



**BAE SYSTEMS ORDNANCE SYSTEMS INC.
RADFORD ARMY AMMUNITION PLANT
RADFORD, VIRGINIA**

Low-Flow Groundwater Sampling and Analysis Plan

Updated September 2002
Revised ~~October~~ November 2016

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1.0 INTRODUCTION

This Sampling and Analysis Plan (SAP) is for utilization in the groundwater monitoring program at the for the hazardous waste management units (Units) located at the Radford Army Ammunition Plant (Radford AAP). This document meets the groundwater sampling and analysis plan requirements of 40 CFR 264 Subpart F. This SAP is based on the USEPA SW-846 and the RCRA Groundwater Monitoring Technical Enforcement Guidance Document (TEGD), “Low Stress (low flow) Purging and Sampling Procedure for the Collection of Ground Water Samples from Monitoring Wells”, and “Ground Water Issue, Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures.

2.0 PURGING AND SAMPLE COLLECTION PROCEDURES

Purging and sample collection procedures govern all the activities in the field prior to sample preservation. This section contains several initial activities that are significant in maintaining the integrity of the sample and data. These include maintaining a field log book, measurement of static water level, detection of immiscible layers, well evacuation, sample withdrawal, and analysis of field parameters.

2.1 Field Log Sheet/Book

A Field Log Sheet (Appendix A) is utilized to record the field information at each well location. The Field Log Sheet in conjunction with a Field Log Book is used to record field activities for each well. The Field Log Sheet includes the following information:

- well identification
- static water level measurement and equipment used
- presence of immiscible layers noted
- reference point for static water level measurements
- purge volume and pumping rate
- well yield comments
- well purging (evacuation) procedure, time, and equipment
- well sampling date, time, and equipment
- sample identifications (by constituents)
- preservatives used
- constituents to be analyzed
- field measurements; pH , T°C, specific conductivity, dissolved oxygen, ORP, and salinity
- headspace in containers review
- time and meters used in field analysis
- sample preparation date, time, and filtering method
- sampler's and sample preparer's names

2.2 Measurement of Static Water Levels

Prior to all sampling activities, plastic sheeting will be placed around each well to protect the sampling equipment from coming in contact with contamination around the well head and to

facilitate the collection of spilled purge water as recommended by the TEGD.

The measurement of the static water level measurement should be performed in each well at the Unit prior to each sampling event. The total depths of all of the wells at Radford AAP have been established. This information is used to assist in determining if the horizontal and vertical flow gradients have changed since initial site characterizations and/or prior sampling events.

The field crew utilizes well logs to assist in the water level measurements. The measurements are taken with an electronic water level probe. The probe is decontaminated with alconox soap followed by isopropanol and deionized water rinses. The probe is then lowered into the well, the water level is measured to the nearest 0.01 foot. The permanent reference point is the top of the casing. To determine the desired value of depth to water from ground surface, the length of casing is measured and subtracted from the depth to water from the top of casing. Any changes in length of casing measurement (i.e., modification of well pad or apron) should be noted and corrected. The same value for length of casing above ground should be used each time the water level is measured in the well. Any damage to well or well casing should be noted at this time.

2.3 Detection of Immiscible Layers

The detection of immiscible layers (i.e., LNAPLs and DNAPLs) is an important process in waste management. These two types of liquids can provide valuable information concerning types of existing contamination within the monitored aquifer. This detection requires specialized equipment such as a flame ionization detector (FID) or a photoionization detector (PID) organic vapor analyzer, interface probe, and a modified bailer as well as sample collection prior to well purging.

In the event immiscible layers are suspected the air in the well head should be sampled with a FID. A manometer will be used to detect the static liquid level. The interface probe will then be lowered into the well to determine the presence of any immiscible layer(s). The probe will register the depths of light and/or dense liquid as well as the water level.

