65	236	3.15	7.36	274.0	"	Milky
(1335)	17.79	246	2.91	7.42	276.2	"	Milky
(1340)	17.70	246	2.85	7.44	277.1	"	Sl. Milky
(1345)	17.81	245	2.83	7.43	277.4	"	" "
(1350)	17.92	245	2.82	7.45	277.9	"	" "
(1355)	18.25	243	2.81	7.44	277.4	"	" "
(1400)	18.75	243	2.79	7.42	277.6	"	" "
(1405)	19.02	242	2.79	7.41	276.3	"	Sl. Clear
(1405)	Readings stable.						
(1425)	19.85	240	2.97	7.43	274.7	Post Sample Reading	

Sample Time: (1410)

Samples Collected: (3) 8260, (2) RSK, (2) TOC, (1) Sulfide
(1) Nitrate/Nitrite/Sulfate 9056

5W8B ✓

DTW: 15.00 Begin Purge: (1440)

Post Purge DTW: 15.49 Initial Purge: Clear

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc.
(1440)	17.40	56	6.79	5.08	281.6	0.3	clear
(1445)	17.00	55	4.29	4.94	294.0	"	"
(1450)	16.88	55	3.52	4.93	305.9	"	"
(1455)	16.95	54	3.13	4.92	320.1	"	"
(1500)	16.97	54	3.01	4.96	333.2	"	"
(1505)	16.92	53	2.99	4.96	337.6	"	"
(1510)	16.88	53	2.98	4.96	342.1	"	"
(1515)	16.86	53	2.97	4.98	339.6	"	"
(1515)	Readings stable.						
(1530)	16.90	53	3.03	4.97	346.1	"	"

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10/27/10 RAAP FB# 9

B03204-08

~~CJB~~/TQE

5W8B

Sample Time: (1520)

Samples Collected: (3) 8260, (2) RSK, (2) TOC, (1) Sulfide

(1) Nitrate/Nitrite/Sulfate 9056

COMPLETED

11/9/10 ESC

11/17/10

GENERAL

- Weath
- PPE
- Equip
- Decon
- All
- Disp

PAD-1

Sam

Samp

(1) 8290,

PAD-X

Sa

Samp

PAD-2

Samp

Sample

(1) 8290,

PAD-3

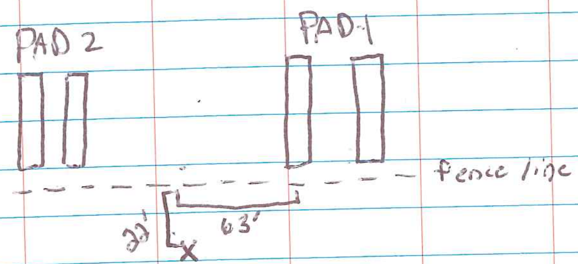
Samp

Sample

(1) 8290,

11/18/10 RAAP B03204-203F TRE/KFC FB#9

SB-1

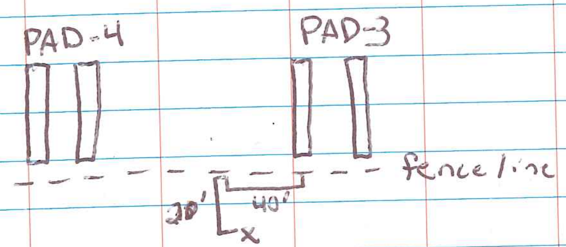


Sample Time (0900)

Samples Collected: (3) 5035/8260B, (1) 8270/TM

(1) 8290, (1) 8330/8332, (1) DRY Weight

SB-2

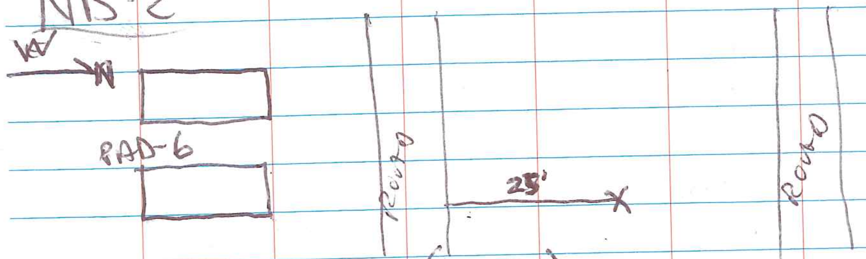


Sample Time (0915)

Samples Collected: (3) 5035/8260B, (1) 8270/TM

(1) 8290, (1) 8330/8332, (1) DRY Weight

NB 2



Sample Time (0930)

Samples Collected: (3) 5035/8260B, (1) 8270/TM,

(1) 8290, (1) 8330/8332 & (1) DRY WEIGHT

12/16/10 RAAP B03204-08 CJR/KFC FB#9

General Notes: Arrived on-site ~0940

- Weather - Snow, 20°s
- PPE - Nitrile gloves, eye protection
- Calibrations: Myron L Ultrameter Serial #614113

YSI-55 -

pH: 4.00 = 4.00, 7.00 = 7.00, 10.00 = 9.99

Conductivity reads 1413µs in a 1413µs standard

- Dedicated tubing & well skirts used at all wells
- All equip deconned between wells
- Purge water disposed of at dedicated location on-site.
- All samples collected and stored/transported on ice.

7W13

DTW: 18.80 Begin Purge (1010)

Post Purge DTW: 25.20 Initial Purge - CLEAR

Time	Temp (C°)	Cond (µs)	DO (mg/L)	pH	ORP (mV)	Purge R (L/min)	Desc.
(1015)	11.6	1290	2.13	7.31	~~N/R~~ 9 (TRE 12-16-10)	.3L/min	clear
(1020)	10.9	1268	2.23	7.24	~~532~~ N/R	"	"
(1025)	10.7	1270	1.96	7.25	5	"	"
(1030)	10.7	1280	1.56	7.24	10	"	"
(1035)	10.6	1288	1.38	7.21	12	"	"
(1040)	10.5	1290	1.35	7.23	12	"	"
(1045)	10.6	1294	1.40	7.23	10	"	"
(1050)	10.7	1292	1.44	7.23	11	"	"
(1055)	10.8	1294	1.48	7.25	9	"	"
(1055)	Readings stable						
(1115)	11.9	1301	1.76	7.28	10	Post sample reading	

Sample Time (1100)

Sample collected: (3) TM

7W13-Dup

Sample Time: (1110)

Sample Collected: (1) TM

4/14/10 RAAP 803204-08 DAS/KFC FB#9

FAL-2 (Cont.) (Cond(us) DO%L pH ORP(mv)
(1150) Readings Stable
(1200) 13.68 681 7.65 6.75 77.5 Post Purge Readings
Sample Time (1155)
Samples Collected: (3)8260, (2)8011, (1)TM

FAL-3 ✓
DTW-57.75 Begin Purge (1208)
Post Purge DTW-58.11 Initial Purge-Clear

Time	Temp(°)	Cond(us)	DO mg/L	pH	ORP(mv)	Purge L	Desc
(1210)	14.65	1182	4.60	6.63	65.8	0.3 gal/min	Clear
(1215)	14.86	1204	3.70	6.60	66.4	"	Clear
(1220)	14.90	1181	2.94	6.59	63.6	"	Sl. Cloudy
(1225)	15.28	1161	2.64	6.60	61.7	"	Sl. Cloudy
(1230)	15.44	1154	2.56	6.60	60.8	"	Sl. Cloudy
(1235)	15.42	1151	2.49	6.59	61.0	"	Sl. Cloudy
(1240)	15.32	1153	2.41	6.59	60.7	"	Sl. Cloudy
(1240) Readings Stable							
(1255)	15.46	1157	2.64	6.58	61.5	Post Purge Reading	

Sample Time (1245)
Samples Collected: (3)8260, (2)8011, (1)TM

WELL-7 ✓
DTW-25.64 Begin Purge (1309)
Post Purge DTW-25.71 Initial Purge-Clear

Time	Temp(°)	Cond(us)	DO mg/L	pH	ORP(mv)	Purge L	Desc
(1310)	13.67	598	7.52	6.24	57.4	0.3 gal/min	Clear
(1315)	13.09	573	6.30	5.98	64.3	"	Clear
(1320)	12.73	536	5.92	5.91	69.4	"	Clear
(1325)	12.65	525	5.91	5.92	70.3	"	Clear
(1330)	12.55	DO 283518	5.92	5.93	71.7	"	Clear
(1335)	12.37	511	5.99	6.00	70.4	"	Clear
(1340)	12.30	520	6.03	6.05	69.6	"	Clear

(39)

4/14/10 RAAP 803204-08 DAS/KFC FB# 9

WELL-7 (Cont.)
(1340) Readings Stable
(1350) 12.41 530 6.25 6.13 68.9 Post Purge Readings
Sample Time (1345)
Samples Collected: (3)8260, (2)8011, (1)TM

STATIC WATER LEVEL TABLE - Unit 16

WELL	DTW	Post Purge DTW	Notes
16-1	41.21 ✓	48.10	
16-2	55.75 ✓	55.79	
16-3	55.60 ✓	60.93	
16-5	3.38 ✓	13.32	
16WC2B	50.76 ✓	55.85	
16mw8	70.67 ✓	71.65	
16WC1B	64.34 ✓		
16WC1A	64.21 ✓	66.34	
16mw9	62.14 ✓	63.54	
16C1			
16C3	57.11		SWL ONLY
16DDH3	DRY		"
16WC2A			"

16-3 ✓
DTW-55.60 Begin Purge (1403)
Post Purge DTW-60.93 Initial Purge-Clear

Time	Temp(°)	Cond(us)	DO mg/L	pH	ORP(mv)	Purge L	Desc
(1405)	14.25	247	7.94	7.74	46.4	0.3 gal/min	Clear
(1410)	14.27	248	6.81	7.77	46.1	"	Clear
(1415)	14.28	248	6.67	7.77	46.4	"	Clear
(1420)	14.50	246	6.42	7.78	46.0	"	Clear
(1425)	14.39	247	6.45	7.80	46.6	"	Clear
(1430)	14.54	248	6.54	7.81	47.3	"	Clear

(40)

16-3 (Cont.)

(1430) Readings Stable

(1445)	14.76	247	6.69	7.79	47.6	Post Purge Reading

Sample Time (1435)

Samples Collected: (6) 8260, (2) 8011, (2) 8270, (6) TM

16-1 ✓

DTW - 41.21 Begin Purge (1503)

Post Purge DTW - 48.10 Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mV)	Purge L/min	Desc
(1505)	13.93	452	8.61	7.07	66.9	0.3	Clear
(1510)	14.35	456	7.95	7.00	66.0	"	Clear
(1515)	14.37	462	7.26	7.05	61.1	"	Clear
(1520)	13.86	462	7.10	7.10	57.6	"	Clear
(1525)	13.74	461	7.13	7.09	57.4	"	Clear
(1530)	13.63	465	7.07	7.09	56.2	"	Clear
(1530)	Readings Stable						
(1542)	13.52	452	7.39	7.07	54.7	Post Purge Reading	

Sample Time (1535)

Samples Collected: (3) 8260, (2) 8270, (1) TM

16-2 ✓

DTW - 55.75 Begin Purge (1554)

Post Purge DTW - 55.79 Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mV)	Purge L/min	Desc
(1555)	13.56	648	9.92	7.13	54.0	0.3	Clear
(1600)	13.73	644	6.84	6.97	56.0	"	Clear
(1605)	13.81	633	6.45	6.97	55.8	"	Clear
(1610)	13.93	608	6.34	6.98	54.6	"	Clear
(1615)	14.13	598	6.21	6.98	53.8	"	Clear
(1620)	14.02	595	6.26	6.97	54.0	"	Clear
(1620)	Readings Stable						
(1634)	13.89	582	6.47	7.10	52.4	Post Purge Reading	

16-2 (Cont)

Sample Time (1625)

Samples Collected: (3) 8260, (2) 8270, (1) TM

16-5 ✓

DTW - 3.38 Begin Purge (1648)

Post Purge DTW - 13.32 Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mV)	Purge L/min	Desc
(1650)	12.61	521	4.54	7.34	42.1	0.3	Clear
(1655)	12.19	524	3.05	7.17	48.6	"	Clear
(1700)	12.10	524	3.30	7.18	51.1	"	Clear
(1705)	12.09	524	3.03	7.21	43.4	"	Clear
(1710)	11.97	523	2.91	7.23	42.5	"	Clear
(1715)	11.96	523	2.77	7.23	42.1	"	Clear
(1715)	Readings Stable						
(1729)	12.14	524	3.30	7.21	48.1	Post Purge Reading	

Sample Time (1720)

Samples Collected: (3) 8260, (2) 8270, (1) TM

16 Spring

Temp(C)	Cond(us)	DO mg/L	pH	ORP(mV)
12.32	559	7.94	7.08	45.4

Sample Time (1735)

Samples Collected: (3) 8260, (2) 8270, (1) TM

General Notes

Weather -

PPE- Eye Protection, Nitrile gloves

Calibrations - YSI 650 MDS

- pH: 4.00 = 4.01 , 7.00 = 7.00 , 10.00 = 9.91
- Conductivity reads 1413 us in 1413 us std.
- DO % = 100

Dedicated tubing and well skirts used at each well

All equipment deconed between each well

Purge water disposed of at dedicated location onsite

All Samples collected stored and transported on ice in coolers

16WC2B ✓

DTW - 50.76 Begin Purge (0842)

