

**ATTACHMENT 3**

**ATK Launch Systems Inc. – Promontory  
Quality Assurance Project Plan  
and  
Sampling and Analysis Plan**

**ATK Launch Systems (ATK) Promontory Facility  
Post-Closure Permit**

**QUALITY ASSURANCE PROJECT PLAN (QAPP)**

**A1: APPROVAL SHEET**

<u>Organization/Title</u>	<u>Signature</u>	<u>Date</u>
Director, Utah Division of Solid and Hazardous Waste (Dated Approval Letter from the Division)	Approval Letter	
ATK Project Manager (ATK PM) Paul V. Hancock	_____	_____
Project Quality Assurance Manager (PQAM) Blair G. Palmer	_____	_____
Field Operations Project Manager (OPM) David Covington	_____	_____
Data Validation Support Manager (DVSM) Scott Fraser	_____	_____
ATK Database Manager (DM) Kent Bates	_____	_____
ATK Environmental Laboratory Manager (LM) Mike Killpack	_____	_____

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### **A3: DISTRIBUTION LISTS**

#### **Organization/Title**

Director, Utah Division of Solid and Hazardous Waste

ATK Project Manager (PM)

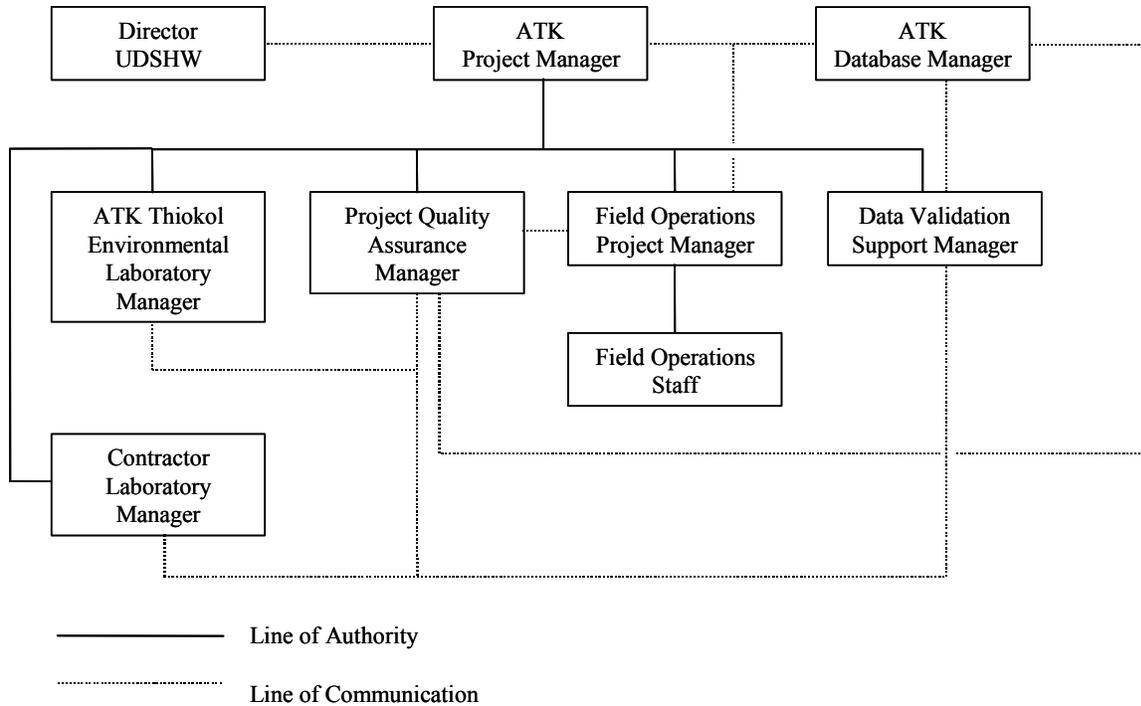
Project Quality Assurance Manager (PQAM)

Field Operations Project Manager (OPM)

Data Validation Support Manager (DVSM)

ATK Environmental Laboratory Manager (LM)

## A4: PROJECT ORGANIZATION



### A.4.1 ATK Project Manager

The ATK project manager (PM) will be responsible and accountable for all of the Post Closure activities. The ATK PM will be the primary contact with the Division for program-specific activities. The ATK PM will manage or delegate management of the following activities:

#### Program Administration

1. Oversee Post Closure program-specific issues relating to contracts, scopes of work (SOWs), technical specifications, QA, and health and safety.
2. Approve and implement Post Closure documents.
3. Arrange for analytical services with the ATK Environmental Laboratory or a contractor laboratory.
4. Assign ATK personnel or contractors to direct specific elements of the Work Plan.

5. Direct hiring of contractors, as needed, to assist ATK.

### **Regulatory Compliance**

6. Assess the overall program for compliance with federal, state, and local regulations.
7. Interact with regulatory and public agencies in coordination with the Division in fulfillment of public participation requirements.
8. Confer, as necessary, with the Division.
9. Issue reports, as necessary, to the Division.

### **Field Operations**

10. Monitor ATK personnel and contractors for compliance with the Post Closure requirements.
11. Assure that field operations are performed in accordance with SAPs.
12. Plan and schedule work tasks as appropriate, record costs and progress of the work.

### **Quality Assurance**

13. Designate individuals and identify their responsibilities for implementation of quality assurance procedures as specified in the QAPP and SAPs.
14. Assume responsibilities of the Project Quality Assurance Manager (PQAM) defined in this QAPP and delegate all or portions of the responsibilities as necessary to meet schedules.

### **Contractor Management**

15. Assign specific scopes of work (SOWs) and responsibilities to all contractors assisting ATK in its implementation of the Work Plan.
16. Assure that Contractor's activities are performed and submittals are produced in accordance with the SAPs specific to a SWMU or group of SWMUs.
17. Monitor contractor performance.

### **A.1.2 Project Quality Assurance Manager**

The responsibilities of the PQAM may be assumed or delegated by the ATK PM. The PQAM is responsible for the development and implementation of the project specific QA requirements in the SAP. Responsibilities of this position include communicating with all levels of project management to assure that a quality product is produced for delivery. Specific responsibilities of the PQAM are as follows:

1. Serve as the official contact for all project-related QA matters.
2. Respond to QA needs, resolve problems, and answer requests for guidance or assistance.
3. Assist the ATK PM and OPM in preparing SAPs.
4. Initiate and approve revisions to the QAPP when necessary.

5. Review SAPs, including the SOPs in accordance with the QAPP.
6. Maintain controlled distribution of the QAPP, SAPs including SOPs, and other project planning documents as described in this QAPP.
7. Review the implementation of the Work Plan and SAPs.
8. Coordinate and conduct selected internal and contractor audits for adherence to the QAPP and SAPs.
9. Confer with the audited entity on the steps to be taken for corrective actions and track nonconformance until corrections are made.
10. Review audit and nonconformance reports to determine areas needing correction.
11. Verify and document corrective actions taken for all nonconformances.
12. Review the contractor laboratory SOW and laboratory qualifications prior to the award of a laboratory contract.
13. Initiate and complete a review of field-specific requirements contained in the SAP and SOPs for a new project through field kick-off meetings.
14. Validate field operations data in cooperation with the OPM.
15. Assess data quality and procedures at the completion of sampling and analysis.

### **A.1.3 ATK Database Manager**

The ATK project database manager (DM) reports to the ATK PM. The DM is responsible for receipt of laboratory-validated data and Data Validation Support Manager (DVSM) validated data from the DVSM as well as field data from the Field Operations Project Manager (OPM). Upon receipt of the validated data the DM is responsible for entry of the data into the project database.

The following tasks at a minimum, will be managed or performed by the DM:

1. Enter electronic data into the project database.
2. Maintain the project database.
3. Prepare routine or special reports for ATK and the Division based on queries of the project database.
4. Check analytical reports against chain-of-custody forms to assure that all samples have been reported.
5. Verify that electronic data matches hardcopy reports.
6. Assure corrections and qualifiers added by the DVSM are entered into the project database.
7. Consult with the ATK PM on matters of data representativeness and comparability as defined in Section C.4 of this QAPP.

#### **A.1.4 Field Operations Project Manager**

The Field Operations Project Manager (OPM) reports to the ATK PM. The fundamental responsibility of the OPM is to produce a quality work product within the allotted schedule and budget. Duties include executing all field phases of the project (as appropriate) and efficiently applying the full resources of the project team in accordance with the project plans, i.e., QAPP, SAPs, and health and safety plans. Specific responsibilities of the OPM are as follows:

1. Assist ATK PM and PQAM in preparation of SAPs
2. Implement the field sampling related aspects of the SAPs.
3. Order, inspect, and accept supplies and consumables.
4. Monitor sample collection, preservation, handling, transport and custody throughout the project; ensure that the request-for-analysis and chain-of-custody (COC) forms are completely and accurately filled out.
5. Assure that the proper number and type of environmental and control samples are collected, identified, tracked, and sent to the laboratory for analysis.
6. Coordinate and schedule sample shipment to analytical laboratories to meet holding time requirements and analytical specifications provided in the SAP.
7. Assure that appropriate sampling, and testing procedures are followed and that field data are recorded.
8. Assure field documentation and logbooks are completed during field activities. The OPM inspects the logbooks and field documentation daily for completeness.
9. Monitor subcontractors for compliance with SAPs and data quality requirements, record cost and progress of the work, plan and reschedule work tasks as appropriate.
10. Coordinate the appropriate disposition of investigation-derived waste.
11. Produce the health and safety plan and ensure the activities conducted are performed in compliance with the plan.
12. Verify and certify field data quality, test results, field equipment calibrations and procedures, and QC documentation; maintain and regularly review all field QC records.
13. Provide full assistance to the PQAM during the conduct of QA audits of field activities and take corrective action that may be required by audit findings.
14. Assure that procedures are modified to reflect any corrective action and that they are distributed to all field personnel, including subcontractors.
15. Report QA problems to the ATK PM.
16. Provide field data to PQAM for validation.

