ABANDONED URANIUM MINES PROJECT

APPENDIX A.4c

USACE DATA MANAGEMENT SUMMARY

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DESCRIPTION OF DATA MANAGEMENT PROGRAM

The Data Management Plan was developed by USACE for USEPA on January 20, 1999. The goal of the Data Management Plan was to provide the end user with data that met the objectives of the project.

The project Data Quality Objectives are the following:

1. Data representative of the condition and quality with respect to the stable and radioactive metals in the water.

2. Data at levels of precision and accuracy such that the data can be compared and evaluated against standard benchmarks of human risk of consuming the water.

3. Data of sufficient quality, documentation and verification to be available for use for the USEPA Superfund administrative and enforcement processes, including but not limited to the various removal and remedial actions intended for exposure reduction.

4. Provide data in a format that is easily accessible to the end user.

PROJECT DATA FLOW DIAGRAM

The flow of data throughout the project is summarized in Figure 1. The left side of Figure 1 presents the flow and review of data on a typical Superfund project. The right side of the figure presents the flow and reviews performed for the Abandoned Uranium Mines-Navajo Lands Project. The two flows are presented to provide any future reviewers of the project information the ability to compare and contrast the data flow processes of a typical Superfund project with the processes employed on the Abandoned Uranium Mines-Navajo Lands Project. The comparison will assist in understanding the necessity of multiple levels of review on the project. The review processes presented for the project provided for the use of data prior to the completion of all the data collection and analysis for the project.

The right side of Figure 1 contains three additional Quality Control (QC) procedures. The review of sample handling and packaging in box 3b provided a check of field procedures and sample identification protocols. This review insured that samples entered the database system correctly, which was an important aspect of supporting the data quality objective of providing data in a format that is easily accessible to the end user.

The Recalculation Validation performed by TechLaw, Inc., in box 8b provided an additional review the project data including a recalculation of the data from the calibration data provided in the data packages. Samples for this level of validation were determined first on finding samples with results that span the linear extent of the results obtained during the project and second on ensuring that at least one sample from each chapter had results that went trhough the recalculation validation process. This review assisted in ascertaining the accuracy of data with respect to calibration assumptions and calculations, which supports the data quality objective of obtaining data of known precision and accuracy.

The QA review performed by the HTRW Center of Expertise in box 6b provided a review of the review validation procedures accomplished by the CQAB and a review of the laboratory method Standard Operating Procedures. The review supports the obtainment of data with sufficient quality, documentation and verification.

Quality assurance split samples collected on a typical Superfund project (box 2a) were not collected for the project. It was determined by the project team that performance evaluation samples would better serve the purpose of evaluating the accuracy of data provided by the laboratory.

GIS and Database capabilities supplied by CH2M Hill in boxes 10b and 11b provided end of project data, which can be efficiently queried and presented to a wide variety of audiences. The development of these formats and applications provides data that is easily accessible to the end user.

The following discussion describes the project flow of data as presented on the right side of Figure 1.

Field Operations (box 1b) represent the beginning of data collection. This started with the initial background research performed by the team. It included the capturing of GPS information, field gamma measurements, and capturing the setting presented at each location as well as the collection of water for analytical analysis.

Field Database management (box 2b) provided a quality control check to insure that field data electronically recorded was sufficient and complete. It also provided the project chemist an opportunity to track samples through the laboratory and establish scheduling for analytical results delivery.

