RADIOLOGICAL SURVEILLANCE OF REMEDIAL ACTION ACTIVITIES AT THE PROCESSING SITE

FALLS CITY, TEXAS

SURVEILLANCE DATE: MARCH 22-26, 1993

Final

April 1993

Prepared by
Jacobs Engineering Group Inc.
UMTRA Project Office
Albuquerque, New Mexico

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1.0 SUMMARY

The Uranium Mill Tailings Remedial Action (UMTRA) Project's Technical Assistance Contractor (TAC) performed a radiological surveillance of the Remedial Action Contractor (RAC), MK-Ferguson and CWM Federal Environmental Services, Inc., at the processing site in Falls City, Texas. This surveillance was conducted March 22-26, 1993, by Jim Hylko and Bill James of the TAC. The U.S. Department of Energy (DOE) was represented by Bob Cornish and Frank Bosiljevac.

No findings were identified during the surveillance. Three site-specific observations and three programmatic observations are presented in this report.

The overall conclusion from the surveillance is that the radiological aspects of the Falls City, Texas, remedial action program are performed adequately. However, some of the observations identify that there is potential for improving certain aspects of the occupational radiological air sampling, ensuring analytical data quality, and in communicating with the DOE and TAC on the ore sampling methods. The TAC has also received and is currently reviewing the RAC's responses regarding the observations identified during the radiological surveillance performed October 29-30, 1992.

Site-specific observations are identified below:

Observation FCT-S03-O01: Radiological respiratory protection and air sampling programs were reviewed and determined to be managed appropriately, and in compliance with existing procedures and applicable DOE requirements (DOE Order 5480.11).

Observation FCT-S03-O02: External dose rate monitoring, contamination control related to heavy machinery maintenance, and radiation detection equipment calibrations were reviewed and determined to be performed in compliance with existing procedures.

Observation FCT-S03-O03: Soil verification sampling, archiving of required quality control (QC) verification samples, and Opposed Crystal System (OCS) operations were reviewed and determined to be adequate to meet Environmental Protection Agency (EPA) requirements.

Programmatic observations are as follows:

Observation FCT-S03-O04: Uranium ore identification samples from the uranium ore pits were observed to be taken only at the four corners of 150x150-foot (46x46-meter) grids (i.e., blocks of 25, 30x30-foot [9x9-meter] grids).

Observation FCT-S03-005: Minor technical concerns related to occupational air sampling procedural compliance and/or terminology, and hand-verified calculations were noted.

Observation FCT-S03-006: The RAC (CWM Environmental Services, Inc.) has not standardized their quality control verification sample tracking system to ensure that a minimum of 4 percent (1 of 25 verification samples) is sent to the vendor laboratory, and results are entered in the OCS Log when received.

2.0 INTRODUCTION

Radiological surveillances are conducted by the TAC for the UMTRA Project Office to provide an independent assessment that the quality of remedial action work is sufficient to ensure that specified EPA standards are met. Different but related purposes are served by radiological surveillance and quality assurance (QA) programs and audits. QA programs and audits provide a high degree of assurance that procedures are followed; radiological surveillance addresses whether the remedial action work actually results in a site that meets EPA standards. The purpose of a radiological surveillance 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 radiological survey techniques and procedures, sampling and measurement techniques, and data management capabilities.

In general, a radiological surveillance report provides two levels of conclusions: findings and observations. The findings conform to DOE Order 5482.1B, where a surveillance is classified as a Functional Appraisal (Paragraph 6.h). Findings (Paragraph 6.g) presented in a radiological surveillance 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 are not of an immediately critical nature, they are important points that the auditors judge to merit documentation and ultimate resolution.

A radiological surveillance of the Falls City, Texas, processing site was conducted March 22-26, 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 surveillance included Larry Patrick, Steve McQuery, David Miller, and Bob Staub. An exit interview was conducted at the processing site upon completion of the surveillance. At that meeting, all observations were discussed, and a preliminary list of observations was presented.

3.0 OBSERVATIONS

3.1 SITE-SPECIFIC

FCT-S03-O01

Observation: Radiological respiratory protection and air sampling programs were reviewed and determined to be managed appropriately, and in compliance with existing procedures and applicable DOE requirements (DOE Order 5480.11).