Post Purge DTW - 55.85 Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(MV)	Purge K	Desc
0845	12.05	368	8.38	7.49	55.7	0.3 L/min	Clear
0850	12.20	344	3.70	6.51	51.4	"	Clear
0855	12.43	337	2.72	6.51	44.3	"	Clear
0900	12.67	332	1.66	6.54	39.1	"	Clear
0905	12.62	332	1.14	6.57	37.9	"	Clear
0910	12.51	331	1.07	6.56	37.5	"	Clear
0915	12.47	331	1.02	6.55	36.8	"	Clear
(0915)	Readings Stable						
(0929)	12.65	324	1.16	6.52	36.4	Post Purge Reading	

Sample Time (0920)

Samples Collected: (3) 8260, (2) 8270, (1) TM

* Replaced water level port Hole plugs for FAL-3 and 16-3

16MW8 ✓

DTW - 70.67 Begin Purge (0954)

Post Purge DTW - 71.65 Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(MV)	Purge K	Desc
(0955)	12.49	129	5.91	5.32	99.8	≤0.3 L/min	Clear
(1000)	12.59	127	5.18	5.28	102.9	"	Clear
(1005)	12.62	128	2.51	5.36	90.3	"	Clear
(1010)	12.67	127	1.88	5.37	88.7	"	Clear
(1015)	12.84	128	1.40	5.37	86.9	"	Clear
(1020)	13.04	129	1.02	5.38	84.6	"	Clear
(1025)	13.19	129	0.95	5.38	81.7	"	Clear
(1030)	13.28	128	0.91	5.38	82.5	"	Clear
(1030)	Readings Stable						
(1059)	14.28	134	1.18	5.35	67.3	Post Purge Reading	

Sample Time (1035)

Samples Collected: (3) 8260, (2) Sulfide, (1) TM, (1) CN, (1) 9065, (2) 8151, (2) 8270, (2) 8081

16MW9 ✓

DTW - 62.14 Begin Purge (1114)

Post Purge DTW - 63.54 Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(MV)	Purge K	Desc
1115	13.35	695	7.80	6.54	22.5	0.3 L/min	Clear
1120	13.05	859	2.76	6.40	26.1	"	Clear
1125	13.11	896	1.60	6.37	23.8	"	Clear
1130	13.35	930	1.32	6.35	29.3	"	Clear
1135	13.48	935	1.23	6.34	32.2	"	Clear
1140	13.37	947	1.23	6.31	35.3	"	Clear
1145	13.27	951	1.25	6.30	34.8	"	Clear
(1145)	Readings Stable						
(1214)	13.98	943	1.50	6.33	24.1	Post Purge Reading	

Sample Time (1150)

Samples Collected: (3) 8260, (2) Sulfide, (1) TM, (1) CN, (1) 9065, (2) 8151, (3) 8270, (2) 8081

4/15/10 RAAP B032004-08 DAS/CJB FB#9

16WC1A ✓

DTW - 64.21 Begin Purge (1227)

Post Purge DTW - 66.34 Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(MV)	Purge L	Desc
(1230)	13.38	555	9.00	6.81	30.7	0.3 L/min	Clear
(1235)	13.52	620	6.71	6.65	34.5	"	Clear
(1240)	13.43	667	4.20	6.60	33.4	"	Clear
(1245)	13.38	696	2.15	6.58	38.6	"	Clear
(1250)	13.30	711	2.01	6.60	36.1	"	Clear
(1255)	13.27	716	1.96	6.62	35.6	"	Clear
(1255)	Readings Stable						
(1406)	14.03	747	1.31	6.80	12.8	Post Purge Reading	

Sample Time (1300)

Samples Collected: (9)8260, (4) Sulfide, (3) TM, (3) CN, (3) 9065
(6)8151, (6)8270, (6)8081

16WDUP

Sample Time (1315)

Samples Collected: (3)8260, (2) Sulfide, (1) TM, (1) TOC, (1) 9065
(2)8151, (2)8270, (2)8081

16WC1B ✓

DTW - 64.34 Begin Purge (1415)

Post Purge DTW - 64.73 Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(MV)	Purge L	Desc
(1416)	14.66	394	8.15	6.34	55.1	0.3 L/min	Clear
(1420)	15.23	350	4.96	5.99	67.3	"	Clear
(1425)	15.95	327	2.64	5.86	68.7	"	Clear
(1430)	16.14	322	1.96	5.83	66.4	"	Clear
(1435)	15.93	310	1.87	5.81	64.3	"	Clear
(1440)	15.86	306	1.79	5.78	62.0	"	Clear
(1445)	15.75	302	1.70	5.77	61.1	"	Clear
(1445)	Readings Stable						
(1508)	15.48	303	1.95	5.88	50.7		

4/15/10 RAAP B032004-08 DAS/CJB FB#7

16WC1B

Sample Time (1450)

Samples Collected: (3)8260, (2) Sulfide, (1) TM, (1) CN
(1)9065, (2)8151, (2)8270, (2)8081

16C1 ✓

DTW - 48.42 Begin Purge (1520)

Post Purge DTW - Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(MV)	Purge L	Desc
(1525)	15.72	667	4.78	6.21	41.4	0.3 L/min	Clear
(1530)	15.57	645	3.43	6.19	39.4	"	Clear
(1535)	14.81	605	2.88	6.16	37.4	"	Clear
(1540)	15.54	556	2.09	6.08	36.6	"	Clear
(1545)	15.47	548	2.10	6.08	34.8	"	Clear
(1550)	15.51	547	2.04	6.08	33.2	"	Clear
(1555)	15.56	546	2.00	6.08	32.9	"	Clear
(1555)	Readings stable						
(1630)	15.48	539	2.04	6.17	35.2	Post Purge Readin	

Sample Time: (1600)

Samples Collected: (3)8260, (2) Sulfide, (1) TM, (1)
(1)9065, (2)8151, (2)8270, (2)8081

4/19/10 RAAP B03204-08 DAS/TOE FB# 9

General Notes

Weather - Sunny, 60's

PPE - Eye Protection, Nitrile gloves, Hard Hats

Calibrations - YSI 650 MDS

pH: 4.00 = 4.00, 7.00 = 6.99, 10.00 = 10.00

Conductivity reads 1413 us in 1413 us std

DO % = 100

Static Water Level Table - Unit 7

WELL	DTW	Post Purge DTW	Notes
7W12B	24.23 ✓	24.28	
7W9C	13.61 ✓	16.76	
7W10B	14.89 ✓	15.58	
7W10C	18.32 ✓	21.42	
7W13	17.79 ✓	20.15	
7MW6	25.30 ✓	29.66	
7W11B	24.52 ✓	24.53	
7WCA	24.46 ✓		
• 7W9B	22.30 ✓	DTW ONLY	
• 7W11	23.46	"	
• 7MW5	24.52	"	
•			

7W12B ✓

DTW - 24.23 Begin Purge (1012)

Post Purge DTW - 24.28 Initial Purge - Clear

Time	Temp(°)	Cond(us)	pH	DO mg/L	ORP(mV)	Purge K	Desc
(1015)	14.31	700	7.25	8.42	141.3	0.3 gal/min	Clear
(1020)	14.50	690	7.26	7.80	134.6	"	Clear
(1025)	14.75	667	7.34	7.36	126.5	"	Clear
(1030)	14.96	662	7.22	7.40	123.3	"	Clear
(1035)	15.18	658	7.15	7.42	121.9	"	Clear
(1040)	15.26	657	7.12	7.45	119.8	"	Clear
(1040)	Readings Stable					"	

(47)

4/19/10 RAAP B03204-08 DAS/TOE FB#

7W12B

(1103) 15.15 651 7.13 7.50 100.3 Post Purge Readin

Sample Time (1045)

Samples Collected: (3) 8260, (2) Sulfide, (1) TM, (1) CN, (1) 9

(2) 8270, (2) 8151, (2) 8081

7W9C ✓

DTW - 13.61 Begin Purge (1133)

Post Purge DTW - 16.76 Initial Purge - Clear

Time	Temp(°)	Cond(us)	DO mg/L	pH	ORP(mV)	Purge K	Desc
(1135)	13.41	1102	4.17	7.00	89.1	0.3 gal/min	Clear
(1140)	13.33	1120	2.15	6.96	91.6	"	Clear
(1145)	13.23	1140	1.74	6.91	92.9	"	Clear
(1150)	13.09	1155	1.50	6.85	95.5	"	Clear
(1155)	13.17	1165	1.46	6.83	96.7	"	Clear
(1200)	13.22	1174	1.40	6.83	97.0	"	Clear
(1205)	13.30	1177	1.38	6.83	97.3	"	Clear
(1205)	Readings Stable						
(1218)	13.09	1189	1.36	6.93	94.0	Post Purge Reading	

Sample Time (1210)

Samples Collected: (1) TM, (1) CN, (2) 8270

7W10B ✓

DTW - 14.89 Begin Purge (1235)

Post Purge DTW - 15.58 Initial Purge - Clear

Time	Temp(°)	Cond(us)	DO mg/L	pH	ORP(mV)	Purge K	Desc
(1240)	12.47	860	2.91	6.98	98.2	0.3 gal/min	Clear
(1245)	12.22	844	1.85	6.88	101.3	"	Clear
(1250)	12.24	841	1.64	6.86	101.8	"	Clear
(1255)	12.27	841	1.39	6.86	102.0	"	Clear
(1300)	12.33	843	1.30	6.86	101.9	"	Clear
(1305)	12.44	844	1.27	6.83	101.5	"	Clear
(1310)	12.58	845	1.28	6.83	101.3	"	Clear

(48)

7/14/10 KAAP B03204-08 DAS/TQE FB# 9

7W10B (Cont.)

(1310) Readings Stable

(1322) 12.98 844 1.39 6.79 100.0 Post Purge Reading

Sample Time (1315)

Samples Collected: (1) TM, (1) CN, (2) 8270

7W10C ✓

DTW - 18.32 Begin Purge (1349)

Post Purge DTW - 21.42 Initial Purge -

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(MV)	Purge K	Desc
(1350)	13.50	785	1.89	7.20	91.6	0.3 gal/min	Clear
(1355)	13.23	785	0.94	7.18	92.7	"	Clear
(1400)	13.16	783	0.82	7.18	92.0	"	Clear
(1405)	13.05	783	0.74	7.18	91.5	"	Clear
(1410)	13.04	781	0.65	7.18	90.8	"	Clear
(1415)	13.15	782	0.59	7.17	93.9	"	Clear
(1420)	13.08	781	0.57	7.18	90.7	"	Clear
(1425)	13.01	782	0.59	7.18	90.1	"	Clear
(1425)	Readings Stable						
(1440)	13.15	784	0.61	7.21	90.4	Post Purge Reading	

Sample Time (1430)

Samples Collected: (1) TM, (1) CN, (2) 8270

4/20/10 KAAP B03204-08 DAS/TQE FB#

General Notes

Weather - Sunny, 60's

PPE - Eye Protection, Nitrile gloves, Hard Hats

Calibrations - YSI 650 MDS

- pH: 4.00 = 4.00, 7.00 = 6.99, 10.00 = 9.99 (Myron L)
- Conductivity reads 1413 us in 1413 us std
- DO % = 100

- Dedicated tubing and well skirts used at each well
- All equipment deconed between each well
- Purge water disposed of at dedicated location onsite
- All samples collected stored and transported in coolers on ice

7W13 ✓

DTW - 17.79 Begin Purge (0939)

Post Purge DTW - 20.15 Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(MV)	Purge K	Desc
(0940)	12.49	1424	4.88	7.47	69.3	0.3 gal/min	Clear
(0945)	12.97	1434	4.54	7.42	-5.0	"	Clear
(0950)	13.26	1439	2.90	7.39	-23.1	"	Clear
(0955)	13.19	1430	2.53	7.36	-27.6	"	Clear
(1000)	13.10	1428	2.39	7.36	-20.3	"	Clear
(1005)	13.20	1425	2.31	7.33	-18.5	"	Clear
(1010)	13.23	1424	2.30	7.32	-16.3	"	Clear
(1010)	Readings Stable						
(1028)	13.38	1430	2.45	7.33	-3.4	Post Purge Reading	

Sample Time (1015)

Samples Collected: (1) TM, (1) CN, (2) 8270

pH probe malfunction on YSI 650 MDS.
Continued pH and ORP readings with Myron L Ultra

TMW6 ✓

DTW - 25.30
Post Purge DTW - 29.66

Begin Purge (1128)
Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(MV)	Purge K	Desc
(1130)	13.86	1761	2.98	7.50	-62	0.3 L/min	Clear
(1135)	13.93	1834	1.87	7.36	-115	"	Clear
(1140)	14.12	1850	1.41	7.27	-119	"	Clear
(1145)	14.11	1855	1.07	7.20	-120	"	Clear
(1150)	14.17	1844	0.95	7.19	-120	"	Clear
(1155)	14.23	1839	1.10	7.25	-118	"	Clear
(1155)	Readings Stable						
(1218)	14.10	1786	1.12	7.36	-97	Post Purge Reading	

Sample Time (1200)
Samples Collected: (3)8260, (2)Sulfide, (1)TIC, (1)ON, (1)9065
(2)8270, (2)8151, (2)8081

