

COMPLETION REVIEW REPORT

FOR THE
REMEDIAL ACTION
AT THE
FALLS CITY, TEXAS
URANIUM MILL TAILINGS
REMEDIAL ACTION PROJECT SITE

April 1997

DIVISION OF WASTE MANAGEMENT
U.S. NUCLEAR REGULATORY COMMISSION

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FALLS CITY, TEXAS, UMTRA PROJECT SITE COMPLETION REVIEW REPORT

INTRODUCTION

The Falls City site is one of the 24 abandoned uranium mill tailings sites to be remediated by the U.S. Department of Energy (DOE) under the Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA). UMTRCA requires, pursuant to Section 104(f)(1), that the U.S. Nuclear Regulatory Commission concur with the DOE's determination that the remedial action has been properly completed. This Completion Review Report (CRR) documents the NRC staff's basis for its concurrence decision with respect to DOE's Certification Summary for the completion of surface remediation at the Falls City site.

1.0 BACKGROUND

1.1 UMTRCA

Title I of UMTRCA provides for remedial action at abandoned uranium mill tailings sites and associated vicinity properties. The purpose of this legislation is to protect the public health and safety and the environment from radiological and non-radiological hazards associated with the process related materials at these sites.

UMTRCA directs DOE to select and perform remedial actions at 24 abandoned uranium mill tailings sites to ensure compliance with the general environmental standards promulgated by the Environmental Protection Agency (EPA) under Section 275(a) of the Atomic Energy Act of 1954, as amended by UMTRCA. UMTRCA also requires DOE to obtain NRC's concurrence with DOE's selection and performance of the remedial actions. Following completion of the remedial actions, UMTRCA authorizes NRC to license the long-term custody, maintenance, and monitoring of the disposal sites to ensure continued protection of the public health and safety and the environment. Appendix B includes a more detailed discussion of this legislation.

1.2 CONCURRENCE PROCESS FOR THE SELECTION OF DOE'S REMEDIAL ACTIONS

To document its selection of the remedial action to be implemented at a particular site, DOE develops and issues a Remedial Action Plan (RAP) under its Uranium Mill Tailings Remedial Action (UMTRA) Project. The RAP describes the series of activities and presents the design proposed by DOE to provide for the long term protection of the public and the environment. Usually this involves cleanup of the processing site, adjacent windblown areas, and vicinity properties in addition to stabilization of the residual radioactive materials. In addition, DOE issues a Remedial Action Inspection Plan (RAIP), which establishes the quality control program of testing and inspection that will be employed for the remedial action. In accordance with UMTRCA Section 108(a)(1), the NRC staff reviews and concurs with the RAP and the RAIP, and any subsequent modifications. By its concurrence in the remedial action selection, the NRC staff concludes that the planned remedial actions will comply with EPA's applicable standards in 40 CFR 192, Subparts A, B, and C.

