

## DATA ITEM DESCRIPTION

**Title:** Munitions Constituents Chemical Data Quality Deliverables

**Number:** FPRI-005-10

**Approval Date:** 20031201

**AMSC Number:**

**Limitation:**

**DTIC Applicable:** No

**GIDEP Applicable:** No

**Office of Primary Responsibility:** CEHNC-ED-CS-P

**Applicable Forms:**

**Use/Relationship:** Munitions Constituents (MC) Chemical Data Quality Deliverables will be used to describe planning and results of sampling and analysis, quality assurance/quality control, laboratory qualification, data acquisition/data reporting, and chain-of-custody when environmental samples are required for Military Munitions Response Program (MMRP) removal/remedial actions.

### 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

#### U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 200-1-1 (1994) Validation of Analytical Chemistry Laboratories

EM 200-1-3 (2001) Requirements for the Preparation of Sampling and Analysis Plans

EM 200-1-6 (1997) Chemical Quality Assurance

ER 1110-1-263 (1996) Data Quality Management for Hazardous, Toxic, Radioactive Waste Remedial Activities

EM 1110-1-4009 Ordnance And Explosives Response

#### U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 540-R-99-008 (1999) Contract Laboratory Program National Functional Guidelines for Organic Data Review

EPA 540-R-01-008 (2002) Contract Laboratory Program National Functional Guidelines for Inorganic Data Review

EPA 530/F-93/004 Test Methods for Evaluating Solid Waste (Rev O; updates I, II, IIA, (Vol. IA, IB, IC, and II) IIB, III, and IIIA)

### 1.2 CHEMISTRY REQUIREMENTS

Chemical Data Quality Control (CDQC) shall be as defined in ER 1110-1-263; this ER, which integrates USACE guidance on the subject, shall be supplemented by EM 200-1-6 for detail technical guidance on CDQC. Work plans and laboratory analysis shall be according to or consistent with EM 200-1-3. Chemistry requirements for MMR projects with environmental sampling shall also be according to EM 1110-1-4009.

#### 1.2.1 Data Quality Objectives (DQO)

Sample acquisition, chemical analysis and chemical parameter measurements shall be performed so that the resulting data meet and support data use requirements. The chemical data shall be acquired,

documented, verified and reported to ensure that the specified precision, accuracy, representativeness, comparability, completeness and sensitivity requirements are achieved.

### 1.2.2 Sampling, Analysis and Measurement

Samples shall be collected and analyzed and/or shipped to a primary laboratory according to the project-specific SOW.

### 1.3 QUALITY ASSURANCE ELEMENTS

The Contractor shall be responsible for the following QA elements necessary to monitor and ensure the quality of chemical data produced.

#### 1.3.1 Laboratory Validation Requirements

The Contractor shall propose the minimum number of laboratories that can attain or have attained U.S. Army Corps of Engineers (USACE) validation in accordance with EM 200-1-1 and consistent with contract required chemical data quality. The Contractor may propose laboratories that shall subsequently be validated by the USACE, or select currently validated USACE laboratories. The laboratory must hold applicable state accreditations. The Contractor shall identify all proposed project laboratories in the proposal and in the sampling and analysis plan (SAP). If a proposed analytical laboratory cannot meet specified analytical requirements or achieve the required validation, the Contractor shall select another laboratory. If not currently validated, the USACE laboratory validation process requires a nominal 120-day process. Samples may not be subcontracted to another laboratory without approval of the CO. If a subcontractor laboratory must be used, the subcontractor laboratory must meet all requirements for validation and accreditation, as well as project-specific SAP requirements.

#### 1.3.2 Quality Assurance Sample Collection and Analysis

The Contractor shall be responsible for collection and transportation of QA samples to the QA laboratory. Samples for all analyses (except volatiles) shall be taken as splits of homogenized samples. Samples for volatiles shall be collected as discrete duplicates/triplicates. Samples shall be collected at a rate of 10 percent per matrix per analysis per sampling event.

