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REV. 1
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UMTRA PROJECT TECHNICAL ASSISTANCE CONTRACTOR QUALITY ASSURANCE IMPLEMENTATION PLAN FOR SURFACE AND GROUND WATER

September 1994

DISCLAIMER

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APPROVALS

UMTRA PROJECT TECHNICAL ASSISTANCE CONTRACTOR
QUALITY ASSURANCE IMPLEMENTATION PLAN
FOR SURFACE AND GROUND WATER

CONTRACT NO. DE-AC04-91AL62350

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Project Manager — Date: 9/30/94

UMTRA PROJECT TECHNICAL ASSISTANCE CONTRACTOR
QUALITY ASSURANCE IMPLEMENTATION PLAN
FOR SURFACE AND GROUND WATER

RECORD OF REVISIONS

REVISION NO.	SECTION	REVISED PAGE NO(S)	DATE REVISED
0	....TOTAL REVISION....		MARCH 1994
1	Foreword, 3.0, 5.0, 7.0, 8.0, and 20.0	Cover, approval page, record of revisions page, title page, and pages v, 3-1, 5-1, 7-1, 8-1, 8-4, 20-1, and 20-2	SEPTEMBER 1994

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UMTRA PROJECT TECHNICAL ASSISTANCE CONTRACTOR QUALITY ASSURANCE IMPLEMENTATION PLAN FOR SURFACE AND GROUND WATER

September 1994

Prepared for
U.S. Department of Energy
UMTRA Project Office
Albuquerque, New Mexico

Prepared by
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LIST OF ACRONYMS AND ABBREVIATIONS

Acronym	Definition
APM	assistant project manager
ASTM	American Society for Testing and Materials
CARD	Characterization and Remedial Design
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	chain of custody
CRDL	contract required detection limit
DAPM	deputy assistant project manager
DCO	data collection objectives
DOE	U.S. Department of Energy
DPM	Deputy Project Manager
DQO	data quality objectives
EPA	U.S. Environmental Protection Agency
HAZWRAP	Hazardous Waste Remedial Actions Program
ISPS	Information Systems Planning and Support
LQAP	laboratory quality assurance plan
PARCC	precision, accuracy, representativeness, completeness, and comparability
PDCS	Project Document Control System
QA	quality assurance
QAIP	Quality Assurance Implementation Plan
QAPP	Quality Assurance Program Plan
QC	quality control
RAC	Remedial Action Contractor
ROCS	Regulatory Oversight and Compliance Support
RRM	residual radioactive materials
SOP	standard operating procedure
SOW	statement of work
SOWP	site observational work plan
SPEAR	Software Program for Environmental Analysis and Reporting
TAC	Technical Assistance Contractor
TAD	*Technical Approach Document*
TAGR	Technical Approach to Ground Water Restoration
TAM	TAC action memo
UMTRA	Uranium Mill Tailings Remedial Action
UMTRCA	Uranium Mill Tailings Radiation Control Act
UPDCC	UMTRA Project Document Control Center
USFS	U.S. Forest Service
WSAP	water sampling and analysis plan

FOREWORD

The Uranium Mill Tailings Remedial Action (UMTRA) Project Technical Assistance Contractor (TAC) Quality Assurance Implementation Plan (QAIP) outlines the primary requirements for integrating quality functions for TAC technical activities applied to the surface and ground water phases of the UMTRA Project.

The QAIP is subordinate to the latest issue of the UMTRA Project TAC Quality Assurance Program Plan (QAPP) (DOE, 1993a), which was developed using U.S. Department of Energy (DOE) Order 5700.6C quality assurance (QA) criteria. The QAIP addresses technical aspects of the TAC UMTRA Project surface and ground water programs. All QA issues in the QAIP shall comply with requirements contained in the TAC QAPP (DOE, 1993a).

Because industry standards for data acquisition and data control are not addressed in DOE Order 5700.6C, the QAIP has been formatted to the 14 U.S. Environmental Protection Agency (EPA) *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) QA requirements. DOE Order 5700.6C criteria that are not contained in the CERCLA requirements are added to the QAIP as additional requirements in Sections 15.0 through 18.0. Project documents that contain CERCLA requirements and 5700.6C criteria shall be referenced in this document to avoid duplication. Referenced documents are not included in this QAIP but are available through the UMTRA Project Document Control Center.

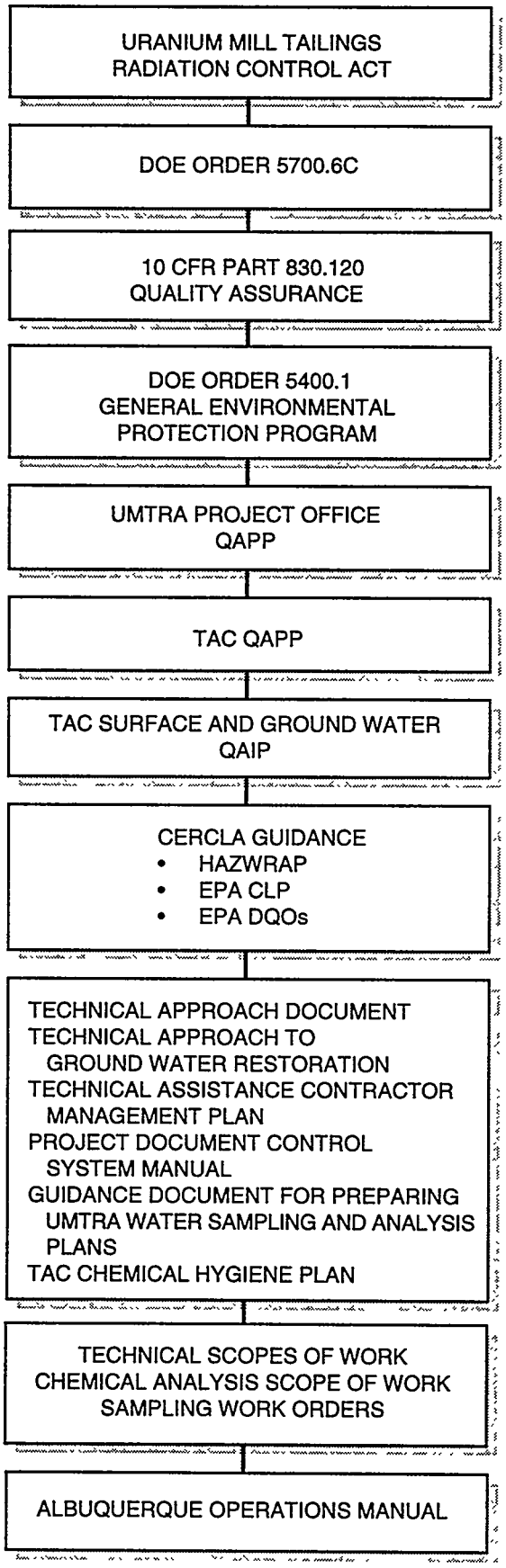
In accordance with the UMTRA Project TAC QAPP, the QAIP is authorized and approved by the TAC Project Manager and QA manager. The QA program is designed to use monitoring, audit, and surveillance functions as management tools to ensure that all Project organization activities are carried out in a manner that will protect public health and safety, promote the success of the UMTRA Project, and meet or exceed contract requirements.