### **A.1.5 ATK Environmental Laboratory Manager, Contractor Laboratory Manager**

Samples collected during this investigation will be analyzed by the ATK Environmental Laboratory (or an ATK-contractor lab) for performance of analytical methods required by the SAPs. The fundamental responsibility of the ATK Environmental Laboratory manager (LM) and/or contractor laboratory manager (CLM) is to oversee all phases of lab internal functions including analytical methods and work; QC checks; instrumentation calibrations; and data assessment and reductions. Specific responsibilities of the lab managers are to ensure that the following lab work and reporting elements have been properly executed:

1. Sample preparation information is correct and complete.
2. Analysis information is correct and complete.
3. The appropriate laboratory SOPs have been followed.
4. Analytical results are correct and complete.
5. QC sample results are within established control limits.
6. Blank results are within appropriate QC limits.
7. Analytical results for QC sample spikes, sample duplicates, initial and continuing calibration verifications of standards and blanks, standard procedural blanks, and laboratory control samples are correct and complete.
8. Tabulation of reporting limits related to the sample is correct and complete.
9. Documentation is complete; all anomalies in the preparation and analysis have been documented; holding times are documented.
10. Laboratory data produced by an analyst are processed and reviewed for overall reasonableness and for attainment of quality-control criteria as outlined in the SAPs, the laboratory QAP, and established EPA methods.
11. All manually entered sample data and all data electronically uploaded from the instrument output into the software packages used for calculations and generation of report forms are checked for accuracy.
12. Initial and continuing calibration data, and calculation of response factors, surrogate recoveries, matrix spike/matrix spike duplicate recoveries, internal standard recoveries, laboratory control sample recoveries, sample results, and other relevant QC measures are reviewed and any sample re-analysis is performed if required to meet the QAPP.
13. The reporting data format meets the requirements of the method cited in data package (deliverable) requirements provided in the QAPP and specific SAPs.
14. Transfer of laboratory-validated data to the DVSM as required by the ATK PM.

### **A.1.6 Data Validation Support Manager**

The data validation support manager (DVSM) reports to the ATK PM, communicates with the LM/OPM/DM/CLM, and provides technical expertise and assistance to the ATK PM. When required by the ATK PM, the DVSM is responsible for data validation of laboratory validated data and auditing (Section C.4) the ATK Environmental Laboratory Procedures. Specific responsibilities of the DVSM include the following:

1. Work with laboratories to produce data in accordance with this QAPP and SAPs.
2. Provide technical direction to the ATK PM and the PQAM in relation to analytical requirements.
3. Review and validate a percentage of the analytical data based upon DQOs specified in the SAP. Data delivery requirements are detailed in this QAPP and in the SAP.
4. Document all submittals and re-submittals from the laboratory, recalculations, and data reviewer corrections.
5. Certify laboratory analytical results are valid.
6. Conduct audits of laboratory procedure.

### **A5: PROBLEM DEFINITION**

This Quality Assurance Project Plan (QAPP) is a planning document that outlines the appropriate level of quality for production of data and appropriate data-management protocols for the RCRA Post-Closure permit conducted at the ATK Launch Systems Promontory Facility. The sampling and analysis plans (SAPs) for groundwater will contain data quality objectives (DQOs), analytical methods and their quality control requirements, and standard operating procedures (SOPs) for field activities, which are focused on specific characteristics of the groundwater undergoing investigation. The SAPs will utilize the QAPP to assure that execution of the SAPs is consistent with the QAPP.

Groundwater sampling at the ATK facility in Promontory Utah plan satisfies the requirements for a ground water sampling and analysis plan as referenced in 264.97 of the Code of Federal Regulations (CFR) and Section R315-8-6 of the Utah Administrative Code.

The Post Closure Permit for the M-136 Burning Area requires ATK to monitor groundwater in the uppermost aquifers as described in Attachment 4 of the Post Closure Permit in a manner that will monitor the release of hazardous constituents from the M-136 Burning Area, in compliance with R315-8-11.5(b)(3), R315-8-7, and R315-8-6 during the post-closure care period.

Groundwater monitoring is also completed for the solid waste management units (SWMUs) at the facility. ATK maintains groundwater monitoring systems, which consist of monitoring wells located hydraulically upgradient and downgradient of the areas of contamination.

Groundwater monitoring at the site has detected the following constituents:

Acetone, Ammonia, Arsenic, Barium, Benzene, Bromomethane, Chloroethane, Chloroform, Chromium, 1,1-Dichloroethane, 1,1-Dichloroethene, 1,2-Dichloroethene, Manganese, Nitrate, Perchlorates, Sulfate, Tetrachloroethene, Tin, Total Dissolved Solids, 1,1,1-Trichloroethane, and Trichloroethene. Continued monitoring and data handling according to this QAP will ensure that groundwater concentrations and migration of contaminants is known.

#### **A6: PROJECT DESCRIPTION**

Groundwater monitoring has shown that contaminants are present which exceed the Groundwater Protection Standard (GWPS). ATK is currently establishing a corrective action program as required by R315-8-6.11 and the Post-Closure Permit.

Monitoring data will be used for assessing the human health and ecological risk associated with the contaminated groundwater in order to determine the appropriate corrective action. Monitoring data will also be used to update groundwater flow and transport models that are used to predict the migration of contaminants and how points of exposure may be affected.

In addition, monitoring data will be used to determine sources for the contaminants found in groundwater. Groundwater samples will be collected from the monitoring wells that comprise the groundwater monitoring system (Attachment 4). These wells will be sampled for VOCs, perchlorate, explosive compounds and metals.

#### **A7: QUALITY OBJECTIVES AND CRITERIA**

The first step in SAP development will be the establishment of data DQOs. Specific DQOs will be listed in the SAP and will, at a minimum, comply with the requirements and guidance set forth in this QAPP.

The DQO process is a systematic planning tool based on a logical method for establishing criteria for data quality. Establishing formal DQOs during the development of SAPs allows clear and unambiguous definitions of project objectives and decision criteria so that data of sufficient type, quality, and quantity are generated to meet project objectives. Details such as practical quantitation Limits (PQLs), method detection limits (MDLs), estimated quantitation limits (EQLs) used by the ATK Laboratory will be provided in the SAPs. In developing SAPs, the latest version of Guidelines for the Data Quality Objectives Process, US EPA, EPA QA/G-4, August 2000, or other appropriate guidelines will be followed.

#### **A8: SPECIAL TRAINING/CERTIFICATIONS**

The OPM and all field staff, including subcontractors that will be performing sampling work at the facility, shall have completed training that meets the requirements in OSHA 29 CFR 1910.120. Documentation and skills certification will be completed as described in OSHA 29

CFR 1910.120. No other certification or special training requirements are requisite for the completion of this project.

**A9: DOCUMENTATION AND RECORDS**

The document control system begins with approving and distributing pertinent project planning documents. These documents include initial and revised QAPPs, SAPs, SOWs, and SOPs. The PQAM has the responsibility for the controlled distribution of these documents. The ATK PM has approval authority.

The PQAM is responsible for initiating any revisions to these planning documents and is responsible for assigning responsibility for making the needed revisions. The QAPP shall be approved first by the Director of the Division of Solid and Hazardous Waste by an official letter from the Division. All revisions or modifications related to this QAPP thereafter will be accomplished by specifying a revision or modification to the QAPP in a SAP. A sufficient number of modifications or a significant modification accepted by the Division in SAPs may justify a revision of the QAPP.

Records of all monitoring, testing and analytical data obtained pursuant to the groundwater monitoring requirements of the Post-Closure Permit will be kept and will be managed as part of ATK’s Operating Record. Semi-annual Groundwater Monitoring Reports will be submitted to the Division of Solid and Hazardous Waste as directed by Permit Condition IV.E.2. and will contain the following information (as described in Table IV-2):

1. semi-annual results of sample analyses including; concentration of hazardous constituents, and a summary of the QA/QC data;
2. semi-annual measurements of static water levels;
3. semi-annual potentiometric surface maps of the impacted aquifers as indicated by permit Conditions IV.D.8. and IV.D.9.;
4. monitoring well total depth measurements, as directed by permit Condition IV.D.1.c., beginning in 2008 and every three years after
5. results of annual model recalibration and a summary analysis of annual model results, as directed by permit Condition IV.E.4.;
6. annual contaminant concentration maps of the impacted aquifers;
7. semi-annual identification of potential “hot spots” meriting attention for further evaluation.

These reports will be submitted no later than January 15 and July 15 of each year. The semi-annual reports will contain the information and be submitted at the frequency as specified below:

<b>Samples and data collected During the months of</b>	<b>Semi-annual sampling events</b>	<b>Results due to the Executive Secretary</b>
January-March		April 15

April-June	January-June	July 15
July-September		October 15
October-November	June-December	January 15

Semiannual results of sample analysis and potentiometric data shall also be submitted electronically with the reports as indicated above. Data submitted electronically shall be in a format approved by the Executive Secretary.