- a. The Contractor shall submit the QA Laboratory Advance Notification (QALAN) to the QA laboratory. The QALAN shall include a list of laboratory-related DQO. The DQO shall include, but shall not be limited to, identification of extraction and analysis method numbers, a list of analytes with required limits, estimated number of tests, approximate sampling dates, and requested completion date for QA testing. The Contractor shall notify the Contracting Officer (CO) and the QA laboratory immediately of any changes.
- b. The Contractor shall provide all labor and field supplies, including sample containers and shipping coolers, for collecting and shipping samples for QA testing. The Contractor shall properly collect, label, and package the QA samples, fill out all chain-of-custody forms, and ship the samples by one-day delivery service to the designated QA laboratory for analysis. The Contractor shall notify the laboratory when all sampling is completed and shall clearly mark the chain-of-custody form accompanying the final shipment "FINAL".
- c. The Contractor shall allow 60 calendar days for laboratory analysis of QA samples, data review, and submission of the Government chemical quality assurance report. The elapsed time shall begin when the Contractor's last sample arrives at the QA laboratory, provided that the Contractor's completed chemistry data package is received within 30 calendar days thereafter. Otherwise, the Contractor shall allow 30 calendar days from the date the completed chemistry data package is received at the laboratory. Where QA results are unacceptable due to Contractor negligence (e.g. improper sample collection and/or handling by the Contractor), or where QA sample results conflict with the Contractor's primary sample results, further sampling and testing shall be performed as directed by the CO. All costs for such additional sampling and testing due to Contractor negligence, including both QC and QA testing and analysis, and for any required remedial actions in the work, shall be borne by the Contractor. USACE acceptance of final disposition of any excavated soil shall not occur until the Contractor's sampling and

QC results have been confirmed by QA results. This includes all final stockpiling, wasting, backfilling, etc. No payment will be made for laboratory sampling and testing before receipt and acceptance by the Government of the QA samples and the completed Chemical Data Final Report (CDFR), properly formulated according to these specifications.

#### 1.3.4 Review of Primary Laboratory Data

The Contractor shall be responsible for the independent data review of the entire primary data set.

#### 1.3.5 Validation of Data

The Contractor shall be responsible for validating the data in accordance with EPA 540-R-99-008, EPA 540-R-01-008, and any applicable state or regional requirements. The data validation strategy shall be established at the beginning of the project to be consistent with project DQOs.

### 1.4 SUBMITTALS

Government and/or regulator approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with project-specific statements of work:

#### **Sampling and Analysis Plan; G.**

The SAP, including the Field Sampling Plan (FSP) and the Quality Assurance Project Plan (QAPP), shall be provided as an Appendix to the work plan according to the work plan schedule.

#### **Quality Assurance Sample Collection and Analysis.**

The QA Laboratory Advance Notification (QALAN) shall be provided to the QA laboratory at least 10 business days before the initial shipment of samples.

#### **Data Quality Control Reports for Environmental Sampling Activities.**

Daily Quality Control Reports (DQCRs) will be prepared daily during environmental sampling activities. Copies shall be sent daily electronically to USAESCH (PM, TM, and Project Chemist) and the geographic district.

#### **Chemistry Data Package.**

The chemistry data package shall be provided to the QA lab and to USAESCH in accordance with project-specific SOW.

#### **Electronic Data Deliverable; G.**

All laboratory data for samples analyzed by commercial laboratories shall be submitted in the Automated Data Review (ADR) software EDD format as provided in ADR Version 4.0 Specifications. The EDD shall be provided to USAESCH in accordance with the project-specific SOW. Tables A1 and A3 are mandatory submittals. Table A2 should be provided if the laboratory is capable.

#### **Chemical Data Final Report; G.**

The CDFR shall be provided as an Appendix to the applicable Final Report. A summary of chemical data results shall be provided within the body of the applicable Final Report.

### 1.5 QUALIFICATIONS

#### 1.5.1 Chemical Quality Control Officer

As a minimum, the Contractor's Chemical Quality Control Officer is a person with a B.S. degree in chemistry or a closely related field who has a minimum of five years of directly related environmental chemistry experience, preferably with munitions. The Chemical Quality Control Officer shall ensure that all chemistry related objectives including responsibilities for DQO definitions, sampling and analysis, project requirements for data documentation and validation, and final project reports are attained. The Chemical Quality Control officer need not be present onsite during routine sampling, but shall be available for consultation with Government and Contractor personnel.