The collection of varying layers requires a modified Teflon® bailer. For the light phase immiscible, the bailer should be slowly lowered until contact is made with the air and light phase liquid interface. The bailer should then be lowered to a depth that is less than the immiscible/water interface depth as determined by the preliminary interface probe measurements. This collection method works best with immiscible layers of two (2) feet or greater thickness. If the layer is less than two (2) feet thick but the depth to the surface of the light phase layer is less than 25 feet use a peristaltic pump. In the event that a peristaltic pump can not be used, a modified bailer will be used. The bailer should have the bottom check valve sealed with plastic sheeting and the top check valve removed to allow the sample to enter the top. A bottom check valve bailer without the top check valve can be used if the modification is performed on the bottom check valve. To compensate for buoyancy of the bailer, a section of one-inch stainless steel pipe can be placed on the retrieval line. The bailer should be lowered carefully to the depths indicated from the preliminary measurements. The target sampling depth is to lower the bailer to one-half

thickness of the immiscible layer and collect the sample.

The dense phase immiscibles are to be collected with a double check valve bailer. The bailer should be lowered and raised in a slow controlled method. The decontamination procedures specified below shall be performed after collection of the sample.

2.4 Low-Flow Well Purging and Sampling Procedures

2.4.1 Well Purging

Low-flow refers to the velocity with which water enters the pump intake and that is imparted to the formation pore water. Water level drawdown provides the best indication of the stress imparted by a given flow-rate for a given hydrological situation. The objective is to pump in a manner that minimizes stress (drawdown) to the system to the extent practical taking into account established Unit sampling objectives. Flow rates on the order of 0.1 – 0.5 l/min are used; however, this is dependent on Unit specific hydrogeology. Water quality indicator parameters are used to determine purging needs. Once parameters such as pH, specific conductance, dissolved oxygen, oxidation-reduction potential, and temperature have stabilized purging is considered complete. In-line flow cells will be used to continuously measure the above parameters.

The stagnant water within the casing is not representative of the in-situ groundwater quality. The well needs to have this stagnant water removed so that formation water can be sampled. To remove the stagnant formation water the pump will be started at the lowest speed setting and slowly increased until discharge occurs. The water level will then be checked. The pump speed will be adjusted until there is little or no water level drawdown (less than 0.3 feet). If the minimal drawdown that can be achieved exceed 0.3 feet but remains stable, continue purging until indicator field parameters stabilize.

Water level and pumping rates will be monitored and recorded every three minutes during purging. Any pumping rate adjustments (both time and flow rate) will be recorded in the field logbook. Pumping rates will, as needed, be reduced to the minimum capabilities of the pump (for example, 0.1 – 0.4 l/min) to ensure stabilization of indicator parameters. Adjustments will be made in the first fifteen minutes of pumping in order to help minimize purging time. During pump start-up, drawdown may exceed the 0.3 feet target and then “recover” the stabilized drawdown value will be recorded, not the initial drawdown. The water level will not be allowed to fall to the intake level (if the static water level is above the well screen, the water level will not lowered to the screen). The final purge volume will be greater than the stabilized drawdown volume plus the extracted tubing volume. This volume will be calculated by the following equation:

$$V_{\text{total}} = V_{\text{tubing}} + V_{\text{drawdown}}$$

$$V_{\text{tubing}} = (h_{\text{tubing}})(\pi r_{\text{tubing}}^2)$$

$$V_{\text{drawdown}} = (h_{\text{water}} * \pi r_{\text{well}}^2) - (h_{\text{purged}} * \pi r_{\text{well}}^2)$$

Wells with low recharge rates may require the use of special pumps capable of attaining very low pumping rates. If the recharge rate of the well is lower than extraction rate capabilities of currently manufactured pumps and the well is essentially dewatered during purging, then the well will be sampled as soon as the water level has recovered sufficiently to collect the appropriate volume needed for all anticipated samples (the intake will not be moved during this recovery period). Samples may then be collected even though the indicator field parameters have not stabilized.

Water level, extraction rate, and drawdown information will be recorded in a field logbook. The extraction rate (final pump dial setting) will be duplicated in future sampling efforts.