TW11R ✓

DTW - 24.52
Post Purge DTW - 24.53

Begin Purge (1242)
Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(MV)	Purge K	Desc
(1245)	13.87	801	3.82	6.58	56	0.3 L/min	Clear
(1250)	13.66	590	1.53	6.41	77	"	Clear
(1255)	13.69	535	1.07	6.37	84	"	Clear
(1300)	13.51	534	0.98	6.38	50	"	Clear
(1305)	13.55	534	0.95	6.35	52	"	Clear
(1310)	13.76	539	1.02	6.35	51	"	Clear
(1315)	13.75	550	1.05	6.37	47	"	Clear
(1315)	Readings Stable						
(1404)	14.14	5160	1.37	6.48	26	Post Purge Reading	

Sample Time (1320)
Samples Collected: (9)8260, (

TWGA ✓

DTW - 24.46
Post Purge DTW - 25.09

Begin Purge (1420)
Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(MV)	Purge K	Desc
(1425)	13.98	1145	2.41	6.85	44	0.3 L/min	Clear
(1430)	13.91	1282	1.34	6.84	50	"	Clear
(1435)	14.06	1315	1.10	6.82	66	"	Clear
(1440)	13.81	1325	0.99	6.83	76	"	Clear
(1445)	13.95	1307	1.03	6.82	84	"	Clear
(1450)	13.96	1295	1.03	6.80	89	"	Clear
(1455)	14.17	1286	1.06	6.80	91	"	Clear
(1455)	Readings Stable						
(1530)	14.32	1266	1.20	6.87	91	Post Purge Reading	

Sample Time (1500)
Samples Collected: (3)8260, (2)Sulfide, (1)TIC, (1)CH
(1)9065, (2)8270, (2)8151, (2)808

TW DUP

Sample Time (1515)
Samples Collected: (3)8260, (2)Sulfide, (1)TIC, (1)CH
(1)9065, (2)8270, (2)8151, (2)8081

General Notes

Weather - Sunny, 60's, turning Partly Sunny
PPE - Eye Protection, Nitrile gloves, Hard Hats, Cotton Suits
Calibrations - YSI 650 MDS / Myron L Ultrameter
- pH: 4.00 = 4.00, 7.00 = 7.00, 10.00 = 10.01
- Conductivity reads 1413 us in 1413 us std.
- DO% = 100

- Dedicated tubing and well skirts used at each well
- All equipment deconed between each well.
- Purge water disposed of at dedicated location onsite.
- All samples collected stored and transported in coolers on ice

Static Water Level Table - UNIT 5

WELL	DTW	Post Purge DTW	Notes
5W8B	14.76 ✓	15.33	
5W7B	9.12 ✓	9.16	
5W5B	9.39 ✓	10.19	
5WC21	9.44 ✓	9.49	
5WC22	9.45 ✓	9.52	
5WC23	8.86 ✓	8.89	
5W12A	11.20	11.22	
55W7	11.50 ✓	DTW ONLY	
55W5	8.24 ✓	"	
5W9A	1.87 ✓	"	
5W10A	13.32 ✓	"	
5W11A	10.37 ✓	"	
5WCA	13.25	"	
55W6	7.08	"	
55W8	12.14	"	
5WC11	16.01	"	
5WC12	15.68	"	

5W8B ✓

DTW - 14.76 — Begin Purge (1016)
Post Purge DTW - 15.33 — Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mV)	Purge K	Desc
(1020)	13.48	68	8.02	5.18	181	~0.3 L/min	Clear
(1025)	13.57	65	7.41	4.94	179	"	Clear
(1030)	13.52	65	7.46	4.82	171	"	Clear
(1035)	13.44	65	7.42	4.80	168	"	Clear
(1040)	13.23	65	7.44	4.80	167	"	Clear
(1045)	13.17	64	7.38	4.80	166	"	Clear
(1050)	12.94	64	7.44	4.81	164	"	Clear
(1050)	Readings Stable						
(1111)	13.06	63	7.48	4.77	163	Post Purge Reading	

Sample Time (1055)
Samples Collected: (3) 8260, (3) RSK175, (1) Sulfide, (1) 9056, (2) TOC

5W5B ✓

DTW - 9.39 — Begin Purge (1141)
Post Purge DTW - 10.19 — Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mV)	Purge K	Desc
(1145)	11.94	635	5.55	5.48	225	0.3 L/min	Clear
(1150)	11.46	671	3.49	5.53	212	"	Clear
(1155)	11.53	682	3.20	5.56	212	"	Clear
(1200)	11.49	684	3.18	5.57	213	"	Clear
(1205)	11.25	687	3.21	5.58	210	"	Clear
(1210)	11.12	686	3.19	5.58	208	"	Clear
(1215)	11.01	688	3.18	5.59	206	"	Clear
(1215)	Readings Stable						
(1238)	10.94	686	3.43	5.63	206	Post Purge Reading	

Sample Time (1220)
Samples Collected: (3) 8260, (3) RSK175, (1) Sulfide, (1) 90
(1) TM, (2) 8270, (2) TOC

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5W7B

DTW - 9.12 Begin Purge (1258)

Post Purge DTW - 9.16 Initial Purge - Clear

Time	Temp(°C)	Cond(us)	DO mg/L	pH	ORP(mV)	Purge K	Desc
(1300)	10.30	145	8.84	5.26	235	0.3 L/min	Clear
(1305)	10.35	140	8.15	5.09	242	"	Clear
(1310)	10.36	137	8.10	5.06	238	"	Clear
(1315)	10.50	135	8.00	5.06	237	"	Clear
(1320)	11.18	135	7.89	5.07	236	"	Clear
(1325)	11.33	134	7.82	5.10	239	"	Clear
(1330)	11.21	134	7.85	5.07	241	"	Clear
(1330)	Readings Stable						
(1403)	10.87	137	8.19	5.20	237	Post Purge Reading	

Sample Time (1335)

Samples Collected: (9) 8260, (9) RSK175, (3) Sulfide (3) 9056, (6) TOC, (3) TIM, (6) 8270

5W12A

DTW - 11.20 Begin Purge (1433)

Post Purge DTW - 11.22 Initial Purge - Clear

Time	Temp(°C)	Cond(us)	DO mg/L	pH	ORP(mV)	Purge K	Desc
(1435)	13.09	400	9.29	6.60	180	0.3 L/min	Clear
(1440)	12.58	304	8.60	6.90	163	"	Clear
(1445)	12.54	176	8.47	7.01	160	"	Clear
(1450)	12.47	158	8.46	6.90	161	"	Clear
(1455)	12.52	145	8.44	6.83	162	"	Clear
(1500)	12.41	140	8.45	6.86	160	"	Clear
(1505)	12.43	137	8.45	6.82	162	"	Clear
(1505)	Readings Stable						
(1522)	12.69	137	8.43	6.81	161	Post Purge Reading	

Sample Time (1510)

Samples Collected: (3) 8260, (3) RSK175, (1) Sulfide, (1) 9056 (2) TOC

4/22/10 KAHN B03204-08 DAS/TQE FB#4

General Notes

Weather - Sunny, 60's

PPE - Eye Protection, Nitrile gloves, Hard Hats, Cotton Suits

Calibrations - YSI 650 MDS, Myron L Ultrameter

- pH: 4.00 = 4.00, 7.00 = 7.00, 10.00 = 10.00
- Conductivity reads 1413 us in 1413 us std
- DO% = 100

- Dedicated tubing and well skirts used at each well
- All equipment decored between each well
- Purge water disposed of at dedicated location onsite
- All samples collected stored and transported in coolers on ice.

5WC21

DTW - 9.44 Begin Purge (0936)

Post Purge DTW - 9.49 Initial Purge - Clear

Time	Temp(°C)	Cond(us)	DO mg/L	pH	ORP(mV)	Purge K	Desc
(0940)	12.53	597	3.40	3.86	262	0.3 L/min	Clear
(0945)	12.95	615	1.92	3.62	325	"	Clear
(0950)	13.23	613	1.80	3.67	325	"	Clear
(0955)	13.37	619	1.55	3.63	323	"	Clear
(1000)	13.39	620	1.46	3.68	320	"	Clear
(1005)	13.35	621	1.42	3.65	325	"	Clear
(1010)	13.47	622	1.38	3.66	325	"	Clear
(1010)	Readings Stable						
(1053)	13.73	640	1.25	3.64	337	Post Purge Reading	

Sample Time (1015)

Samples Collected: (3) 8260, (3) RSK175, (1) Sulfide, (1) 9056 (1) TIM, (2) 8270, (2) TOC

5W DUP

Sample Time (1030)

Samples Collected: (3) 8260, (3) RSK175, (1) Sulfide, (1) 9056 (1) TIM, (2) 8270, (2) TOC

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SWC22 ✓

DTW - 9.45 Begin Purge (1107)

Post Purge DTW - 9.52 Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mV)	Purge K	Desc
(1110)	13.66	873	2.19	6.56	235	0.3 L/min	Clear
(1115)	13.79	926	0.99	6.77	201	"	Clear
(1120)	13.81	960	0.76	6.80	187	"	Clear
(1125)	13.92	967	0.75	6.80	183	"	Clear
(1130)	14.00	968	0.73	6.82	176	"	Clear
(1135)	14.13	971	0.76	6.83	173	"	Clear
(1140)	14.20	971	0.76	6.83	169	"	Clear
(1140)	Readings Stable						
(1204)	14.59	983	0.80	6.90	162	Post Purge Reading	

Sample Time (1145)

Samples Collected: (3)8260, (2)RSK175, (1)Sulfide, (1)9056 (1)TIM, (2)8270, (2)TOC

SWC23 ✓

DTW - 8.86 Begin Purge (1220)

Post Purge DTW - 8.89 Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mV)	Purge K	Desc
(1225)	13.06	921	5.67	7.22	156	0.3 L/min	Clear
(1230)	12.79	988	1.25	6.90	167	"	Clear
(1235)	12.85	996	1.12	6.88	167	"	Clear
(1240)	13.15	997	1.05	6.86	164	"	Clear
(1245)	13.32	1001	1.08	6.84	164	"	Clear
(1250)	13.46	1001	1.06	6.86	160	"	Clear
(1255)	13.51	1002	1.06	6.85	158	"	Clear
(1255)	Readings Stable						
(1318)	13.74	1007	1.10	6.88	155	Post Purge Reading	

Sample Time (1300)

Samples Collected: (3)8260, (3)RSK175, (1)Sulfide, (1)9056 (1)TIM, (2)8270, (2)TOC

4/27/10 RAAP B03204-08 DAS/TOE FB#C

General Notes

Weather - Partly Sunny, Scattered Showers, 50-60's

PPE - Eye Protection, Nitrile gloves, Cotton Suits,

Calibrations - YSI 650 MDS / Myron L Ultrameter

- pH - 4.00 = 4.00, 7.00 = 7.00, 10.00 = 10.00
- Conductivity reads 1413 us in 1413 us std.
- DO% = 100

- Dedicated tubing and well skirts used at each well
- All equipment deconed between each well
- Purge water disposed of at dedicated location onsite
- All samples collected, stored and transported on ice in cool

Static Water Level Table

WELL	DTW	Post Purge DTW	Notes
13MW1	20.19 ✓	20.35	
13MW2	20.08 ✓	20.85	
13MW3	12.92 ✓	12.97	
13MW4	16.37 ✓	16.43	
13MW5	15.92 ✓	16.46	
13MW6	15.51 ✓	16.05	
13MW7	15.54 ✓	15.66	

13MW3 ✓

DTW - 12.92 Begin Purge (0711)

Post Purge DTW - 12.97 Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mV)	Purge K	Desc
(0715)	11.72	615	7.28	7.30	134	0.3 L/min	Clear
(0720)	11.76	639	6.70	7.10	135	"	Clear
(0725)	11.76	647	6.60	6.98	134	"	Clear
(0730)	11.79	654	6.51	6.96	137	"	Clear
(0735)	11.77	656	6.46	6.98	135	"	Clear
(0740)	11.74	657	6.46	6.96	134	"	Clear
(0740)	Readings Stable						

4/27/10 KHH B03204-08 DAS/TQE FB# 4

13MW3 (Cont.)	(Cond (us)	DO mg/L	pH	ORP	
(0810) 11.88	656	6.56	6.98	142	Post Purge Reading

Sample Time (0745)

Samples Collected: (3) 8260, (2) Sulfide, (2) 8280, (2) 8332/8330
(2) 8081/8082, (2) 8151, (1) 314.0, (1) TM, (1) CN, (2) 8270

13MW4 ✓

DTW - 16.37 Begin Purge (0823)

Post Purge DTW - 16.43 Initial Purge - Clear

Time	Temp (C)	Cond (us)	DO mg/L	pH	ORP (mv)	Purge K	Desc
(0825)	12.15	453	6.70	6.98	145	0.3 l/min	Clear
(0830)	12.16	482	6.56	6.82	145	"	Clear
(0835)	12.15	492	6.59	6.82	149	"	Clear
(0840)	12.17	496	6.60	6.81	152	"	Clear
(0845)	12.20	497	6.60	6.78	151	"	Clear
(0850)	12.19	497	6.61	6.78	149	"	Clear
(0850) Readings Stable							
(0929)	12.16	475	6.83	6.78	157	Post Purge Reading	

Sample Time (0855)

Samples Collected: (3) 8260, (2) Sulfide, (2) 8280, (1) TM, (1) 314.0
(1) CN, (2) 8270, (2) 8151, (2) 8081/8082, (2) 8330/8332

13MW Dup

Sample Time (0910)

Samples Collected: (3) 8260, (2) Sulfide, (2) 8280, (1) TM, (1) 314.0
(1) CN, (2) 8270, (2) 8151, (2) 8081/8082, (2) 8330/8332

