QA/QC APPLIED TO THE DESIGN PORTION OF THE URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT - LOW-LEVEL NUCLEAR WASTE

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ABSTRACT

The Uranium Mill Tailings Radiation Control Act of 1978 (PL 95-604) requires the U.S. Department of Energy (DOE) to perform remedial action at 24 abandoned uranium processing sites. The Uranium Mill Tailings Remedial Action (UMTRA) project was initiated to accomplish this. The project involves the stabilization, disposal, and control of mill tailings to prevent or minimize radon diffusion into the environment. Remedial actions implemented at UMTRA sites must meet standards set by the U.S. Environmental Protection Agency (EPA). Each remedial action site must be licensed by the Nuclear Regulatory Commission (NRC) as having been designed and constructed to meet EPA standards. In addition, remedial actions must also comply with Quality Assurance (QA) requirements as stipulated in ANSI/ASME NQA-1-1979 (NQA-1), DOE Order 5700.6A and DOE Order AL 5700.6A.

This paper describes the implementation of a QA program responsive to NQA-1 for management of low-level nuclear waste from uranium mill tailings. Aspects of QA implementation such as development of project procedures, training, and audits are discussed and potential problems areas are identified. It is shown that an efficient and cost effective QA program can be implemented in compliance with QA requirements.

INTRODUCTION

In 1983, Morrison-Knudsen Engineers (MKE) was selected by the DOE to perform detailed engineering for the cleanup of 24 abandoned uranium processing sites in response to the Uranium Mill Tailings Radiation Control Act of 1978 (PL 95-604). The DOE contract called for compliance with criteria contained in ANSI/ASME NQA-1-1979 (see Table I) and in DOE orders 5700.6A and AL 5700.6A. Because the existing company QA program was responsive primarily to non-nuclear projects, it was not entirely responsive to the QA criteria required for the UMTRA project. It was therefore necessary to develop QA project procedures which would be fully responsive both to the existing company QA program and to the criteria required by the DOE contract.

TABLE I

QA Criteria
ANSI/ASME NQA-1-1979

1. Organization
2. Quality Assurance Program
3. Design Control
4. Procurement Document Control
5. Instructions, Procedures, and Drawings
6. Document Control
7. Control of Purchased Materials, Equipment and Services
8. Identification and Control of Materials, Parts and Components
9. Control of Manufacturing and Installation Processes
10. Inspection
11. Test Control
12. Control of Measuring and Test Equipment
13. Handling, Storage and Shipping
14. Inspection, Test and Operating Status
15. Nonconforming Materials, Parts or Components
16. Corrective Action
17. Quality Assurance Records
18. Audits

An overriding concern in implementing any QA program is the impact of the program on project cost and schedule. Although QA must be considered independent of cost and schedule, its impact requires attention. It is clear, however, that the assurance of quality supersedes schedule and cost considerations and that QA procedures should be followed precisely. Schedules were prepared on the UMTRA project for QA implementation, and QA costs, although they fluctuated with changes in personnel and training requirements, were kept at a minimum.

DEVELOPING AND IMPLEMENTING QA PROCEDURES

To satisfy all QA requirements for the UMTRA project, procedures complementing the existing company QA program were developed, training programs were established and audits were conducted.

Developing Project Procedures

The first step in preparing project procedures was to identify the criteria in NQA-1 applicable to the MKE scope of work for the UMTRA project. Procedures were developed by the QA manager addressing such criteria as design and document control, corrective action, quality assurance records and audits. These procedures were then approved by the UMTRA project manager and chief engineer, and were used as the basis for subsequent external audits.

In some cases, the existing company QA program exceeded the NQA-1 requirements. Certain features of the company QA program, such as Design Basis Memoranda which define the design basis, methodology, and scope of work and require client approval, were retained in project procedures. Other criteria required developing new procedures. For example, procedures governing the control of project documents, including a numbering identification system, standardized logging and retrieval methods and accurate tracking mechanisms were developed in response to NQA-1 Document Control requirements.