2.4.2 Measurement of Indicator Field Parameters

During well purging, indicator field parameters (temperature, specific conductance, pH, Eh, DO) will be monitored every three minutes (or less frequently, if appropriate). Purging will be considered complete and sampling may begin when all above indicator field parameters have stabilized. Stabilization is considered to be achieved when three consecutive readings, taken at three-minute intervals, are within the following limits:

<u>Constituent</u>	<u>Variability</u>
DO	10%
Specific conductance	3%
Temperature	3%
PH	± 0.1 unit
ORP/Eh	± 10 millivolts

All measurements will be obtained using a flow through-cell. A transparent flow-through-cell will be used, because they allow field personnel to watch for particulate build-up within the cell. This build-up may affect indicator field parameter values measured within the cell. If the cell needs to be cleaned during purging operations, the cell will be disconnected while the pump remains running. The cell will be cleaned and reconnected and monitoring activities will continue.

The flow-through-cell will be designed in a way that prevents air bubble entrapment in the cell. When the pump is turned off or cycling on/off, water in the cell must not drain out. Monitoring probes will remain submerged in water at all times. If two flow-through-cells are used in series, the one containing the dissolved oxygen probe will come first (this parameter is most susceptible to error if air leaks into the system).

2.4.3 Sample Withdrawal

Water samples for laboratory analyses must be collected before water has passed through the flow-through-cell (the cell will be disconnected prior to obtaining samples).

VOC samples will be collected first and directly into pre-preserved sample containers. Allowing the pump discharge to flow gently down the inside of the container with minimal turbulence will fill all sample containers.

During purging and sampling, the tubing will remain filled with water so as to minimize possible changes in water chemistry upon contact with the atmosphere. Quarter inch or three-eighths inch (inside diameter) tubing will be used to help insure that the sample tubing remains water filled. If the pump tubing is not completely filled to the sampling point, one of the following procedures will be used to collect samples: (1) a clamp, connector (Teflon® or stainless steel) or valve to constrict sampling end of tubing will be added; (2) a small diameter Teflon® tubing will be inserted into water filled portion of pump tubing allowing the end to protrude beyond the end of the pump tubing, samples will be collected from the small diameter tubing; (3) non-VOC samples will be collected first, then the flow rate will be increased slightly until water completely fills the tubing, at that time collection of remaining samples and the new drawdown, flow rate and new indicator field parameter values are then recorded.

2.5 Alternative Well Purging and Sampling Procedures

2.5.1 Alternative Well Purging and Sampling Equipment

In the event of malfunctions with any of the dedicated low-flow pumps, well purging will be conducted using either decontaminated non-dedicated Teflon® or stainless steel bailers, or new disposable polyethylene bailers. In order to reduce the possibility of cross-contamination during sample collection upon completion of well purging, sampling personnel will use either freshly decontaminated non-dedicated Teflon® or stainless steel bailers, or use new, disposable polyethylene bailers for collecting samples from each well.

Any non-dedicated sampling equipment will be decontaminated prior to use at each well. In addition, equipment blanks will be collected from non-dedicated sampling equipment.

2.5.2 Purge Volume Calculations

The Field Log Sheet (Appendix A) will be used to document the calculation of the minimum purge volume of water from the well prior to sample collection. The form also will be used to record the field pH, specific conductivity and temperature measurements for each well sampled.

Prior to collecting groundwater samples from each well, a volume of water equal to three (3) times the combined volume of the wetted well casing and the sand filter pack shall be purged from the well. The goal is to ensure that all of the stagnant water within the well is replaced with fresh formation water upon completion of the process.

The purge volumes will be calculated using the following methods:

- For each well, measure the depth to water (DTW) and total depth of the well (TD) with respect to the top of the well casing prior to disturbing the water column.

- Subtract the depth to water from the total well depth (TD-DTW) in order to obtain the height of the water column in the well casing in feet (h_w).
- For wells with water levels above the top of the sand filter pack, the equation for calculating the purge volume shall be:

$$3 * [(\Pi r_b^2 h_s - \Pi r_c^2 h_s) * 0.3 + (\Pi r_c^2 h_w)]$$

For wells with water levels below the top of the sand filter pack, the equation for calculating the purge volume shall be:

$$3 * [(\Pi r_b^2 h_w - \Pi r_c^2 h_w) * 0.3 + (\Pi r_c^2 h_w)]$$

Where: r_b = radius of well borehole;
 r_c = radius of well casing;
 h_s = height of sand filter pack;
 h_w = height of the water column.