4/27/10 KHH B03204-08 DAS/TQE FB#

10MW2 ✓

DTW - 15.81 Begin Purge (1014)

Post Purge DTW - 16.03 Initial Purge - Clear

Time	Temp (C)	Cond (us)	DO mg/L	pH	ORP (mv)	Purge K	Desc
(1015)	13.02	426	9.92	7.25	157	0.3 l/min	Clear
(1020)	12.88	427	9.51	7.29	153	"	Clear
(1025)	12.91	426	9.50	7.28	157	"	Clear
(1030)	12.87	427	9.49	7.32	145	"	Clear
(1035)	12.68	428	9.52	7.43	142	"	Clear
(1040)	12.56	427	9.52	7.40	143	"	Clear
(1045)	12.74	427	9.51	7.35	148	"	Clear
(1045) Readings Stable							
(1208)	13.10	428	9.63	7.40	147	Post Purge Reading	

Sample Time (1050)

Samples Collected: (18) 8260, (3) TM, (3) CN, (3) 9065, (6) 8151
(6) 8270, (6) 8081, (4) 8081, (4) Sulfide

Static Water Level Table - Unit 10

Well	DTW	Post Purge DTW	Notes
10DDH2R	17.74 ✓	17.76	
10D3			
10D3D	16.38 ✓	16.45	
10MW1	15.81 ✓	16.03	
10D4			

4/27/10 RAAP B03204-08 DAS/TOE FB#9

10DDH2R ✓

DTW- 17.74 Begin Purge (1228)

Post Purge DTW-17.76 Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mv)	Purge L	Desc
(1230)	11.56	599	3.11	7.13	159	0.3 L/min	Clear
(1235)	11.19	654	1.00	7.24	142	"	Clear
(1240)	10.98	644	0.95	7.20	122	"	Clear
(1245)	10.89	626	0.98	7.16	116	"	Clear
(1250)	10.85	593	1.15	7.09	116	"	Clear
(1255)	10.86	569	1.49	6.96	118	"	Clear
(1300)	10.97	555	1.62	6.94	120	"	Clear
(1305)	10.98	546	1.68	6.96	120	"	Clear
(1310)	11.02	539	1.74	6.97	122	"	Clear
(1310)	Readings Stable						
(1334)	10.92	515	1.96	6.85	127		

Sample Time (1315)

Samples Collected: (4)8260, (2)Sulfide, (1)TM, (1)CN, (1)9065
(2)8151, (2)8270, (2)8081, (2)8081

(61)

4/28/10 RAAP B03204-08 DAS/TOE FB#10

General Notes

Weather - Heavy fog/light rain

PPE - Eye Protection, Nitrile gloves, Cotton Suits, Rubber boots, Face Shield

Calibrations - YSI 650 MDS / Myron L Ultrameter

- pH: 4.00 = 4.00, 7.00 = 7.01, 10.00 = 10.00
- Conductivity reads 1413 us in 1413 us std
- DO% = 100

- Dedicated tubing and well skirts used at each well
- All equipment deconed between each well
- Purge water disposed of at dedicated location onsite
- All samples collected stored and transported on ice in cooler

13MW06 ✓

DTW - 15.51 Begin Purge (0704)

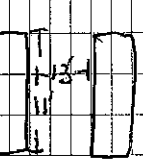
Post Purge DTW-16.05 Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mv)	Purge L	Desc
(0705)	11.56	791	4.34	7.12	137	0.3 L/min	Clear
(0710)	11.95	825	3.54	7.00	139	"	Clear
(0715)	12.10	831	3.44	7.05	140	"	Clear
(0720)	12.16	831	3.44	7.04	143	"	Clear
(0725)	12.19	830	3.39	7.02	144	"	Clear
(0730)	12.17	828	3.37	7.00	144	"	Clear
(0730)	Readings Stable						
(0800)		820	3.53	7.05	146	Post Purge Reading	

Sample Time (0735)

Samples Collected: (3)8260, (2)Sulfide, (2)8480, (1)TM, (1)CN
(2)8270, (1)314.0, (2)8081/8082, (2)8151, (2)8332/8321

PAD-1



Sample Time (0750)

Samples Collected:
(4) 8290

DUP-1

Sample Time (0800)

Samples Collected:
(4) 8290

(62)

4/28/10 RAAP FB# 9
B03204-08
DAS/TQE

10D3D ✓

DTW - 16.38 Begin Purge (1351)

Post Purge DTW - 16.45 Initial Purge - Clear w/rotten "egg" odor

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mv)	Purge k	Desc
(1355)	14.15	646	2.78	7.71	~~-187~~ -187 DC	0.3 L/min	Clear w/rotten odor
(1400)	14.22	647	2.07	7.46	-190	"	"
(1405)	14.47	643	2.89	7.45	-180	"	"
(1410)	14.61	642	3.08	7.43	-174	"	"
(1415)	14.39	642	3.14	7.42	-160	"	"
(1420)	14.20	642	3.15	7.41	-157	"	"
(1425)	14.07	638	3.21	7.41	-155	"	"
(1425)	Readings Stable						
(1448)	14.35	638	3.51	7.45	-149		

Sample Time (1430) Post Purge Reading

Samples Collected: (6)8260, (2)Sulfide, (2)8081, (1)TM, (1)CN
(2)8151, (2)8270, (2)8081, (1)9065

10D3 ✓

DTW - 16.07 Begin Purge (1503)

Post Purge DTW - 16.14 Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mv)	Purge k	Desc
(1505)	13.95	536	4.64	7.42	-85	0.3 L/min	Clear
(1510)	15.20	537	4.02	7.35	1	"	Clear
(1515)	14.76	539	3.40	7.42	30	"	Clear
(1520)	14.57	539	3.22	7.41	54	"	Clear
(1525)	14.68	538	3.22	7.36	63	"	Clear
(1530)	14.66	540	3.20	7.36	66	"	Clear
(1535)	14.80	539	3.25	7.37	70	"	Clear
(1535)	Readings Stable						
(1612)	14.73	550	3.47	7.45	82	Post Purge Reading	

Sample Time (1540)

Samples Collected: (6)8260, (2)Sulfide, (2)8081, (1)TM, (1)CN
(2)8151, (2)8270, (2)8081, (1)9065

4/28/10 RAAP FB#
B03204-08
DAS/TQE

10D4P

Sample Time (1555)

Samples Collected: (6)8260, (2)Sulfide, (2)8081, (1)TM, (1)CN
(2)8151, (2)8270, (2)8081, (1)9065

10D4 ✓

DTW - 22.78 Begin Purge (1626)

Post Purge DTW - Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mv)	Purge k	Desc
(1630)	14.22	337	6.37	7.10	80	0.3 L/min	Clear
(1635)	14.36	332	4.80	7.02	90	"	Sl. Cloud
(1640)	14.51	328	3.69	6.93	101	"	Sl. Cloud
(1645)	14.30	326	3.63	6.91	104	"	Sl. Cloud
(1650)	13.90	325	3.63	6.91	107	"	Sl. Cloud
(1655)	13.96	324	3.66	6.93	108	"	Sl. Cloud
(1655)	Readings Stable						
(1716)	14.23	328	3.78	7.00	112	Post Purge Reading	

Sample Time (1700)

Samples Collected: (6)8260, (2)Sulfide, (2)8081, (1)TM
(1)CN, (1)9065, (2)8151, (2)8270
(2)8081

COMPLETED
5/20/10 FBL

6/28/10 KAAV FB# 9

803204-08
DAS/KFC

General Notes

Weather - Partly Cloudy, 80's
PPE - Eye Protection, Nitrile gloves, Hard Hats
Calibrations - YSI 650 MDS
- pH: 4.00 = 4.00 7.00 = 7.00 10.00 =
- Conductivity reads 1412 us in 1413us std
- DO % = 100%
- Dedicated tubing and wellskirts used at each well.
- All equipment decon'ed between each well.
- Purge water disposed of at dedicated location onsite.
- All samples collected, stored and transported in coolers on ice.

TW13

DTW - 19.30
Post Purge DTW - 25.76

Begin Purge (1045)
Initial Purge - Clear

Time	Temp(C°)	Cond(ms)	DO mg/L	pH	ORP(mv)	Purge(K)	Desc.
(1050)	13.70	1359	1.63	7.01	225.0	0.3 L/min	clear
(1055)	13.91	1357	1.53	6.99	178.3	"	Slt. Cloudy
(1100)	13.65	1366	1.36	7.00	136.2	"	CLEAR
(1105)	13.74	1360	1.17	6.96	122.0	"	CLEAR
(1110)	13.76	1358	1.24	6.94	116.2	"	CLEAR
(1115)	13.80	1356	1.30	6.93	116.2	"	Clear
(1120)	13.78	1353	1.34	6.94	116.3	"	Clear
(1120)	Readings Stable						
	Sample Time (1125)						
	Samples Collected: (2) TW						
(1135)	13.87	1350	1.64	6.95	117.8	Post Purge Readings	

(69)

6/28/10 KAAV FB# 9

803204-09
Verification
DAS/KFC

NewMW9

DTW - 65.65
Post Purge DTW - 66.30

Begin Purge (1156)
Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mv)	Purge K(gpm)	Desc
(1200)	17.58	809	9.24	6.55	201.0	0.3 L/min	Clear
(1205)	17.08	896	5.00	6.37	178.2	"	Clear
(1210)	16.71	913	2.40	6.38	148.0	"	Clear
(1215)	16.83	907	1.68	6.40	137.0	"	Clear
(1220)	17.13	902	1.49	6.39	132.8	"	Clear
(1225)	16.30	892	1.25	6.40	128.9	"	Clear
(1230)	15.96	863	1.20	6.40	126.2	"	Clear
(1235)	15.85	866	1.18	6.39	129.6	"	Clear
(1235)	Readings Stable						
	Sample Time (1240)						
	Samples Collected: (6) 8260						
(1245)	16.18	860	1.26	6.40	131.9	Post Purge Readings	

16WC18

DTW - 68.66
Post Purge DTW - 68.86

Begin Purge (1254)
Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mv)	Purge K(gpm)	Desc
(1255)	17.24	353	5.39	6.03	182.0	0.3 L/min	Clear
(1300)	16.16	291	1.75	5.79	194.9	"	Clear
(1305)	15.74	280	1.30	5.75	197.4	"	Clear
(1310)	15.90	273	1.08	5.75	198.7	"	Clear
(1315)	16.34	273	0.93	5.76	199.9	"	Clear
(1320)	15.98	274	0.86	5.79	202.1	"	Clear
(1325)	16.07	273	0.81	5.80	201.6	"	Clear
(1325)	Readings Stable						
	Sample Time (1330)						
	Samples Collected: (2) 8081						
(1345)	16.90	278	1.25	5.30	232.1	Post Purge Readings	

(70)

6/28/10 RAAP FB#9
B03204-08
DAS/KFC

16 DUP

Sample Time (1340)
Samples Collected: (2) 8081

10MW01 ✓

DTW — 18.13 Begin Purge (1406)
Post Purge DTW - 18.38 Initial Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mV)	Purge K	Desc
(1410)	18.20	391	9.44	7.20	197.6	0.3 L/min	Clear
(1415)	18.34	393	8.90	7.14	241.5	"	Clear
(1420)	18.16	392	8.70	7.07	260.4	"	Clear
(1425)	18.28	392	8.73	7.02	270.5	"	Clear
(1430)	18.00	394	8.76	7.01	276.7	"	Clear
(1435)	17.96	391	8.45	6.94	281.9	"	Clear
(1440)	17.95	392	8.45	6.91	283.7	"	Clear
(1445)	17.90	391	8.41	6.87	285.3	"	Clear
(1445)	Readings Stable						
(1503)	17.78	394	8.70	6.76	286.6	Post Purge Readings	

Sample Time (1450)
Samples Collected: (1) 9066

10-DUP1

Sample Time (1500)
Samples Collected: (1) 9066

6/28/10 RAAP FB#
B03204-08
DAS/KFC

10DDH2R ✓

DTW - 17.76 Begin Purge (1515)
Post Purge DTW - 19.85 Initial / Purge - Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mV)	Purge K	Desc
(1515)	17.43	492	6.99	6.81	160.6	0.8 L/min	Clear
(1520)	18.24	575	5.20	6.89	180.7	"	Clear
(1525)	18.10	615	4.95	6.89	185.3	"	Clear
(1530)	17.87	619	4.46	6.88	186.1	"	Clear
(1535)	16.78	592	4.14	6.73	184.0	"	Clear
(1540)	16.48	550	3.89	6.62	185.2	"	Clear
(1545)	16.27	525	3.90	6.57	188.9	"	Clear
(1550)	16.34	520	4.01	6.57	190.8	"	Clear
(1550)	Readings Stable						
(1612)	16.48	517	3.43	6.47	197.9	Post Purge Readings	

Sample Time (1555)
Samples Collected: (1) 9066

10 DUP-2

Sample Time (1605)
Samples Collected: (1) 9066

7/9/10 KAAP B03204-08 CJB ~~DRS~~ TQE FB#4

General Notes
- weather: sunny 80s - 90s
- PPE: Eye Protection, Nitrile Gloves
- Calibrations: YSI 650 MDS
  pH: 4.00 = 4.00, 7.00 = 7.00, 10.00 = 9.96
  Conductivity reads 1412 us in 1413 us std
  DO% = 100
- Dedicated Tubing and well skirts used at each well
- All equipment deconed between each well
- Purge water disposed of at dedicated location onsite
- All samples collected, stored, and transported in coolers on ice