#### 1.5.2 Field Chemist

As a minimum, the Field Chemist shall have: a B.S. degree in Chemistry, Environmental Science, Engineering, Geology, Hydrology, or a related field; two years of experience in and knowledge of EPA methods for collecting environmental and hazardous waste samples; two years of experience in operation of field screening equipment (e.g. PID, FID, infrared spectrometer, immunoassay, etc.); and two field seasons of experience with the particular field screening techniques for use on this project. The Field Chemist shall perform all field screening tests and shall also be available for consultation with Government personnel.

#### 1.5.3 Environmental Sampler

As a minimum, the Environmental Sampler shall have documented training in sampling procedures and associated documentation.

### 2.1 GENERAL EXECUTION REQUIREMENTS

The Contractor shall be responsible for chemical sample acquisition, sample analysis, instrumental measurements of chemical parameters, and chemical data quality control. An effective chemical data quality control system shall be established that meets the requirements for the chemical measurement DQO applicable to the project. The system shall cover chemical measurements pertaining to and required for Contractor and subcontractor produced chemical data. The Contractor shall control field screening, sampling, and testing in conjunction with remedial activities to meet all DQO; minimize the amount of excavated material requiring temporary storage; prevent dilution of contaminated soils with clean soils; and ensure completion of work within the required time.

### 2.2 QUALITY CONTROL PLAN

#### 2.2.1 Additional Requirements

In addition to the quality control requirements specified in DID FPRI-005-11, the CQC Plan shall incorporate the qualifications, authority and responsibilities of all chemical quality management and support personnel. Chemical measurements including sampling and/or chemical parameter measurement will not be permitted to begin until after production and acceptance of the CQC Plan, and Government/Regulator approval of the SAP.

#### 2.2.2 Chemistry Elements of the CQC Plan

To cover contract related chemical measurements by the Contractor and all subcontractors, the CQC Plan shall include the following as a minimum.

##### 2.2.2.1 Qualifications

Names, education, experience qualifications, authorities, and decision-making responsibilities of all chemical quality management and support personnel. The CQC Plan shall contain a copy of a letter from the project QC manager designating and authorizing a Chemical Quality Control Officer and chemical quality control organization staff.

##### 2.2.2.2 Authority and Responsibility

A diagram, flow chart, or figure clearly depicting the chemical data quality management and support

staff and the authority and responsibility of each for chemical sampling and analysis, procedures for corrective actions, deliverables and submittals, deviations and changes, chemical quality documentation, data validation, minimum data reporting requirements, and DQO for chemical parameter measurement by the Contractor and subcontractors. The contents of this section of the CQC Plan shall be included in the applicable "Project Organization" elements of the FSP and the QAPP.

### 2.3 SAMPLING AND ANALYSIS PLAN

The SAP shall be prepared in accordance with CDQC requirements and EM 200-1-3. The SAP shall be a two-part document that contains two distinct elements: FSP and QAPP. Sections of the FSP and QAPP shall be cross-referenced. The SAP shall confirm the Contractor's understanding of the contract requirements for chemical data quality control, and shall describe procedures for field sampling and sample submittal for analysis, field chemical parameter measurement, data documentation, data assessment and data reporting requirements. The SAP shall delineate the methods the Contractor intends to use to accomplish the chemical quality control items to assure accurate, precise, representative, complete, legally defensible and comparable data. The SAP shall describe all chemical parameter measurements for all matrices for all phases of the contract. As a single interrelated document, the SAP shall be provided to field and laboratory personnel. The Contractor may propose original/innovative approaches to chemical parameter measurements for cost reduction and remediation efficiency by abbreviated sampling, contingency sampling and/or contingency analysis, indicator or tracer analysis, onsite analytical services, equivalency or screening methods. The SAP shall clearly identify the Contractor obtained laboratories. The Contractor shall furnish copies of the Government/Regulator approved SAP to all laboratories and the Contractor's field sampling crew. The SAP shall address all levels of the investigation with enough detail to become a document that may be used as an audit guide for field and laboratory work. The Contractor shall provide the laboratory QA/QC plan and applicable Standard Operating Procedures as an electronic Appendix to the SAP.