In the event that a well has a low yield, it shall be purged to dryness if dryness occurs prior to purging the required three well casing volumes. A minimum of one well volume will be purged in this instance.

2.5.3 Measurement of Indicator Field Parameters

During well purging, indicator field parameters temperature, specific conductance, and pH will be measured. Purging shall continue until temperature, specific conductance, and pH readings have stabilized. "Stability" is defined as variation less than 10% of the preceding reading for two consecutive readings. Water temperature, specific conductance, and pH shall be measured a minimum of two times per well volume or once per 2.5 gallons of purge water (whichever is less). Each measurement of temperature, specific conductance, and pH shall be recorded along with the cumulative purge volume and the time-of-day.

2.5.4 Sample Withdrawal

For each monitoring well, the samples will be collected using either freshly decontaminated non-dedicated Teflon[®] or stainless steel bailers, or new, disposable polyethylene bailers upon completion of well purging. Individual sample aliquots will be collected in order of decreasing constituent volatility. VOC samples will be collected first and directly into pre-preserved sample containers.

Low yield wells must be sampled within 24 hours of purging. If yield is insufficient to obtain the required sample volume, the samples should be noted as "not obtainable due to insufficient well yield" on the Field Log Sheet for that well and in the Field Log Book.

2.5.5 Equipment Decontamination

Any non-dedicated sampling equipment will be decontaminated prior to use at the site, and after use at each well. Decontamination will be performed in a manner such that the decontamination solutions may be captured. The non-dedicated sampling equipment will be decontaminated as follows:

- Wash equipment with phosphate-free detergent.
- Rinse equipment with deionized water.
- Rinse equipment with isopropanol.
- Rinse equipment with deionized water.

Following decontamination, the equipment will be allowed to air dry or dried using clean disposable wipes.

2.6 Sample Preservation and Handling

Samples will be preserved with the proper preservatives in accordance with USEPA SW-846 (Test Methods for Evaluating Solid Waste, latest edition). Prior to sample collection, sample bottles will be prepared by the analyzing laboratory. Preservatives (as required by analytical methods) will be added to samples immediately after they are collected if the sample containers are not pre-preserved by the laboratory. More detailed preservation information is provided in Table 1.

The groundwater-monitoring program requires certain special handling considerations. Initially, the samples should not be transferred to another container due to loss of analyte and volatilization. The VOCs, TOX, and TOC containers should be slowly filled to eliminate any headspace within the container. Any headspace remaining in these containers should be noted in the logbook.

All sample containers shall be packed in a cooler with ice as soon as they are collected. Upon the completion of activities at the Unit, the coolers will be packed with additional ice for transport to the contract laboratory. The samples will be relinquished directly from the samplers to representatives from the contract analytical laboratory for transport to the laboratory, or the samples will be shipped to the laboratory by common carrier.

In the event that final receipt by the laboratory of any shipping container or sample bottle indicates evidence of compromised sample integrity, the laboratory QA/QC officer or his/her representative shall notify the operator within 24 hours of receipt. Subsequent to notification, sample integrity will be evaluated and appropriate actions will be taken to assure representative samples. Sample integrity determinations and needs for additional actions will be conducted according to QA/QC guidance from USEPA SW-846 (Test Methods for Evaluating Solid Waste, latest edition). Resampling will be conducted if determined necessary.