SWC 21 ✓

DTW: 10.21 Begin Purge (0915)

Post Purge DTW: 10.29 Initial Purge: Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mV)	Purge	Desc
(0920)	17.09	595	3.37	3.55	325.4	≤0.3 L/min	Clear
(0925)	17.10	589	2.21	3.49	362.2	"	clear
(0930)	17.27	590	1.56	3.47	376.6	"	Clear
(0935)	17.51	589	1.42	3.47	384.1	"	clear
(0940)	17.68	588	1.12	3.47	389.9	"	clear
(0945)	18.17	589	0.96	3.47	392.2	"	clear
(0950)	18.66	589	0.84	3.48	393.2	"	clear
(0955)	18.75	589	0.79	3.50	389.4	"	clear
(1000)	18.87	589	0.80	3.51	388.4	"	Clear
(1000)	Readings Stable					Post Purge Reading	
(1017)	18.57	599	1.00	3.48	378.4		

Sample Time (1005)
Samples Collected: (4) 8270

7/9/10 KAAP B03204-08 CJB ~~DRS~~ TQE FB#

SWC 22 ✓

DTW: 10.23 Begin Purge (1031)

Post Purge DTW: 10.26 Initial Purge: Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mV)	Purge	Desc
(1035)	16.73	913	1.26	6.15	316.5	≤0.3 L/min	clear
(1040)	16.53	906	0.72	6.18	285.6	"	clear
(1045)	16.48	903	0.59	6.22	260.4	"	Clear
(1050)	16.88	899	0.45	6.17	251.0	"	Clear
(1055)	17.24	901	0.40	6.17	237.0	"	clear
(1100)	17.25	901	0.35	6.19	228.0	"	Clear
(1105)	17.25	901	0.33	6.20	217.6	"	Clear
(1110)	17.32	901	0.32	6.21	209.4	"	Clear
(1115)	17.41	900	0.31	6.20	204.4	"	Clear
(1120)	17.65	900	0.31	6.18	199.5	"	Clear
(1125)	17.71	901	0.31	6.18	195.1	"	Clear
(1125)	Readings Stable						
(1141)	16.95	905	0.42	5.89	209.4	Post Purge R[eading]	

Sample Time (1130)
Samples Collected: (4) 8270

SWC ~~22~~ 23 ✓

DTW: 9.65 Begin Purge (1158)

Post Purge DTW: Initial Purge: Clear

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mV)	Purge	Desc
(1200)	20.11	965	5.07	6.98	171.6	≤0.3 L/min	clear
(1205)	18.87	957	2.92	6.79	193.2	"	clear
(1210)	18.94	947	2.64	6.53	204.9	"	clear
(1215)	18.96	929	1.34	6.42	208.4	"	clear
(1220)	18.64	923	1.18	6.40	209.2	"	clear
(1225)	18.37	911	0.92	6.40	208.0	"	Clear
(1230)	17.01	910	0.87	6.38	206.4	"	clear
(1235)	17.37	908	0.75	6.94	206.0	"	Clear

7/9/10

RAAP
BO3204-08
C3B1RDE

FB#9

SWC 23 cont

Time	Temp(C)	Cond(us)	DO mg/L	pH	ORP(mV)	purge	Desc
(1240)	17.41	912	0.69	6.35	203.9	F0.34 min	Clear
(1245)	17.54	908	0.71	6.36	203.1	"	Clear
(1250)	17.60	910	0.73	6.37	201.0	"	Clear
(1250)	Readings Stable						
(1310)	18.01	915	1.02	6.42	208.7	Post Purge Reading	

Sample Time (1255)
Samples Collected: (4) 8270

COMPLETED
7/13/10 RAH

(75)

07/23/10

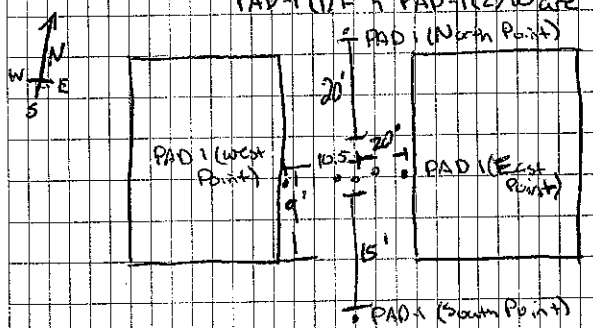
RAAP-OBG
BO3204-203E
TQE/CSB

FB#

General Notes
- Weather - Sunny 80°
- PPE: Eye Protection, Nitrile Gloves, Chemical Resistant Boo
  White Cotton Flame Retardant Coveralls,
- All equipment deconned after sampling
- Dedicated equipment used at each sampling location
- Decon water containerized & disposed of at dedicated
  location onsite
- Samples collected, stored and transported in coolers
  on ice

PAD-1

PAD-1 (1) E & PAD-1 (2) W are collocated duplicate samples
located 6' to th
east & west of th
original location
Sampling location (P



PAD-1 (1) E Sample Time (0850)
Samples Collected: (2) 8290 soil/cinder mix

PAD-1 (2) W Sample Time (0840)
Samples Collected: (2) 8290 soil/cinder mix

PAD-1 Sample Time (0830)
Samples Collected: (2) 8290 soil/cinder mix

PAD-1 (West Point) Sample Time (0815)
Samples Collected: (2) 8290 cinders

PAD-1 (East Point) Sample Time (0755)
Samples Collected: (2) 8290 cinders

PAD-1 (North Point) Sample Time (0745)
Samples Collected: (2) 8290 soil/cinder mix

PAD-1 (South Point)
Sample Time (0805)
Samples Collected: (2)
soil/cinder mix

(76)

10/13/10 RAAP FB#9

B03204-08
CJB/~~KFC~~ ~~TQE~~ KFC
CTD 10/13/10

General Notes

- Weather - Mostly cloudy, stormy, 60°s
- PPE - Nitrile gloves, Eye protection
- Calibrations - YSI 650 MDS
  - pH: 4.00 = 4.00, 7.00 = 7.00, 10.00 = 9.98
  - Conductivity: 1,413 µS = 1,413 µS
  - DO % = 100 %
- Dedicated tubing and well skirts used at all wells
- All equipment decanned between wells
- Purge water disposed at dedicated location on site
- All samples collected, then stored and transported in ice.

Static Water Level Table - Unit 16

Well	DTW	Post Purge DTW	Notes
16-1	47.40	51.80	
16-2	55.77	55.87	
16-3	56.94	71.05	
16-5	3.20	3.22	
16WC2B	54.92	66.68	
16MW8	74.58	Below top of pump	
16WC1B	70.70	71.32	
16WC1A	70.28	71.11	
16MW9	67.09	67.54	
16C1	50.15	50.17	
16C3	68.46	—	GW Not sampled
16DDH3	Dry	—	" " "
16WC2A	Dry	—	" " "

10/13/10 RAAP FB#9

B03204-08
CJB/KFC

16-3 ✓

DTW - 56.94 Begin Purge: (10:15)
Post Purge DTW - 71.05 Initial Purge: (Clear)

Time	Temp(C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge(L/min) K	Desc
(1020)	14.27	251	6.83	7.62	215.6	0.3	Clear
(1025)	14.52	247	6.59	7.75	219.4	"	"
(1030)	14.65	245	6.54	7.77	223.7	"	"
(1035)	15.02	241	6.71	7.81	231.8	"	"
(1040)	14.32	239	6.53	7.80	241.8	"	"
(1045)	14.16	238	6.45	7.83	249.2	"	"
(1050)	14.12	236	6.46	7.85	256.2	"	"
(1055)	14.30	235	6.61	7.81	263.8	"	"
(1100)	14.27	237	6.76	7.79	271.0	"	"
(1105)	14.23	234	6.78	7.78	275.8	"	"
(1105)	READINGS STABLE						Post Purge Readings
(1126)	14.30	235	6.76	7.86	279.2	"	"

SAMPLE TIME (1110)

*Samples Collected: (6) 8260, (2) 8011, (2) 8270D (1) TM, (1) TM + Hg

*(Samples collected for both units 353 & 16 from this shared well)

16-1 ✓

DTW - 47.40 Begin Purge (11:40)
Postpurge DTW - 51.80 Initial Purge: Clear

Time	Temp(C)	Cond(ms)	DO(mg/L)	pH	ORP(mv)	4/min Purge	K	Desc.
(1150)	15.07	465	7.04	7.07	317.8	0.3 L/min		Clear
(1155)	15.49	477	7.02	7.09	318.0	"		"
(1200)	15.23	482	7.06	7.10	318.8	"		"
(1205)	14.97	484	7.07	7.09	319.4	"		"
(1210)	15.00	484	7.06	7.09	319.7	"		"
(1215)	15.18	483	7.07	7.07	320.8	"		"

16-1 - continued from page 90

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc
(1220)	15.22	484	7.09	7.08	314.7	0.3 L/min	Clear
(1220)	Readings stable					"	"
(1230)	15.22	486	7.17	7.03	317.7	"	"

Sample Time: (1225)
Samples Collected: (3) 8260, (2) 8270, (1) TM

16-2 ✓

DTW - 55.77 Begin Purge: (1245)
Post Purge DTW - 55.87 Initial Purge: Clear

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc
(12:50)	14.41	644	5.34	6.69	319.5	0.3 L/min	Clear
(12:55)	14.26	670	4.71	6.64	316.1	"	"
(13:00)	14.96	673	4.64	6.65	312.7	"	"
(13:05)	15.22	675	4.72	6.61	309.9	"	"
(13:10)	15.21	677	4.79	6.60	308.2	"	"
(13:15)	14.98	674	4.77	6.62	309.4	"	"
(13:20)	15.51	677	4.84	6.69	307.9	"	"
(13:25)	15.25	675	4.91	6.69	308.8	"	"
(13:30)	15.18	672	4.93	6.69	310.1	"	"
(13:30)	Readings stable		CJB 10/13/10	~~6.56~~	~~312.8~~	"	"
~~(13:45)~~ 13:45		654	5.17	6.56	312.8	"	"

Sample Time: (1335)
Samples Collected: (3) 8260, (2) 8270, (1) TM

16-5 ✓

DTW - 3.20 Begin Purge: (1400)
Post Purge DTW - 3.22 Initial Purge: Clear

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16-5 - continued from page 91

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc.
(1405)	14.14	520	2.14	7.17	224.4	0.3	Clear
(1410)	14.15	523	2.23	7.16	223.5	"	"
(1415)	14.07	522	2.04	7.13	222.7	"	"
(1420)	14.06	522	1.89	7.14	221.7	"	"
(1425)	14.01	522	1.83	7.14	223.2	"	"
(1430)	13.93	522	1.63	7.14	222.1	"	"
(1435)	13.90	522	1.49	7.13	222.0	"	"
(1440)	13.80	521	1.42	7.14	221.6	"	"
(1445)	13.75	521	1.38	7.14	221.3	"	"
(1445)	Readings stable						
(1500)	14.13	521	1.60	7.15	222.0	"	"

Sample Time: (1450)
Samples Collected: (3) 8260, (2) 8270, (1) TM

Spring 16

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	~~Purge K (L/min)~~	~~Desc~~
(1504)	14.32	571	8.09	7.10	113.2	CJB 10/13/10	

Sample Time: (1505)
Samples Collected: (3) 8260, (2) 8270, (1) TM

16WC2B ✓

DTW - 54.92 Begin Purge: (1510)
Post Purge DTW - 66.68 Initial Purge: Clear

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc
(1515)	15.59	324	9.09	7.55	235.9	0.3 L/min	Clear
(1520)	15.27	323	4.31	7.59	204.3	"	"
(1525)	14.85	321	1.07	7.67	177.1	"	"
(1530)	15.06	322	0.87	7.64	153.9	"	"
(1535)	15.67	324	0.96	7.64	127.4	"	"

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10/13/10 — RAAP B03204-08 CJB/KFC — FB #9

16WC2B – continued from page 92

Time	Temp(°C)	Cond(µS)	DO (mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc.
(1540)	14.93	321	0.78	7.57	106.7	0.3	Clear
(1545)	14.92	321	0.68	7.54	94.4	"	"
(1550)	14.86	322	0.69	7.53	90.4	"	"
(1555)	14.99	321	0.71	7.55	89.9	"	"
(1600)	14.94	322	0.70	7.54	83.8	"	"
(1600)	Readings stable.						
(1610)	15.03	322	0.94	7.57	80.1	"	" Post Purge

Sample Time: (1605)

Samples Collected: (3) 8260, (2) 8270, (1) TM

10/14/10 — RAAP B03204-08 CJB/TQE — FB #9

General Notes

- Weather - Cloudy, steady wind, 60's
- PPE - Nitrile Gloves, Eye Protection
- Calibrations - YSI 650 MDS
  - pH: 4.00 = 4.00, 7.00 = 7.00, 10.00 = 9.98
  - Conductivity: 1,413 µS = 1,413 µS
  - DO % = 100 %
- Dedicated tubing and well skirts used at all wells.
- All equipment decanned b/n wells
- Purge water disposed at dedicated location on site.
- All samples collected, then stored and transported on ice.