**B1: SAMPLING PROCESS DESIGN**

The Sampling and Analysis Plan (SAPs) for groundwater sampling will be submitted under separate cover. The SAP will define the data quality objectives for groundwater sampling and will generally follow the procedures in Table B-1:

**Table B-1.  
CHECKLIST FOR DEVELOPING SAMPLING AND ANALYSIS PLANS  
ATK LAUNCH SYSTEMS**

<b>SAP Component</b>	<b>Specifications</b>
Sampling	Sampling Plan Development of Data Quality Objectives Sample Design/Strategy List of Analytes List of Sampling Locations Analytical Methods Analytical Procedures Analytical Equipment Standard Operating Procedures (SOPs) For Field-Investigation Activities (such as sample collection, decon, shipping etc.) Field Equipment Selection of Sampling and Field Analysis Equipment Operation & Maintenance Procedures Calibration & Acceptance Criteria Calibration Frequencies, Decon Procedures Investigation Derived Waste (IDW) Disposal Field Data Sheets Field Activity Daily Log Field Instrumentation Log for Calibration and Maintenance Procedure Variance Log Sample-Handling and Shipping Procedures Containers & Volumes Holding Times & Preservation Requirements Sample Packaging & Shipping Sample Labels & Sample Identification Number Analytical Request and Chain of Custody Forms

	Sampling (continued)
	Transfer of Custody from Field to Laboratory Receipt and Acceptance of Samples
Laboratory Analytical Procedures	<p>Analytical Methods, Requirements, and Detection Limits</p> <p>Explosives: Procedure No. 25000DT05484 for NG, diNG, Butanetriol, and BTTN and ATK SOP 424 for Nitroaromatics and nitroamines</p> <p>Volatile Organic Compounds (VOCs): USEPA Method 8260B-ATK SOP 401</p> <p>Total Metals: USEPA Method 6010B-ATK SOP 364</p> <p>Mercury: USEPA Method 7471A-ATK SOP 373, Cold Vapor Atomic Adsorption-</p> <p>Perchlorate: USEPA Method 314-ATK SOP 314</p> <p>Anions: USEPA 9056-ATK SOP-341</p> <p>Hydrogen ion (pH): USEPA 9040B (aqueous); USEPA 9045C (solids)-ATK SOP 333</p> <p>Semivolatiles: USEPA 8270 C-ATK SOP 402</p> <p>Other Analyses</p> <p>Obtain SOPs from the Laboratory for inclusion in the SAP</p>
Quality Control	<p>Field</p> <p>Field Duplicates</p> <p>Trip Blanks</p> <p>Equipment Blanks</p> <p>Field Blanks (water)</p> <p>Laboratory</p> <p>See the laboratory-specific QAP on file with the laboratory.</p>
Data Quality Measurement	<p>Precision Level (<math>\pm</math> 15%) Subject to adjustment if sample medium justifies change.</p> <p>Accuracy Value (<math>\pm</math> 20%) Subject to adjustment if sample medium justifies change.</p> <p>Representativeness – goal of representativeness will be specified in each SAP.</p> <p>Completeness</p> <p>Comparability</p> <p>Estimated Quantitation Limits</p> <p>Method Detection Limits</p>

## **B2: SAMPLING METHODS**

Specific groundwater sampling methods are addressed in the groundwater SAP. These procedures have previously been established and utilized for groundwater sampling at the site.

## **B3: SAMPLING HANDLING AND CUSTODY**

Written documentation of sample custody from the time of sample collection through the generation of data is recognized as a vital aspect of an environmental study. The Chain-of-Custody (COC) of the physical sample and its corresponding documentation will be maintained throughout the handling of the sample. The COC form that will be used for the project is included in the SAP. All samples will be identified, labeled, and logged onto a COC and Request for Analysis form, as a part of the procedure designed to assure the integrity of the resulting data. The record of the physical sample, including the location and time of sampling, will be joined with the analytical results through accurate accounting of the sample custody. Sample custody applies to both field and laboratory operations. All laboratories completing chemical analyses will be required to maintain samples in a secure location with limited access from the time of sample receipt through sample disposal. The requirements for sample containers, holding times and preservation are addressed in Table 1 of the SAP.

Samples collected during this investigation will be either shipped to the laboratory via a commercial carrier or will be hand-delivered to the analytical laboratory when possible. All packaging materials and samples will be reviewed for compliance with changes in air shipment regulations when shipping by commercial carrier. If the samples are shipped via a commercial carrier, the following procedure will be used for packaging:

- 1. Inert cushioning material will be utilized when needed;
- 2. Sample containers will be placed upright in the cooler;
- 3. Blue ice or wet ice and additional packaging materials will be placed around the containers;
- 4. Pertinent paperwork such as the COC/Request for Analysis form will accompany shipping papers;
- 5. The cooler will be sealed with packaging tape; and
- 6. A shipping label will be affixed to the outside of the cooler.

## **B4: ANALYTICAL METHODS**

Chemical analyses of samples will be completed by using specific laboratory methods in accordance with turn-around time for the completion of analyses and laboratory data reporting specified in SAPs. These methods may include analysis of explosives, volatile organic

compounds (VOCs), semivolatile compounds, metals, and perchlorate. Samples will be collected and preserved as described in specific SAPs. Sample holding times shall be calculated from the date and the time of collection.

Samples collected during this investigation will be analyzed by the ATK Environmental Laboratory or an ATK contractor laboratory.

The laboratories chosen to complete the analyses during this investigation shall not subcontract any portion of the work without prior written approval from the ATK PM. The laboratory shall use analytical equipment and procedures to produce data that will meet the DQOs and requirements as specified in SAPs.

If non-standard analytical methods are proposed, the method must be approved by the Division. Detailed descriptions of the analytical method shall be reviewed by the PQAM to ensure that data generated by the method will meet the minimum data quality objectives and requirements as specified in SAPs. The review will focus on the method as supplied by the analytical lab including scope, requirements, applicable documents, materials and equipment, operations, QC limits, QA/QC measures, safety, sample preparation and analysis. Upon completion and satisfactory review, the PQAM will recommend the ATK PM submit the method to the Division for approval. The data validation process for data generated by the method shall follow the protocol specified in this QAPP and in the pertinent SAP.

## **B5: QUALITY CONTROL**

Quality Control checks of both the field sampling procedures and laboratory sample analyses will be used to assess and document data quality and to identify discrepancies in the measurement process that need correction. The checklist of the minimum analytical laboratory QC samples to be considered for inclusion in the SAPs is provided in Table B-1.

Quality control samples will be used to assess various data quality parameters such as representativeness of the environmental samples, the precision of sample collection and handling procedures, the thoroughness of the field equipment decontamination procedures, and the accuracy of laboratory analyses.

In addition, all sample containers, preservation methods, and holding times will be in accordance with QC requirements, as specified in SAPs.

The analytical laboratory will use a series of QC samples as identified in the laboratory QAP and specified in the standard analytical methods. The types of samples include method blanks, surrogate spikes, laboratory control samples, laboratory control sample duplicates, matrix spikes, and matrix spike duplicates. Analyses of QC samples will be performed for samples of similar matrix type and concentration and for each sample batch.

Data precision, accuracy, representativeness, and completeness will be evaluated as discussed below. The quality control limits for precision and accuracy are given below in Section D1.4, Data Validation.

### **Data Precision**

Precision (and accuracy) are two important characterizations of the amount of variability and bias inherent in a data set. Precision describes the reproducibility of measurements of the same parameter for a sample under the same or similar conditions. Precision is expressed by the lab as a range (the difference between two measurements of the same parameter) or as a relative percent difference (RPD), defined as the range relative to the mean, expressed as a percent. Precision, in terms of relative percent difference will be determined by the laboratory in accordance with DQOs and specified in the SAP.

### **Data Accuracy**

Accuracy is the comparison between measured or experimental values and known or calculated values. Accuracy is an indication of the systematic error in the analytical measurements, and its value is expressed by the laboratory as percent recovery (%R). Percent recoveries are derived from analyses of samples or blanks, such as a water blank, a soil blank, or actual samples (matrix spikes) that have been spiked with known amounts of specific analytes. The amount of the added or spiked analyte that is recovered is indicative of the accuracy of the analytical method. Accuracy in terms of percent recovery will be determined by the laboratory in accordance with DQOs and specified in SAP.

### **Representativeness**

Representativeness is a qualitative measure of the degree to which data accurately and precisely represent the environmental condition at a site. The sampling and sample-handling process prescribed in the SAPs, the quality control utilized by the samplers and laboratories, and the number of samples collected all affect the degree to which data represent the conditions of a site. Following the determination of data precision for analyses of field duplicates produced from the same field sample and statistical analyses of analytical results, a statement on representativeness will be prepared by the ATK PM with input from the PQAM and included in the Investigation Completion Report.

### **Completeness**

Completeness establishes whether a sufficient number of valid measurements were obtained during sampling activities. Completeness is a measure of the amount of data that meet the precision, accuracy, and representativeness objectives defined in the DQOs versus the total amount of measurements taken at a SWMU or group of SWMUs. Completeness, based on accuracy and precision, will be determined by the laboratory in accordance with DQOs specified in the SAP. The completeness target is 100 percent; however, matrix heterogeneity can reduce the degree of completeness. The ATK PM, with input from the PQAM, will determine the degree of completeness with respect to the following criteria to meet DQOs for characterization of a site:

- The data are representative based on process knowledge and
- The data are sufficient based on statistical analyses.

### **B5.1 Field Quality Control Checks**

At a minimum, field equipment will be calibrated as frequently as recommended in the manufacturer's specifications. Each calibration including the results will be documented in the field logbook or on a data sheet developed for calibration and signed by the OPM. Additionally, quality control samples will be collected during environmental sampling activities. Each type of field quality control sample is defined below.

#### ***B5.1.1 Field Duplicate Samples***

A field duplicate sample is a second sample collected at the same location as the sample designated for collection. Field duplicate sample results are used to assess precision, including variability, associated with both the laboratory analysis and the sample collection process. Field duplicate and regular samples will be collected simultaneously, from the same sample interval, providing sufficient material exists, and treated in an identical manner during storage, transportation, and analysis. When recovery of groundwater from sampling operations is sufficient, field duplicate samples will be collected at a frequency to be specified in specific SAPs.