Training

A good QA training program is an essential component of a successful project. The QA training program for the UMTRA project has been especially successful in providing training in an environment of growth and transition. All UMTRA personnel must complete the training program and pass an examination. Because the UMTRA staff continues to grow and individual responsibilities change, training begins early and continues from year to year.

The UMTRA training program consists of reading the project procedures, viewing a five-hour video tape, participating in discussions, and taking a formal examination. Individuals who complete the program are issued certificates and are recertified each year by taking an additional examination. One-on-one discussions with those individuals who fail the examination are held in which the graded exam is reviewed and discussed by the QA manager and the individual. To date, only three individuals have failed the examination and have received individual attention.

A key to the success of the UMTRA training program is the recognition by project management that a strong QA program is an asset to the project. Project management participates directly in the development and the formal approval of QA project procedures and therefore is more ready to comply with QA procedures and less likely to suggest changes.

Audits

Both internal management reviews and external QA audits are performed to verify that project procedures comply with all aspects of the NQA-1 Quality Assurance Program. Internal management reviews are conducted prior to external audits and are scheduled at a frequency commensurate with the status and importance of the activity being audited. The QA manager selects a lead reviewer not directly responsible for performing the activities being audited. The lead reviewer then chooses a review team and develops and documents a plan which identifies the audit scope and requirements, the activities to be audited, organizations to be notified, applicable documents, schedule, and written procedures or checklists. Results of the review are documented and reviewed by responsible managers and, where necessary, corrective action, including measures to prevent recurrence, is scheduled. Audit records include audit plans and reports, written replies, and the record of completion of corrective action.

External audits may be conducted by the Technical Assistance Contractor (TAC), the DOE, the NRC and state agencies. These audits may be planned audits with an established checklist of items to be reviewed, or they may be unannounced audits. As with internal audits, findings are presented to project management and any non-conformance is identified. Project management is then required to take and provide evidence of corrective action.

POTENTIAL PROBLEM AREAS

Calculations

Computer calculations must meet very specific requirements in NQA-1. Non-computer calculations are not addressed. Existing company QA procedures call for calculations to be checked by peers for theory, assumptions and arithmetic. In addition to this, QA project procedures required conformance with NQA-1 criteria. In most cases, calculations had been performed using pencil instead of ink. External auditors requested that calculations be performed in ink, which would greatly increase the time and cost. A compromise was reached whereby the calculations could be prepared initially in pencil prior to submission for review. Once submitted for review, corrections must be crossed out and initialed and erasers are not permitted.

Redundant calculations required by NQA-1 also presented an initial problem. The NRC determined, however, that calculations performed by the TAC met the redundant calculation requirement called for by NQA-1. As the UMTRA project develops and the interface between the TAC and the Remedial Action Contractor (RAC) responsibilities undergoes modifications, redundant calculations may be required of the organization performing the original calculations.

Logistics

The logistics of coordinating project activities between UMTRA sites and project offices at various locations across the country (see Fig. 1) complicates the performance of certain project functions, especially in the areas of communications, changing project conditions and document control. Changes to data and design criteria resulting from changing conditions can have an impact on project schedule and QA procedures, such as in determining critical items which may require design review. Changes that occur in the field must be reviewed and approved at the same level as the original design. This is accomplished using a Project Interface Document which must be signed by the engineering design manager who ensures that the change has been appropriately reviewed and approved. Specifications and drawings must also be updated to reflect any changes and then signed.

To ensure that changes are accurately reviewed and correctly documented requires effective communications, accurate scheduling and good document control procedures. Accurate communication is ensured by having representatives present in respective offices. MKE has a representative headquartered in the RAC project office in Albuquerque. Meetings are held in Albuquerque, San Francisco, Washington D.C., and at specific sites. Documents are controlled to ensure accuracy and minimize schedule delays caused by the necessity to send documents long distances and to supply documents to field locations and other entities which might request them. All documents received are automatically logged in and documents sent are logged out with appropriate cover transmittal letters. All documents are sent to the RAC project office in Albuquerque for final distribution. Despite the constraints placed on project staff and schedules by logistical considerations, quality assurance is not compromised.