To provide control details, this QAIP is supplemented by approved standard operating procedures (SOP) that outline the requirements for performing the various TAC quality-related activities. These SOPs describe applicable documentation requirements.

The QAIP shall be reviewed once each calendar year. The review shall be completed not sooner than 6 months and not later than 18 months following the last review. The review shall be documented, including the reviewer's name, date, and comments.

The flow chart in Figure 1 represents the hierarchy of the UMTRA Project Office QAPP, the TAC QAPP, the UMTRA Project surface and ground water QAIP, and supporting referenced material.

During 1994, 10 CFR §830.120 codified the requirements of DOE Order 5700.6C. Since the QAIP meets the requirements of DOE Order 5700.6C, no changes were required to meet 10 CFR §830.120.



HAZWRAP - HAZARDOUS WASTE REMEDIAL ACTIONS PROGRAM
CLP - CONTRACT LABORATORY PROGRAM
DQO - DATA QUALITY OBJECTIVE

FIGURE 1
HIERARCHY OF TAC QA DOCUMENTS FOR THE UMTRA PROJECT

1.0 PROJECT DESCRIPTION

1.1 UMTRA PROJECT DESCRIPTION

1.1.1 The Uranium Mill Tailings Remedial Action (UMTRA) Project was initiated by the *Uranium Mill Tailings Radiation Control Act* of 1978 (UMTRCA) (42 USC §7901 *et seq.*). The UMTRCA established a program of assessment and remediation at 24 inactive uranium mill sites (Title I) in 10 states. The purpose is to stabilize, dispose of, and control residual radioactive materials (RRM) so that radiological and nonradiological hazards do not exceed standards established by the U.S. Environmental Protection Agency (EPA) for the protection of public health, safety, and the environment.

1.1.2 The UMTRA Project, under 40 Part CFR Part 192, consists of two phases: surface remediation (Subpart A) and ground water restoration (Subpart B). The surface remediation phase has a specific termination date and is nearing completion. Remediation activities are described in the *Technical Approach Document* (TAD) (DOE, 1989) and related documents. The ground water restoration phase began in 1991 and currently has no specific time limitations. Restoration activities are described in the *Technical Approach to Ground Water Restoration* (TAGR) (DOE, 1993b) and related documents.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

2.1 INTRODUCTION

This section outlines the project organization and responsibilities for this quality assurance implementation plan (QAIP). Since this QAIP describes office, field, and laboratory activities and procedures related to data collection and reduction for the UMTRA Project, it applies primarily to Technical Services Group personnel. However, the procedures and activities described herein apply to any qualified UMTRA Project personnel performing office, field, or laboratory activities related to data collection and reduction regardless of group or department affiliation. Figure 2.1 illustrates the UMTRA Project organizational structure.

2.2 ORGANIZATION AND LINES OF COMMUNICATION

2.2.1 The UMTRA Project Technical Assistance Contractor (TAC) organization is described in the UMTRA Project TAC Quality Assurance Program Plan (QAPP) (DOE, 1993a) in Section 1.0 and in the TAC management plan (DOE, 1993c).

2.2.2 The Technical Services Group is managed by an assistant project manager (APM), a deputy assistant project manager (DAPM), and department managers. These managers oversee technical and administrative activities and interface with the DOE UMTRA Project managers and staff.

2.2.3 The Technical Services Group departments include Characterization and Remedial Design (CARD), Data Management and Assessment, TAC Regulatory Compliance, Publications, Regulatory Oversight and Compliance Support (ROCS), and Safety Advancement Field Effort (Figure 2.1). The responsibilities of each department are described in the UMTRA Project TAC QAPP (DOE, 1993a) and the TAC management plan (DOE, 1993c).

a. Sample preparation facility responsibilities

1. The UMTRA Project operates a sample preparation facility for technical support purposes. This facility is in the U.S. Forest Service (USFS) building (2205 Columbia, SE, Albuquerque, New Mexico) and is operated by the Data Management and Assessment Department. Individuals working at the sample preparation facility, and in the field where similar activities are performed, shall perform all tasks in accordance with the TAC chemical hygiene plan (in preparation). The TAC chemical hygiene plan will describe chemical hygiene practices for working with hazardous chemicals and list pertinent procedures specific to activities performed at the sample preparation facility.

2.2.4 Work specifically provided for and budgeted in the fiscal year is ultimately overseen by the TAC Project Manager, who delegates work and responsibilities