#### ***B5.1.2 Trip Blanks***

A trip blank is a sample of distilled and/or deionized, organic-free water preserved with HCl provided in three VOC bottles (and may vary in the specific SAPs). Trip blanks will be prepared only for the analysis of VOCs and will be subjected to the same handling as the other samples. The trip blanks will serve to identify contamination from sample containers or transportation and storage procedures. One trip blank will accompany each cooler of samples at a frequency specified in the SAP and will be sent to the laboratory for the analysis of VOCs.

#### ***B5.1.3 Equipment Blanks***

Equipment blanks are collected and analyzed to determine any level of contamination potentially introduced into samples due to the equipment cleaning technique. Equipment blanks will be collected as determined by the ATK PM. General procedures for collecting equipment blanks are as follows:

The sample collection device will be cleaned in the following sequence:

- (1) Wash - Scrub the sample device parts with a dedicated wash brush in a bucket of soap (Alconox®) mixed with tap water;

- (2) Initial Rinse - Scrub with dedicated rinse brush and rinse the sample device parts in a bucket of tap water;
- (3) Intermediate rinse – Repeat #2 in another rinse bucket of tap water.
- (4) Final Rinse - While holding the sample tube parts above the rinse bucket, rinse the parts again using clean distilled water from a pressurized container.

For non-dedicated pumps the following procedure shall be followed:

- (1) Wash – Dip pump in a bucket of soap (Alconox®) mixed with tap water, and scrub with dedicated brush
- (2) Initial Rinse - Scrub with dedicated rinse brush and rinse the sample device parts in a bucket of tap water;
- (3) Intermediate rinse – Repeat #2 in another rinse bucket of tap water.
- (4) Final Rinse - While holding the sample tube parts above the rinse bucket, rinse the parts again using clean distilled water from a pressurized container.

As detailed by specific SAPs, a sample of the equipment sample device rinse water will be collected using the following additional steps:

- (1) Collect a sample from the final rinse (step 4 above). Collect the water off the equipment being rinsed into the required sample bottle(s);
- (2) Submit the equipment blank for analysis of all waste constituents sampled groundwater. This equipment blank will be used to help quantify the potential for cross-contamination between samples due to improperly cleaned sampling devices;
- (3) Discharge wastewater to a sanitary sewer; and
- (4) Obtain fresh wash water and rinse water from the tap.

#### **B5.1.4 Performance Evaluation (blind) Samples**

If specified in the SAP, PE samples will be used to assess the accuracy of the analytical methods specified. These samples will be prepared by an independent laboratory or supplier with known composition and submitted to the analytical laboratory. The PE samples are analyzed in the same manner as all environmental samples. Acceptance criteria for PE samples will be specified by the PE sample supplier, or the PQAM. The data validation of the PE data will be conducted by the PQAM or a DVSM.

#### **B5.1.5 Temperature Quality Control**

All coolers storing samples and not immediately delivered to the laboratory, shall be maintained at a temperature between four to six degrees Celsius (4-6°C).

### ***B5.1.6 Field Blanks***

Field blanks consist of empty, clean sample containers filled with reagent grade water prior to collection of a primary sample. The field blank container is sealed and carried through the same handling, shipping, and analytical procedures as the primary sample. Since the frequency of field blanks is project-specific, field blanks will be specified in the SAP.

## **B6: EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE**

To minimize downtime of measurement systems, all field sampling and laboratory equipment will be maintained in working condition. Also, backup equipment or common spare parts will be available so that if any piece of equipment fails during use, repairs or replacement can be made as quickly as possible and the measurement tasks resumed.

All field equipment which have manufacturer-recommended schedules of maintenance will receive preventive maintenance according to that schedule. Other equipment used only occasionally will be inspected for availability of spare parts, cleanliness, battery strength, etc. at least quarterly and especially prior to being taken into the field.

Electronic laboratory equipment usually has recommended maintenance prescribed by the manufacturer. These instructions will be followed as a minimum requirement. Due to the cost of some laboratory equipment, back up capability may not be possible. But all commonly replaced parts will have spares available for rapid maintenance of failed equipment. Such parts include but are not limited to: batteries; tubes; light bulbs; tubing of all kinds; replacement specific ion electrodes; electrical conduits; glassware; pumps; etc.

## **B7: EQUIPMENT CALIBRATION**

### **B7.1 Field Equipment**

Calibration of field equipment and instrumentation helps assure that accurate and reliable measurements are obtained. All measurement equipment used for groundwater sampling activities will be calibrated and adjusted to operate within manufacturer's specifications. Methods and intervals of calibration and maintenance will be based on the manufacturer's recommendations, the type of equipment, the analytical method, the instrument's stability characteristics, its required accuracy, intended use of the data, and environmental conditions under which the instrument is operated.

Calibration standards, frequencies, equipment maintenance, and calibration acceptance criteria for field instrumentation will be provided in the SAPs. Information required for calibration will be maintained in the field logbooks. The OPM or designee shall assure that all applicable calibration procedures and frequency of calibration are met before and during sampling by recording applicable notes in the daily logs.

The equipment necessary for the completion of groundwater sampling activities includes portable water quality meters that measure pH, specific conductance, and temperature. Additionally, portable sampling pumps, bailer, and generators will be used to collect groundwater samples.

## **B7.2 Laboratory Equipment**

All instruments will be calibrated in accordance with the analytical method requirements and QC acceptance criteria. All analytes reported will be present in the initial and continuing calibrations and these calibrations, at a minimum, will meet the acceptance criteria specified in the method. Records of standards preparation and instrument calibration will be maintained and submitted upon request to the DVSM. Calibration standards will be traceable to standard materials or standard references.

The initial calibration will be checked at the frequency specified in the method using standard materials. Multipoint calibrations will contain at least the minimum number of calibration points specified in the method. The calibration curve must meet the detection limits required by the DQOs as specified in SAPs. The laboratory instrumentation requirements and calibration requirements including frequency intervals and acceptance criteria are defined in specific SAPs under the analytical methods.

## **B8: INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES**

Only sample containers approved for use with the analytical method will be acceptable for the project. The OPM will be responsible for distributing appropriate sample materials to the OS.

All other consumables such as buffer solution and distilled water shall be checked by the OS prior to the sampling event for signs of tampering, expiration dates, and suitability for use.

## **B9: NON-DIRECT MEASUREMENTS**

No non-direct data will be needed for the project.

## **B10: DATA MANAGEMENT**

All analytical data produced by ATK Environmental Laboratory, the contractor laboratory, and the field operations manager will be stored at each producer's location. A copy of all permanent data will be provided to Environmental Services Central File. Following implementation of an electronic database for Promontory, data will be electronically stored in the database.

Data transfer and communications must ensure that only validated data (level 2) are stored in the project database. The transfer of data from generation, through validation, database entry and final delivery to the Division can be summarized as follows:

- Field personnel generate field data using appropriate field instruments under the direction of the OPM.
- Field personnel collect and send samples to the laboratory for analysis.
- The OPM supplies field data to the ATK PM for review.
- The PQAM supplies validated field data to the ATK DM for entry into the project database.
- The laboratory generates laboratory validated data and sends the data to the ATK PM.
- The ATK PM reviews laboratory validated data for representativeness.
- If required by the ATK PM, the laboratory sends laboratory validated data to the DVSM for review (rarely); otherwise, the laboratory will send laboratory validated data directly to the ATK DM (usually).
- If applicable, the DVSM performs a level 2 validation of a percentage of the laboratory-validated data. This percentage is determined by the judgment of the ATK PM.
- All laboratory validated data and if applicable, DVSM validated data are sent by the DVSM to the ATK DM for entry into the project database.
- The DVSM communicates with the LM and contract laboratory manager (CLM), the ATK PM, and ATK DM with respect to the validation process involving a laboratory. The PQAM, ATK PM, and OPM communicate with respect to the field data validation process. These communications occur throughout the data transfer process and provide the necessary feedback related to data validation. This communication constitutes the data validation communication loop for the respective types of data.
- The ATK DM forwards electronic read only copies of validated data as part of reports to the Division, or upon request by the Division.

Data-validation procedures apply to both field and laboratory data. All decisions and recommendations presented in communications between ATK and the Division will be based upon validated data.

### **B10.1 Validation of Laboratory Data**

The ATK Environmental Laboratory and contractor laboratory will provide a QC review of their respective data in accordance with the relevant laboratory QAP. The laboratory will enter laboratory validated (level 2) data into the laboratory database.

During the data validation process, the ATK Environmental Laboratory or a contractor laboratory will submit laboratory validated data to the ATK PM for review.

### **B10.2 Validation of Field-Generated Data**

The ATK PM or the PQAM will conduct on-site data validation of field generated data and for audits of field procedures. All field generated data, will be reviewed by the OPM and validated

by the ATK PM or the PQAM for completeness and legibility prior to incorporation into the project database by the DM (if available). The PQAM will validate data generated by the field instrumentation in accordance with instructions supplied with the instruments.

### **B10.3 Use and Storage of Data**

Data and documents shall be backed up daily to avoid loss. Retrieval of project documents is limited to project personnel who have been granted access to the appropriate electronic files. Sensitive or final electronic documents may be password protected to prevent unauthorized access or inadvertent changes. At project or contract closure, these electronic documents will be copied and electronically stored on a disc, CD, or DVD with an archived hardcopy in Environmental Services Central Files. At a minimum, archived electronic or hard copy analytical data will be stored for the duration of the permit. The quality control and quality assurance laboratory data package associated with the analytical data will be stored for five years in either electronic or in hardcopy form.

## **C1: ASSESSMENT AND OVERSIGHT**

ATK Environmental personnel will review this QAPP and the overall project design annually and may suggest procedural refinements or modifications. Any such changes will be subject to Division approval.

## **C2: AUDITS AND REPORTS TO MANAGEMENT**

An official "hard copy" report shall be signed and transmitted by the LM to the OPM along with originals of the chain of custody records, field reports, and internal QA/QC data. Additional reporting will be in accordance with Module IV, Section E of the Post Closure Permit.