#### 2.3.1 Field Sampling Plan

The FSP shall contain necessary technical detail and direction for the field personnel to understand sampling and field measurement requirements. The FSP shall provide a comprehensive description and full detail for personnel to perform all onsite activities required to attain project DQO, including: locations of samples, sampling procedures for onsite and offsite chemical analysis, summaries of analyses to be performed on samples, shipment of samples for offsite analyses, performance of onsite and offsite instrumental parameter measurements, data documentation and reporting requirements.

#### 2.3.2 Quality Assurance Project Plan

The QAPP shall contain necessary technical detail and direction for field and laboratory personnel to understand project sample analysis, quality control and data reporting requirements, analytical methods, required detection limits, QC requirements, and data validation and reporting requirements.

### 2.4 DATA QUALITY CONTROL REPORTS FOR ENVIRONMENTAL SAMPLING ACTIVITIES.

The reports will include site activities, description of samples collected, and instruments and equipment utilized. Any deviations from the approved work plan will be documented in the DQCRs, including a description of the problems encountered, corrective action taken, and a summary of any verbal or written instruction received from Government personnel. Any deviations that may affect data quality objectives must be conveyed to USACE personnel (technical manager, project chemist, etc.) immediately. The following should be attached to the DQCRs: QA sample tables that match up primary, replicate (QA/QC), and other field control samples (e.g., blanks), copies of chain-of-custody forms, and any other environmental sampling-related project forms that are generated. DQCRs will become part of the project file.

### 2.5 CHEMISTRY DATA PACKAGE

The chemistry data package shall be produced and provided through USAESCH CO to the USACEQA

lab and USAESCH. The chemistry data package shall contain information to demonstrate that the project's DQO have been fulfilled. The QA function will compare QA sample results to corresponding primary sample results, will assess the Contractor's compliance with the SAP, and will recommend corrective action as necessary. The laboratory shall provide data reporting elements for definitive data per Section I.13.4.2 of EM 200-1-3. The laboratory shall report all analytical results greater than the Method Detection Limit (MDL), which, in the analyst's professional judgment, are believed to be reliably detected. Concentrations reported between the MDL and the Practical Quantitation Limit (PQL) shall be flagged as estimated. PQLs shall be at least 3 times MDLs for all analytes.

## 2.6 CONTROL OF CHEMICAL DATA QUALITY

Contractor chemical data quality control shall ensure that a quality control program is in place that assures sampling and analytical activities and the resulting chemical parameter measurement data comply with the DQO and the requirements of the SAP. The Contractor shall utilize the three-phase control system that includes a preparatory, initial and follow-up phase for each definable feature of work. The Contractor's three-phase chemical data control process shall ensure that data reporting requirements are achieved and shall be implemented according to the CQC Plan and the SAP.

**2.7 ANALYTICAL TESTING LABORATORIES** The Contractor shall propose the analytical laboratories to be used for the primary samples analyses. Laboratory validation requirements shall be in accordance with paragraph Laboratory Validation Requirements. The Contractor may utilize its own laboratory or utilize subcontract laboratories to achieve the primary required sample analyses.

### 2.7.1 Laboratory Analytical Requirements

The Contractor shall provide the specified chemical analyses by the Contractor's laboratory. The Contractor shall provide chemical analyses to achieve the project DQO for all parameters specified by the methods. To give the USACE programs the greatest flexibility in the execution of its projects, the EPA 530/F-93/004 methods are generally the methods employed for the analytical testing of environmental samples. These methods are flexible and shall be adapted to individual project-specific requirements. Method performance must be in accordance with EM 200-1-3, Appendix I requirements, unless variances are specifically approved in the SAP. The requirement for the laboratory to provide quantitative second column confirmation for explosives per EM 200-13/SW8000B (i.e., five-point calibrations must be performed for each target analyte for the primary and confirmatory columns and quantitative results for each column must be reported) will not be waived. Based upon project requirements, exceptions will be considered for the following coeluting pairs: 2-A-DNT/4-A-DNT, 2-NT/4-NT, and 2,4-DNT/2,6-DNT.