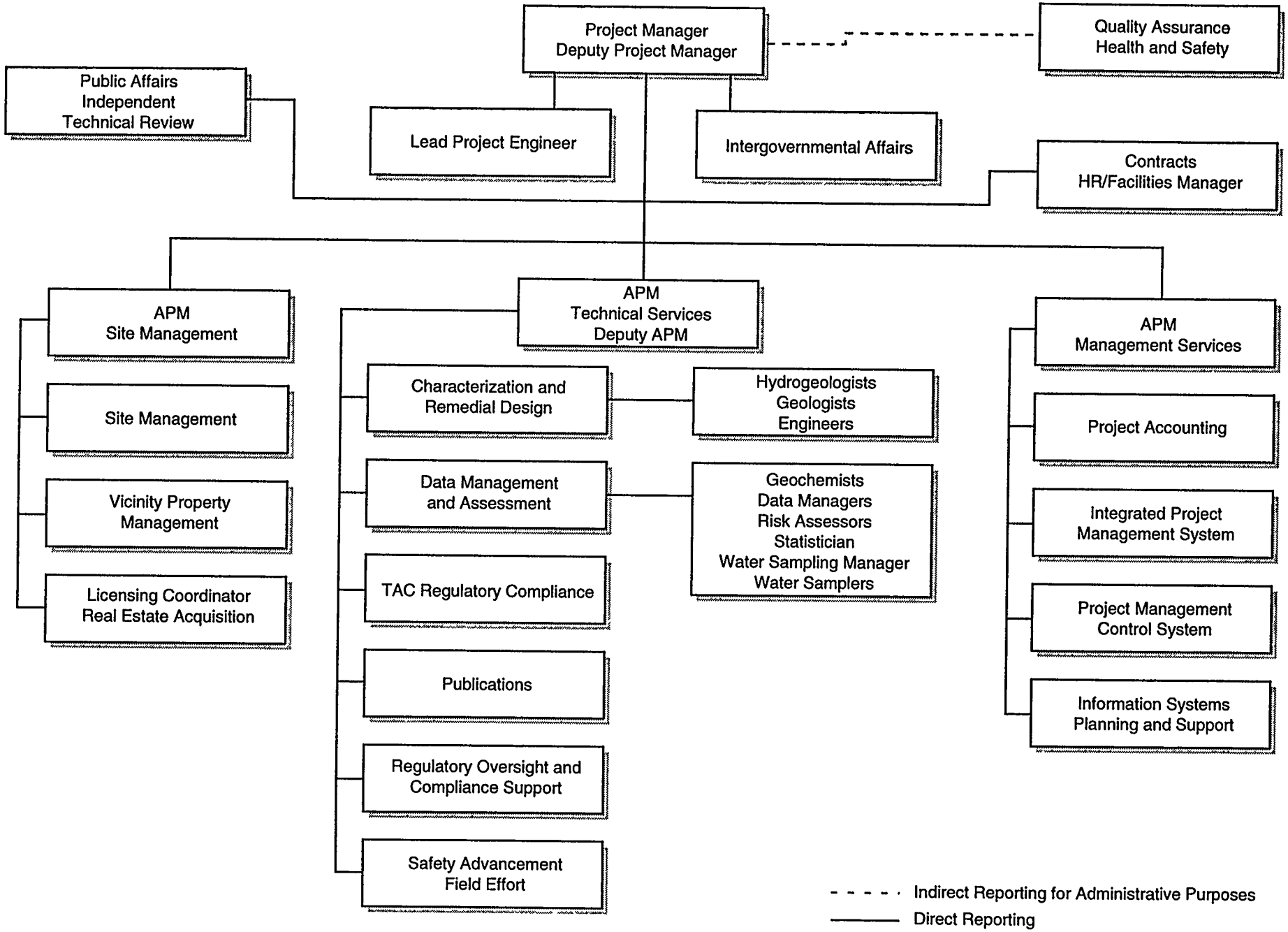


FIGURE 2.1
UMTRA PROJECT TAC ORGANIZATION

MAC:NONSITE/QAIP/UMTRA/TAC ORG

in the TAC organization through the Deputy Project Manager (DPM), APMs, and department managers. Department managers assign, coordinate, and oversee work performed by personnel in their respective departments. Department managers are a crucial link of contact and communication between their personnel and TAC upper management, TAC site managers, and the U.S. Department of Energy (DOE).

2.2.5 Requests for work from the DOE that are not budgeted for the fiscal year shall be handled through a TAC action memo (TAM). Albuquerque Operations Manual SOP 1.4, "TAC Action Memos," describes in detail the responsibilities and lines of communication necessary in the TAM process.

2.2.6 A request from the DOE shall not be acted upon by the TAC staff until a charge number is designated according to the appropriate site, group, or department manager or a charge number is created by the manager of the Project Management Control System Department for the specific activity.

2.3 SUBCONTRACT LABORATORIES

2.3.1 Data Management personnel in the UMTRA Project Data Management and Assessment Group oversee the analytical services of several commercial laboratories on a subcontract basis. Subcontracted laboratory personnel responsibilities are outlined in the UMTRA Project TAC general inorganic and radiochemical analyses statements of work (SOW) (JEG, 1993) and in the individual laboratory quality assurance plans (LQAP). The TAC general inorganic and radiochemical analyses SOW will subsequently be referred to in this QAIP as the chemical analysis SOW.

2.4 QA PERSONNEL RESPONSIBILITIES

2.4.1 The TAC UMTRA Project Manager is responsible for establishing the scope and enforcing the provisions of the quality assurance (QA) program. The QA manager is responsible for developing and implementing the QA program. Project supervisors are responsible for ensuring quality, with each individual held responsible for the quality of his or her work. The TAC QA program is described in detail in the UMTRA Project TAC QAPP (DOE, 1993a).

3.0 QUALITY ASSURANCE OBJECTIVES FOR DATA ACQUISITION

3.1 INTRODUCTION

This section discusses the data quality objective (DQO) process for the UMTRA Project and the analytical quality control (QC) levels used.

3.2 DATA QUALITY OBJECTIVES

3.2.1 DQOs are qualitative and quantitative statements formulated to ensure that data of known and usable quality are obtained during site characterization and monitoring activities (EPA, 1987). DQOs do the following:

- Provide a qualitative and quantitative framework for data collection.
- Provide answers for the type, quality, and quantity of data needed.
- Allow decision makers to make decisions with a predetermined acceptable level of confidence.
- Serve as performance criteria for assessing ongoing or completed activities.

3.2.2 The UMTRA Project consists of 24 uranium mill tailings sites in various stages of work and under separate surface and ground water programs. DQOs are developed on a site-specific basis for UMTRA Project sites based on the end use of the data. DQOs are presented in water sampling and analysis plans (WSAP), site observational work plans (SOWP), contract statements of work (SOW), and sampling work orders. WSAPs, SOWPs, SOWs, and sampling work orders are written by site hydrologists, geochemists, and engineers and are approved by Technical Services group management, site management, the QA manager, and the Project Manager.

3.2.3 Several references are available to the UMTRA Project for the DQO development process. These include "Data Quality Objectives for Remedial Response Activities" (EPA, 1987), "Hazardous Waste Remedial Actions Program Quality Control Requirements for Field Methods" (DOE, 1989), and "Data Quality Objectives Process for Superfund" (EPA, 1993a; 1993b).

3.2.4 Appropriate analytical QC levels

a. Appropriate analytical QC levels by data use are presented in Table 3.1. The data quality control levels A through E are consistent with the HAZWRAP (DOE, 1990a; 1990b).