Audits may be conducted as a principal means to determine compliance with this QAPP and the SAP. Audits are used to review the actual performance of the project during its course and throughout all levels of operations and management. Specifically, audits may be conducted for both field and laboratory operations to assess the accuracy of the measurement systems and to determine the effectiveness of QC procedures. Several factors will be taken into consideration for determining the scope and frequency for audits as follows:

1. Complexity of the activity;
2. Duration and scope of activity;
3. Degree of QC specified in the SAP;
4. Criteria to achieve quality assurance objectives;
5. Requirements for deliverables;
6. Criticality of data collection; and
7. Potential for or frequency of nonconformances.

The PQAM has Primary Audit Responsibility: The PQAM will have primary responsibility for overseeing audits, and the authority to delegate certain audit functions, as necessary. For complex or highly specialized tasks, senior technical specialists may be assigned as audit team members and as such, assigned portions of an audit under the direction of the PQAM. Both the PQAM and technical specialists will be familiar with the technical and procedural requirements of the field and laboratory operations, the associated SAP, as well as this QAPP.

The Auditing Process: The auditing process includes identifying an auditor, audit notification, audit report, identification of nonconformance, establishing corrective actions, and audit completion notification. Results of all audits performed, as well as associated recommendations for actions will be distributed to the Distribution List as given at the beginning of this QAPP. If there is any nonconformance identified during the audit, a follow-up audit after the report will be conducted to assure the nonconforming issue has been corrected. In circumstances where

corrective actions have not been completed as planned or scheduled, the auditing process provides for management intervention to resolve problems.

The various types of audits that may be conducted during the project are described in the following sections. These audits will be used to accomplish the following:

1. Verify that measurement systems are operating properly;
2. Assess whether data quality is adequately documented;
3. Confirm the adequacy of data collection systems; and
4. Evaluate management effectiveness to meet QA guidelines.

Addressing Nonconformance: The PQAM and audit team members have the authority with the concurrence of the ATK PM to stop all or part of the project activities if a critical situation occurs. A critical situation is defined as a situation in which systematic nonconformances occur. In addition, the PQAM and audit team members have direct access to the ATK PM so that the required authority can be provided where necessary to assure appropriate development and implementation of the required corrective actions.

Documentation: All auditing processes and results shall be documented by the PQAM, in an appendix attached to the Investigation Completion reports.

### **C2.1 Performance Audit**

If deemed appropriate by the ATK PM, a performance audit may be performed during sampling. A performance audit is used to determine the status and effectiveness of both field and laboratory measurement systems.

For laboratories, this may involve the use of PE samples. These samples have known concentrations of constituents that are analyzed as unknowns in the laboratory. Results of the laboratory analysis are calculated for accuracy against the known concentrations and acceptance limits provided by the supplier or manufacturer and evaluated by the PQAM or DVSM in relation to the project objectives.

Field performance will be evaluated using field blanks, trip blanks, field duplicates, and equipment blanks as described in Section B5.

### **C2.2 Data Quality Audit**

A data quality audit will be conducted following the procedures specified in Section C2 and the SAP to assess the effectiveness and documentation of the data collection and generation processes. Data-quality audits will be conducted by the DVSM at a frequency specified by the ATK PM.

### **C2.3 Technical Systems Audit**

A technical systems audit is used to confirm the adequacy of the data collection (field operation) and data generation (laboratory operation) systems. This is an on-site audit that is conducted to determine whether the Work Plan, SAPs and SOPs are properly implemented. Technical systems audits of field activities may be conducted periodically during the field operations. Sample and field-data collection will be audited by the PQAM or designee while the laboratory data generation will be audited by a DVSM. The audit shall identify all instances of non-compliance and allow for recommendation of corrective actions.

A systems audit of field procedures will be used to assess and document, at a minimum, sampling methods (including collection, containers, and preservation), equipment decontamination, chain of custody, sample tracking and shipment documentation, sample labeling, pre-field activities, equipment maintenance and calibration, field activity logs, and equipment check-in and re-calibration.

An audit of sample specific requirements of the laboratory is included in Section D.1.4 Laboratory Data Validation.

## **D1: DATA REVIEW, VERIFICATION AND VALIDATION**

This section outlines the methodology for assuring the correctness of the data-reduction process. The procedures describe steps for verifying the accuracy of data reduction. Data will be reduced either manually on calculation sheets or by computer on formatted printouts. The following responsibilities apply to all personnel who conduct activities in the data-reduction process:

- Technical personnel will document and review their own work and are accountable for its correctness.
- Major calculations, if applicable, will receive both a method and an arithmetic check by an independent checker. The checker will be accountable for the correctness of the checking process.
- A technical review may be conducted by an independent reviewer to assure the consistency and defensibility of the concepts, methods, assumptions, calculations, etc., stated in reports.
- The laboratory data reduction will be performed in a manner that produces quality data through review and approval of calculations.

### **D1.1 Laboratory Data Reduction and Review**

Data reduction is the process of converting measurement-system outputs to an expression of the parameter that is consistent with the comparable objectives identified in SAPs. Reduction of laboratory analytical data will be completed in accordance with the laboratory QAP and SOPs.

The laboratory will perform the in-house analytical data reduction and QA review under the direction of the laboratory manager or designee. The laboratory is responsible for assessing data quality and advising the ATK PM or DVSM of any data that were rated "preliminary" or "unacceptable," or other notations that would caution the data user of possible unreliability. Data reduction, QA review, and reporting by the laboratory may include, the following QC tasks:

- The data reviewer will check that preliminary data produced by the analyst are processed and reviewed for attainment of quality control criteria as outlined in the laboratory QAP.
- The data reviewer will check all manually entered sample data for entry errors and will check for transfer errors for all data electronically uploaded from the instrument output into the software packages used for calculations and generation of report forms and will decide whether any sample re-analysis is required.
- The data reviewer will review initial and continuing calibration data, and calculation of response factors, surrogate recoveries, matrix spike/matrix spike duplicate recoveries, internal standard recoveries, laboratory control sample recoveries, sample results, and other relevant QC measures.

- Upon acceptance of the preliminary reports by the laboratory data reviewer, the Laboratory QA Officer or certified technician will review and approve the data packages prior to report submittal to the DVSM and ATK PM.

The signing of the Certified Analytical Data Report Submittal by the QA Officer indicates that the QC review tasks, as applicable, have been accomplished.

## **D1.2 Laboratory Data Package Delivery Requirements**

The data reporting format shall meet the requirements of the method cited in the SAPs and this QAPP. The following forms and information (as pertinent to the method and analysis) will be delivered to a DVSM or ATK PM by analytical laboratories:

- Certified report listing all analytical methods used, sampling dates/times, EQLs, MDLs, dilutions, analysis dates/times, analyst, and results. A summary of any causes and reasons for variance from the original analytical request, corrective actions taken, factors affecting the analyses, other inconsistencies with paperwork, shipping, and packaging of samples. The report shall include any change or modifications to the sample, if done, and supporting reasons for the change or modifications.
- Analytical data results (listing both the laboratory ID and field sample ID) and detection limit summaries for all samples. Include results for method blanks, field blanks, MS/MSD, and QC samples as applicable.
- Blanks summary sheets (Initial, Continuing, Prep Blank).
- Calibration/Standardization plots and equations, as requested by the PM.
- Chain-of-Custody records.
- Copies of laboratory notebook pages showing data not otherwise recorded and calculations, as requested by the PM.
- Digestion and preparation logs, as requested by the PM.
- Enhanced or background subtracted spectra, as requested by the PM.
- ICP interference check sample summary form, ICP serial dilution, as requested by the PM.
- Initial and continuing calibration verification summary sheets with results of true values compared to found values, as requested by the PM.
- Internal standard area (or recovery) and retention time summary information, as requested by the PM.
- Laboratory control sample results information/summary.

- Laboratory generated library standard spectra. For tentatively identified compounds provide the reference mass spectrum or spectra from the software-spectra library, as requested by the PM.
- Matrix spike/matrix spike duplicate recovery information.
- Preparation and run logs and preliminary data (including printer tapes, strip charts, spectra, etc.) for analysis/reanalysis, calibrations, diluted/undiluted samples and QC samples, as requested by the PM.
- Quantitation and integration reports, as requested by the PM.
- Preliminary compound spectra, as requested by the PM.
- Surrogate recovery information.
- Standard addition results.
- Sample extraction and analysis dates and times.

### **D1.3 Field Data Reduction and Review**

The OPM is responsible for recording data generated by field instruments, possibly including but not limited to PIDs, thermometers, barometers, and field analytical test kits in accordance with SOPs provided by the manufacturer or in the SAPs. Data shall be reported in a format to be provided in SAPs and shall include, at a minimum the following QC checks:

- The OPM will check that data produced by the instrument are within the calibration range of the instrumentation and other QC measures relevant to the field instruments.
- The OPM will check field logs and cross check field sampling locations and procedures with the field data for representativeness.
- The OPM will check all manually entered field data for entry errors and will check for transfer errors for all data electronically uploaded from an instrument output where appropriate.
- Upon acceptance of the field data and field logs by the OPM, the data packages will be delivered, as requested by the PM, to the PQAM for review.