16MW8 ✓

DTW - 74.58 — Begin Purge: (1000)

Post Purge DTW - Below top of pump — Initial Purge: Clear

Time	Temp(°C)	Cond(µS)	DO (mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc
(1005)	13.56	89	1.27	4.87	237.4	≤ 0.3	Clear
(1010)	13.75	98	1.12	4.93	226.1	≤ 0.3	Clear
(1015)	13.77	100	1.08	4.94	215.7	≤ 0.3	"
(1020)	13.79	101	1.05	4.94	210.7	"	"
(1025)	13.82	102	1.03	4.93	208.8	"	"
(1030)	13.83	103	1.01	4.95	219.9	"	"
(1035)	13.99	105	1.06	4.96	198.6	"	"
(1040)	14.09	105	0.98	4.86	197.0	"	"
(1045)	14.15	105	0.97	4.84	196.7	"	"
(1050)	14.19	105	0.97	4.82	195.8	"	"
(1055)	14.23	105	0.95	4.82	193.2	"	"
(1055)	Readings stable						
(1140)	14.55	105	1.23	4.91	199.8	"	" Post Purge Reading

Sample Time: (11:00)

Samples Collected: (3) 8260, (2) 8270, (1) TM

Low flow at end, difficult to collect sample.

16MW9 ✓

DTW - 67.09 Begin Purge: (1200)
Post Purge DTW - 67.54 Initial Purge: Clear

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc.
(1205)	14.98	712	8.31	6.75	289.1	0.3	Clear
(1210)	14.54	782	7.89	6.70	299.5	"	"
(1215)	14.40	811	7.19	6.65	298.4	"	"
(1220)	15.07	879	5.25	6.54	207.6	"	"
(1225)	15.73	930	1.73	6.49	145.1	"	"
(1230)	15.86	935	1.58	6.49	132.0	"	"
(1235)	15.77	939	1.44	6.50	117.9	"	"
(1240)	14.45	937	1.40	6.51	109.3	"	"
(1245)	15.03	930	1.25	6.49	104.3	"	"
(1250)	15.13	926	1.13	6.49	100.0	"	"
(1255)	15.23	927	1.18	6.50	98.6	"	"
(1255)	Readings stable.						
(1305)	15.46	938	1.44	6.50	103.7	"	"

Sample Time: (1300)
Samples Collected: (3) 8260, (2) 8270, (1) TM

16WC1A ✓

DTW - 70.28 Begin Purge: (1315)
Post Purge DTW - 71.11 Initial Purge: Clear

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc.
(1320)	15.62	578	9.40	7.34	233.4	0.3	Clear
(1325)	14.77	707	3.41	6.86	232.4	"	Clear
(1330)	14.73	713	2.55	6.86	224.1	"	"
(1335)	14.86	718	1.90	6.87	149.1	"	"
(1340)	14.62	719	1.55	6.88	105.0	"	"
(1345)	14.37	717	1.04	6.89	56.5	"	"
(1350)	14.45	717	0.99	6.90	49.9	"	"
(1355)	14.52	718	1.03	6.91	47.8	"	"

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16WC1A - continued from page 95

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc.
(1355)	Readings stable						
(1440)	15.12	724	1.75	7.03	38.1	0.3	Clear

Sample Time: (1400)
Samples Collected: (9) 8260, (6) 8270, (3) TM

16W-Dup (From 16WC1A)
Sample Time: (1445)
Samples Collected: (3) 8260, (2) 8270, (1) TM

16WC1B ✓

DTW - 70.70 Begin Purge: (1500)
Post Purge DTW - 71.32 Initial Purge: Clear

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc
(1505)	15.35	468	5.24	6.58	243.5	0.3	Clear
(1510)	15.26	527	2.41	6.52	239.3	"	"
(1515)	15.00	492	1.82	6.44	234.1	"	"
(1520)	14.86	461	1.55	6.37	230.0	"	"
(1525)	14.81	445	1.40	6.34	227.5	"	"
(1530)	14.87	446	1.02	6.29	223.7	"	"
(1535)	14.98	448	1.08	6.34	222.7	"	"
(1540)	15.01	449	1.12	6.33	222.1	"	"
(1540)	Readings stable.						
(1550)	15.97	454	1.52	6.38	243.4	"	"

Sample Time: (15:45)
Samples Collected: (3) 8260, (2) 8270, (1) TM

B03204-08
CJB/TQE

16C1 ✓

DTW - 50.15 Begin Purge: (1600)
Post Purge DTW - 50.17 Initial Purge: Clear

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc.
(1605)	15.19	488	9.25	6.80	269.6	0.3	Clear
(1610)	14.44	669	2.53	6.44	272.4	"	"
(1615)	14.94	706	1.84	6.45	265.7	"	"
(1620)	15.06	722	1.57	6.45	262.6	"	"
(1625)	15.26	730	1.44	6.44	259.3	"	"
(1630)	15.29	731	1.42	6.44	258.4	"	"
(1635)	15.27	735	1.42	6.44	258.0	"	"
(1635)	Readings stable.						
(1645)	15.52	742	1.70	6.58	271.1	"	"

Sample Time: (1640)
Samples Collected: (3) 8260, (2) 8270, (1) TM

COMPLETED
11/9/10 EDL

B03204-08
CJB/KFC

GENERAL NOTES:
- Weather - Clear - 40°s
- PPE - White cotton flame retardant coveralls, Nitrile Gloves, Eye Protection, Steel toed boots
- Calibrations: YSI 600 MDS
  pH: 4.00 = 4.00 7.00 = 7.00 10.00 = 10.00
  Conductivity reads 1413 µs in a 1413 µs standard
  DO% = 100 %
- Dedicated tubing and well skirts used at all wells.
- All equipment decanned between wells.
- Purge water disposed of at dedicated location on-site.
- All samples collected, then stored and transported on ice.

BMW3 ✓

DTW - 12.30 Begin Purge: (0725)
Post Purge DTW - 13.70 Initial Purge: Clear

TIME	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Clear
(0725)	15.92	604	7.19	6.87	374.9	0.3	clear

Note: Debris from stormwater over flowing well head during flooding has caused a dense mat of pine needles and other small fines of plant matter to form a layer at the surface of the water column. It took a bailer and several deployments of the bailer to bust through the fibarous mat in order to ~~take~~ collect the water level.

(0730)	16.02	605	4.85	6.94	285.0	0.3	Clear
(0735)	16.07	605	4.75	6.97	264.1	"	"
(0740)	16.20	608	4.84	6.97	237.8	"	"
(0745)	16.17	608	4.88	6.99	230.1	"	"
(0750)	16.20	608	4.91	6.98	229.7	"	"
(0755)	16.23	608	4.92	6.96	229.6	"	"
(0755)	Readings stable.						
(0810)	16.68	610	4.92	6.96	233.2	"	"

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CJB 10/19/10

~~W~~16-2 Repaired defective pump fitting on well head due to stress crack in existing hardware. Removed defective part, applied ~~pipe dope~~ teflon tape to fitting and secured onto well cap. (back) CJB 10/19/10

Event took approx. 1 hour.

- Weather - Overcast, rainy, 50's
- PPE - Nitrile gloves, eye protection, work boots
- CALIBRATIONS: 451 650

pH: 4.00 = 4.00, 7.00 = 7.00, 10.00 = 10.00

Conductivity reads 1413 µS in a 1413 µS standard.

DO % = 99.8 %

- Dedicated tubing and well skirts used at all wells.
- All equipment deconned between wells.
- Purge water disposed of at dedicated location on-site.
- All samples collected, stored and transported on ice.

Static Water Level Table - Unit 10

Well	DTW	Post Purge DTW	Notes
10DDH2R	21.42	22.14	
10D3	20.08	20.12	
10D3D	19.84	19.87	
10MW1	19.72	20.00	
10D4	22.90	22.94	

10MW1 ✓

DTW - 19.72 Begin Purge: (10:25)

PostPurge DTW - 20.00 Initial Purge: Clear

Time	Temp (C°)	Cond (µS)	DO (mg/L)	pH	ORP (mv)	Purge Rate (L/min)	Desc.
(10:35)	14.66	429	6.74	7.33	279.0	0.3	Clear
(10:40)	14.67	429	6.01	7.35	283.9	"	"
(10:45)	14.68	430	5.77	7.36	291.1	"	"
(10:50)	14.68	430	5.70	7.36	299.3	"	"
(10:55)	14.69	429	5.70	7.35	303.0	"	"
(11:00)	14.70	429	5.69	7.37	306.9	"	"
(11:05)	14.78	430	5.68	7.37	310.8	"	"
(11:05)	Readings stable						
~~11:30~~ 11:20 CJB 10/20/10	14.80	430	5.69	7.39	322.0	"	" Post Purge

10MW1

Sample Time: (11:10)
Samples Collected: (6) 8260, (1) TM, (2) 8270, (1) CN

10DDH2R ✓

DTW: 21.42 Begin Purge: (11:25)
Post Purge DTW: 22.16 Initial Purge:

Time	Temp(°C)	Cond(µs)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc
(11:30)	13.67	665	1.60	7.20	299.2	0.3	Clear
(11:35)	13.74	662	1.84	7.14	291.1	"	"
(11:40)	13.76	663	1.94	7.12	288.9	"	"
(11:45)	13.77	664	2.13	7.12	287.9	"	"
(11:50)	13.76	666	2.41	7.13	287.9	"	"
(11:55)	13.76	668	2.66	7.14	289.2	"	"
(12:00)	13.83	670	2.90	7.13	291.3	"	"
(12:05)	13.89	671	2.97	7.12	291.8	"	"
(12:10)	13.96	672	3.09	7.12	292.6	"	"
(12:15)	14.20	673	3.06	7.12	292.8	"	"
(12:15)	Readings stable						
(12:50)	14.06	679	3.15	7.11	286.1	"	" Post Sample

Sample Time: (12:20)
Samples Collected: (18) 8260, (3) TM, (6) 8270, (3) CN

10D3D ✓

DTW: 19.86 Begin Purge: (12:55)
Post Purge DTW: 19.87 Initial Purge: Clear

Time	Temp(°C)	Cond(µs)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc.
(13:00)	14.59	670	2.04	7.27	-114.0	0.3	Clear
(13:05)	14.44	675	2.25	7.35	-76.7	"	"
(13:10)	14.48	684	2.08	7.37	-121.5	"	"
(13:15)	14.72	686	2.08	7.35	-132.1	"	"
(13:20)	15.29	688	2.19	7.37	-133.9	"	"
(13:25)	15.61	691	2.18	7.35	-133.9	"	"

10D3D

Time	Temp(°C)	Cond(µs)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc
(1330)	15.53	690	2.30	7.37	-135.8	0.3	"
(1335)	15.72	689	2.18	7.37	-138.6	"	"
(1335)	Readings stable.						
(1350)	16.01	694	2.29	7.34	-134.6	"	" Post sample

Sample Time: (1340), Samples Collected: (6) 8260, (1) TM, (2) 8270 (1) CN

10D3 ✓

DTW: 20.08 Begin Purge: (14:00)
Post Purge DTW: 20.12 Initial Purge: Clear

Time	Temp(°C)	Cond(µs)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc.
(1405)	14.96	619	4.99	7.14	-13.4	0.3	Clear
(1410)	15.13	639	3.69	7.15	68.6	"	"
(1415)	14.95	651	3.36	7.18	89.9	"	"
(1420)	14.57	658	3.22	7.19	101.1	"	"
(1425)	14.36	663	3.04	7.22	110.9	"	"
(1430)	14.29	662	2.94	7.22	120.5	"	"
(1435)	14.54	665	2.93	7.22	129.9	"	"
(1440)	14.64	667	2.95	7.22	134.8	"	"
(1445)	14.57	666	3.01	7.22	144.1	"	"
(1450)	14.58	668	2.90	7.22	150.4	"	"
(1455)	14.70	668	2.91	7.23	153.9	"	"
(1500)	14.71	669	2.88	7.23	158.7	"	"
(1505)	14.67	670	3.01	7.24	162.0	"	"
(1505)	Readings stable.						
(1510)	14.79	673	3.52	7.24	176.7	"	" Post Sample

Sample Time: (1510)
Samples Collected: (6) 8260, (1) TM, (2) 8270, (1) CN

10DUP

Sample Time: (1520)
Samples Collected: (6) 8260, (1) TM, (2) 8270 (1) CN

10/20/10 — RAAP — FB#9

1004 ✓

B03204-08
CSB/TGE

DTW: 22.90 — Begin Purge: (1535)

Post Purge DTW: 22.94 — Initial Purge: Clear

Time	Temp (°C)	Cond (µS)	DO (mg/L)	pH	ORP (mV)	Purge K (L/min)	Desc.
(1540)	16.50	381	3.52	6.88	202.9	0.3 L/min	Cloudy
(1545)	16.67	394	3.24	6.83	203.2	"	"
(1550)	16.75	396	3.34	6.86	201.4	"	"
(1555)	16.81	395	3.52	6.87	200.9	"	"
(1600)	16.52	396	3.50	6.85	202.1	"	Sl. Cloudy
(1605)	16.46	396	3.49	6.83	204.7	"	Clear
(1610)	16.43	397	3.48	6.82	213.9	"	"
(1615)	16.48	397	3.47	6.80	215.3	"	"
(1620)	16.46	397	3.46	6.82	217.9	"	"
(1625)	16.59	397	3.40	6.80	220.0	"	"
(1625)	Readings stable						
(1635)	16.91	395	3.56	6.77	227.8	"	" Post Sample

Sample Time: (1630)

Samples Collected: (6) 8260, (1) TM, (2) 8270, (1) CN

COMPLETED
11/9/10 ESW

10/25/10 — RAAP — F.B.#9

B03204-08
CSB/TGE

- Weather: Overcast
- PPE: Nitrile Gloves, Eye Protection
- Calibrations: 451'650
  pH: 4.00 = 4.00, 7.00 = 7.00, 10.00 = 9.99
  Conductivity: reads 1413 µs in a 1413 µs standard.
  DO% = 99.8%
- Dedicated tubing and well skirts used at all wells.
- All equipment decon'ed between wells
- Purge water disposed of at dedicated location on-site.
- All samples collected and stored/transported on ice.