TABLE 1
SAMPLING AND PRESERVATION PROCEDURES

PARAMETER	ANALYTICAL METHOD	CONTAINER ^a / VOLUME REQUIRED	PRESERVATIVE	MAXIMUM HOLDING TIME
INORGANICS ANALYSES				
Metals (total) except Mercury	6010/6020	P - 1L	HNO ₃ to pH<2	6 months
Mercury (total)	7470A	P - 300 ml	HNO ₃ to pH<2	28 days
Cyanide	9010	P, G - 500 ml	Cool to ≤6°C, NaOH to pH>12, 0.6 g ascorbic acid.	14 days
ORGANICS ANALYSES				
Acrolein and acrylonitrile	8260	2 - 40 ml VOA ^b w/ G, Teflon-lined septum	Cool to ≤6°C HCL to pH 4-5	14 days
Purgeable Volatile Compounds	8260	2 - 40 ml VOA ^b G, Teflon-lined septum	Cool to ≤6°C HCL to pH 4-5	14 days
Benzidines	8270	G, Teflon-lined cap – 1 L Amber	Cool to ≤6°C	7 days until extraction; 40 days after extraction
Haloethers	8270	G, Teflon-lined cap – 1 L Amber	Cool to ≤6°C	7 days until extraction; 40 days after extraction
Phthalate esters	8270	G, Teflon-lined cap – 1 L Amber	Cool to ≤6°C	7 days until extraction; 40 days after extraction
Nitrosamines	8270C	G, Teflon-lined cap – 1 L Amber	Cool to ≤6°C, store in dark	7 days until extraction; 40 days after extraction
Nitroaromatics and cyclic ketones	8270	G, Teflon-lined cap – 1 L Amber	Cool to ≤6°C, store in dark	7 days until extraction; 40 days after extraction
Phenol	8270	G, Teflon-lined cap – 1 L Amber	Cool to ≤6°C, store in dark	7 days until extraction; 40 days after extraction
Polynuclear aromatic Hydrocarbons	8270-SIM	G, Teflon-lined cap – 1 L Amber	Cool to ≤6°C, store in dark	7 days until extraction; 40 days after extraction

NOTES:

^a Container Types:

P: Plastic (polyethylene)

G: Glass

^b Do not allow any headspace in the container.

2.7 Chain-of-Custody Documentation

The groundwater-monitoring program incorporates a chain-of-custody program to track the route and handlers of the groundwater samples. The monitoring of sample possession from field sampling to laboratory analysis is important in the event that unexpected lab results occur and the security of transportation is evaluated. This documentation contains several records and logs that assist in the quality control of the program.

Sample labels are used to prevent misidentification of samples. The labels are filled and affixed to the sample containers prior to field sampling. The labels contain the following information:

- Sample identification number
- Name of sampler (initials)
- Date and time of sample collection
- Sampling location
- Constituents to be analyzed

Sample seals should be used when a common carrier transports the sample shipment to the laboratory. These seals ensure that the samples have not been disturbed during transportation. The sample identification and date will be included on the sample seal.

The chain-of-custody record is filled out for each Unit and accompanies the samples to the contract laboratory. The completed form is returned to Radford AAP with the analysis for each Unit. This record is shown in Figure 7.1. The sample possession is established from time of collection to the time of analysis. This record contains the following information:

- sample identification and location
- signature of sampler
- date and time of sampling
- sample type
- well identification
- number of containers
- required analysis
- signatures of person(s) involved in possession
- times and dates of possession
- method of transportation
- statement for packing on ice
- temperature during shipment (min & max)
- internal temperature upon arrival at laboratory

A sample analysis request sheet can further clarify the samples for each requested constituent. This additional check sheet will be utilized when necessary (i.e., beginning of a new contract with a new laboratory). This sheet sent along with the samples will contain the following information:

- name of person receiving samples
- laboratory sample number

- date of sample receipt
- analysis to be performed
- internal temperature during shipping

2.8 Sample Transport

The samples will be relinquished directly from the samplers to representatives from the contract analytical laboratory for transport to the laboratory. In the event that a laboratory courier is unavailable, the samples will be shipped to the laboratory by a certified carrier.

2.9 Analytical Procedures

The analytical methods set forth in USEPA SW-846 (Test Methods for Evaluating Solid Waste, latest edition) will be used to analyze all constituents. Suggested analytical methods and associated practical quantitation limits (PQLs) for each Unit are listed in Appendix B.

The laboratory shall perform the necessary preparation on all samples, including blanks and duplicates.

All records of analysis will be distributed to the appropriate agency as well as maintained on site.