### **D1.4 Data Validation**

#### ***D1.4.1 Laboratory Data Validation***

The first level of review will be conducted by the ATK Environmental Laboratory or contractor laboratory. Laboratories have the initial responsibility for the correctness and completeness of the data they generate. The laboratory data reviewer will evaluate the quality of the analytical data based on an established set of laboratory guidelines (laboratory QAP and

SOPs) and this QAPP. This person will review the data packages to confirm at a minimum, the following:

- Sample preparation information is correct and complete;
- Analysis information is correct and complete;
- The appropriate SOPs have been followed;
- Analytical results are correct and complete;
- QC sample results are within established control limits;
- Blank results are within appropriate QC limits;
- Analytical results for QC sample spikes, sample duplicates, initial and continuing calibration verifications of standards and blanks, standard procedural blanks, and laboratory control samples are correct and complete;
- Tabulation of reporting limits related to the sample is correct and complete; and
- Documentation is complete (all anomalies in the preparation and analysis have been documented; holding times are documented).

The quality control limits for accuracy and precision for the different parameters that will be analyzed are shown below:

Analysis	Accuracy Limits	Precision Limits
Volatile Organic Compounds	80 – 120% Recovery	≤20% RPD
Metals	75 – 125% Recovery	≤20% RPD
Perchlorate/ Nitrate	80 – 120% Recovery	≤20% RPD
Explosives	80 – 120% Recovery	≤20% RPD

Another level of review beyond the laboratory validation of the laboratory generated analytical data is the data validation of 10% of the data conducted by a DVSM upon request of the ATK PM. The DVSM will review sample-specific requirements as required under the DQOs. Data validation may be conducted from the results reported on the summary forms and certificates of analysis so that proper qualifiers are assigned to all results. Typical qualifiers are: J qualified and F – failed depending on the data quality finding.

The sample-specific requirement review conducted by a DVSM, at a minimum, may include the following:

- 1) Blanks Analyses
- 2) Organic Analyses
  - a) Holding Times
  - b) Surrogate Spike Results
  - b) Matrix Spike/Matrix Spike Duplicate (MS/MSD) Sample Analysis

- c) Tentatively Identified Compound Identification
- d) Field Duplicate Agreement
- 3) Metals and Inorganic Analyses
  - a) Holding Times
  - b) Duplicate Sample Analysis
  - c) Matrix Spike Sample Analysis
  - d) Matrix spike duplicate or laboratory duplicate precision
  - e) Post-digestion Spike Recovery
  - f) ICP Serial Dilution
  - g) Field Duplicate Agreement
- 4) Other Analyses

The laboratory will be contacted by the DVSM with regard to any missing or incorrect deliverables in the data packages noted during the validation process. The DVSM will document all subsequent submittals and re-submittals from the laboratory, recalculations, and data reviewer corrections. The data package delivery requirements (D1.2) as specified in this QAPP and the SAP will be reviewed for completeness. Data determined to be outside acceptance criteria, using professional judgment, and any conclusions reached concerning usability of the suspect data will be described in the data validation reports submitted by the DVSM to the OPM with the laboratory results report.

A data package shall consist of results associated with approximately 20 or fewer field sample numbers.

#### ***D1.4.2 Field Data Validation***

The purpose of the validation process is to evaluate the usability of field data that are collected or documented in accordance with specified protocols outlined in the SAPs. First, all field data will be reviewed by the OPM at the time of collection by following the QC checks outlined in the SAPs and this QAPP (5.1.3). Second, field data will be validated by the PQAM or designee, who will review the field data documentation to identify discrepancies or unclear entries. Field data documentation, at a minimum, may be validated against the following criteria, as appropriate:

- Sample location and adherence to the plan;
- Field instrumentation and calibration;
- Sample collection protocol;
- Sample volume;
- Sample preservation;
- Blanks prepared and submitted with each respective sample set for laboratory analysis;

- Duplicates collected and submitted with each respective sample set for laboratory analysis;
- Sample documentation protocols;
- Chain-of-custody protocols; and
- Sample shipment.

## **D2: RECONCILIATION WITH USER REQUIREMENTS**

Once the data verification and validation procedures have been completed, the PQAM and DVSM will evaluate the results to determine if project DQOs have been met for field operations and laboratory analyses, respectively. The calculations specified in other sections of this QAPP and in SAPs will be used to determine if the specified numeric acceptance criteria have been met. Data, which do not meet the requirements for their intended use, will be flagged accordingly and the flags entered into the project database, so that all data reports used for decision making are clearly noted.

**ATK LAUNCH SYSTEMS (ATK) PROMONTORY  
FACILITY  
POST-CLOSURE PERMIT**

**GROUNDWATER SAMPLING AND ANALYSIS PLAN**

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**FIGURES**

Figure 1 Example of Chain of Custody Form

**TABLES**

Table 1 Sampling and Analytical Methods Requirements

Table 2 Groundwater Monitoring Wells Completed in Unconsolidated Sediments

**ATK LAUNCH SYSTEMS  
GROUND WATER SAMPLING AND ANALYSIS PLAN  
FOR POST-CLOSURE PERMIT MONITORING**

**1.0 PURPOSE AND SCOPE**

ATK Launch Systems (ATK) has developed this plan to satisfy the requirements for a ground water sampling and analysis plan as referenced in 264.97 of the Code of Federal Regulations (CFR). The plan also addresses Section R315 7-13-4 of the Utah Administrative Code and 40 CFR 265.93 with respect to Assessment Monitoring.

The plan specifically addresses the sampling of ground water monitoring wells at ATK Launch systems Promontory, Utah-based Operations. The location, number, and description of each well have been submitted previously to the Utah DSHW. The plan addresses all procedures for taking ground water samples, shipping the samples for analysis, and methods for analyzing samples.

The goal of this plan is to collect groundwater samples that are representative of in-situ groundwater conditions and to minimize changes in groundwater chemistry during sample collection and handling. DNAPL's are not known to be present in any screened interval of any well. If DNAPL's are discovered to be present in a well, this document is not sufficient, and protocol for sampling will be developed prior to sample collection.

## **2.0 QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA**

This section presents the DQOs for the project and the performance criteria necessary to meet these DQOs. Included are discussions of the project DQOs, quantitative DQOs (precision, accuracy, and completeness), and qualitative DQOs (comparability and representativeness). The overall QC objective is to generate data that are of known, documented, and defensible quality.

### **2.1 DATA QUALITY OBJECTIVES**

DQOs are statements that specify the quantity and quality of the data required to support project decisions. DQOs were developed for this project using the seven-step process listed in *Data Quality Objectives Process for Hazardous Waste Site Investigations* (U.S. EPA, 2000). The QC procedures as well as the associated sampling procedures for this project will be focused on achieving these DQOs in a timely, cost-effective, and safe manner. Deviations from the DQOs will require defining the cause or causes for noncompliance and will initiate the process of determining whether additional sampling and analyses will be required to attain project goals.

#### **2.1.1 Statement of Problem**

Groundwater monitoring at the ATK facility has shown that, due to waste management practices of the past, contaminants have been released to the groundwater. Some of the contaminants have routinely been detected at concentrations exceeding the Groundwater Protection Standard (GWPS) established in Module IV of this Permit. Pursuant to R315-8-6, and this Permit, ATK is required to establish a corrective action program when the GWPS is exceeded. Groundwater monitoring data collected in accordance with this SAP will be used for assessing the human health and ecological risk associated with the contaminated groundwater in order to determine the appropriate corrective action. Monitoring data will also be used to update groundwater flow and transport models that are used to predict the migration of contaminants and how points of exposure may be affected. Therefore, the goal of this plan is to outline the methodologies for collection of groundwater samples that are representative of in-situ groundwater conditions and to minimize changes in groundwater chemistry during sample collection and handling.

#### **2.1.2 Decision Statement**

Decision statements identify the key questions that the study should address and alternative actions that may be taken, depending on the answer to the study questions. The key questions associated with groundwater sampling at the Promontory facility are:

- Where do the contaminant concentrations exceed the GWPS? and;
- Does the site contamination pose an unacceptable risk to human health and the environment?

The decision statement for this program is to determine where contaminant concentrations

exceed the GWPS site-wide and what response is appropriate for those areas. The appropriate response (e.g. removal or treatment of contaminants, site management, or continued monitoring) will be based on the results of groundwater models, human health and ecological risk assessments and a corrective measures study.

### **2.1.3 Decision Inputs**

The most appropriate resolution of the decision statement will require the collection of groundwater samples and potentiometric surface data on a regular schedule. These samples will be analyzed for the constituents shown in Table 1 of this SAP. The analytical methods that will be used are also shown in the table. These data along with historic groundwater data, will be used as inputs to groundwater models and human health and ecological risk assessments. All of this information will be considered and appropriate corrective measures will be proposed in a Corrective Measures Study.

### **2.1.4 Study Boundaries**

Groundwater contamination at the facility exists in at least three separate plumes and in two different aquifers. The boundary of the study is defined by the extent of groundwater contamination and is not limited to the ATK property. The Area of Compliance is defined as all monitoring wells, piezometers and springs located within impacted aquifers and displaying concentrations that exceed the Groundwater Protection Standard as defined in section IV.C. of Module IV.

The monitoring wells and springs that will be sampled semi-annually are listed in Table 1 of Attachment 4. Well and spring locations are shown on the maps that are also included in Attachment 4.

### **2.1.5 Decision Rule**

As stated above, groundwater monitoring at the site has shown that the GWPS has been exceeded for a number of constituents. The GWPS for constituents that have been detected at the site are listed in Table IV-1 of the Permit. Based on the requirements of R315-8-6 and this Permit, if the GWPS is exceeded than a corrective action program shall be initiated.

In accordance with Module V, Section A, ATK is planning on conducting human health and ecological risk assessments, as part of the corrective action program, after the groundwater flow and contaminant transport models are completed. The risk assessments will be conducted in accordance with the State of Utah R315-101 Cleanup Action and Risk-Based Closure Standards. The characterization and evaluation of risk is based on developing concentration terms for contaminants (generally the 95% upper confidence limit of the mean) and calculating the reasonable maximum exposure for all exposure pathways. The appropriate response action that will be taken at the site will be dependent on the results of the risk assessments.