Review

Drawings and specifications are reviewed both internally and externally. Internal reviews require approval by authors, reviewers, the site design leader, the engineering and design manager and the chief engineer. The QA manager must sign after all other signatures have been obtained.

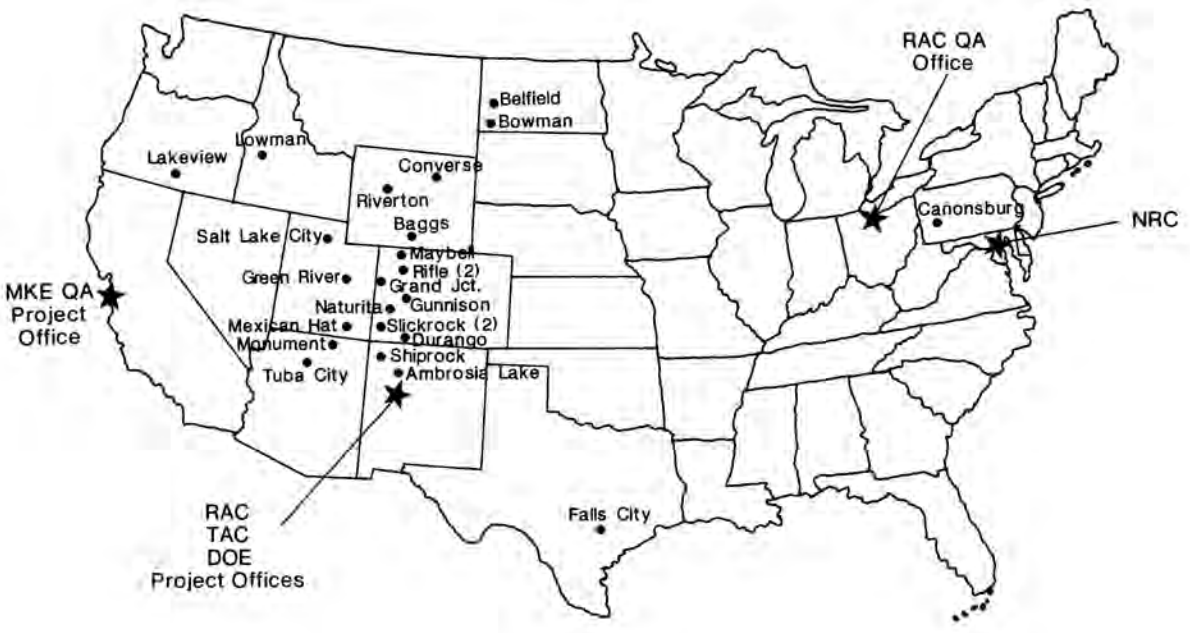

Fig. 1 Locations of UMTRA Sites and Related Offices

After internal review, the drawings and specifications (and somtimes the related calculations) are sent to the RAC project office in Albuquerque which obtains review comments from the TAC, DOE and NRC. This process may be repeated several times. Internal and external design reviews are also conducted in a manner and with a regularity consistent with NQA-1 Design Control requirements.

Document Control

Document Control is one of the most complicated aspects of the QA program to implement. Only UMTRA project personnel generate and receive controlled documents. All incoming and newly generated documents are logged in, and document searching and retrieval are performed manually. Staff members responsible for logging, searching and retrieving documents receive extensive training to ensure proficiency in this important area.

By agreement between the RAC, MKE and the DOE, it was established that designs and specifications would be considered controlled documents only after being approved by the DOE. Half-size drawings are exceptions and are not considered controlled documents. Approved MKE-generated controlled documents are sent to the RAC project office in Albuquerque with appropriate transmittal forms. An acknowledging signature is required when controlled documents are superseded or are to be returned or destroyed.

SUMMARY

The UMTRA project at MKE has grown from 10 to 35 staff members from its inception in 1983 and has undergone significant changes in personnel at all levels. The project has been audited both internally and externally. Despite changes in personnel and conditions, the UMTRA project has met all NQA-1 requirements and has proven to be cost effective. The success of the MKE UMTRA program can, in large part, be attributed to the comprehensive training of project staff in QA policy and the complete support of project management in implementing that policy.