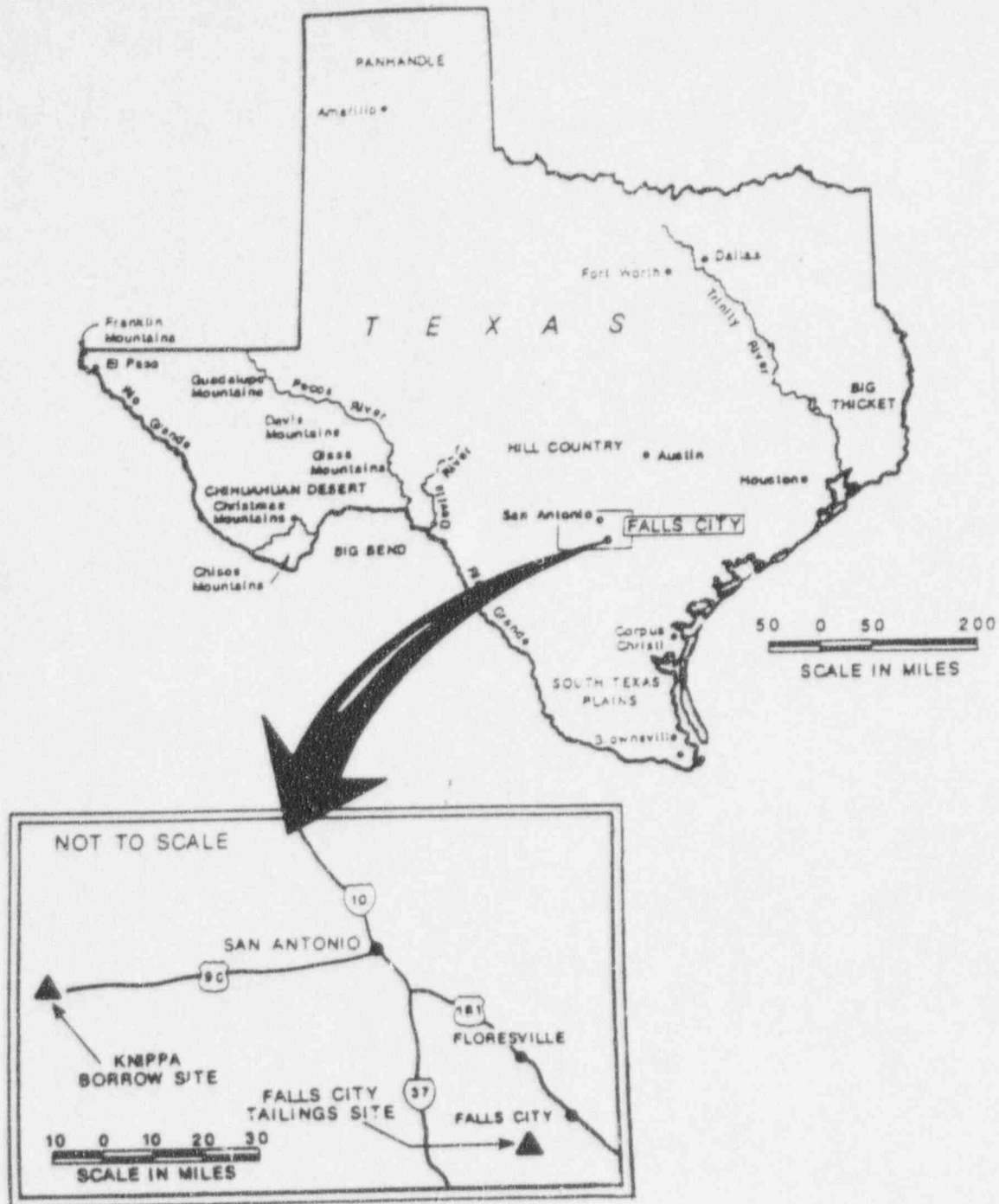


FIGURE 1.1
LOCATION OF FALLS CITY UMTRA SITE (DOE, 1991a)

The remedial action performed by DOE consisted of the following major activities:

1. All tailings and contaminated materials were consolidated and stabilized into a single disposal cell at the previous location of piles 1, 2, and 7 (Figure 1.2). Materials from piles 3, 4, 5, and pond 6, the windblown areas, and portions of piles 2 and 7 were consolidated into the embankment. The disposal cell covers 127 acres and measures approximately 2,600 feet by 2,200 feet. The pile rises a maximum of 62 feet above the surrounding terrain, with an average of 37 feet. The disposal cell was built with side slopes of 20 percent and a top slope of 1 percent.
2. The contaminated materials were covered with a 36 inch radon barrier on the top and a 24 inch barrier on the side slopes to inhibit radon emanation. This was topped with a six-inch-thick bedding layer, overlain by a 30-inch-thick soil growth medium, and a six-inch-thick topsoil layer to establish a vegetative slope. Rock was placed on the side slopes for erosion protection. No permanent drainage or interceptor ditches were necessary on the site.

The NRC was not involved with the actual remedial action activities which were performed by the DOE contractors. However, DOE obtained NRC concurrence with the site construction design and a few significant modifications known as Project Interface Documents (PIDs). NRC also performed on-site construction reviews to monitor the progress of the construction activity (see Appendix A).

1.5 COMPLETION REVIEW REPORT ORGANIZATION

The purpose of this CRR is to document the NRC staff review of DOE's Falls City Completion Report (CR) (DOE, 1996). Section 2 of this report presents the analysis of remedial action construction. This section is organized by technical discipline and addresses engineering and radiation protection aspects of the remedial action. Appendix A provides a listing of NRC staff visits to the Falls City site. Appendix B provides a detailed description of the requirements of UMTRCA and the resulting phased process of the UMTRA project.

2.0 ANALYSIS OF DOE REMEDIAL ACTION PERFORMANCE

2.1 PREVIOUS ACTIONS

NRC staff, based on its review of the RAP (DOE, 1991a-e), and the RAIP (MK-F, 1992) concurred that the remedial action, as designed, would meet the applicable EPA standards. This concurrence was based on technical findings that there is reasonable assurance that the selection of the remedial action would meet the standards for long-term stability, radon attenuation, water resources protection, and cleanup of contaminated land and buildings.