Table 3.1 Appropriate analytical QC levels by data use

Data use (analytical level)	Site work plan	Site characterization including health and safety	Risk assessment	Interim action	Development of ground water cleanup activities	Treatability investigations	Selection of ground water restoration methods	Remedial design and implementation	Ground water monitoring	Licensing
LEVEL A	X	X		X					X	
LEVEL B	X	X		X	X	X	X		X	
LEVEL C	X	X	X	X	X	X	X	X	X	X
LEVEL D	X	X	X		X		X	X	X	X
LEVEL E	X	X	X					X		X

b. Levels of quality control

1. Level A

Level A data are qualitative or semiquantitative data that are used as indicator parameters (DOE, 1990b). Level A data are not obtained on an analyte-specific basis.

2. Level B

Level B data are semiquantitative or quantitative data that are analyte-specific (DOE, 1990b). Level B data are generally obtained by on-site field laboratories for immediate results.

3. Level C

Level C data are quantitative, analyte-specific, laboratory generated data that are technically defensible (DOE, 1990a). Level C QC typically involves low detection limits, a wide range of analytes, matrix recovery information, laboratory process control information, and quantifiable precision and accuracy (DOE, 1990a). Also included is a review of the laboratory QA program and UMTRA Project work plan for the subcontracted laboratory (DOE, 1990a).

4. Level D

Level D data are quantitative analyte-specific data that are both technically and legally defensible (DOE, 1990a). Level D QC requirements follow all Level C QC requirements. However, for Level D work, all supporting documentation associated with each analysis must also accompany the data. The chemical analysis SOW provides clear guidance on the preparation and maintenance of this supporting documentation.

5. Level E

Level E QC is used for analysis of nonstandard sample matrices and for nonstandard analytical methods (DOE, 1990a).

c. Analytical laboratory data deliverables for soil and water matrices generally meet Level C reporting requirements. However, as outlined in Section 4.2.4 of the chemical analysis SOW (JEG, 1993), subcontracted laboratories must maintain Level D documentation as specified in HAZWRAP (DOE, 1990a) and the EPA ILMO2.0 (EPA, 1991), and be able to deliver this documentation upon request to the TAC Data Management staff. This approach is a cost-effective method of procuring defensible data and acknowledging the extent of the most recent Superfund guidance (DOE,

1993a) by being able to produce Level D data as the need arises. Laboratory chemical analytical techniques, required detection limits, and QC sample type, number, and acceptance criteria, as well as QA guidelines for supporting documentation, are provided in the chemical analysis SOW (JEG, 1993).

d. Level E analytical services not covered by the chemical analysis SOW (JEG, 1993) shall be specified by written instructions prepared by the Data Management staff.

e. Specific field QC data requirements (Levels A and B) will be developed on an as-need basis by staff in the CARD and Data Management and Assessment Departments.

f. Tables 3.1 through 3.3 state what QC levels may be used for an UMTRA Project activity. Table 3.1 lists a range of QC levels for various data uses. Specific requirements must be set on a site-by-site and need basis. Table 3.2 lists QC levels for field analyses of UMTRA Project water samples. QC levels for laboratory analyses of unsaturated zone materials are presented in Table 3.3. DQOs and QC levels for laboratory analytical data are discussed in the chemical analysis SOW (JEG, 1993) and in Section 3.2.4.c above.

Table 3.2 Field analysis DQOs for selected constituents

Field analysis	Desired DQO level[a]
Alkalinity	A
Ammonium	A-B
Conductivity	A
Dissolved Oxygen	A
Iron (Fe [Tot])	A-B
Iron (Fe+2)	A-B
Nitrate	A-B
Nitrite	A-B
Manganese	A-B
Oxidation-reduction potential	A
pH	A
Sulfate	A-B
Sulfide	A-B
Temperature	A
Total acid	A

[a]Ref.: APHA et al., 1989; EPA, 1983.

Table 3.3 Laboratory analysis DQOs for unsaturated zone and aquifer materials

Unsaturated zone and aquifer material	Desired DQO level[a]
Bulk mineralogy	A-B
% fractions (sand, silt, clay size)	A-B
Mineralogy of size fractions	A-B
Clay mineralogy	A-B
Ion exchange capacity (CEC)	A-B
Acid or base neutralization capacities	A-B
Organic carbon	A-B
Total carbon	A-B
Hydrocarbons (HC)	A-B[a,b]
HC as coating on grains	A-B[a,b]
HC as coprecipitates	A-B[a,b]

[a]Ref.: ASA/SSSA, 1986.
[b]Ref.: EPA, 1986.

4.0 DATA COLLECTION AND SAMPLING PROCEDURES

4.1 INTRODUCTION

This section discusses how data are collected and recorded and what procedures are applicable to data collection and sampling. DQOs are established prior to data collection and sampling. This section covers the data collection objectives (DCO) and documentation for the UMTRA Project. DQOs are discussed in Section 3.0 of this QAIP.

4.2 GUIDELINES USED TO COLLECT FIELD DATA AND DOCUMENT FIELD SAMPLING EVENTS

4.2.1 On the UMTRA Project, field data collection and sampling are accomplished through the following activities:

- Environmental sampling (air, water, biota, soil, waste).
- Geotechnical sampling and observation/description (drill-cutting, rock-core, test pitting, soil sampling).
- Geophysical logging.
- Aquifer pumping and slug testing.
- Well and topographic surveying.
- Site reconnaissance or field trips.

4.2.2 Data are collected in the field and information is recorded in a field notebook or on a sampling field form. Field notebooks are maintained by field personnel. Field personnel may include, but are not limited to, site hydrologists, engineers, geochemists, and water samplers. Details that are recorded in a field notebook include dates, times, personnel, weather conditions, explanations for deviations from standard sampling protocols, samples obtained and identification numbers, events in chronological order, and field data.

4.2.3 Field forms are designed to record field data for a specified type of sampling or data acquisition event. On the UMTRA Project these events include environmental sampling, geotechnical sampling, and aquifer pumping and slug testing.

4.2.4 The level of detail in field records shall be sufficient to understand and recreate the activity at a later date.

4.2.5 At the end of a field task or sampling event, the generated data are compiled into a field data package. The field data package consists of original field data

forms, calibration records, the field notebook or copies of the pertinent pages of the field notebook, and a completed field activity summary form. It contains all documentation related to the field activity. The original field package is verified for completeness as specified in Section 8.0 of this QAIP and sent to the UMTRA Project Document Control Center (UPDCC) for storage. Copies are distributed to appropriate personnel.

4.2.6 SOPs used for field data collection and sampling are listed in Table 4.1.

4.3 GUIDELINES USED TO SELECT FIELD SAMPLING/DATA COLLECTION SITES

4.3.1 Water sampling and analysis plan

a. The WSAP provides the basis for ground water and surface water sampling at a site. It may also cover soil and biota sampling. It identifies the purpose of sampling and provides justification for the sampling locations, analysis parameters, and frequency of sampling at a site. It also contains information on well locations, well construction, hydraulic parameters of hydrogeologic units, and water quality.

b. Guidance for preparing and modifying a WSAP is provided in the guidance document.

c. WSAPs are updated annually.