STATIC WATER-LEVEL TABLE-UNIT 7

Well	DTW	Post Purge DTW	Notes
7W12B	24.86	24.94	
7W9C	14.55	16.89	
7W10B	15.67	16.08	
7W10C	21.39	21.55	
7W13	19.36	21.42	
7MW6	26.58	26.98	
7W11B	25.19	25.23	
7WCA	25.03	25.70	

- other wells on page 114

7W12B ✓

DTW - 24.86 — Begin Purge: (0955)

Post Purge DTW - 24.94 — Initial Purge: Clear

Time	Temp (C°)	Cond (µS)	DO (mg/L)	pH	ORP (mV)	Purge K (L/min)	DESC
~~1456~~ 1000	14.56	662	12.30	7.05	316.1	0.3	Clear
1005	14.39	670	8.63	7.09	324.1	"	"
1010	14.33	676	7.26	7.10	331.0	"	"
1015	14.31	677	6.93	7.09	334.7	"	"
1020	14.35	676	6.83	7.11	339.7	"	"
1025	14.36	675	6.71	7.13	341.2	"	"
1030	14.43	674	6.68	7.14	343.0	"	"

10/25/10 RAAP B032404-08 CSB/TQE F.B.#9

TW12B - cont

Time	Temp(C)	Cond(µs)	DO mg/L	pH	ORP(mV)	purge L	Desc
(1035)	14.44	672	6.66	7.12	346.7	0.3 L/min	clear
(1040)	14.46	674	6.69	7.11	344.6	"	"
(1040)	Readings Stable						
(1103)	14.35	670	7.01	7.10	329.7	post sample Reading	

Sample Time (1045)
Samples Collected: (1) TM, (2) 8270, (1) CN
↑ Heavy rain during purge / light rain during sample

TW9C ✓
DTW - 14.55
Post Purge DTW - 16.89

Begin Purge (11:30)
Initial Purge - Clear

Time	Temp(C)	Cond(µs)	DO mg/L	pH	ORP(mV)	purge L	Desc
(11:35)	14.02	1208	8.84	7.09	224.9	0.3	Clear
(11:40)	13.99	1212	8.62	7.08	223.7	"	"
(1145)	13.96	1214	8.31	7.06	221.1	0.3	"
(1150)	13.94	1216	8.01	7.01	221.6	"	" Air bubble on PO
(1155)	13.97	1216	7.02	7.00	221.7	0.3	Clear
(1200)	13.74	1242	5.54	6.97	212.0	"	"
(1205)	13.62	1254	4.94	6.93	199.8	"	"
(1210)	13.72	1254	4.45	6.96	190.2	"	"
(1215)	13.99	1256	4.46	6.97	169.1	"	"
(1220)	14.11	1256	4.26	6.97	157.8	"	"
(1225)	14.19	1254	4.21	6.97	147.0	"	"
(1230)	14.26	1251	4.15	6.97	144.1	"	"
(1235)	14.31	1247	4.19	6.97	141.0	"	"
(1240)	14.39	1242	4.14	6.94	140.1	"	"
(1240)	Readings Stable						
(1252)	14.20	1239	4.52	6.96	128.1	post sample	

Sample Time (1245)
Samples Collected: (1) TM, (2) 8270, (1) CN

10/25/10 RAAP B032404-08 CTB/TQE F.B.#9

TW10B ✓
DTW - 15.67
Post Purge DTW - 16.08

Begin Purge (1305)
Initial Purge - Clear

Time	Temp(C)	Cond(µs)	DO mg/L	pH	ORP(mV)	purge L	Desc
(1310)	14.44	957	4.82	6.98	278.1	0.3	Clear
(1315)	14.64	970	4.50	6.98	279.0	"	"
(1320)	14.95	977	4.34	6.98	281.2	"	"
(1325)	14.98	979	4.32	6.98	282.6	"	"
(1330)	15.15	981	4.31	6.99	288.4	"	"
(1335)	15.26	989	4.08	6.97	294.7	"	"
(1340)	15.44	989	4.18	7.00	289.1	"	"
(1345)	15.52	989	4.17	7.00	289.4	"	"
(1350)	15.60	990	4.17	7.00	288.9		
(1350)	Readings stable						
(1400)	15.76	981	4.47	6.98	285.5	Post sample Readings	

Sample Time: (1355)
Samples Collected: (1) TM, (2) 8270, (1) CN

TW10C ✓
DTW - 21.39
Post Purge DTW - 21.35

Begin Purge: (1410)
Initial Purge: Clear

Time	Temp(C)	Cond(µs)	DO mg/L	pH	ORP(mV)	purge L	Desc
(1415)	14.11	808	2.48	7.28	-26.3	0.3	Clear
(1420)	13.78	810	2.70	7.26	+10.2	"	"
(1425)	13.64	808	2.79	7.23	24.2	"	"
(1430)	13.52	808	2.80	7.25	24.4	"	"
(1435)	13.56	808	3.04	7.26	35.0	"	"
(1440)	13.63	807	3.19	7.25	29.7	"	"
(1445)	13.40	807	3.36	7.26	29.2	"	"
(1450)	13.21	806	3.24	7.26	29.7	"	"
(1455)	14.00	804	3.39	7.27	30.5	"	"
(1500)	14.13	804	3.38	7.24	30.2	"	"

continued on page 113

7W10C - continued from page 112

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc.
(1505)	14.38	803	3.38	7.27	32.1	0.3	Clear
(1505)	Readings stable.						
(1520)	14.57	808	4.17	7.23	35.6		Post Sample Reading

Sample Time: (1510)
Samples Collected: (1) TM, (2) 8270, (1) CN

7MW16 ✓

DTW: 26.58
Begin Purge: (1535)
Initial Purge: Clear
Post Purge DTW:

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc.
(1540)	15.60	1714	2.81	7.36	-3.9	0.3	Clear
(1545)	15.78	1698	2.89	7.34	-32.5	"	"
(1550)	16.00	1681	2.99	7.33	-48.6	"	"
(1555)	15.97	1636	3.11	7.35	-58.9	"	"
(1600)	15.87	1616	3.27	7.33	-56.1	"	"
(1605)	15.71	1590	3.18	7.41	-57.9	"	"
(1610)	15.77	1581	5.01	7.44	-55.8	"	"
(1615)	15.56	1589	3.44	7.43	-50.9	"	"
(1620)	15.46	1591	3.43	7.44	-47.8	"	"
(1625)	15.74	1603	3.45	7.42	-45.5	"	"
(1625)	Readings stable						
(1645)	15.93	1613	3.98	7.47	-54.9		Post ~~Purge~~ Sample Reading 10/25/10

Sample Time: (1630)
Samples Collected: (1) TM, (2) 8270, (1) CN

General Notes:
- Weather: Sunny 70s
- PPE: Nitrile gloves, eye protection
- Calibrations: YSI 650 MDS
  pH: 4.00 = 4.00, 7.00 = 7.00, 10.00 = 9.98
  Conductivity: 1,413µS = 1,413µS
  DO % = 99.9 %
- Dedicated tubing and well skirts used at all wells.
- All equipment decanned between wells
- Purge water disposed of at dedicated location on-site.
- All samples collected and stored/transported on ice.

Static Water-Level Table - Unit 7

Well	DTW	Post Purge DTW	Notes
7W9B	22.76	DTW only	no sampling
7W11	24.25	"	"
7MW5	25.01	"	"

7W13 TQE 10/26/10
~~7W11B~~

DTW: 19.36
Begin Purge: 1003
Post Purge DTW: 21.42
Initial Purge: Cloudy/milky

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc
(1005)	14.03	1321	10.21	7.30	169.1	0.3	milky/cloudy
(1010)	14.16	1303	7.18	7.29	110.4	"	"
(1015)	14.24	1294	6.31	7.30	99.0	"	"
(1020)	14.33	1271	5.42	7.30	89.1	"	"
(1025)	14.61	1258	4.78	7.29	87.1	"	"
(1030)	14.85	1249	4.20	7.29	89.7	"	sl. cloudy
(1035)	15.15	1242	3.96	7.30	93.1	"	"
(1040)	15.37	1243	3.80	7.30	99.5	"	sl cloudy
(1045)	15.46	1240	3.51	7.30	109.1	"	clear

Continued on page 115

10/26/10 RAAP B03204-08 CJB/TQE FB#9

TW13 Cont

Time	Temp(C)	Cond(µS)	DO mg/L	pH	ORP(mV)	purge(L/min)	Desc.
(1050)	16.61	1245	3.31	7.30	110.0	0.3L/min	Clear
(1055)	15.81	1245	3.35	7.30	109.1	"	clear
(1100)	15.78	1247	3.25	7.30	106.9	"	Clear
(1100)	Reading Stable						
(1125)	15.97	1249	3.28	7.31	102.1	post sample	

Sample Time (1105)
Samples Collected: (1) TM, (2) 8270, (1) CN

TW11B ✓

DTW: 25.19 Begin Purge: (1140)
Post Purge DTW: 25.23 Initial Purge: Clear

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc.
(1145)	16.58	819	5.61	6.57	258.7	0.3	Clear
(1150)	16.36	829	4.34	6.59	264.2	"	"
(1155)	16.64	830	4.01	6.59	261.7	"	"
(1200)	16.75	836	3.81	6.60	260.6	"	"
(1205)	16.95	838	3.66	662	258.4	"	"
(1210)	17.32	839	3.57	6.62	256.0	"	"
(1215)	16.90	844	3.42	6.65	255.0	"	"
(1220)	16.91	847	3.32	6.65	252.8	"	"
(1225)	17.05	843	3.27	6.66	252.1	"	"
(1230)	17.38	844	3.25	6.66	250.9	"	"
(1235)	17.43	848	3.22	6.67	247.9	"	"
(1235)	Readings stable.						
~~(1240)~~ (1315)	17.67	846	3.48	6.62	246.3	Post Sample Reading	

Sample Time: (1240)
Samples Collected: (3) TM, (6) 8270, (3) CN

10/26/10 RAAP B03204-08 CJB/TQE FB#9

TWCA ✓

(CJB 10/26/10 Wrong time tripod to correct start @ 1350 and purge @ 1445)

DTW: Begin Purge: (1350)
Post Purge DTW: 25.70 Initial Purge:

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc.
(1355)	15.48	1063	2.79	6.95	294.4	0.3	Clear
(1400)	16.02	989	2.74	6.93	289.0	"	"
(1405)	15.97	941	2.72	6.92	284.9	"	"
(1410)	16.13	890	2.59	6.92	274.8	"	"
(1415)	16.27	881	2.59	6.92	268.0	"	"
(1420)	16.21	882	2.67	6.92	258.2	"	"
(1425)	16.30	875	2.66	6.92	254.8	"	"
(1430)	16.27	876	2.68	6.92	245.8	"	"
(1435)	16.67	877	3.06	6.92	234.4	"	"
(1440)	16.79	877	2.94	6.90	232.3		
(1445)	16.84	877	2.98	6.92	229.0		
(1445)	Readings stable.						
(1520)	17.03	878	3.23	6.93	232.0	Post Sample Time	

Sample Time: (1450)
Samples Collected: (1) TM, (2) 8270, (1) CN

TMW Dup

Sample Time: (1500)
Samples Collected: (1) TM, (2) 8270, (1) CN

COMPLETED 11/19/10 esk

Unit 5 - Static Water Level Table

Well	DTW	Post Purge DTW	Notes
5W8B	15.00	15.49	
5W7B	9.99	10.03	
5W5B	10.27	11.01	
5WC21	9.69	9.69	
5WC22	9.66	9.66	
5WC23	9.08	9.13	
5W12A	12.39	12.40	
S5W7	11.89	DTW Only - No sampling	
S5W5	9.46	" " " "	
5W9A	3.40	" " " "	
5W10A	16.04	" " " "	
5W11A	14.43	" " " "	
5WCA	13.91	" " " "	
S5W6	8.21	" " " "	
S5W8	12.31	" " " "	
5WC11	16.25	" " " "	
5WC12	15.98	" " " "	

5W5B ✓

DTW: 10.27 Begin Purge: (1540)

Post Purge DTW: 11.01 Initial Purge: Clear

Time	Temp(°C)	Cond(µs)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc.
(1545)	16.55	693	10.29	5.67	279.7	0.3	Clear
(1550)	16.86	688	5.48	5.67	282.6	0.3	Clear
(1555)	16.78	687	5.69	5.69	285.4	"	"
(1600)	16.70	691	4.29	5.70	287.7	"	"
(1605)	16.57	696	4.05	5.71	289.5	"	"
(1610)	16.58	699	3.89	5.72	290.9	"	"
(1615)	16.54	704	3.75	5.72	292.8	"	"

5W5B

Time	Temp(°C)	Cond(µs)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc
(1620)	16.57	705	3.71	5.72	293.3	0.3	Clear
(1626)	Readings Stable						
(1630)	16.60	713	3.89	5.71	295.7	Post Sample Reading	

Sample Time: (1630)

Samples Collected: (3) 8260, (2) RSK, (2) TOC, (1) Sulfide
(1) Nitrate, Sulfate, 9056 Nitrite

5W7B ✓

DTW: 9.99 Begin Purge: (1700)

Post Purge DTW: 10.03 Initial Purge: Clear

Time	Temp(°C)	Cond(µs)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc.
(1705)	20.63	163	3.45	4.47	322.5	0.3	Clear
(1710)	20.80	165	3.14	4.40	330.4	"	"
(1715)	20.81	166	3.07	4.37	334.4	"	"
(1720)	20.93	166	2.95	4.35	340.1	"	"
(1725)	20.90	165	2.92	4.34	341.3	"	"
(1730)	20.88	164	2.92	4.34	343.1	"	"
(1735)	20.84	164	2.93	4.29	346.5	"	"
(1740)	20.84	165	2.92	4.27	349.2	"	"
(1740)	Readings stable						
(1800)	20.43	166	3.12	4.31	355.2	Post Sample Reading	

Sample Time: (1745)

Samples Collected: (9) 8260, (6) RSK, (6) TOC, (3) Sulfide
(3) 9056 Nitrate, Nitrite, Sulfate

General Notes:
- Weather:
- PPE: Nitrile gloves, eye protection
- Calibrations: YSI 650 MDS
  pH: 4.00 = 4.00, 7.00 = 7.00, 10.00 = 9.98
  Conductivity: 1,413 µS = 1,413 µS
  DO % = 99.9 %
- Dedicated tubing and well skirts used at all wells.
- All equipment decanned between wells.
- Purge water disposed of at dedicated location on-site.
- All samples collected and stored/transported on ice.