Staff reviews included assessments in the areas of geology, geotechnical engineering, surface water hydrology, and health physics. The NRC concurred on the final RAP and the RAIP on August 4, 1992. The basis for the NRC

personnel. Records indicating acceptable calibration of measuring and testing equipment are provided in the DOE CR.

3. The CR shows that frequencies of material testing and inspection comply with the frequencies specified in the RAIP and in the NRC Staff Technical Position on Testing and Inspection Plans (NRC, 1989).
4. Continuous inspections by DOE or its agents confirmed that the volume of organics included in the construction materials was limited to the range specified in the RAP.
5. The radon barrier layer was continually inspected by DOE or its agents to ensure that the specified lift thicknesses and compaction levels were achieved.
6. The material type, placement, and compaction methods specified for the radon barrier layer resulted in the desired permeability and density of the barrier.
7. As-built drawings adequately document that the completed remedial action is consistent with the NRC-approved design.
8. Final slope, elevation and compaction operations of the foundation soil and capillary break were adequately inspected to ensure that the final conditions were consistent with those stated in the RAP and final design.

Based on the above observations, and on the results of on-site inspections (see Appendix A) performed by NRC staff during construction, the NRC staff concludes that the geotechnical engineering aspects of construction were performed in accordance with the specifications identified in the RAP and RAIP.

Section 2.2.2 Surface Water Hydrology and Erosion Protection

NRC staff reviewed the surface water hydrology and erosion protection aspects of remedial actions at Falls City to ensure that they were constructed in accordance with the applicable construction specifications as stipulated in the RAP, RAP modifications, RAIP, and the final design. Areas of review included construction operations, laboratory and field testing, and quality assurance audits. In addition, the review was also based on NRC observations of the remedial actions and review of records and testing during several NRC on-site inspections.

The remedial action design included erosion protection in several specific areas, including: (1) a vegetated top slope; (2) riprapped side slopes; and (3) a buried riprap toe adjacent to the side slope. The top and side slopes of the cell were designed to prevent long-term erosion and gullyng of the cell cover. The buried riprap toe was placed to prevent erosion and migration of gullies toward the cell.

The NRC staff reviewed each of these features and determined that testing, placement, and configuration complied with specifications in the RAP, RAP

review was based primarily on the staff's assessment of information presented in the Falls City CR.

The criteria for site cleanup and radon attenuation design were established in the RAP and concurred in by NRC staff as providing assurance that the processing site and disposal cell would meet the EPA requirements of 40 CFR Part 192. The criterion for soil radium (Ra-226) requires cleanup at the processing site and on adjacent lands to levels complying with the applicable EPA standards (40 CFR 192.12) such that the average Ra-226 levels above background in each 100 m² area do not exceed either 5 pCi/g in the top 15 cm of soil, or 15 pCi/g in any underlying 15-cm layer. A supplemental cleanup standard for thorium (Th-230) was proposed in the RAP in the event an area contained significant Th-230 levels at a depth below the excavation depth for Ra-226, as required by 40 CFR 192.21(h). The supplemental standard was based on meeting either the 1000-year Ra-226 level, or the potential interior radon progeny level (assumes a house would be built over the deposit) within 1000 years. DOE also stated in the RAP that uranium ore in its original location would not be removed, but would be identified and the identification methodology, plus evidence supporting the decision not to remove the ore, would be documented. Also, since open pit mines and naturally occurring mineralized radioactive material (in situ material with elevated Ra-226 and/or Th-230 levels) were found on and off site, it was necessary for DOE to develop procedures to distinguish between the tailings and in situ material in order to facilitate cleanup. To distinguish this in situ material from tailings material, DOE developed criteria (procedure OP-003-6) that included the Ra-226 to U-238 ratio and visual examination (stratigraphy, color, texture, density) by a geologist.

The RAP called for demolition of all buildings, structures, foundations, and utilities and disposal of the resulting debris in the tailings cell. Therefore, cleanup criteria were not specified and verification of building cleanup was not required.

The RAP final radon attenuation design in PID 15 was based on construction of a compacted clayey soil radon barrier 2 feet thick on the side slopes and 3 feet thick on the top slopes of the cell. The design change increased the radon barrier thickness on the top slopes, because less windblown contaminated material (low Ra-226 content) was placed on top than originally planned. The PID 15 design was supported by a calculation of the estimated long-term radon flux from the barrier. This computer code calculation utilized parameter values for density, Ra-226, and radon emanation fraction based on analyses of contaminated material during placement in the disposal cell. A final flux calculation was provided in the CR incorporating final test data on the radon barrier.