Discussion: The program for controlling the use of respiratory protection was observed. The system developed and implemented for appropriate issuance of respirators was reviewed and determined to be adequate. Training, medical and fit-testing records for certifying potential respirator wearers were observed and determined to be adequate for demonstrating the accuracy of the controlled list for approved respirator users.

Occupational radiological air sampling data and procedures for determining air concentrations were reviewed. The instruments, equations, and raw data used to produce occupational air radionuclide concentrations were also reviewed. The recent and historical Th-230 and gross alpha air concentrations were observed to average well below 10 percent of applicable derived air concentrations (DAC).

The respiratory protection storage and issuing station at the site access control trailer was observed to be adequate in controlling respiratory protection usage. The amount of respirator usage for radiation protection purposes was investigated and it was apparent that respirator usage is negligible at the site due to low occupational radionuclide air concentrations. The only usage of respirators for radiation protection purposes occurred during a vegetation burn, where three workers wore respirators for precautionary measures.

Recommendation: Due to the potential for changes in regulatory requirements in the near future that will require more extensive respiratory protection training, the RAC should be prepared to re-evaluate their need to have a large number of approved respirator wearers (for cost reduction and optimization purposes).

FCT-S03-O02

Observation: External dose rate monitoring, contamination control related to heavy machinery maintenance, and radiation detection equipment

calibrations were reviewed and determined to be performed in compliance with existing procedures.

Discussion: Routine external dose rate monitoring in work areas was observed to be performed adequately using the Bicron Micro Rem survey meter. Contamination control for heavy machinery (e.g., truck air/oil filters, etc.) was discussed with the site health physics manager. The RAC's efforts were determined to be adequate to ensure that potentially contaminated components are surveyed and handled appropriately. All radiation detection instruments observed were in calibration and operational to perform radiological monitoring appropriately.

Recommendation: None.

FCT-S03-003

Observation: Soil verification sampling, archiving of required QC verification samples, and OCS operations were reviewed and determined to be adequate to meet EPA requirements.

Discussion: Verification soil sample collection was witnessed on 15 grids. The grids were carefully located, nine soil slugs uniformly spaced in the grids were composited, and the well-mixed composites placed in appropriately labeled sample cans and marinelli beakers.

Operation of the OCS, the recording of data, and the archiving of QC verification samples were observed and determined to comply with procedural requirements. QC blind samples were analyzed by the site OCS to determine whether the systems have potential bias or other quality concerns related to accuracy and precision.

The blind analyses performed during the surveillance indicated that, on the average for all analyses, the OCS bias was -8 percent, which meets the TAC target precision standard of ±10 percent for group data. The UMTRA Project standard for individual results of ±30 percent of the reference value with a 95 percent confidence level was also met. None of the 25 results were outside of the ±30 percent range.

A concern for a low bias was studied and discussed extensively during and after the last two Falls City site radiological surveillances. To date, all of the testing of OCS units (including extensive testing at the Grand Junction, Colorado site) has shown a consistent overall bias of approximately -10 percent, when comparing observed values with the known concentrations of the blind samples. The possibility

that the blind reference sample cans leak during air shipment, allowing radon gas to escape, and immediate analysis by the RAC before equilibrium is established in the cans has been investigated. The data collected for this purpose (1 and 20-day counts, and daily ingrowth count) has not indicated that leaking of cans in air shipments is the probable cause for identification of a low bias in the OCS systems. This determination further supports the TAC's concern that there is a systematic low bias (e.g., from improper calibration, background subtraction, and the like) in the OCS performance.

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

3.2 PROGRAMMATIC

FCT-S03-004

Observation: Uranium ore identification samples from the uranium ore pits were observed to be taken only at the four corners of 150x150-foot (46x46-meter) grids (i.e., blocks of 25, 30x30-foot [9x9-meter]) grids.

Discussion: Although the site operating procedure (OP-003-6, Revision 0) does not state required grid sizes for uranium ore identification sampling, the NRC may not find the RAC's use of a 150x150-foot (46x46-meter) grid size for sampling to be acceptable. The NRC has not observed results from grid sizes different than 30x30-foot (9x9-meter) verification sampling grids. It was also noted that the RAC is not taking and compositing multiple plugs at the four corners of the 150x150-foot (46x46-meter) grids. The site health physics manager stated that approval was given by the RAC Headquarters (Albuquerque Office) to sample 150x150-foot (46x46-meter) grids for uranium ore, but this was not communicated to the DOE or the TAC.