4.3.2 Sampling work orders

a. Sampling work orders detail a particular sampling event at a site as specified in the WSAP. These work orders shall be written by either a site hydrologist, site geochemist, or a member of the risk assessment staff and are approved by the department manager with the concurrence of the appropriate site manager. These plans may cover water, soil, and/or biota sampling.

4.3.3 Statements of work

a. SOWs are prepared by personnel in the CARD and Data Management Departments for work subcontracted by the TAC. SOWs are attached to contracts that are prepared by the TAC UMTRA Project Contracts Department.

b. Each SOW varies in content according to the nature of the subcontracted work. The SOW generally states the specific work to be done, DQOs, SOPs to be followed, and materials needed.

Table 4.1 Field data collection and sampling procedures

SECTION 10
TAC RADIOLOGICAL STANDARD OPERATING PROCEDURES

10.2.1	High Volume Air Particulate Sampling
10.2.2	Personal Air Particulate Sampling
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16.1.3	Slug Testing
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16.1.6	Soil-Water Sampler Installation and Sample collection (Suction Lysimeters)
16.1.7	Installation/Servicing of Tensiometers and Measurement of Soil Water Potential
16.1.10	Field Measurement of Water samples for Temperature, Conductivity, pH, Alkalinity, and Total Acid.
16.1.11	Sample Collection for Organic Substances.
16.1.13	Field Measurement of Oxidation/Reduction Potential (ORP) in Water Samples
16.1.14	Field Determination of Dissolved Oxygen in Water Samples
16.1.16	Field Determination of Dissolved Oxygen in Water Samples (Alternate Method)
16.1.17	Well Decommissioning Procedures

Table 4.1 Field data collection and sampling procedures (Concluded)

16.1.20	Well Repair Procedures
16.1.21	Measurement of Water Turbidity
16.1.22	Controlled Disposal of Potentially Contaminated Materials
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16.2.4	Sampling Radon in Water
16.2.5	Monitor Well Sampling With an Electric Submersible Pump
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16.2.7	Monitor Well Sampling With a Peristaltic Pump
16.2.8	Quality Control Samples for Water Sampling
16.2.9	Monitor Well Sampling With a Bailer

c. The SOW may cover topics such as analytical laboratory testing, surveying, geotechnical testing, well installation, or any other technical activity on the UMTRA Project.

5.0 SAMPLE CUSTODY PROCEDURES

5.1 SAMPLE CUSTODY

5.1.1 Sample custody is maintained on the UMTRA Project during sample collection and shipping and at the analytical laboratory. The procedures discussed below cover sample custody.

5.1.2 SOP 16.2.10, "Packaging, Shipping, and Custody of Environmental Samples," covers sample custody in the field for environmental samples. Sample labels, custody seals, the field logbook, and chain of custody (COC) documents are discussed in this SOP.

5.1.3 Sample custody for noncontaminated geotechnical samples is covered in SOP 14.5.1, "Procedures for Handling and Shipping of Uncontaminated Geotechnical Samples." Geotechnical samples include soil and rock core samples. Sample collection, labeling and documentation, and COC documents are discussed in this SOP.

5.1.4 The packaging and shipping of hazardous materials and uranium mill tailings are discussed in SOPs 10.8.1, "Hazardous Materials Packaging and Shipping," and 10.8.2, "Packaging and Shipping of Unassayed Tailings Samples." These procedures do not cover COC. The COC procedures discussed in SOPs 14.5.1 and 16.2.10 should be followed for SOPs 10.8.1 or 10.8.2.

5.1.5 Sample custody for UMTRA Project subcontract laboratories is covered in the chemical analysis SOW (JEG, 1993) in Sections 1.2, "Sample Custody," and 2.9, "Sample Receipt and Storage Requirements."

6.0 CALIBRATION AND CALIBRATION CHECK PROCEDURES

6.1 INTRODUCTION

This section discusses calibrations performed on instruments used in the sample preparation facility and in the field. It also briefly discusses subcontractor laboratory calibration requirements.

6.1.1 Instruments used at the sample preparation facility and in the field include thermometers, conductivity meters, dissolved oxygen meters, oxidation-reduction potential meters with electrode, pH meters with electrode, digital titrators, turbidity meters, analytical balances, and spectrophometers. The use, calibration, and performance checks of these instruments shall be as described in the instruction manual for each instrument. These manuals describe calibration procedures, instrument performance checks, and frequency of calibrations and checks for each instrument. Each instrument found to be functioning improperly will be sent back to the manufacturer to be either repaired or replaced.

6.1.2 Volumetric pipettes that are American Society for Testing and Materials (ASTM) Class A glassware need not be checked for accuracy of calibration. For pipettes requiring disposable tips, accuracy is checked by pipetting three or more aliquots of distilled water into a weighing dish prior to use. If the weight of the aliquots varies by more than 1 percent from the expected value the pipette must be recalibrated or removed from service.

6.2 RADIOLOGICAL SURVEY INSTRUMENTS

6.2.1 Portable radiological survey instruments are used to detect radionuclides that are alpha/beta emitters, beta/gamma emitters, or gamma emitters. These instruments provide a rapid field estimate of radioactivity so that personnel may select the appropriate action.

6.2.2 These instruments are periodically checked and calibrated. Instrument calibration is covered in SOPs in Section 10.4 of the Albuquerque Operations manual (JEG, n.d.). These SOPs cover calibration procedures, reference standards, and calibration frequency. Accessories used to calibrate or adjust radiological instruments include pulsers, voltmeters, and oscilloscopes. Instructions for using these accessory instruments are given in the owner's/operator's manuals.

6.3 CALIBRATION

Calibration of subcontractor laboratory equipment is the responsibility of each subcontractor. TAC requirements for laboratory analytical chemistry subcontractors are explained in Section 3.0 of the UMTRA Project TAC

chemical analysis SOW (JEG, 1993) or in Section 8.3, "Measuring Test Equipment," of the TAC QAPP (DOE, 1993a).

7.0 ANALYTICAL PROCEDURES

7.1 This section discusses how analytical procedures are covered on the UMTRA Project. It covers activities performed at the sample preparation facility as well as at subcontract laboratories.