During the review, with respect to the above criteria and commitments, NRC staff noted the following:

1. Soil Cleanup: Appendix J of the CR indicates that all tailings contaminated areas were cleaned according to DOE UMTRA Project procedures. Appendix H indicates that some windblown areas were re-characterized to

Based on the above evaluations, the NRC staff concludes that commitments and requirements stated in the RAP were fulfilled and that data in the CR provides assurance that the soil cleanup and disposal cell cover radon control standards have been met at the Falls City site.

2.2.4 Groundwater Protection

The RAP concluded, and NRC concurred that due to the poor hydrologic conditions at the Falls City site, groundwater protection will be achieved by monitoring existing monitoring wells under the provisions of supplemental standards. Therefore, no point of compliance monitoring wells were constructed for the site as part of the remedial action addressed by the CR. DOE has elected to postpone any groundwater remedial action activities to a separate phase of the project, so there were no hydrology issues to be considered by NRC in its review of the current document.

3.0 SUMMARY

NRC staff reviewed geotechnical engineering, surface water hydrology and erosion protection, and radiation protection aspects of the remedial action performed at the Falls City uranium mill tailings site. The purpose of this review was to determine whether DOE had performed remedial actions at the site in accordance with specifications in the RAP, RAP modifications, and other supporting project documents, and thus with the EPA standards in 40 CFR Part 192, Subparts A-C. Based on its review of the Final CR and on observations made during periodic on-site construction visits, the NRC staff concludes that DOE performed remedial action at the Falls City site in accordance with the EPA standards. Therefore, NRC concurs with DOE's certification of completion of the Falls City remedial action.

4.0 REFERENCES

U.S. Department of Energy (DOE), Washington, D.C.

- , "Remedial Action Plan and Final Design for Stabilization of the Inactive Uranium Tailings at Falls City, Texas," Remedial Action Selection Report and Attachments 1-4, 1991a.
- , "Uranium Mill Tailings Remedial Action Project (UMTRAP), Falls City, Texas - Design Calculations," Volumes I, II, and III, 1991b-d.
- , "Uranium Mill Tailings Remedial Action Project, Falls City, Texas- Information for Reviewers," 1991e.
- , "Draft Completion Report, Falls City, Texas," Volumes 1-5, March 1995.
- , "Final Audit Report of Remedial Action Construction at the UMTRA Projects Falls City, Texas, Site," May 1995.

APPENDIX A

NRC SITE VISITS TO THE FALLS CITY UMTRA PROJECT SITE

<u>DATE</u>	<u>STAFF/DISCIPLINE</u>	<u>PURPOSE</u>
6/4-5/87	S. Bilhorn/project management J. Grimm/geology M. Fliegel/management	Pre-construction review
2/13-14/91	B. Jagannath/geotech. engineering N. Coleman/hydrogeology M. Thaggard/hydrogeology T. Johnson/surface hydrology	Discuss approach for remedial action
7/15-16/91	M. Layton/hydrology	Observe progress of tailings pile closure
12/9/92	D. Rom/geotech. engineering M. Layton/hydrology	On-site construction review
5/12/93	E. Brummett/health physics/ project management	Construction and verification progress review
10/25/93	T. Johnson/surface hydrology D. Rom/geotech. engineering	Observe barrier placement
2/28/95	T. Johnson/surface hydrology T. Harris/geotech. engineering	Observe construction of two toe drains
6/21/96	D. Gillen/management	Site visit

background level by more than 20 microroentgens per hour [40 CFR 192.12(b)].

The portion of the EPA standards dealing with groundwater requirements. 40 CFR 192.20(a)(2)-(3) were remanded by the Tenth Circuit Court of Appeals on September 3, 1985. Based on this court decision, EPA was directed to promulgate new groundwater standards. EPA proposed these standards in the form of revisions to Subparts A-C of 40 CFR Part 192 in September 1987, and now is in the process of completing action to promulgate the final groundwater standards.

As mandated by Section 108(a)(3) of UMTRCA, however, the remedial action at the inactive uranium processing sites, is to comply with EPA's proposed standards until such time as the final standards are promulgated. DOE continues to perform remedial action at the inactive processing sites in accordance with NRC's concurrence with the remedial action approach based on the proposed EPA groundwater standards (52 FR 36000; September 24, 1987). Delaying implementation of the remedial action program would be inconsistent with Congress' intent of timely completion of the program. Modifications of disposal sites after completion of the remedial action to comply with EPA's final groundwater protection standards may be unnecessarily complicated and expensive and may not yield commensurate benefits in terms of human and environmental protection. Therefore, the Commission believes that sites where remedial action has been essentially completed prior to EPA's promulgation of final groundwater standards will not be impacted by the final groundwater standards. Although additional effort may be appropriate to assess and clean up contaminated groundwater at these sites, the existing designs of the disposal sites should be considered sufficient to provide long-term protection against future groundwater contamination. NRC does not view UMTRCA as requiring the reopening of those sites that have been substantially completed when NRC concurred with the selection of remedial action in accordance with applicable EPA standards, proposed or otherwise in place at the time such NRC concurrence was given.