Typical Superfund Data Review

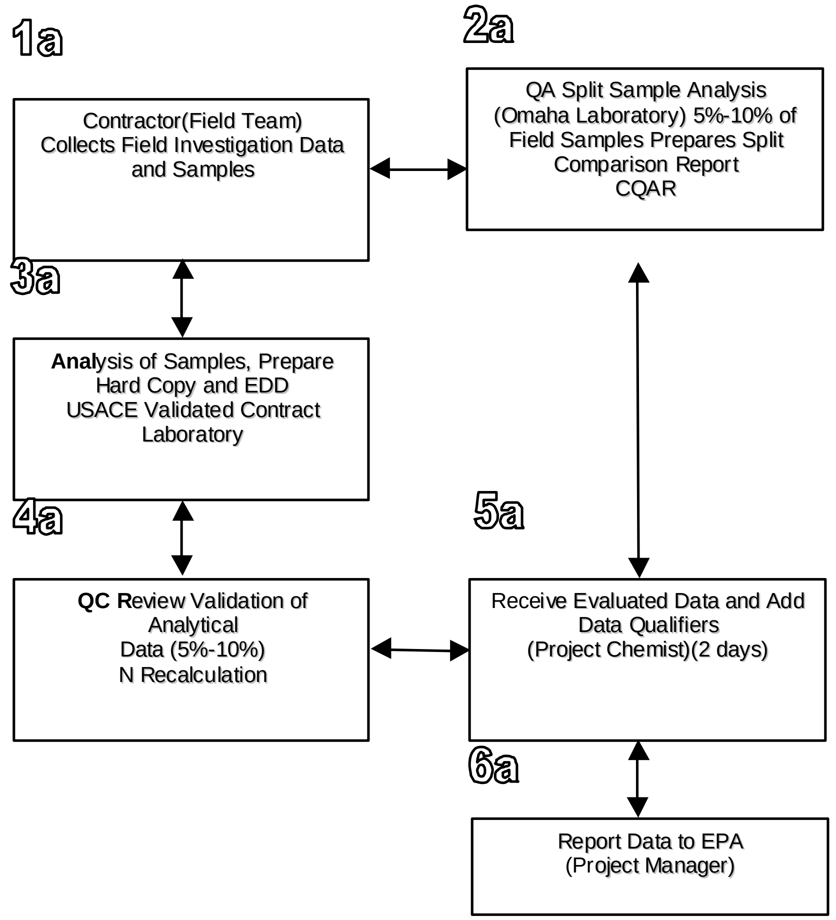
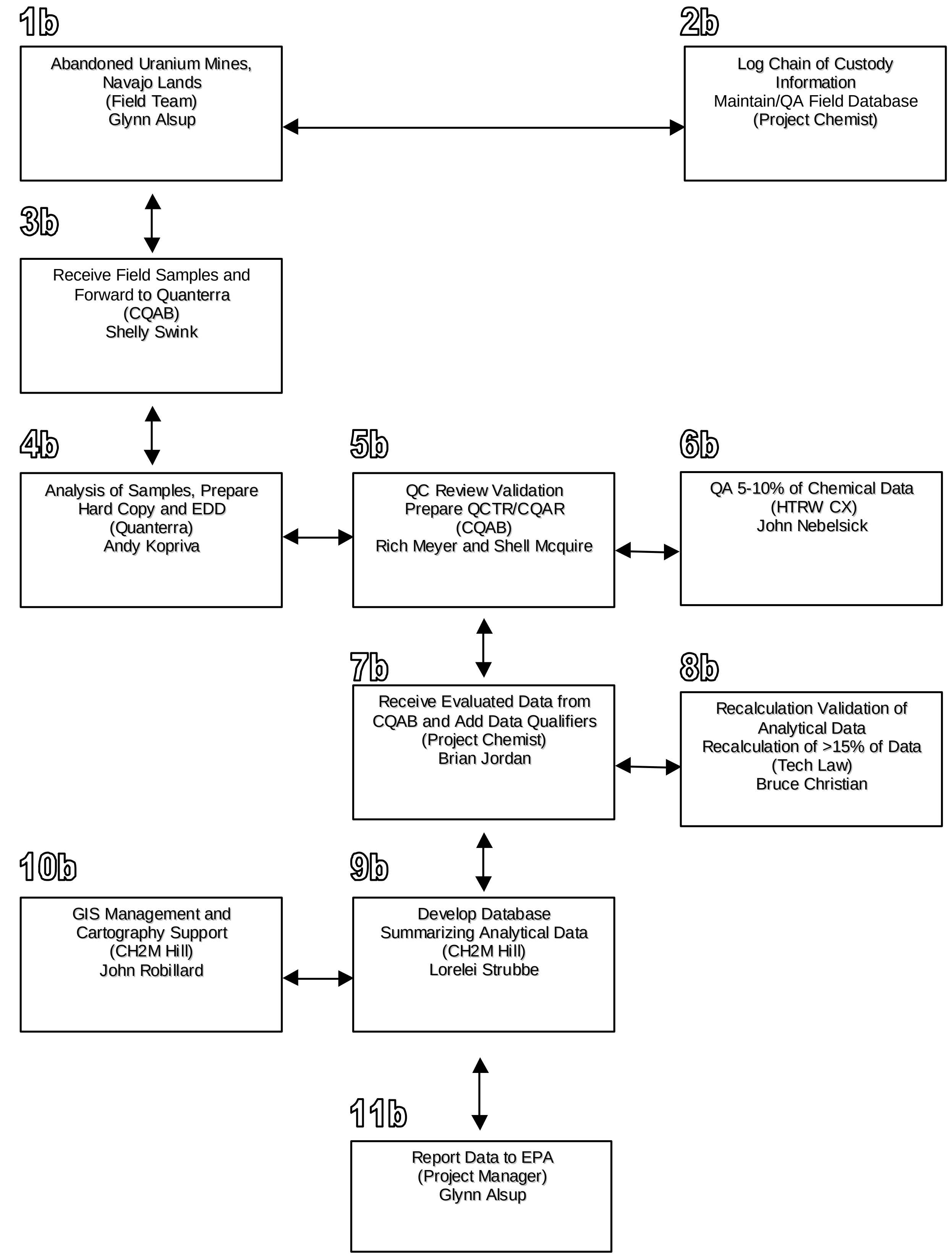