7.2 Analytical procedures performed at the sample preparation facility include batch and column testing, determining gravimetric moisture contents from soil samples, and using a spectrophotometer. Batch and column testing is described in SOP 16.1.8, "Batch and Column Testing." SOP 16.1.9, "Method for Determining Gravimetric Moisture Content of Drill-Bit Cuttings From the Unsaturated Zone," describes measuring soil moisture content. The spectrophotometer is operated according to the manufacturer's instruction manual.

7.3 Subcontract laboratories use EPA-approved chemical analytical procedures as specified in the chemical analysis SOW (JEG, 1993) and in the CLP SOW (EPA, 1991).

7.4 Subcontract laboratories performing analyses on soil and rock core samples shall use ASTM standard procedures or industry approved procedures. These procedures shall be stated in a specific SOW written by either a site engineer, hydrogeologist, or geologist.

8.0 DATA REDUCTION, VALIDATION, AND REPORTING

8.1 INTRODUCTION

8.1.1 This section presents the procedures and practices utilized on the UMTRA Project to ensure that data are defensible and representative of field conditions. These include data collection, documentation, verification, and validation. Data collection and documentation are addressed in Section 4.0. Figure 8.1 is the flow chart that illustrates the UMTRA Project TAC field/analytical data collection, validation, and management process.

8.1.2 The following UMTRA Project TAC activities utilize field- and laboratory-generated data:

- Engineering design and evaluation.
- Environmental characterization and compliance evaluation.
- Geological characterization and evaluation.
- Health and safety monitoring.
- Geochemical characterization and evaluation.
- Hydrological characterization and evaluation.
- Risk assessment.

Data collected during these activities shall go through the validation process illustrated in Figure 8.1.

8.2 DATA QUALITY EVALUATION/VALIDATION

8.2.1 Data quality evaluation and validation are procedures used to ensure that project-generated data are adequate for their intended use. The intended use of the data is defined during the initial DQO process. The data evaluation process includes, but is not limited to, verification, certification, and auditing. The evaluation\validation criteria vary with the UMTRA Project TAC activity, and are defined in the related SOW or SOP. This section describes the procedures and approaches used to evaluate and validate project data.

8.2.2 Verification and evaluation of field data

a. The completed field data package will be evaluated relative to DQOs and DCOs. This evaluation will be done by a department manager or a designee. The following considerations may guide the verification/evaluation process:

1. Has the field activity summary been prepared?

2. Were the appropriate data forms used and completely filled out?

3. Were all measurements/monitoring properly documented?

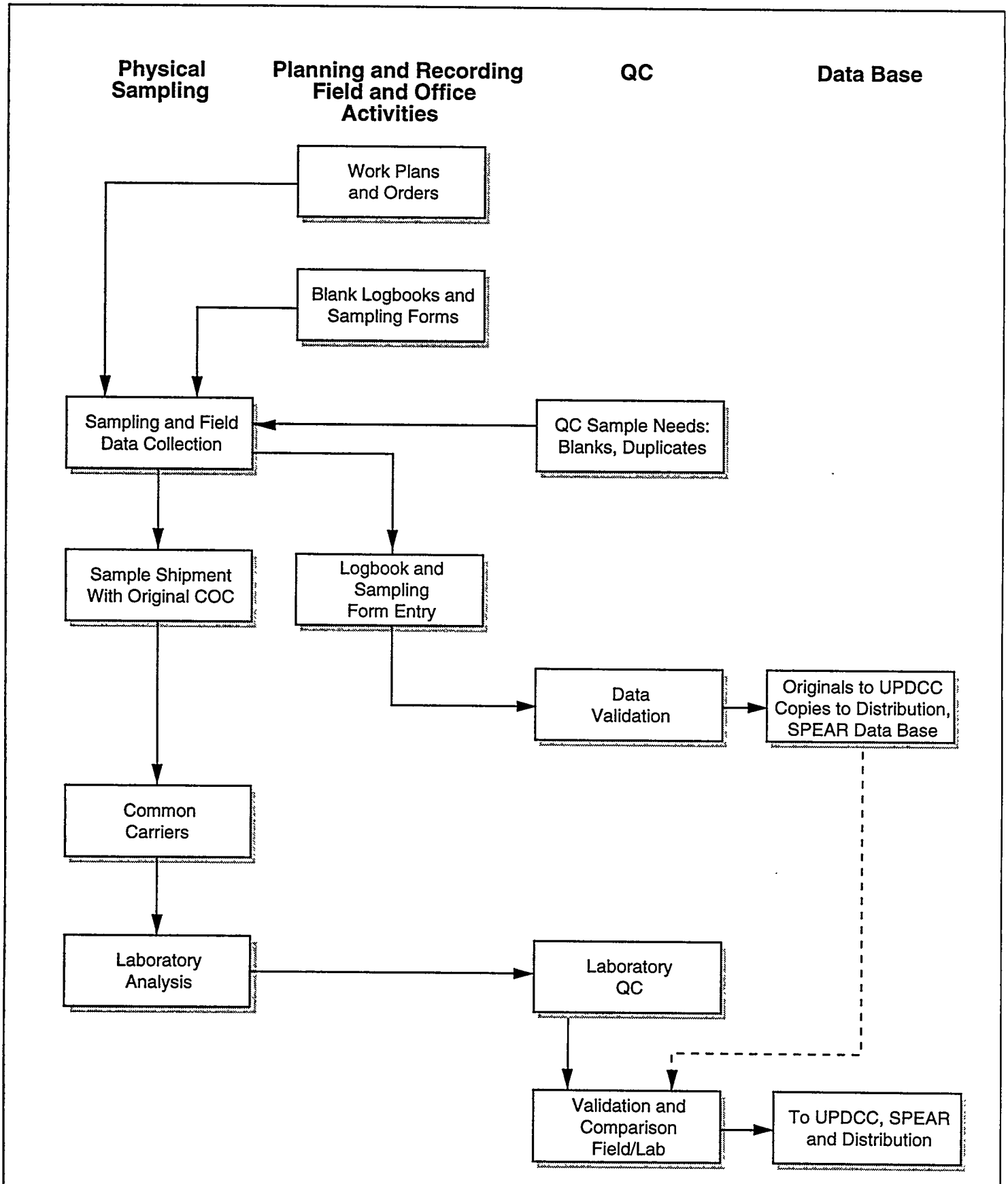

FIGURE 8.1
UMTRA FIELD/ANALYTICAL DATA COLLECTION, VALIDATION, MANAGEMENT

4. Were the DQOs and the DCOs satisfied?

5. Was all the field equipment used calibrated as required? Is the calibration log complete?

6. Were the stipulated or standard procedures used as required?

7. Have the preliminary calculations on the data forms been checked?

8. Have the original data records been transferred to the UPDCC?

b. After verification and technical evaluation, appropriate field data will be entered into the Software Program for Environmental Analysis and Reporting (SPEAR) data base (DOE, 1992b). Data that require qualifiers as a result of the verification and/or evaluation procedure will be flagged appropriately. Data management is addressed in Section 8.3.