### 2.7.2 Laboratory Performance

The Contractor shall provide continued acceptable analytical performance and shall establish a procedure to address data deficiencies noted by review and/or quality assurance sample results. The Contractor shall provide and implement a mechanism for providing analytical labs with the SAP or QAPP portion of the SAP, for monitoring the lab's performance and for performing corrective action procedures. The Contractor shall acquire analytical services with additional USACE validated and state accredited laboratories in the event a project lab loses its validation status during the project.

## 2.8 ELECTRONIC DATA DELIVERABLE

Chemical data shall also be provided electronically by the Contractor in the ADR format and as part of the Geographic Information System. Use of the ADR software will require that the contractor develop a comprehensive library file for all of the methods to be analyzed under this SOW. The library file will accurately reflect all of the analytical quality requirements as documented in the final SAP for this project and will be provided to both USAESCH and the sub-contract lab for use in screening EDD submittals. All electronic data submitted by the contract laboratory is required to be error-free, and in complete agreement with the hardcopy data. Data files are to be delivered both by e-mail and on high density CD accompanying the hardcopy data reports. The disk must be submitted with a transmittal letter from the laboratory that certifies that the file is in agreement with hardcopy data reports and has been found to be free of errors using the latest version of the ADR evaluation software provided to the laboratory. The contract laboratory, at their cost, will correct any errors identified by USAESCH. The Contractor is responsible for the successful electronic transmission of field and laboratory data under

this SOW. The Contractor's laboratory is responsible for archiving the electronic raw data and sufficient associated hardcopy data (e.g., sample login sheets and sample preparation log sheets) to completely reconstruct the analyses that were performed for a period of ten years after completion of this contract.

**2.9 CHEMICAL DATA FINAL REPORT** The CDFR shall be produced including a summary of quality control practices employed and all chemical parameter measurement activities after project completion. As a minimum, the CDFR shall contain the following:

- a. Summary of project scope and description.
- b. Summary of any deviations from the design chemical parameter measurement specifications.
- c. Summary of chemical parameter measurements performed as contingent measurements.
- d. Summary discussion of resulting data including achieving data reporting requirements.
- e. Summary of achieving project-specific DQOs.
- f. Presentation and evaluation of the data to include an overall assessment on the quality of the data for each method and matrix. This should include, at a minimum, two types of data tables. The first shall include all analytical results for all samples collected. The second shall include all analytical results greater than Method Detection Limit (MDL) for all samples collected. Tables should be sorted by method and include appropriate data flags resulting from laboratory review and from Contractor's data validation.
- g. Internal QC data generated during the project, including tabular summaries correlating sample identifiers with all blank, matrix spikes, surrogates, duplicates, laboratory control samples, and batch identifiers.
- h. A list of the affected sample results for each analyte (indexed by method and matrix) including the appropriate data qualifier flag (J, B, R, etc.), where sample results are negatively impacted by adverse quality control criteria.
- i. Summary of field and laboratory oversight activities, providing a discussion of the reliability of the data, QC problems encountered, and a summary of the evaluation of data quality for each analysis and matrix as indicated by the laboratory QC data and any other relevant findings.
- j. Comparison of results to any applicable project-specific numeric criteria.
- k. Conclusions and recommendations.
- l. Appendices containing: (1) Chemistry data package, (2) DQCRs, and (3) Results of the Chemical Quality Assurance Report (CQAR). The CQAR is a Government produced document achieved through the inspection and analysis of QA samples and corresponding project sample data. The CQAR will include review of all QC parameters such as holding times, detection limits, method blanks, surrogate recoveries, matrix spikes and duplicates, and inter-laboratory and intra-laboratory data comparisons.

## 2.10 DOCUMENTATION

Documentation records shall be provided as factual evidence that required chemical data has been produced and chemical data quality has been achieved. The documentation shall comply with the requirements specified in paragraphs SAMPLING AND ANALYSIS PLAN, DATA QUALITY CONTROL REPORTS FOR ENVIRONMENTAL SAMPLING ACTIVITIES, CHEMISTRY DATA PACKAGE, ELECTRONIC DATA DELIVERABLE, and CHEMICAL DATA FINAL REPORT.

## 2.11 End of DID FPRI-005-10.