Recommendation: RAC, TAC, DOE, state of Texas and NRC representatives should discuss grid sizes for uranium ore sampling, and determine if the grid size requirement for verification sampling applies. The RAC should strongly consider sampling 30x30-foot (9x9-meter) grids for ore identification; and, if necessary, due to analytical capacity limitations, archive/store these samples for later analysis (if required to do so). Communication by the RAC to inform the DOE and the TAC about special procedures and/or possible procedural modifications should be improved.

FCT-S03-005

Observation: Minor technical concerns related to occupational air sampling procedural compliance and/or terminology, and hand-verified calculations were noted.

Discussion: Although the air sampling procedure (RP-002-1, Revision 2) states that the air samples shall be collected as close to the "worker's breathing zone" as possible, it is apparent that performing this is very difficult with high-volume grab samples. It also must be noted that the RAC is not, by definition, determining breathing zone air samples. If grab samples are interpreted as real worker intakes, it must be demonstrated that the grab work area samples are reasonably representative of full-shift personal (lapel) air samples.

The TAC hand calculated the minimum detectable concentration (MDC) using the equation in Section 3.4 of RP-002-1 for some air samples on a computer data sheet. The hand calculation did not agree with the MDC printed on the data sheet because the equation in the procedure is not explicit in using a volume that is unadjusted by the air density correction factor, and the volume displayed on the computer data sheet was not identified as already corrected by this factor. The procedure also uses the terms "temperature correction factor" and "air density correction factor" interchangeably, yet nowhere in the procedure are the two terms equated. It was also noted that the MDC and air sample concentration equations were not printed on the bottom of the computer data sheet (e.g., as the equations are printed on the environmental air sample data sheets).

The usage of the atmospheric density correction factor may be inappropriate for air sampling instrumentation calibrated at the sites. This factor is being used in a way that increases the volume of air sampled if there is less atmospheric pressure (e.g., increase in altitude of site), and thus lowers the air concentration result. This is a non-conservative adjustment in estimating worker exposures, and appears to be unnecessary when the instruments are calibrated at the atmospheric pressure that they are used.

Additionally, if the purpose for using this correction factor is to adjust volumes (i.e., rotameter flows) to standard temperature and pressure (STP) conditions, it should not be used because the air concentration limits are not "STP qualified" standards.

Recommendation: Justify using grab samples to determine breathing zone air concentrations. Alternatively, designate the grab samples as area samples only. Provide the DOE/TAC with appropriate information to

correlate personal (lapel) air samples (i.e., breathing zone air concentration) with the grab, area air samples. Provide the technical basis for applying the potentially non-conservative air density correction factor. Use consistent terminology for the factor. Display the appropriate equations at the bottom of the occupational air sampling data sheets, and identify whether the volume is corrected for air density (if use of it continues).

FCT-S03-O06

Observation: The RAC (CWM Environmental Services, Inc.) has not standardized their QC verification sample tracking system to ensure that a minimum of 4 percent (1 of 25 verification samples) are sent to the vendor laboratory, and results are entered in the OCS Log when received.

Discussion: The TAC noted that corrective actions to address GRJ-S04-O01, repeat observation, regarding verification sample logbook maintenance and the overlooked submittal of two QC verification samples to Barringer Laboratories have not been uniformly implemented at all sites. The corrective actions at the Grand Junction site were assessed as being acceptable and appear to ensure that these problems will not recur.

The corrective action to ensure that vendor laboratory results are recorded in the verification sample logbook involves the stamping with required signature lines (i.e., health physics manager for review, health physics laboratory technician for OCS Log entry, and health physics data technician for data base entry and filing) of reports as they are received. The corrective action for ensuring that QC samples are sent to Barringer Laboratories involved improvement of the logging system and creation of a special entry line that must be completed on the bottom of each page of the Leak Test and Verification Sample QC Logbook to record QC verification sample submittal information.

Recommendation: As a good practice, the RAC should standardize their QC verification sample tracking and recording system at all UMTRA sites with respect to the corrective actions observed at the Grand Junction, Colorado, site in response to GRJ-S04-001.

4.0 LIST OF CONTRIBUTORS

The following individuals contributed to the preparation of this RAP.

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