2.10 Quality Assurance/Quality Control

The SAP addresses the Quality Assurance/Quality Control (QA/QC) program to ensure the reliability and validity of field and analytical laboratory data gathered as part of the overall groundwater monitoring program.

2.10.1 Field QA/QC Program

The field QA/QC program is designed to ensure the reliability and validity of the field data gathered as part of the overall groundwater monitoring program. The field QA/QC program consists of regular calibration of field analytical instruments, and routine collection and analysis of trip blanks, and blind field duplicates. In the event that non-dedicated sampling equipment is used, equipment blanks will be collected and analyzed as well.

Field analytical instruments shall be calibrated in the field at each Unit prior to sampling the first well using standard solutions prepared by the manufacturer of the instrument or other laboratory. Calibration of these instruments shall be checked against standard solutions between each well and after sampling the final well at the Unit. All calibration data shall be recorded, indicating time-of-day and value.

For each sampling event, one trip blank per Unit shall be filled with laboratory-grade reagent water in the laboratory that has been selected to conduct the groundwater analyses. The trip blank shall be analyzed only for the same Unit-specific volatile

organic compounds for which the samples will be analyzed. The trip blank shall accompany the sampling kit, in the transport cooler, at all times.

One blind field duplicate sample will also be taken for every 20 samples per Unit, whether that sampling event occurs on one day or longer. The blind field duplicate will be analyzed for the Unit-specific constituents. The monitoring well from which the blind field duplicate is collected should be noted on the Field Log Sheet for that well and in the Field Log Book.

Equipment blanks will be used to monitor the decontamination of non-dedicated equipment used in the sampling process. The blank consists of filling sample bottles with Type II reagent grade water through the sampling device, transfer to sample bottles, and return to the laboratory for analysis. Again, this blank is handled like a groundwater sample. One equipment blank every 20 samples will be used whether that sampling event occurs over one day or longer. The equipment blank will be analyzed for the Unit-specific constituents.

The occurrence of constituents in blank samples may serve to invalidate the analytical results of the affected constituents. Additional blanks or duplicate samples may be prepared and analyzed to address specific, unanticipated conditions.

2.10.2 Laboratory QA/QC Program

The contract laboratory is to provide a QA/QC plan for laboratory analysis according to USEPA SW-846 (Test Methods for Evaluating Solid Waste, latest edition). This plan utilizes standards, laboratory blanks, duplicates, batch spikes, and matrix spikes for calibration and identification of potential matrix interferences. This data is on file at the laboratory and is routinely reviewed by Radford AAP personnel. This data is a measure of performance as well as an indicator of potential sources of cross contamination. This control data is for performance review and not for correction of groundwater analysis data.