Figure A.4c-1 - Project Data Flow

Abandoned Uranium Mines-Navajo Lands Data Review



Upon receipt of the coolers (box 3b) the samples were examined and logged into the CQAB system with a number that identifies that sample only. A cooler receipt form was filled out for each sample delivery group.

Laboratory analysis (box 4b) was provided by three laboratories. The laboratories used were Quanterra Environmental Laboratory in Richland WA, Energy Laboratories, Inc., in Caspar WY, and the Chemical Quality Assurance Branch of USACE. Laboratory standard operating procedures were reviewed prior to the initiation of work.

The CQAB Review Validation (box 5b) was started after the analyses were complete for a sample delivery group. CQAB compiled the Quality Assurance Test Results for the Project Chemist to review. This data package includes a list of the samples, sampling dates, sample matrix, analyses requested, custody papers, cooler receipt forms, radiochemistry and metals results, and any relevant method Quality Control (QC), method blanks, matrix spikes, laboratory control samples, and laboratory duplicates. A review of the sample batch quality control was included at the beginning of the Quality Assurance Test Results (QATR). Specific comments were made for method blanks, matrix spike recoveries, laboratory control sample recoveries, duplicate analyses, and holding times. This review would be comparable to the review of data provided in the QC review validation of analytical data (Box 4a).

The Quality Assurance Review (box 6B) conducted by the USACE HTRW Center of Expertise, evaluated the standard operating procedures carried out by the project laboratories and the review procedures conducted by the CQAB laboratory.

The receipt of evaluated data (box 7b) from the CQAB involved a review of the CQARs and the assigning of project relevant data qualifiers. Data packages were forwarded to TechLaw, Inc., for Recalculation Validation and assignment of data qualifiers. The electronic data was also reformatted and evaluated prior to transmittal to CH2M Hill.

The recalculation validation (box 8b) performed by TechLaw, Inc., involved the recalculation of analytical results from the batch QC data provided in the laboratory data packages. It also provided another review of other aspects of the QC performed by the laboratory including the analysis of method blank, matrix spike, laboratory control, and calibration samples.

The incorporation of all the project data into a GIS and an database (boxes 9b and 10b) allowed the distribution of data quickly to the end users. The processing of data is subject to errors introduced by formatting and translation of data files. Through the process of data interpretation and presentation, quality control evaluations were made to insure that the data were correctly represented.

Project Quality Control Samples

QC duplicate samples and field blank samples were collected throughout the project. A total of 26 quality control samples (13-field blanks, 13-duplicate samples) were collected. The ratio of quality control samples to investigative samples is 11.5%. The sampling plan target was a ratio of 10%.

Duplicate samples were collected and analyzed to assess laboratory performance through comparison of the duplicate sample pair results. Duplicate sample results are in agreement with the primary sample result. Duplicate samples were submitted to the laboratory without their knowledge of the sample being a QC split sample. There is the expected variability in result reported between the detection limit and reporting limit. Sample CT990310TCW005 illustrates the possible variability in samples collected at differing times of the year. The sample collected in August 1998, was during a high use period for the windmill and the March 1999 sample during a limited use period for the windmill. Future investigations may need to address this variability.

Field blank samples were collected to evaluate field sampling and handling procedures. Field blank samples were prepared by placing deionized water directly into a pre-cleaned sample container, then adding preservatives in the field. The blank sample results illustrate that the field procedures minimized the chance of contamination of investigative samples from sample containers or the preservative used in the field, with respect to the laboratory reporting limit. The blank samples are in agreement with laboratory quality control method blank results. Field blank samples generated from the field and processed by the laboratory indicate no false positive bias to the data. One quality assurance sample was processed through an independent laboratory.

One Radiological Chemistry Performance Evaluation sample was prepared for the project but was not able to be analyzed before the project field operations were stopped. The project laboratories prior to the start of the project completed performance evaluation samples for metals analyses. The performance evaluation sample prepared for radiological analysis would have provided an additional assessment of analytical accuracy.

