

**RADIOLOGICAL AUDIT OF REMEDIAL  
ACTION ACTIVITIES AT THE PROCESSING SITES  
MEXICAN HAT, UTAH AND MONUMENT VALLEY, ARIZONA**

**AUDIT DATE: MAY 3-7, 1993**

**Final**

**May 1993**

**Work Performed Under Contract No. DE-AC04-91AL62350**

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

**Prepared by  
Jacobs Engineering Group Inc.  
Albuquerque, New Mexico**

**MASTER**

**MAY 1993  
RECEIVED**

**TABLE OF CONTENTS**

<u>Section</u>		<u>Page</u>
1.0	SUMMARY .....	1-1
2.0	INTRODUCTION .....	2-1
3.0	FINDINGS .....	3-1
4.0	OBSERVATIONS .....	4-1
5.0	LIST OF CONTRIBUTORS .....	5-1

**DISCLAIMER**

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

**CHANGE HISTORY**

<b>Document Version</b>	<b>Date</b>	<b>Pages/Comments</b>
Ver. 1	05/13/93	Initial version.
Ver. 2	05/21/93	Incorporated TAC review comments.

## **DISCLAIMER**

**Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.**

## 1.0 SUMMARY

The Uranium Mill Tailings Remedial Action (UMTRA) Project's Technical Assistance Contractor (TAC) performed a radiological audit of the Remedial Action Contractor (RAC), MK-Ferguson and CWM Federal Environmental Services, Inc., at the processing sites in Mexican Hat, Utah, and Monument Valley, Arizona. This audit was conducted May 3-7, 1993, by Bill James and Gerry Simiele of the TAC.

Three site-specific findings and four observations were identified during the audit and are presented in this report.

The overall conclusion from the audit is that the majority of the radiological aspects of the Mexican Hat, Utah, and Monument Valley, Arizona, remedial action programs are performed adequately. However, the findings identify that there is some inconsistency in following procedures and meeting requirements for contamination control, and a lack of communication between the RAC and the DOE on variances from the published remedial action plan (RAP).

Site-specific findings are identified as follows:

- Finding HAT-A03-F01:** The disposal sequence of contaminated materials was reviewed and found to be different from the required sequence described in the RAP.
- Finding HAT-A03-F02:** Vehicles granted a restricted release are being stored and maintained in an uncontrolled area that does not meet the requirements of RAC-RP-003 and DOE Order 5480.11.
- Finding HAT-A03-F03:** Vehicles exiting the decontamination pad stop at an area outside of a controlled area and drip potentially contaminated wash water.

Site-specific observations are as follows:

- Observation HAT-A03-O01:** Environmental air sampling stations were observed to be located near large buildings and/or trees that may cause non-representative radioactive particulate sampling as discussed in DOE/EH-0173T, *Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance*.
- Observation HAT-A03-O02:** Occupational radiological air sampling, analysis, and data generation were observed to be in compliance with procedures and the site health physics monitoring plan.
- Observation HAT-A03-O03:** The methods and facilities for collecting and preparing bioassay samples to be shipped for analysis off the site were reviewed and determined to be excellent.

**Observation HAT-A03-004:**

The site Opposed Crystal System (OCS) Ra-226 analytical performance on blind quality control (QC) samples demonstrated its ability to meet the accuracy requirement of  $\pm 30$  percent at the 95 percent confidence level for individual results and  $\pm 10\%$  for group data; however, an overall low bias of -9.8 percent was observed.

## 2.0 INTRODUCTION

Radiological audits are conducted by the TAC for the UMTRA Project Office to provide an independent assessment that the safety and quality of remedial action work is sufficient to ensure that specified U.S. Environmental Protection Agency (EPA) standards and DOE Orders are met. Radiological audits provide a high degree of assurance that procedures are followed and address whether the remedial action work actually results in a site that meets EPA standards. The purpose of a radiological audit is not only to determine if the proper procedures are followed, but also to determine if the procedures are effective. Specific attention is given to the contractor's occupational and environmental radiological survey techniques and procedures, sampling and measurement techniques, and data management capabilities.

In general, a radiological audit report provides two levels of conclusions: findings and observations. The findings conform to DOE Order 5482.1B, where an audit is classified as a functional appraisal (Paragraph 6.h). Findings (Paragraph 6.g) presented in a radiological audit of remedial action activities will be based on any of the following criteria (Paragraph 6.a):

- Noncompliance with published requirements of the remedial action plan (RAP), vicinity properties management and implementation manual, engineering design, or UMTRA Project Office directives applicable to the site.
- Evidence that the existing radiological measurement methods may result in residual contamination levels in excess of established limits (under-excavation).
- Evidence that the existing radiological measurement methods may result in the removal of materials not contaminated in excess of the limits (over-excavation).
- Evidence that some aspects of the contractor's radiological survey plans and procedures, measurement techniques, or data management capabilities are insufficient to allow eventual certification of the site.
- Evidence that activities are not in compliance with applicable DOE Orders.