5WC21 ✓

DTW: 9.69 Begin Purge (0800)

Post Purge DTW: 9.69 Initial Purge: cloudy

Time	Temp(C)	Cond(µs)	DO(mg/L)	pH	ORP(mV)	Purge(L/min)	Desc
(0805)	15.29	573	6.41	3.68	240.6	0.3	Cloudy
(0810)	15.38	572	6.32	3.67	241.7	"	"
(0815)	15.40	572	6.27	3.66	243.1	"	"
(0820)	15.41	572	5.99	3.70	245.4	"	"
(0825)	15.43	572	5.72	3.70	249.7	"	"
(0830)	15.43	572	5.42	3.71	252.9	"	"
(0835)	15.49	572	5.23	3.71	259.2	"	"
(0840)	15.59	572	4.68	3.71	269.1	"	Clear
(0845)	15.64	572	4.47	3.75	277.6	"	"
(0850)	15.70	572	4.36	3.75	282.3	"	"
(0855)	15.90	571	4.25	3.77	290.2	"	"
(0900)	16.14	572	4.11	3.78	295.1	"	"
(0905)	16.17	572	4.03	3.76	297.9	"	"
(0910)	16.23	571	4.00	3.79	298.9	"	"
(0915)	16.29	571	4.16	3.80	299.8	"	"

- continued to page 120

5WC21 - continued from page 119

Time	Temp(C)	Cond(µs)	DO(mg/L)	pH	ORP(mV)	Purge(L/min)	Desc
(0920)	16.37	571	3.94	3.80	309.6	0.3	Clear
(0925)	16.42	571	3.86	3.81	312.5	0.3	Clear
(0930)	16.41	571	3.84	3.81	313.6	"	"
(0935)	16.35	571	3.81	3.81	314.1	"	"
(0940)	16.20	571	3.71	3.81	317.6	"	"
(0940)	Readings stable						
(1020)	16.37	572	4.08	3.82	328.6	"	"

Sample Time: (0945)
Samples Collected: (3) 8260, (2) RSK, (2) TOC, (1) Sulfide, (1) Nitrite/Nitrate/Sulfate 9056

5WDup

Sample Time: (1000)
Samples Collected: (3) 8260 (2) RSK, (2) TOC, (1) Sulfide, (1) Nitrite, Nitrate, Sulfate 9056

5WC22

DTW: 9.66 Begin Purge: (10:30)

Post Purge DTW: 9.66 Initial Purge: (51. Cloudy)

Time	Temp(C)	Cond(µs)	DO(mg/L)	pH	ORP(mV)	Purge(L/min)	Desc
(1035)	15.52	864	3.46	6.74	320.1	0.3	51. Cloudy
(1040)	15.37	864	2.64	6.70	315.0	"	"
(1045)	15.40	863	2.63	6.73	308.5	"	"
(1050)	16.00	862	2.64	6.73	297.7	"	"
(1055)	16.36	862	2.70	6.73	290.3	"	"
(1100)	16.64	863	2.64	6.73	282.6	"	Clear
(1105)	16.67	863	2.67	6.73	275.0	"	"
(1110)	16.66	863	2.63	6.73	271.2	"	"
(1115)	16.68	862	2.70	6.71	263.1	"	"
(1120)	16.95	861	2.69	6.73	260.7	"	"

- continued on page 121

5WC22 - continued from page 120

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc
(~~17.16~~ 1125)	17.16	~~2.77~~ 862	2.79	6.71	258.2	0.3	Clear
(1130)	17.56	861	2.78	6.70	251.3	0.3	Clear
(1130)	Readings stable						
(1150)	17.68	861	3.12	6.69	242.1	Post Sample Reading	

Sample Time: (1135)

Samples Collected: (3) 8260, (2) RSK, (2) TOC, (1) Sulfide
(1) Nitrate, Nitrite, Sulfate 9056

5WC23 ✓

DTW: 9.08 Begin Purge: (1155)

Post Purge DTW: 9.13 Initial Purge: Clear

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc
(1200)	17.71	888	4.67	6.97	274.5	0.3	Clear
(1205)	17.81	882	2.94	6.71	270.7	"	"
(1210)	18.36	879	2.87	6.68	258.3	"	"
(1215)	18.86	880	2.77	6.66	248.3	"	"
(1220)	18.87	878	2.81	6.66	243.5	"	"
(1225)	18.36	878	2.81	6.65	239.1	"	"
(1230)	18.22	875	2.78	6.66	235.0	"	"
(1235)	17.95	876	2.71	6.66	230.2	"	"
(1240)	17.94	876	2.71	6.66	222.0	"	"
(1245)	1802	874	2.74	6.66	220.1	"	"
(1250)	18.04	874	2.73	6.66	117.7	"	"
(1250)	Readings stable.						
(1310)	18.21	876	3.01	6.67	213.1	"	"

Sample Time: (1255)

Samples Collected: (3) 8260, (2) RSK, (2) TOC, (1) Sulfide
(1) Nitrate, Nitrite, Sulfate 9056

5W12A ✓

DTW: 12.39 Begin Purge: (1320)

Post Purge DTW: 12.40 Initial Purge: ~~Clear~~ Sl. Milky

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc.
(1325)	17.74	175	4.39	7.11	267.9	0.3	Sl. Milky
(1330)	17.65	236	3.15	7.36	274.0	"	Milky
(1335)	17.79	246	2.91	7.42	276.2	"	Milky
(1340)	17.70	246	2.85	7.44	277.1	"	Sl. Milky
(1345)	17.81	245	2.83	7.43	277.4	"	" "
(1350)	17.92	245	2.82	7.45	277.9	"	" "
(1355)	18.25	243	2.81	7.44	277.4	"	" "
(1400)	18.75	243	2.79	7.42	277.6	"	" "
(1405)	19.02	242	2.79	7.41	276.3	"	Sl. Clear
(1405)	Readings stable.						
(1425)	19.85	240	2.97	7.43	274.7	Post Sample Reading	

Sample Time: (1410)

Samples Collected: (3) 8260, (2) R5K, (2) TOC, (1) Sulfide
(1) Nitrate/Nitrite/Sulfate 9056

5W8B ✓

DTW: 15.00 Begin Purge: (1440)

Post Purge DTW: 15.49 Initial Purge: Clear

Time	Temp(°C)	Cond(µS)	DO(mg/L)	pH	ORP(mV)	Purge K (L/min)	Desc.
(1440)	17.40	56	6.79	5.08	281.6	0.3	clear
(1445)	17.00	55	4.29	4.94	294.0	"	"
(1450)	16.88	55	3.52	4.93	305.9	"	"
(1455)	16.95	54	3.13	4.92	320.1	"	"
(1500)	16.97	54	3.01	4.96	333.2	"	"
(1505)	16.92	53	2.99	4.96	337.6	"	"
(1510)	16.88	53	2.98	4.96	342.1	"	"
(1515)	16.86	53	2.97	4.98	339.6	"	"
(1515)	Readings stable.						
(1530)	16.90	53	3.03	4.97	346.1	"	"

- continued on page 123

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B03204-08

~~CJB~~/TQE

5W8B

Sample Time: (1520)

Samples Collected: (3) 8260, (2) RSK, (2) TOC, (1) Sulfide

(1) Nitrate/Nitrite/Sulfate 9056

COMPLETED

11/9/10 ESC

11/17/10

GENERAL

- Weath
- PPE
- Equip
- Decon
- All
- Disp

PAD-1

Sam

Samp

(1) 8290,

PAD-X

Sa

Samp

PAD-2

Samp

Sample

(1) 8290,

PAD-3

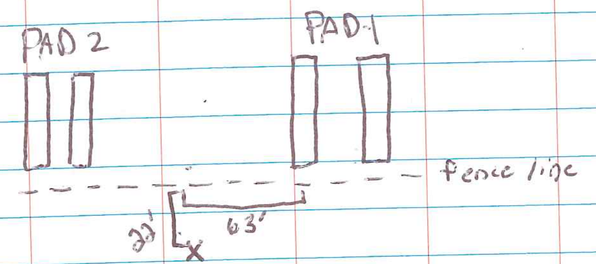
Samp

Sample

(1) 8290,

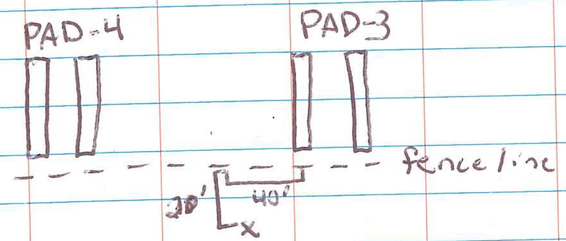
11/18/10 RAAP B03204-203F TREIKFL FB#9

SB-1



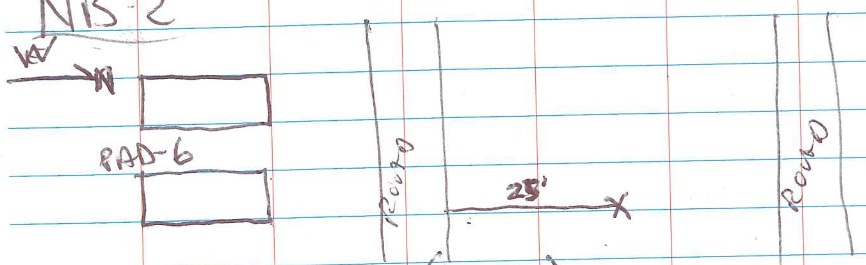
Sample Time (0900)
Samples Collected: (3) 5035/8260B, (1) 8270/TM
(1) 8290, (1) 8330/8332, (1) DRY Weight

SB-2



Sample Time (0915)
Samples Collected: (3) 5035/8260B, (1) 8270/TM
(1) 8290, (1) 8330/8332, (1) DRY weight

NB 2



Sample Time (0930)
Samples Collected: (3) 5035/8260B, (1) 8270/TM,
(1) 8290, (1) 8330/8332 & (1) DRY WEIGHT

12/16/10 RAAP B03204-08 CJR / KFC FB#9

General Notes: Arrived on-site ~0940
- Weather - Snow, 20°s
- PPE - Nitrile gloves, eye protection
- Calibrations: Myron L Ultrameter Serial #614113
  YSI-55 -
  pH: 4.00 = 4.00, 7.00 = 7.00, 10.00 = 9.99
  Conductivity reads 1413μs in a 1413μs standard
- Dedicated tubing & well skirts used at all wells
- All equip deconned between wells
- Purge water disposed of at dedicated location on-site.
- All samples collected and stored/transported on ice.

7W13

DTW: 18.80 Begin Purge (1010)
Post Purge DTW: 25.20 Initial Purge - CLEAR

Time	Temp (C°)	Cond (μs)	DO (mg/L)	pH	ORP (mV)	Purge R (L/min)	Desc.
(1015)	11.6	1290	2.13	7.31	~~N/R~~ 9 (TLVE 12-16-10)	.3L/min	clear
(1020)	10.9	1268	2.23	7.24	~~532~~ N/R	"	"
(1025)	10.7	1270	1.96	7.25	5	"	"
(1030)	10.7	1280	1.56	7.24	10	"	"
(1035)	10.6	1288	1.38	7.21	12	"	"
(1040)	10.5	1290	1.35	7.23	12	"	"
(1045)	10.6	1294	1.40	7.23	10	"	"
(1050)	10.7	1292	1.44	7.23	11	"	"
(1055)	10.8	1294	1.48	7.25	9	"	"
(1055)	Readings stable						
(1115)	11.9	1301	1.76	7.28	10	Post sample reading	

Sample Time (1100)
Sample collected: (3) TM

7W13-Dup
Sample Time: (1110)
Sample Collected: (1) TM