LABORATORY ANALYTICAL QUALITY OBJECTIVES

Laboratory Analytical Quality Objectives were developed to assist in achieving the project Data Quality Objective of obtaining data at levels of precision and accuracy such that the data can be compared and evaluated against standard benchmarks of human risk of consuming the water.

Specific analytical objectives for precision and instrument calibration were outlined in the analyte specific methods selected for the project. Discussions with the laboratories were made throughout the project to discuss the possibility of making improvements where necessary to analytical procedures to obtain relevant data at the detection limit goal. The usability of analytical data that is close to or below a detection limit is always difficult to assess. To avoid the over assigning of risk to an analyte that was not quantified at the PRG it was decided to assign a value of zero to analyte concentrations reported below the detection limit.

The Minimum Detectable Activity (MDA) reported for Pb^{210} is one of the analytes, which presented this problem in assessing the total risk. The method selected would not provide data of value at or below the PRG of 0.047 pCi/L without involving the collection of a sample volume > 5 gallons or extending the method count time to many weeks. For sample results below the MDA the concentration of the analyte cannot be ascertained with confidence, but the concentration of the analyte is not above the MDA. The MDA for an analysis is computed for each analysis. The incremental life cancer risk for Pb^{210} associated with a sample at the MDA is approximately 2.0×10^{-5}.

The analytical methods for arsenic, cadmium, lead, selenium and thallium were changed from 6010b to 7000 series methods utilizing graphite furnace atomic absorption. This change in method was made to improve the detection of the analytes at the laboratory analytical quality objective of 0.045 mg/L for arsenic, 0.3 mg/L for cadmium, 2 mg/L for lead, 4 mg/L for selenium and 2.9 mg/L for thallium.

FOLLOW UP ACTIONS

The circumstances for follow up sampling envisioned in the Field Sampling Plan and later analysis of field conditions falls into four categories.

1. During the planning for the project it was initially thought that community members may wish to bring samples for analysis to the project field team from remote water sources or culturally sensitive areas. If the sample from the community member showed concentrations at levels of concern a follow up sample collected by the field team would be warranted. No follow-up sampling is needed for this contingency. The field team using the sampling methods included in the FSP collected all samples.

2. If data quality issues arose concerning the representative nature of a sample with respect to the sampling methods employed or analytical method used for analysis it was to be followed up with an appropriate method of sample collection and analysis. The one and only instance where a follow up activity was needed to better reflect the conditions encountered in the field is the ongoing Hydrogeologic Investigation being carried out at the Cameron mining pit Yazzie 312. Turbidity of the samples after a field filtration at 5 microns remained extensive enough to bias the water analysis. Modifications include the centrifuging of field samples to decrease suspended sediments contained in the pit water. The analysis of pit samples has been modified to more accurately quantify high concentration samples from the pit. A monitoring well has been installed to ascertain the impacts of the pit on groundwater in the area. No follow-up actions were required to evaluate risk posed by these waters. Further investigations are ongoing and warranted at these locations to evaluate exposure reduction activities.

3. Follow up actions were warranted where sample results were unusual or inconsistent with the data set as a whole or with regional information. The Shonto well below the Rare Metals facility in Tuba City was referred to the Department of Energy for follow up sampling due to some unusual radiological findings from the spring with respect to other samples obtained from the Moenkopi Wash area. Subsequent sampling at the spring but at a different outlet has not shown the same unusual pattern of results. Shonto well has been added to the Department of Energy's monitoring program associated with the Rare Metals facility. This is the only location where unusual or inconsistent results were obtained with respect to samples taken in the same area.

4. The finding of local alternative water sources to replace sources identified as having elevated risk was to initiate follow up actions. This activity was started in the Coal Mine Mesa chapter but not completed prior to the decision to stop field activities. This sampling is needed for the purpose of finding of local alternative water sources to replace sources identified in the initial phase of the project as presenting a potential risk to the community members.

PROJECT DATA QUALITY OBJECTIVES ATTAINMENT

1. The data are representative of the condition and quality with respect to the stable and radioactive metals in the water at the point of use.

2. The data are at levels of precision and accuracy such that the data can be compared and evaluated against standard benchmarks of human risk for consumption of water.

3. The data are of sufficient quality, documentation and verification to be available for use by the USEPA Superfund administrative and enforcement processes, including but not limited to the various removal and remedial actions intended for exposure reduction.

4. The Data are presented in formats that are easily accessible to the end user.