8.2.3 Verification and validation of chemical laboratory data

The criteria and procedures for the verification and validation of chemical data are defined in SOPs 16.3.2 and 16.3.3 and the TAC chemical analysis SOW (JEG, 1993). The validation criteria are based on quality Levels C and D.

8.2.4 Verification and validation of engineering\design data

a. All engineering/design data will be verified and validated before use. The criteria will depend on the intended use of the data. The verification and validation criteria and procedures will be stipulated on the related work order.

b. Use of data for calculations

1. Data collected in the field or produced in laboratories are used for calculations to support site modeling scenarios, remedial designs, baseline risk assessments, and other applications. UMTRA Project TAC calculations follow a strict protocol that includes a formal numbering system, calculation cover sheet, and specific outline. The procedures for performing calculations are covered in UMTRA Project TAC SOPs 17.1.1, "Analysis of Data and Compilation of the Site Characterization Appendix," and 17.1.2, "Compilation of Design Calculations."

2. All data to be used in design, modeling, and characterization must be checked for validity and applicability.

8.3 DATA AND RECORDS MANAGEMENT

8.3.1 Data record filing and maintenance

a. SPEAR computer data management system

The SPEAR data base management system is designed for the management and maintenance of the UMTRA Project computer data base of laboratory and field chemical data, well completion data, and hydrologic data. The SPEAR data base is maintained by the Information Systems Planning and Support Department (ISPS).

b. Project document control system

1. The purpose of the UMTRA Project Document Control System (PDCS) is to provide an active and continuing program for the acquisition, control, retention, retrieval, archival, and disposition of UMTRA Project documents. The system is designed to provide guidance and coordination in the transfer of UMTRA Project documents to the UPDCC. In addition to documents produced by the TAC, documents produced by other project participants, such as the Remedial Action Contractor (RAC), are stored at the UPDCC.

2. The PDCS is described in the UMTRA PDCS manual (DOE, 1992a).

8.3.2 Record use

a. Dissemination and use of records and documents

1. UMTRA Project documents and records are available for review to project participants and interested parties through the PDCS.

2. Copies of UMTRA Project documents and records are available to project participants and interested parties based on existing agreements.

b. Use of the SPEAR data base

The SPEAR data base is accessible to UMTRA project participants upon approval by the Project Manager. Most staff members have read-only rights to this data base. Read and write privileges exist for data managers and selected ISPS staff members only.

9.0 INTERNAL QUALITY CONTROL CHECKS

9.1 Subcontract analytical laboratories performing chemical analyses are required by the TAC chemical analysis SOW (JEG, 1993) to perform internal QC checks. These are specifically covered in Section 3.0, "Analytical and Quality Control Requirements," of the chemical analysis SOW.

9.2 Subcontractors performing geotechnical or materials analyses shall perform internal QC checks as specified in SOWs and work orders.

9.3 Instruments used to take measurements in the field and at the sample preparation facility are calibrated and checked for proper operation as described in Section 6.0 of this QAIP.

9.4 Internal QC for calculations, maps, drawings, and surveying will be performed in accordance with SOWs and SOPs in Section 17.0 of the Albuquerque Operations manual (JEG, n.d.).

9.5 Section 10.8 of the UMTRA Project TAC QAPP (DOE, 1993a) allows for internal audit procedures for TAC activities.

10.0 PERFORMANCE AND SYSTEMS AUDITS

10.1 GENERAL

Planned internal and external audits are established and implemented through the UMTRA Project TAC QAPP annually. Audits will be performed on field activities, project system activities, and subcontract laboratories. Before a subcontract is issued, an audit will be conducted in accordance with the requirements of Section 10.0 of the UMTRA Project TAC QAPP and in SOP 9.2.2, "Quality Audits" (JEG, n.d.).

11.0 PREVENTIVE MAINTENANCE

11.1 INTRODUCTION

This section describes and lists preventive maintenance tasks and procedures that are followed to minimize downtime of field and laboratory instruments during the performance of UMTRA Project tasks.

11.2 SUBCONTRACT LABORATORY EQUIPMENT

Preventive maintenance of subcontract laboratory equipment shall be performed in accordance with manufacturers' recommendations or according to subcontract laboratory SOPs that adhere to guidelines set forth in Section 2.7 of the TAC chemical analysis SOW (JEG, 1993). Preventive maintenance of laboratory equipment or instruments is performed by a laboratory employee or by a qualified vendor representative.

11.3 SAMPLE PREPARATION FACILITY AND FIELD EQUIPMENT

11.3.1 The following methods shall be used to check the sample preparation facility and field equipment for reliable performance:

a. Examination of instrument log books and field forms for consistency of data records.

b. Calibration and performance checks of equipment as described in Section 6.0 of this QAIP.

11.3.2 All equipment found to be malfunctioning shall be replaced or sent to a vendor for repair.

11.4 PORTABLE RADIOLOGICAL SURVEY INSTRUMENTS

The performance of portable radiological survey instruments shall be checked using calibration check procedures discussed in Section 6.0 of this QAIP. Equipment found to be malfunctioning shall be replaced or sent to a vendor for repair.

12.0 ROUTINE PROCEDURES USED TO ASSESS DATA PARCC PARAMETERS

12.1 INTRODUCTION

12.1.1 The precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters are indicators of data quality. The EPA provides historical data regarding achievable precision and accuracy (for analytical chemistry) for specific measurement systems and concentration ranges (EPA, 1987). However, to apply these concepts, the UMTRA Project TAC has adopted specific procedures to address each PARCC parameter.

12.1.2 The PARCC parameters can be applied not only to analytical chemical analyses, but also to many other measurement processes. The means by which the PARCC parameters are addressed for each measurement process are described in the applicable SOPs. The examples discussed below are limited to sample acquisition and chemical analysis. While precision and accuracy are functions of detection limits in this context, a separate discussion of the relationship between detection limits and DQOs is provided.

