UMTRA

Uranium Mill Tailings Remedial Action Project

Vicinity Property Program
In November 1978, Congress enacted the "Uranium Mill Tailings Radiation Control Act" (Public Law 95-604) to stabilize and control the tailings in a safe and environmentally sound manner and to minimize or eliminate potential radiation health hazards to the public.

The Act identified 24 millsite locations nationwide (Figure 1), and authorized the U.S. Department of Energy (DOE) to enter into cooperative agreements with the affected States and Indian Tribes to conduct an assessment of the problem and to initiate a remedial action program. The cost of the program was to be shared as 90 percent Federal funds and 10 percent State funds; except when the site was located on Indian lands, the Federal Government was required to pay the entire cost.

1. This map identifies the 24 millsite locations included in the UMTRA Project.
The Act also authorized the U.S. Environmental Protection Agency (EPA) to promulgate general standards to be applied to cleanup work conducted under the auspices of the Uranium Mill Tailings Remedial Action (UMTRA) Project. In March 1983, the Environmental Protection Agency Published "Standards for Remedial Action at Inactive Uranium Processing Sites" (40 CFR Part 192). These standards established guidelines for control of the tailings piles and the cleanup of buildings and open lands.

The Act further requires that the selection and performance of all remedial actions undertaken by Department of Energy are to be with the full participation of the affected States and Indian Tribes, and with the full concurrence of the U.S. Nuclear Regulatory Commission (NRC). The Nuclear Regulatory Commission is responsible for concurrence in the selection of each disposal site, and participates in the engineering design, construction monitoring, certification, and long-term surveillance and monitoring plan for each site. After remedial action has been completed, each repository will be licensed by the Nuclear Regulatory Commission.

The Department of Energy and the Nuclear Regulatory Commission entered into a Memorandum of Understanding whereby NRC concurrence was granted for all vicinity property sites where remedial action was to be accomplished in accordance with EPA standards. However, separate concurrence is required by the Nuclear Regulatory Commission for any vicinity property where the Department of Energy proposes to invoke supplemental standards. The Nuclear Regulatory Commission will receive a copy of each Radiologic and Engineering Assessment, a copy of the Property Completion Report, and the DOE Certification Letter on each vicinity property which has been included in the UMTRA Project.

### Summary of EPA Standards

<table>
<thead>
<tr>
<th>Topic</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control of Tailings Piles</td>
<td></td>
</tr>
<tr>
<td>Longevity</td>
<td>200–1000 years</td>
</tr>
<tr>
<td>Radon emission</td>
<td>20 pCi/m³·s: or 0.5 pCi/l</td>
</tr>
<tr>
<td>Water protection</td>
<td>No limits, site specific judgment</td>
</tr>
<tr>
<td>Clean-up of Buildings</td>
<td></td>
</tr>
<tr>
<td>Indoor radon decay products</td>
<td>0.02 WL action; reduce below 0.03 WL</td>
</tr>
<tr>
<td>Indoor gamma radiation</td>
<td>20 microR/hr above background</td>
</tr>
<tr>
<td>Clean-up of Land</td>
<td></td>
</tr>
<tr>
<td>Surface</td>
<td>5 pCi/g above background in 15 cm surface</td>
</tr>
<tr>
<td>Buried</td>
<td>layer</td>
</tr>
<tr>
<td></td>
<td>15 pCi/g above background in any 15 cm</td>
</tr>
<tr>
<td></td>
<td>layer below surface layer</td>
</tr>
<tr>
<td>Exceptions</td>
<td></td>
</tr>
<tr>
<td>Procedure</td>
<td>Supplemental standards</td>
</tr>
<tr>
<td>Applicability</td>
<td>Health, safety, costs, quantity, and accessibility</td>
</tr>
</tbody>
</table>

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Exposure Reduction

Since uranium is a naturally occurring element, its radioactive decay products are always present in the environment. They do not present a hazard to health or the environment unless they become concentrated and are placed where people can be exposed to them.

The radioactive decay chain for natural uranium eventually produces lead, which is stable and non-radioactive. Some of the more important steps in the decay chain are shown below.

The uranium mill tailings present at vicinity properties may present a potential long-term health hazard principally because they emit small amounts of radon and some gamma radiation. Radon is more readily released from tailings because the ore has been finely crushed. Radon progeny, decay products of radium, can attach themselves to smoke and dust particles and damage sensitive lung tissues if inhaled over a long period of time.

One of the objectives of the Uranium Mill Tailings Remedial Action Project is to reduce or eliminate human exposure to radon and other residual radioactive substances that may be present due to the use of mill tailings.