Observations are additional comments by the auditors to acknowledge good practices, to document issues of concern, and to note areas where improvements in techniques or procedures could be made. Although observations of concern are not of an immediately critical nature, they are important points that the auditors judge to merit documentation and ultimate resolution.

A radiological audit of the Mexican Hat, Utah, and Monument Valley, Arizona, processing site was conducted May 3-7, 1993. Reviews were made of the RAC's radiological procedures and measurements, instrument calibration, QA control, and data management/analysis.

On-site RAC personnel interviewed during the audit included Phil Mohrman, Jules Bitsilly, and Sean Pond. An exit interview was conducted at the processing site upon completion of the audit. At that meeting, all findings and observations were discussed, and a preliminary list of these was presented.

### 3.0 FINDINGS

#### SITE-SPECIFIC

##### HAT-A03-F01

**Finding:** The disposal sequence of contaminated materials was reviewed and found to be different from the required sequence described in the RAP.

**Discussion:** Section 4.0 and Figure 4.2 of the RAP specify that contaminated materials from Monument Valley will be placed as the top layer of the stabilized pile. During the audit, it was discovered that windblown/waterborne materials from Mexican Hat remained to be excavated even though Monument Valley materials were already being placed in the disposal cell. The text of Calculation 9-239-05-03 stated that windblown/waterborne materials from Mexican Hat, along with Monument Valley materials from Areas A, B, C, D, E, and roads, would comprise the top layer of the stabilized pile; however, it is unclear if this assumption is reflected in the cover design since sheet 3 of this calculation does not appear to address any Mexican Hat materials in layer number 6.

**Recommendation:** Prepare a RAP Project Interface Document to describe the actual disposal sequence. In addition, review the cover design to determine if the actual sequence has been properly modeled and discussed in the appropriate documents.

##### HAT-A03-F02

**Finding:** Vehicles granted a restricted release are being stored and maintained in an uncontrolled area not meeting the requirements of RAC-RP-003 and DOE Order 5480.11.

**Discussion:** The storing and maintaining of the haul trucks that are used for carrying tailings and other contaminated materials were observed to be performed in an area that was not a controlled area. According to the site health physics personnel interviewed, the trucks stored in this area have been cleaned and surveyed (surveys are at a 10 percent frequency) from controlled areas to meet restricted release criteria. By definition, a restricted release from a controlled area requires that the trucks be directly transported to another controlled area. Therefore, storing and routinely maintaining the trucks or any equipment that only meet the restricted release criteria outside of a controlled area is not in compliance with the RAC's procedure for contamination control, RAC-RP-003, *Site Contamination Control*.

Plausible scenarios exist where a worker or member of the public could enter this uncontrolled area, and come into contact with radioactive material. These events are possible because radiological controls are lacking, which are required in DOE Order 5480.11.

**Recommendation:** Do not store or perform routine maintenance on vehicles or equipment that are conditionally released (i.e., under restricted release requirements) in uncontrolled areas.

**HAT-A03-F03**

**Finding:** Vehicles exiting the decontamination pad stop at an area outside of a controlled area and drip potentially contaminated wash water.

**Discussion:** Upon review of the Mexican Hat site truck decontamination pad activities and the area used by the drivers to stop and perform safety inspections, a plastic-lined trench for controlling decontamination wash water dripping from the trucks was observed. The trench extended from the boundary of the controlled area at the gate to about 100 feet (30 meters) outside of the controlled area onto the road.

When asked why the liner was placed in the trench, health physics personnel stated that it would help prevent contamination of the soil in and around the trench, if the dripping wash water was contaminated. Therefore, it appears that either a contaminated or potentially contaminated area in and/or around the trench could exist at almost any time. No data was presented to show that the dripping wash water was not contaminated. This situation of having a potentially contaminated area outside of a controlled area does not meet the requirements in RAC-RP-003, Section 4.3.1, and DOE Order 5480.11.

**Recommendation:** Contain the trench for the truck safety check and drying off area within the controlled area, or provide and maintain documented evidence that the area has negligible potential to become contaminated.

## 4.0 OBSERVATIONS

### SITE-SPECIFIC

#### HAT-A03-O01

**Observation:** Environmental air sampling stations were observed to be located near large buildings and/or trees that may cause nonrepresentative radioactive particulate sampling as discussed in DOE/EH-0173T, *Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance*.