DOE Selection (Design) Phase

For each site, UMTRCA requires that DOE select a plan of remedial action that will satisfy the EPA standards and other applicable laws and regulations, and with which the NRC will concur. For each site, this phase includes preparation by DOE of an Environmental Assessment or an Environmental Impact Statement, and a Remedial Action Plan (RAP). The RAP is structured to provide a comprehensive understanding of the remedial actions proposed at that site and contains specific design and construction requirements. To complete the first phase, NRC and the appropriate State or Indian tribe will review the RAP and then concur that the RAP will meet the EPA standards.

The Performance (Construction) Phase

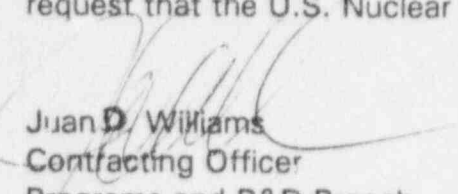
In this phase the actual remedial action (which includes decontamination, decommissioning, and reclamation) at the site is done in accordance with the RAP. The NRC and the State/Indian tribe, as applicable, must concur in any changes to the concurred-in plan that arise during construction. At the

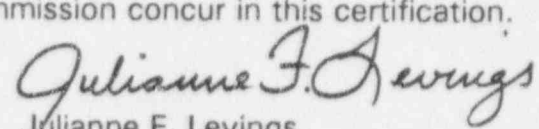
One of the requirements in the EPA standards is that control of the tailings should be designed to be effective for up to 1000 years without active maintenance. Although the design of the stabilized pile is such that reliance on active maintenance should be minimized or eliminated, the NRC license will require emergency repairs as necessary. In the event that significant repairs are necessary, a determination will be made on a site specific basis regarding the need for additional National Environmental Policy Act actions, and health and safety considerations based on 10 CFR Parts 19, 20, and 21.

ENCLOSURE 2

**U.S. DEPARTMENT OF ENERGY
CERTIFICATION SUMMARY
FOR THE
FALLS CITY, TEXAS, UMTRA DISPOSAL SITE**

The Director of the Environmental Restoration Division and the Contracting Officer for the U.S. Department of Energy certify the Falls City, Texas combined processing and disposal site is complete and meets all design criteria and technical specifications of the surface Remedial Action Plan required under Public Law 95-604. The undersigned request that the U.S. Nuclear Regulatory Commission concur in this certification.

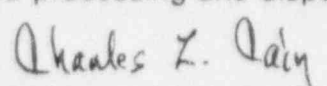

Juan D. Williams
Contracting Officer
Programs and R&D Branch
Contracts and Procurement Division


Julianne F. Levings
Acting Director
Environmental Restoration Division

DATE: 2-20-97

DATE: 2/20/97

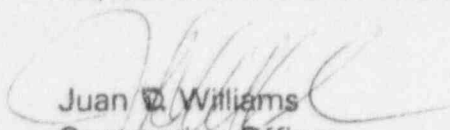
The Chief, Uranium Recovery Branch, Division of Waste Management, Office of Nuclear Materials Safety and Safeguards, U.S. Nuclear Regulatory Commission hereby concurs with the U.S. Department of Energy's completion of surface remedial action at the Falls City, Texas combined processing and disposal site.

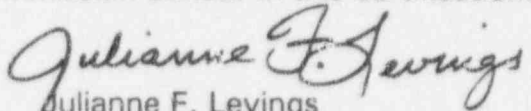

For Joseph J. Holonich, Chief
Uranium Recovery Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards
U.S. Nuclear Regulatory Commission

DATE: April 16, 1997

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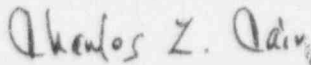

Juan W. Williams
Contracting Officer
Programs and R&D Branch
Contracts and Procurement Division


Julianne F. Levings
Acting Director
Environmental Restoration Division

DATE: 2-20-97

DATE: 2/20/97

The Chief, Uranium Recovery Branch, Division of Waste Management, Office of Nuclear Materials Safety and Safeguards, U.S. Nuclear Regulatory Commission hereby concurs with the U.S. Department of Energy's completion of surface remedial action at the Falls City, Texas combined processing and disposal site.


for Joseph J. Holonich, Chief
Uranium Recovery Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards
U.S. Nuclear Regulatory Commission

DATE: April 16, 1997