12.2 PARCC PARAMETERS

12.2.1 Precision

a. The precision of data is a measure of the agreement between the results of two or more replicate measurements of the same sample. The UMTRA Project TAC uses relative percent difference to quantify precision for general inorganic parameters, and the replicate error ratio for radiochemical parameters. Specific mathematical formulas for these measures of precision, as well as the associated acceptance criteria, are given in the chemical analysis SOW, and in SOP 16.3.2, "Validation of Chemical Analysis Data."

b. To assess the contribution of the sampling process to overall measurement precision, field duplicate samples are obtained and analyzed. These data can then be compared with laboratory replicate data, in comparable matrices and concentration ranges, to provide some measure (by subtraction) of sampling precision. Due to complications introduced by diverse sample matrices and other factors, the results of this process should be viewed as a qualitative measure of sampling precision.

12.2.2 Accuracy

The accuracy of a result is its proximity to the actual or "true" value. Hence, accuracy in general is the bias in a measurement system. The major sources of error in environmental sampling and analysis are sampling process errors, field and laboratory contamination, sample matrix interferences, sample preparation, and the sample analysis techniques themselves. Quarterly performance

evaluation samples, field blanks, and various types of QC samples are used to assess accuracy. Discussions relating to accuracy may be found in the chemical analysis SOW, in SOP 16.3.2, "Validation of Chemical Analysis Data," and in SOP 16.3.3, "Data Management."

12.2.3 Representativeness

Data representativeness is the degree to which the data represent a characteristic of a population. In this case, the characteristic would be the concentration or activity of parameters of interest in surface water, ground water, soil, etc. In UMTRA Project work, representativeness is primarily addressed through SOPs for sample acquisition activities, such as purging a well prior to taking a sample from it and following EPA guidance for sample preservation. These procedures are discussed in Section 4.0 of this document.

12.2.4 Completeness

Completeness is a term used to refer to the percentage of valid data obtained. That is, the percentage of all data acquired that can be formally validated and used without qualification. While not always achievable in practice, the UMTRA Project TAC chemical analysis SOW is geared to facilitate the acquisition of complete data. The SOW provides and clearly communicates TAC guidelines for processes that are scrutinized during data validation activities.

12.2.5 Comparability

The confidence with which one data set may be compared with another is called comparability. It is a qualitative measure of the degree of agreement between data for similar samples acquired and analyzed under similar conditions. The sampling SOPs and the chemical analysis SOW address data comparability by providing detailed technical instructions pertaining to all aspects of the sampling and analysis processes. In addition, the UMTRA Project TAC subjects newly acquired data to a statistical comparison with historical data. This helps identify isolated anomalies resulting from random contamination or reporting errors.

12.3 DETECTION LIMITS

The instrument detection limit is the experimentally and statistically derived lower limit of an instrument's ability to see analytes at low concentrations. The UMTRA Project contract required detection limits (CRDL) for general inorganic parameters are reporting limits, below which data will simply be reported as "less than the CRDL." These CRDLs are chosen with analytical limitations, regulatory and toxicological requirements, and geochemical interpretation requirements in mind. In the cases in which the desired CRDLs are close to the instrument detection limit, large uncertainties, and hence, reduced accuracy and precision, may be associated with reported low-level results. The chemical

analysis SOW attempts to provide CRDLs that represent the best balance between the often conflicting considerations listed above.

13.0 CORRECTIVE ACTION

13.1 The QA Department maintains a corrective action program that identifies the cause of any significant condition adverse to quality, and provides the means for remediation. The corrective action program consists of identifying non-conformances in activities related to SOPs, SOWs, WSAPs, documentation, recommended disposition, and notification of affected organizations. Corrective action protocols shall ensure that conditions adverse to quality are promptly identified and reported to the QA Department, and that the causes of these conditions are investigated, evaluated, and corrected to preclude repetition.

13.2 All TAC activities shall be monitored so that conditions adverse to quality are promptly identified. It is the responsibility of all UMTRA Project personnel to report any known/observed nonconformances immediately to the QA Department through appropriate levels of management so that corrective action can be initiated. Corrective action protocol is addressed in Section 3.0 of the UMTRA Project TAC QAPP (DOE, 1993a) and SOPs.

13.3 SUBCONTRACT LABORATORY CORRECTIVE ACTION

13.3.1 The corrective action programs for subcontract laboratories shall be outlined in their documented and approved QA programs, and shall adhere to the applicable SOW and Section 3.0 of the UMTRA Project TAC QAPP (DOE, 1993a).

13.3.2 Subcontract laboratories shall be responsible for identifying, documenting, and reporting needed corrective actions to the TAC analytical QA specialist or data base administrator. Drilling or geotechnical subcontractors shall be responsible for identifying, documenting, and reporting problems to the TAC technical representative (either the site hydrologist, engineer, geochemist, site manager, or contract representative).

13.4 CORRECTIVE ACTIONS RESULTING FROM AUDITS

All internal UMTRA Project groups and subcontract laboratories conducting activities in support of the UMTRA Project shall be audited by the QA Department annually. Subcontract laboratories shall be audited using criteria developed from applicable SOWs, SOPs, and the subcontract LQAPs. Corrective action subsequent to audit findings shall follow the procedure described in Section 3.4 of the UMTRA Project TAC QAPP (DOE, 1993a).

14.0 QUALITY ASSURANCE PROJECT PLANS

The UMTRA Project TAC QAPP (DOE, 1993a) is the governing QA document for all UMTRA Project activities. The UMTRA Project TAC QAPP outlines the QA requirements for measurement systems and data quality. Site-specific QAPPs are not developed on the UMTRA Project.

15.0 PERSONNEL TRAINING AND QUALIFICATIONS

Personnel training and qualifications for TAC personnel shall conform with Section 2.0 of the UMTRA Project TAC QAPP (DOE, 1993a) and SOP 9.2.3. Subcontract laboratories and subcontract vendors shall have approved training and qualification programs in place before any subcontract is issued.

16.0 DOCUMENTS AND RECORDS

Documents and records shall be collected and maintained in accordance with the requirements outlined in Section 8.0 of this QAIP, Section 4.0 of the UMTRA Project TAC QAPP (DOE, 1993a), and the PDCS manual. Subcontractors shall maintain documents and records in accordance with requirements outlined in appropriate SOWs.

17.0 DESIGN

UMTRA Project activities requiring design input from the TAC shall be performed in accordance with Section 6.0 of the UMTRA Project TAC QAPP (DOE, 1993a).

18.0 PROCUREMENT

Procurement necessary to the TAC for UMTRA Project related activities shall be performed in accordance with Section 7.0, "Procurement Purpose," of the UMTRA Project TAC QAPP (DOE, 1993a).

19.0 LIST OF CONTRIBUTORS

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