**Discussion:** Environmental air sampling stations for monitoring radioactive particulates and radon gas were observed to be maintained and operated in accordance with procedures and the site health physics monitoring plan. However, it was noted that three environmental monitoring stations (near the bioassay laboratory, warehouse, and San Juan trailer park) were located adjacent to large structures, which could affect their ability to collect representative particulate air samples. In addition, the sampler housings containing the particulate air samplers may also adversely affect their ability to obtain a representative sample.

**Recommendation:** Review the location and structures of existing environmental monitoring stations to determine if their ability to obtain representative samples is affected by adjacent obstructions. Document the review and justify continued sampling at suspect locations based on cost/benefit considerations or an analysis of existing site data.

#### HAT-A03-O02

**Observation:** Occupational radiological air sampling, analysis, and data generation were observed to be in compliance with procedures and the site health physics monitoring plan.

**Discussion:** The methods for collecting and analyzing occupational air samples and generating data were observed. Results were reviewed and the data indicated that work area grab air samples were typically at a few percent of the applicable derived air concentration (DAC). The health physics and safety personnel stated that the use of respiratory protection for reducing exposures to airborne radionuclides has not been necessary at the site.

Two good site-specific practices (above and beyond procedural requirements) were observed during the review of occupational air sampling. The health physics technicians performing the air sampling are required to note on a site drawing the approximate locations of air samples taken, along with a description of the remediation work being performed during the sampling. This information could be valuable for possible future investigations or trending studies. The other good

practice was the keeping of an informal logbook in the laboratory for recording daily "batches" of air samples analyzed on the automatic counting system. This log was a helpful record for the laboratory technician in performing the final review of data. However, it was noted that the log's informal appearance (e.g., logbook not being bound or required by procedure) may be a detriment during a rigid quality assurance (QA) audit of the records in the laboratory.

**Recommendation:** The RAC should review the site-specific good practices noted in this observation and consider implementing these at all sites by revising appropriate procedures.

**HAT-A03-O03**

**Observation:** The methods and facilities for collecting and preparing bioassay samples to be shipped for analysis off the site were reviewed and determined to be excellent.

**Discussion:** A tour of the new bioassay sample preparation facility was performed along with a review of the methods used to collect and prepare bioassay samples. The controls in the facility were determined to be excellent for minimizing cross-contamination of samples and the production of "false positive" sample results, along with providing protection to the technician preparing the samples. The health physics supervisor's description of sample collection by workers also indicated a good effort to minimize introduction of external contamination into samples.

**Recommendation:** None.

**HAT-A03-O04**

**Observation:** The site OCS Ra-226 analytical performance on blind QC samples demonstrated the ability to meet the accuracy requirement of  $\pm 30$  percent at the 95 percent confidence level for individual results and  $\pm 10$  percent for group data; however, an overall low bias of -9.8 percent was observed.

**Discussion:** Ten blind QC samples were provided to the health physics laboratory for analysis on the OCS. Ten analyses were performed on each sample to observe analytical accuracy and precision (consistency). The UMTRA Project standard for individual results of  $\pm 30$  percent of the reference value with a 95 percent confidence level was met. Only one of the 100 results was outside of the  $\pm 30$  percent range. The blind analyses indicated that, on the average, the OCS bias was -9.8 percent. This average bias meets the TAC target accuracy standard of  $\pm 10$  percent for group data. Excellent consistency (precision) was observed for the repeat analyses of each sample (standard deviations were consistently less than 15 percent of the average value reported).

**Note:** The TAC target accuracy standard was mistakenly identified as the TAC target precision standard in two previous audit reports (March 1993, Falls City, Texas; and April 1993, Ambrosia Lake, New Mexico).

Although the accuracy standards were met by the OCS performance, the average bias at this site and those observed at most others have been a concern because of their consistency to be negative (low) and near the unacceptable level. The recent blind QC sample data collected at the Ambrosia Lake site has indicated that at least one of the RAC OCS operations can be very accurate and without any significant low bias. At the present, the TAC is reviewing the Canberra OCS calibration and quality assurance procedure to determine if there is a reason for developing a consistent negative bias of about -10 percent. This is an effort that the RAC should be undertaking also because the problem has been identified in previous reports (March 1993 reports for Grand Junction, Colorado, and Falls City, Texas). It should be noted that a different type of OCS (an APTEC) is being used at the Ambrosia Lake site and it may be operated in a manner that does not produce as significant a negative bias as the Canberra systems. Comparing the two OCS types and their operating procedures may be helpful in identifying the problem causing the bias.

**Recommendation:** The cause of the negative bias should be determined and corrected.

### 5.0 LIST OF CONTRIBUTORS

The following individuals contributed to the preparation of this audit report.

Name	Contribution
Jim Gibb	Document Review
Gerry Simiele	Auditing
Bill James	Auditing
Joy Martin	Secretarial Support
Mark Miller	Document Review
Carmen Silva	Technical editing, document coordination
Cheryl Slosberg	Word Processor