### 2.1.6 Tolerable Limits on Decision Errors

Tolerable error limits assist in the development of sampling designs to ensure that the spatial variability and sampling frequency are within specified limits. However, the location, number, and frequency of sampling at the Promontory facility has been previously determined by the requirements of the Post Closure Permit and compliance monitoring downgradient of identified Solid Waste Management Units. The selection of the well locations was based on professional judgment rather than statistics. Therefore, error limits are not used to determine sampling locations or frequency. There is no need to define the “gray region” or the tolerable limits on the decision error, since these only apply to statistical designs.

In general, the steps necessary to minimize errors and produce good quality data will be incorporated into quality assurance/quality control (QA/QC) protocols in this plan.

### 2.1.7 Selected Sampling Design

The proposed sampling locations (monitoring wells) were drilled in areas based on best professional judgment, site history, aerial photos, and results of previous environmental investigations. A statistical design for collecting groundwater samples will not be used. The Post-Closure care period, which began in 1992 for the M-136 impoundments, lasts for 30 years. The location of contaminant plumes have been identified based on this collection of data. In addition, due to the large number of wells that exist, plans are submitted semi-annually for which wells will be sampled. The selection of wells to sample is based on an evaluation of what data is the most pertinent at the time the sampling plan is generated.

## 2.2 QUANTITATIVE OBJECTIVES

Precision quantifies the repeatability of a given measurement. Precision is estimated by calculating the relative percent difference (RPD) of field duplicates, as shown in the following equation:

$$(\%)RPD = \frac{\text{Result} - \text{Duplicate Result}}{(\text{Result} + \text{Duplicate Result})/2} \times 100$$

The laboratory will review the QC samples to ensure that internal QC data lies within the limits of acceptability. Any suspect trends will be investigated and corrective actions taken. The laboratory will document the calculation for %RPD or other statistical treatment used. The results will be compared to the acceptance criteria as published in the mandated test method. Where there are no established criteria, the laboratory will determine internal criteria and document the method used to establish the limits

Accuracy refers to the percentage of a known amount of analyte recovered from a given matrix. Percent recoveries are estimated using the following equation and can be calculated for the project-specific matrix (i.e., water).

Recovery Laboratory Control Standard (LCS) and Surrogate Internal Standard

$$\text{(SIS) (\%)} = \frac{\text{(Amount Spike Recovered)}}{\text{Added Spike Amount}} \times 100$$

Recovery Matrix Spike/Matrix Spike Duplicate

$$\text{(MS/MSD)(\%)} = \frac{\text{(Spiked Sample Result)} - \text{(Sample Result)}}{\text{Spike Added}} \times 100$$

The recovery of most spiked organic compounds is expected to fall within a range of 70 to 130%.

Completeness refers to the percentage of valid data received from actual testing done in the laboratory. Completeness is calculated as shown in the following equation. The target completeness goal for all compounds is 100%. However, where data are not complete, decisions regarding re-sampling and/or reanalysis will be made by a collaborative process involving ATK Environmental personnel, laboratory personnel, and regulatory personnel. The completeness goal for holding times will be 100%.

$$\text{Completeness \%} = \frac{\text{Number of Measurements Judged Valid}}{\text{Total Number of Measurements}} \times 100$$

### 2.3 QUALITATIVE OBJECTIVES

Comparability is the degree to which one data set can be compared to another. To ensure comparability, samples will be collected at specified intervals and in a similar manner, and will be analyzed within the required holding times by accepted and comparable methods. Comparability will be obtained through the use of standard sampling procedures and trained personnel, and through standard analytical methods used by the laboratory. Additionally, adherence to the procedures and QC approach contained in the QAPP will provide for comparable data throughout the sampling events. All data and units used in reporting for this project will be consistent with accepted conventions for environmental matrix analyses. This approach will ensure direct comparability between the results from one sampling event to the next sampling event using the methods presented in this SAP.

Representativeness is the degree to which a sample or group of samples is indicative of the population being studied. Over the course of a project, samples will be collected in a manner such that they are representative of both the chemical composition and the physical state of the sample at the time of sampling.

## 2.4 AUDITS AND REPORTING

A Performance Audit will be conducted during a sampling round at least once in a five year period. The performance audit will be used to determine the status and effectiveness of field and laboratory measurement systems.

For the laboratory, this will involve the use of PE samples with known concentrations of constituents that will be analyzed as unknowns in the laboratory. Results of the laboratory analysis will be calculated for accuracy against the known concentration and acceptance limits provided by the supplier or manufacturer.

Field performance will be evaluated using field blanks, trip blanks, field duplicates, and equipment blanks as described in Section B5 of the QAPP.

A Data Quality Audit will be conducted following the procedures specified in Section C2 of the QAPP to assess the effectiveness and documentation of the data collection and generation processes. Data-quality audits will be conducted by the DVSM at least once during a five year period.

A Technical System Audit (TSA) will be performed once each five years. A TSA is a thorough and systematic qualitative onsite audit where equipment, personnel, training, procedures, and record keeping are examined for conformance with requirements of the QAPP. The TSA will encompass field sampling activities, data validation, and data management. All findings will be documented in writing to the OPM and communicated to the PM when the assessment is complete. A copy of the TSA report will be provided to the Division for review, together with a discussion of all proposed corrective actions and corrective actions taken as a result of the audit.

The TSA will include a field audit to check on sample collection and sample handling procedures. The field audit will include:

- A review of compliance with requirements of the QAPP and Sampling Plans
- On-site visits, which will include observation of field personnel as they perform all aspects of the sampling programs: field equipment calibration, equipment decontamination, sample collection, sample packaging, and documentation. The on-site visits will also include a review of data collection forms, COC forms, calibration procedures, etc. The auditor will also talk individually with field personnel to determine consistency of sampling procedures and adherence to the approved sampling plan.

### **3.0 SAMPLE COLLECTION**

#### **3.1 WATER LEVEL MEASUREMENT**

Before sampling any ground water monitoring wells, a water level measurement will be recorded using an electronic water level indicator to the nearest 0.01 feet. The water level will be recorded in the field book before each monitoring well is sampled. The total depth of all monitoring wells that are completed in unconsolidated sediments will be measured every three years beginning in 2008 and will be recorded to the nearest 0.1 feet in the field book. The northern edge of the (inner) PVC casing shall be used as the reference point. A List of all wells that were completed in unconsolidated material is in TABLE 2.

#### **3.2 PURGING THE MONITORING WELLS**

The ground water monitoring wells will be purged before sampling begins. Monitoring wells shall be purged so that stagnant waters, which are not representative of the waters in the aquifer, can be removed before sampling. The amount of water to be removed from the well will be dependant upon the ground water yield for the formation in which the well is located. Although specific purge and sample systems are described below, other methods may be employed if they meet guidelines approved by the USEPA and Utah DSHW.

##### **3.3.1 Purging High-Yield Formations**

**A.** For high-yield formations (which produce greater than 1 gpm), three casing volumes of water will be removed from the well or until the pH, temperature, and conductance has stabilized within approximately 10% over at least two measurements. A casing volume is defined as the volume of water between the water level measured and the total depth of the monitoring well. The casing volume will be calculated during each sampling period, so that a consistent volume of standing water can be removed prior to each sampling.

**B.** Low-flow Purging (consistently yields the highest level of data quality), <1 L/min (.26 gpm), Low-flow Sampling < 300 ml/min (0.3 L/min or 0.1 gpm). During purging, the water level in the well should not decrease significantly and should stabilize after purging for a few minutes. Purge the well until the pH, temperature, and conductance have stabilized within approximately 10% over at least two measurements. The pump intake will be positioned within the lower screened interval.

##### **3.3.2 Purging Low Yield Formations**

For low-yield formations (which produce less than approximately 1 gpm), wells should be purged at or below their recovery rate so that migration of water in the formation above the well screen does not occur. A low purge rate also will reduce the possibility of stripping VOCs from the water, and will reduce the likelihood of mobilizing colloids in the subsurface that are immobile under natural flow conditions. Make sure that purging does not cause formation water

to cascade down the sides of the well screen. At no time should a well be purged to dryness if recharge caused the formation water to cascade down the sides of the screen, as this will cause an accelerated loss of volatiles. Water should be purged from the well at a rate that does not cause recharge water to be excessively agitated until the pH, temperature and conductance has stabilized within approximately 10% over at least two measurements. The pump intake will be positioned within the lower screened interval.

### **3.3.3 Purging and Sampling Equipment**

Wells less than 250 feet deep may be purged and sampled with a variable frequency pump or a bladder pump. Wells greater than 250 feet deep, may be purged and sampled using a pneumatic-operated tubing-vented piston pump or a bladder pump. Wells greater than 250 feet with a dedicated system may use a submersible pump for purging and a bladder pump for collection of volatile organic samples or a variable frequency 4" diameter Pump or a bladder pump. Wells greater than 500 feet deep may be purged using a submersible pump and sampled with a bailer or a bladder pump may be used. Variable speed low rate centrifugal pumps and bladder pumps may also be used for both purging and sampling. When dedicated equipment is not used for sampling it should be cleaned in the following manner: Wash the equipment with a non-phosphate detergent. Rinse the equipment with tap water. Rinse the equipment with reagent water. Decontamination fluids should be put in the waste water collection tank and disposed of with the collected well water. Equipment blanks will be taken on approximately 10% of all wells sampled not using dedicated equipment.

### **3.3.4 Nested Multi-Screened Well**

Wells B-2 and F-2 consist of three two inch inside-diameter well casings nested within an eight-inch diameter borehole. Each casing is screened at a different depth in the aquifer. Purging and sampling is accomplished by using a pneumatic-operated tubing-vented piston pump or a centrifugal, variable speed, low-rate pump. Each casing shall be purged of three casing volumes prior to sampling, or until parameters stabilize.