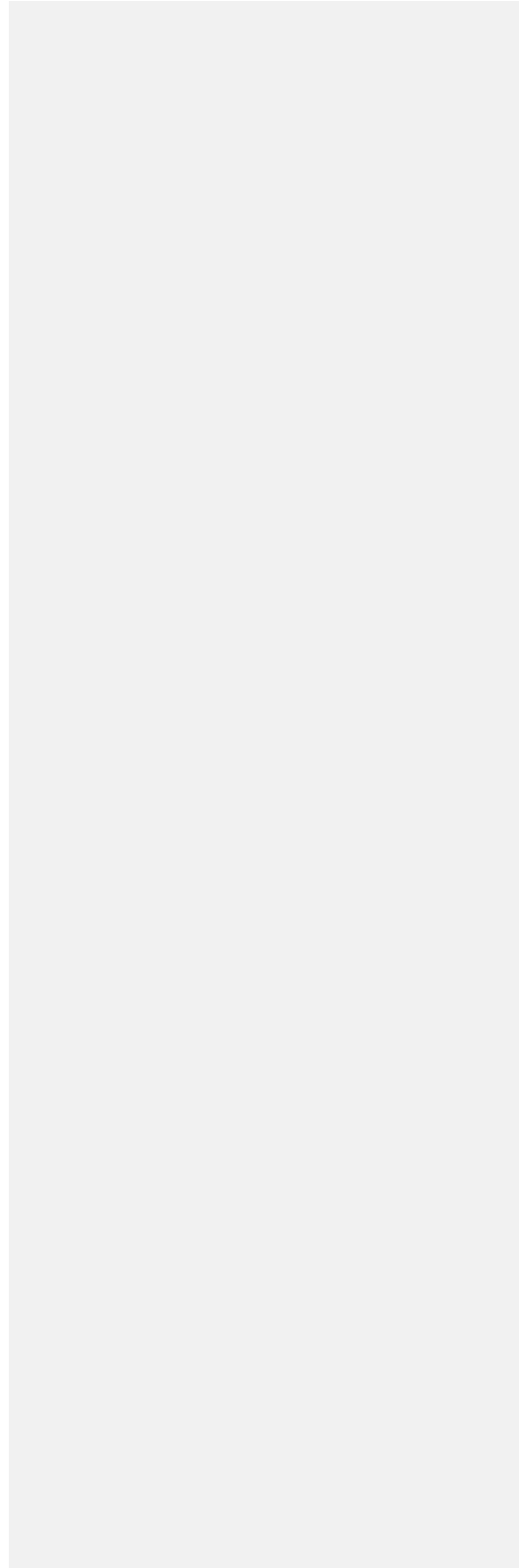
The contract laboratory will keep a logbook to document the processing steps that are applied to the sample. All sample preparation techniques and instrumental methods must be identified in this logbook. The results of the analysis of all quality control samples should be identified specific to each batch of groundwater samples analyzed. The logbook should also include the time, date, and name of person who performed each processing step.

Dilution during analyses has a major impact on the overall quality and usability of the ground water monitoring data. Large dilution factors may mask hazardous constituents that are present at low concentrations, which may result in constituent concentrations not being identified completely throughout the plume. Therefore, when multiple analyses using sequential dilutions are required, the results from these multiple analyses will be reported.

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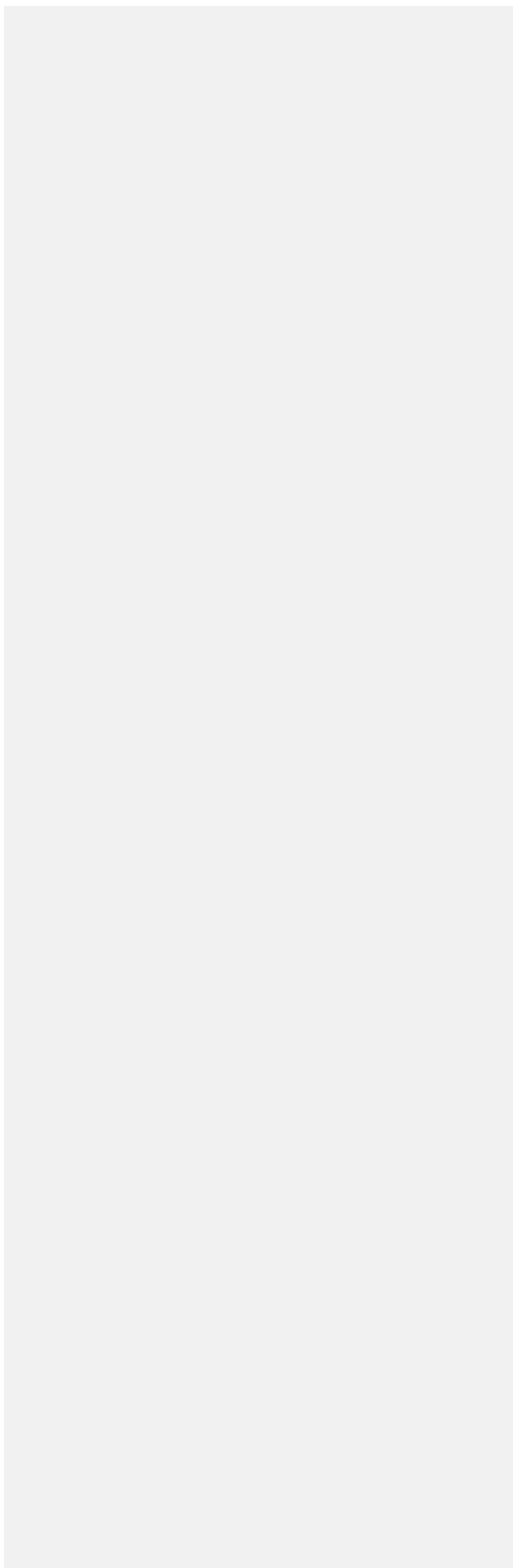
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APPENDIX A
Field Log Sheet