2. Uranium Decay Chain
3. Human health can be threatened by direct exposure to residual radioactive materials, ingestion of contaminated drinking water or vegetation, or exposure to radon gas that has accumulated in closed buildings.
4. When uranium mills processed ore, about 98 percent of the material which entered the mill as ore came out as waste in the form of mill tailings. This is a photograph of the Mexican Hat Mill in Utah.

5. Uranium mill tailings are a fine, sandy material which still contain much of the radioactivity that was present in the unprocessed ore. In this picture the tailings are the light gray area.
II. Vicinity Properties Program

Locations away from inactive millsites where tailings were used for construction purposes are called "vicinity properties."

The Department of Energy has used a variety of methods to identify vicinity properties which may be included in the UMTRA Project. Mobile-van surveys, on-site inspections, and records from uranium mills and processing plants were all used to identify properties.

A master listing of approximately 8,000 designated vicinity properties has been compiled. These properties have been identified by the Department of Energy to receive inclusion surveys. It is estimated that approximately 50 to 60 percent of these properties contain uranium mill tailings in excess of EPA standards and will require remediation by the UMTRA Project.

The remedial action process for vicinity properties, as performed by the Department of Energy, its contractors and subcontractors, follows the steps outlined below.
Perform Inclusion Survey

Using the locations from the designated property list, the Inclusion Survey Contractor completes a preliminary radiologic survey of a property for any evidence of mill tailings. A report summarizing the survey findings and recommending inclusion or exclusion is prepared and submitted to the Department of Energy for action.

If contamination levels on a property exceed the standards published by the Environmental Protection Agency, the Department of Energy informs the property owner that the property has been included in the Uranium Mill Tailings Remedial Action Project. If levels do not exceed EPA Standards, the property is excluded from the UMTRA Project and the Department of Energy so notifies the property owner.

7. The Inclusion Survey Contractor crew doing the preliminary survey of a property.
Prepare Remedial Action Design

Once a property is included in the UMTRA Project, the Remedial Action Contractor is assigned responsibility for completing remedial work so that contamination levels at the property are mitigated to comply with Environmental Protection Agency standards. After the uranium mill tailings have been removed, the property is restored to a condition similar to that which existed prior to remedial action.

Physical Survey—Prior to preparing the design for remedial action, a physical survey of the property is completed to map structures, fences, landscaping, sidewalks, or other permanent improvements on the property.

Radiological Survey—Next, a detailed radiologic survey which identifies the specific locations, depths, and extent of tailings is conducted.

Master Drawing—All pertinent information from the physical and radiologic surveys is incorporated into master drawings of the property for use in remedial action design.
9. Scintillometers are used to develop a broad outline of the tailings deposits.

10. A grid is set up to determine the dimensions of the area to receive remedial action.
11. Soil samples are taken and analyzed to determine the radium content of the soil.

12. Interior surveys may be conducted if it is suspected that the tailings continue beneath a structure.
13. Computer-assisted drawing (CAD) work stations provide a rapid, efficient method of transferring survey details to a master plot plan.

14. This is a completed CAD plot plan.
Prepare/Coordinate Owner Agreement

A written Radiologic and Engineering Assessment (REA) is prepared and a meeting is arranged between the Remedial Action Contractor's Architect/Engineer and the property owners to review the survey data and the construction design. The Radiologic and Engineering Assessment is the basis for the Remedial Action Agreement (RAA).

The Remedial Action Agreement outlines the responsibilities of the parties involved and states owner acceptance of all aspects of the construction phase (e.g., methods, materials, potential dislocation, and construction time). The Remedial Action Agreement is the formal contractual agreement between the property owners, the Department of Energy, and the State, and is signed by all parties.

Perform Remedial Action

The Remedial Action Contractor (RAC) solicits competitive bids to perform the construction work.

Once a contract is awarded, the construction subcontractor representative, along with the RAC construction inspector and the property owners, conducts a property walk-through to determine and document its preconstruction condition.

Vicinity properties construction work can range from simple, minor tailings deposit removal (earth removal in sidewalk bedding, yards, vacant lots, etc.) to significant activities for buildings with internal structure involvement.

Following tailings removal, the subcontractor restores the property to a condition similar to that which existed prior to remedial action. The Remedial Action Contractor's construction inspectors carefully monitor the work during excavation and restoration to ensure that all activities are performed in a safe, cost-effective, and timely manner.

Once the tailings have been removed and reconstruction at the property is completed, the property is inspected by all parties. Owners indicate their approval of the final condition by signing a "Notice of Final Inspection."

The following are examples of vicinity properties construction projects.
16. Remedial action at this residence involved removal of tailings from beneath the carport and driveway.