## **3.4 SAMPLING PROCEDURE FOR MONITORING WELLS**

Each well will be sampled using the following procedure. These procedures will describe specifically the following steps for sampling the wells.

- (1) Each well will be purged before removing a sample
- (2) The sampling pump will be operated to produce a stream of ground water. Before taking a sample, the pH, specific conductance, and temperature will be measured using portable meters. Samples will be taken when the pH, conductance, and temperature have stabilized to within approximately 10% over at least two readings, or after three casing volumes of water have been purged. A sample from the pump will be put into an appropriate container.

- (3) For volatile organic compounds, the flow rate will be restricted to less than 100ml/minute while taking the samples. To minimize the possibility of volatilization of organic constituents, no headspace should exist in the containers of samples containing volatile organics.
- (4) The samples will be taken in the following order:
  - 1) Volatiles
  - 2) Anions
  - 3) TDS
  - 4) Metals
  - 5) Other Constituents
- (5) The number, size and type of sample containers required for the constituents that will be sampled are given in Table 1.
- (6) If samples are being split, the samples will be taken directly from the ground water monitoring well. This process will be done in order to minimize volatilization of sensitive organics.

### **3.5 FIELD QUALITY ASSURANCE AND CONTROL PROGRAM**

The field QA/QC program is described in the Post-Closure Permit Quality Assurance Project Plan. A general description is given below.

A QA/QC officer has been appointed to oversee the Ground Water QA/QC Plan, implement all phases of the Field Quality Assurance and Control Program, and to periodically audit the laboratory's QA/QC Program. The QA/QC officer will work with the sampling staff and the laboratory's QA/QC officer to assure that the data collected from the ground water is accurate. The QA/QC officer duties include:

1. Making sure that the Ground Water Sampling Plan is followed.
2. Making sure the laboratory follows their QA/QC plan.
3. Send spiked samples periodically to the laboratory to audit the QA/QC program.

#### **3.5.1 Trip Blanks, Field Blanks and Field Duplicates**

Trip blanks, when collecting VOC's, will consist of not less than ten percent of the total of samples, and will be made of deionized water, prepared at the laboratory immediately before leaving on a sampling run. The trip blanks are then placed in a cooler which will be filled by other samples: the trip blanks are handled in the same manner as other samples. Holding times for a trip blank begins when groundwater samples are being collected.

Field Blanks (field rinsate blank, decontamination blank, equipment blank)

Collect one field blank for every 10 samples collected. Decontaminate the sampling equipment for the field blank the same way you do when collecting other samples. After decontaminating the sampling device (e.g., bailer or pump), fill it with laboratory reagent grade water, then collect a sample of the reagent grade water, this is your field blank. The field blank should be analyzed for the same parameters as the samples. Field blanks are not required if you used dedicated sampling equipment (permanently left in the well) or disposable sampling equipment.

Field duplicates, consisting of not less than ten percent of the total samples, will be collected and stored with the water samples. The field duplicates are collected and handled at the same time and in the same manner as a regular sample. The results of these samples are compared against those of the appropriate regular sample.

### **3.5.2 Blind Controls and Spiking Samples**

Annually, the QA/QC officers will send a spiked sample or a blind control to the laboratory to audit the laboratory's QA/QC program. A blind control and a spiked sample both are samples with a known amount of solute in a solvent. The difference between a blind control and a spiked sample is the following:

- 1) Blind Control – An unannounced spiked sample sent to the laboratory.
- 2) Spiked Sample – An announced spiked sample sent to the laboratory.

The level of contamination in either case is not divulged to the laboratory.

The QA/QC officer will review the spike or blind control recovery. If the spike or blind control recovery is out of line with the laboratory's surrogate spike and matrix spike recoveries, the laboratory's QA/QC officer will be contacted to resolve the problem.

### **3.5.3 Sample Handling**

Sampling equipment and techniques have been designed so that the ground water sample is not contaminated or altered. A critical part of obtaining samples is proper sample handling. All of these procedures will be followed for handling ground water samples.

All samples requiring refrigeration will be stored in a secured refrigerator or ice chest with ice. Sample preservation requirements and maximum holding times for the constituents that will be collected are shown in Table 1. All samples will be labeled and accompanied by a laboratory request and chain of custody sheets.

### **3.5.4 Labeling Samples**

All sample containers will be labeled with the following information:

- 1) Sampling date and time
- 2) Sample number
- 3) Name of person taking samples
- 4) Parameters to be analyzed in sample
- 5) Location of sampling point
- 6) Preservative added (if applicable)

### **3.5.5 Field Book**

During each sampling period, the person sampling the ground water wells will keep a field book into which all relevant information regarding sampling will be recorded. The data must be entered in the book using permanent ink. The following information will be entered into the field book:

- 1) Signature and date of person(s) conducting the sampling.
- 2) General weather conditions.
- 3) Date and time each well is sampled.
- 4) Sample number and location of sample (i.e., well number).
- 5) Static water level in well.
- 6) Volume of a casing of well (if applicable).
- 7) Well depth
- 8) Flow rate, and purge start and stop times.
- 9) Well purging procedure and equipment
- 10) Well yield (high or low) and well recovery after purging (slow, fast)
- 11) PH, specific conductance, and temperature measured during stabilization of well.
- 12) Sample withdrawal procedure and equipment
- 13) Internal temperature of field and shipping containers
- 14) Conductance and pH meter calibration date.
- 15) Any irregularities in the sampling procedures or in the conditions of the wells.
- 16) Any other information the sampler deems necessary or important during sampling.

### **3.5.6 Chain-of-Custody Control Procedures**

All samples will be controlled by chain-of-custody procedures. All samples shall be accompanied by a chain-of-custody form. This form must be completely filled out, signed, and dated by the sampler. An example of the form is found on Figure 1.

The containers will be placed in a lockable cold storage box, or refrigerator. This box will be in the possession of the person charged with the custody of the samples or the box will be locked and placed in a secure place. Under no circumstances will the box with the samples be left unlocked or unattended. A copy of all the Chain-of-Custody forms will be reviewed for accuracy and filed by the QA/QC officer.

### **3.5.7 Field Equipment Calibration Procedure**

Each sampling day, the pH and conductivity meters will be calibrated with a standardized solution in accordance with the manufacturer's specification. Record of these calibrations will be kept in the Field Log Book.

## **3.6 SAMPLE COLLECTION SCHEDULE**

The ground water monitoring wells will be sampled semiannually.

## **4.0 ANALYSIS OF GROUND WATER SAMPLES**

Wells will be sampled for constituents specified in the post-closure permit. Samples will also be analyzed for the field water quality parameters pH, temperature, and conductance.

### **4.1 ANALYTICAL LABORATORY**

All samples will be analyzed by a state certified laboratory using EPA or State approved analytical methods. If there is not an established EPA or State approved analytical method, the Utah DSHW will be notified of the proposed analytical method.

If the laboratory is not State certified to do a specific analysis, the laboratory will subcontract a qualified laboratory to do the analysis. Table 1, contains a listing of analytes, methods, containers, and holding times.

## **5.0 REPORTS**

Reports submitted semiannually to the Utah DEQ will include raw analytical data and analysis of data as described previously in Sections A-9 of the QAPP.

## **5.1 PRESENTATION OF ANALYTICAL RESULTS**

The analytical results received from the laboratory will be placed on a computer for easy data manipulation and presented in the following manner:

### **5.1.1 Listing of Data**

All the collected monitoring data will be presented in a list. This list will be presented according to monitoring well and will include all of the data produced from sampling the monitoring well. The list will include the following data:

- Ground water contaminant constituents
- Monitoring well number
- Date sample was taken
- Concentration of constituents
- Units
- Laboratory detection limits (including the method detection limit and estimated quantitation limit)

## **CONCLUSION**

ATK is a dynamic, creative and resourceful company that is always looking for ways to improve its systems and programs. Currently it is looking at some innovative and creative sampling systems that show Promise. ATK is currently doing a side by side study using the Hydrasleeve sampler along side regular sampling techniques to demonstrate the effectiveness of the Hydrasleeve Sampler. With approval from the State of Utah we would like to incorporate this technology into our sampling program.



**TABLE 1. SAMPLING AND ANALYTICAL METHODS REQUIREMENTS**

<b>Parameter</b>	<b>Matrix</b>	<b>Analytical Method</b>	<b>Containers per sample (number, size, and type)</b>	<b>Preservation Requirements (temperature, chemical)</b>	<b>Maximum Holding Time (to extraction)</b>	<b>Lab Holding Time (after extraction)</b>
Volatile Organic Compounds	Water	USEPA Method 8260B - Thiokol SOP 401	3-40 ml glassTeflon cap	Cool 4° C HCl to pH<2	14 Days	40 days
Perchlorate	Water	USEPA Method 314- Thiokol SOP 314	250 ml nalgene	Cool 4° C	28 days	28 days
Metals: As, Ba, Be, Co, Cr, Mo	Water	USEPA Method 6010B- Thiokol SOP 364 USEPA Method 7471A-Thiokol SOP 373	500 ml nalgene	Cool 4° C HNO <sub>3</sub> to pH<2	28 days (Hg); 6 months (other)	40 days
RDX	Water					
HMX	Water					
Nitrate	Water					

**Table 2 – Groundwater Monitoring Wells Completed in Unconsolidated Material**

A-7	G-2	H-5
B-5	G-3	H-6
B-6	G-4	H-8
B-7	BC-1	H-9
B-8	BC-2	H-10
C-7	BC-3	J-1
E-1	BC-4	J-3
E-2	BC-5	EW-6
E-4	BC-6	M-5081
E-5	LF-1	M-5082
E-8	LF-2	M-5083
E-9	LF-3	M-5084
F-1	P-1	M-508B1
F-2 A, B, C	P-2	TCC1
F-3	P-5	
G-1	H-4	