APPENDIX B

Unit-Specific Groundwater Monitoring Constituent Lists



**Hazardous Waste Management Unit 5
Groundwater Compliance Monitoring (Semiannual) Constituent List
Radford Army Ammunition Plant, Radford, Virginia**

Analyte	METHOD	PQL (ug/l)
Antimony, total	6010/6020	2
Arsenic, total	6010/6020	10
Barium, total	6010/6020	10
Beryllium, total	6010/6020	1
Cadmium, total	6010/6020	1
Chromium, total	6010/6020	5
Cobalt, total	6010/6020	5
Copper, total	6010/6020	5
Lead, total	6010/6020	2
Mercury, total	7470A	2
Nickel, total	6010/6020	10
Selenium, total	6010/6020	10
Silver, total	6010/6020	2
Thallium, total	6010/6020	1
Vanadium, total	6010/6020	10
Zinc, total	6010/6020	1030
Acetone	8260	10
Bis (2-ethylhexyl) phthalate (DEHP)	8270	6
2-Butanone (Methyl ethyl ketone; MEK)	8260	10
Chloroform	8260	1
Dichlorodifluoromethane	8260	1
1,2-Dichloroethane	8260	1
Diethyl ether	8260	12
Diethyl phthalate	8270	10
2,4-Dinitrotoluene	8270	10
2,6-Dinitrotoluene	8270	10
Methylene chloride (Dichloromethane)	8260	1
<i>o</i> -Nitroaniline; 2-	8270	10
<i>p</i> -Nitroaniline; 4-	8270	20
Nitrobenzene	8270	10
Toluene	8260	1
Xylenes (total)	8260	3

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**Groundwater Compliance Monitoring (Semiannual) Constituent List
Hazardous Waste Management Unit 16
Radford Army Ammunition Plant, Radford, Virginia**

Analyte	METHOD	PQL (ug/l)
Arsenic, total	6010/6020	10
Barium, total	6010/6020	10
Beryllium, total	6010/6020	1
Cadmium, total	6010/6020	1
Chromium, total	6010/6020	5
Cobalt, total	6010/6020	5
Copper, total	6010/6020	5
Lead, total	6010/6020	12
Mercury, total	7470	2
Nickel, total	6010/6020	10
Vanadium, total	6010/6020	10
Zinc, total	6010/6020	1030
Benzene	8260	1
2-Butanone	8260	10
Carbon tetrachloride	8260	1
Chloroethane	8260	1
Dichlorodifluoromethane	8260	1
1,1-Dichloroethane	8260	1
1,1-Dichloroethene	8260	1
Diethyl ether	8260	12.5
Dimethyl ether;	8260	12.5
Ethylbenzene	8260	1
Methylene chloride	8260	1
Tetrachloroethene; PCE	8260	1
Chloromethane	8260	1
Toluene	8260	1
1,1,1-Trichloroethane	8260	1
Trichloroethene	8260	1
1,1,2-Trichloro-1,2,2-Trifluoroethane	8260	1
Trichlorofluoromethane	8260	1
Tetrahydrofuran	8260	25
Xylenes, total	8260	3
Diethyl phthalate	8270	5
2,4-Dinitrotoluene	8270	10
2,6-Dinitrotoluene	8270	10

Notes:
ug/l = micrograms per liter
PQL = Practical Quantitation Limit

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Commented [RM1]: 1,1-DCE added to Compliance Monitoring Program in Class 1 Permit Modification approved by VDEQ September 12, 2014.

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Commented [JF2]: Tetrahydrofuran added to compliance monitoring program based 2Q2016 detection.