17. Tailings have been removed. Clean dirt is used as the backfill for the new concrete flooring and driveway.
18. Placing of the concrete is complete.

19. The residence driveway at the completion of remedial action.
20. The land surrounding this commercial property contained extensive tailings deposits.

21. The entrance of this newspaper's offices and printing plant following restoration of landscaping at the project's completion.
22. Tailings removal often involves subgrade utility lines. The technician is checking for "scale" contamination adhering to the lines.

23. The depth of tailings deposits at this public building required substantial excavation.
24. Extensive shoring support of the building floor was installed.

25. An interior view of the building prior to backfilling the excavated areas with clean materials.
26. The concrete is being removed to allow access to the mill tailings used as fill beneath this public sidewalk in Edgemont, South Dakota.

27. New sidewalks being installed at the completion of the remedial action.
28. This home had tailings beneath the basement floor.

29. The furnace is hoisted to permit removal of the tailings.
30. The furnace area after new concrete flooring installed.

31. The subfloor of this residence enclosed porch contained tailings. The blue line indicates the limits of the area to be excavated.
32. The tailings have been removed and clean washed gravel and rock filled in.

33. An additional layer of clean sand is put in before replacing the floor.
34. The enclosed porch after restoration.

35. This home required removal of the entire basement family room floor. The wood grid is used to photograph the flagstones in place for repositioning.
36. The flooring has been removed and excavation begun.

37. Plywood has been installed to protect the wood paneling.
38. A subfloor radon collection system is installed prior to replacing the floor.

39. This illustration shows installation of a subfloor collector vent. This system intercepts radon beneath the floor slab and passively vents it from the structure.
40. The concrete floor is now in place.

41. Replacement of the flagstones is in progress.
Verify/Certify

Once the remedial action process is completed, a gamma survey is conducted of the exterior and soil samples are taken before backfilling to verify that radium-in-soil concentrations are below Environmental Protection Agency standards. Air monitors are installed in structures to verify that radon levels have been mitigated to below the limits specified by the Environmental Protection Agency.

Several types of active and passive monitoring devices are routinely used. These measurement devices are placed in the lowest habitable rooms of the structures where the maximum radon-daughter concentration is expected.

Active measurement devices are calibrated in the Grand Junction Projects Office Radon-Daughter Environmental Chamber. Passive measurement devices are also chamber-exposed and included for processing and read-out with devices exposed for remedial action validation. All calibration exposures are made by the Technical Measurements Center, confirmed with the U.S. Department of Energy Environmental Measurements Laboratory and other lead laboratories, and are ultimately traceable to the U.S. Bureau of Standards.
After final inspection and followup monitoring, the Property Completion Report is produced by the Remedial Action Contractor. The report documents the effectiveness of the remedial action and demonstrates that the property is in compliance with the applicable EPA standards. It also includes pre-remedial action measurements and the results of the verification survey (post-remedial action measurements). In addition, the location, concentration, and volume of any contamination in excess of EPA standards left on a property is documented in the report. For properties which exceed the radon working-level standard because of natural background, soil samples are taken, analyzed, and the results are included in the Completion Report to verify whether tailings or natural materials are causing the elevated working levels.

Once the Completion Report is approved by the Department of Energy, a Certification of Decontamination letter is distributed by the Department of Energy to the property owners, the State, and others, as appropriate. The certificate states that remedial action has been accomplished and the property is in compliance with Environmental Protection Agency standards.

Department of Energy
Post Office Box 2567
Grand Junction, Colorado 81502-2567
February 11, 1987

Location No.: GJ-00000
Address: XYZ Street
Grand Junction, CO 81501

Dear Mr. Doe:

Under the Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-804, the Department of Energy (DOE) in cooperation with the Colorado Department of Health, has completed remedial action at the property address listed above. Review of the available data indicates that your property has been cleared of residual radioactive contamination to the extent required by the Environmental Protection Agency (EPA) standards (40 CFR 192). Therefore, the DOE certifies that your property is in compliance with the EPA standards.

The current status of your property will be recorded by the State on the appropriate property records, per requirements of Public Law 95-804. Records of UMTRA vicinity properties are archived with the State and the United States Department of Energy.

Should you have any questions regarding the project or your property, please call me at 303-242-8621 or G. A. Franz, III, Supervisory Health Physicist, Colorado Department of Health, at 303-248-7185. Your cooperation in the successful accomplishment of this work has been greatly appreciated.

Very truly yours,

Michael K. Tucker
Certification Official

Michael R. Tucker
Certification Official

43. This is an example of a Certification of Decontamination letter.