



**OVERVIEW OF URANIUM MILL TAILINGS REMEDIAL
ACTION PROJECT OF THE UNITED STATES OF AMERICA
1995-1996**

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Abstract

From the early 1940's through the 1960's the United States federal government contracted for processed uranium ore for national defense research, weapons development and commercial nuclear energy. When these contracts were terminated, the mills ceased operation leaving large uranium tailings on the former mill sites. The purpose of the Uranium Remedial Action Project (UMTRA) is to minimize or eliminate potential health hazards resulting from exposure of the public to the tailings at these abandoned sites. There are 24 inactive uranium mill tailings sites, in 10 states and on Indian reservation lands, included for clean up under the auspices of UMTRA. Presently the last 2 sites are under remediation. This paper addresses the progress of the project over the last two years.

1. INTRODUCTION

Uranium ore has been mined in the United States in significant quantities for more than 40 years. Initially, the ore was mined by private companies for federal government use in national defense programmes. After the 1950s, uranium was also needed as fuel for nuclear power plants.

When the mills shut down, they left behind large piles of uranium mill tailings, the sand-like material that remains after uranium has been extracted from the ore. They contain 85 percent of the radioactivity present in the unprocessed uranium ore and small concentrations of naturally occurring materials that radioactively decay to radium and produce radon, a radioactive gas.

Levels of human exposure to radioactive materials from the piles are low; however, in some cases, tailings were used as construction materials before the potential health hazards of the tailings were recognized. In homes or other structures containing tailings, the radon gas can concentrate in enclosed spaces.

The purpose of remedial action is to minimize or eliminate potential health hazards resulting from exposure of the public to residual radioactive materials at the former processing sites and at contaminated properties.

Legislation

After determining that uranium mill tailings might pose a public health hazard, Congress passed Public Law 95-604, the *Uranium Mill Tailings Radiation Control Act (UMTRCA) of 1978*, to clean up all inactive uranium mill sites that had been abandoned by the late 1960s. Uranium mill sites still in operation in 1978 or later remained the

responsibility of their private owners. The U.S. Department of Energy (DOE) was given the responsibility for carrying out the project at the 24 inactive sites, and in 1979, the UMTRA Project Office was formed as part of the DOE Albuquerque Operations Office.

The processing sites are located in 10 states: Arizona, Colorado, Idaho, New Mexico, North Dakota, Oregon, Pennsylvania, Texas, Utah and Wyoming. In addition, a 1983 amendment to the UMTRCA gave the UMTRA Project responsibility for cleaning up vicinity properties (VPs) near Edgemont, SD. The former Tennessee Valley Authority uranium mill site in Edgemont was remediated in the late-1980s.

The UMTRCA also called for the U.S. Environmental Protection Agency (EPA) to establish remedial action standards. Congress directed the U.S. Nuclear Regulatory Commission (NRC) to provide consultation and concurrence in the type of remedial action performed. Before remedial action, the DOE must comply with the requirements of the *National Environmental Policy Act (NEPA)* and perform detailed studies of the environmental impacts that remedial action would have at each site.

The states and tribes enter into cooperative agreements with the DOE, concur on the selected remedial action and acquire rights to the final disposal site when necessary. Participating states have responsibility for 10 percent of the cost of remedial action; the federal government pays the remaining 90 percent. When the site is on tribal land, the federal government is responsible for 100 percent of the cost.

The EPA established standards requiring DOE to stabilize and isolate the tailings from the environment in order to control radiation emissions for 200 to 1,000 years. After completion of remedial action, the NRC issues a license for future surveillance and monitoring of each disposal site.

To date, surface cleanup is complete at 18 UMTRA sites: Ambrosia Lake, Canonsburg, Durango, Falls City, Grand Junction, Green River, Gunnison, Lakeview, Lowman, Mexican Hat, Monument Valley, Rifle (two sites), Riverton, Salt Lake City, Shiprock, Spook and Tuba City. Remedial action is under way at four sites: Maybell, Naturita and Slick Rock (two sites). DOE has suspended all surface and ground water activities at the remaining two sites, Belfield and Bowman. The state of North Dakota has proposed removing the two sites from the list of sites which the UMTRCA identified for remedial action. In addition, NRC has issued licenses for seven sites: Canonsburg, Durango, Lakeview, Lowman, Shiprock, Spook and Tuba City.

Vicinity Properties

An important component of the UMTRA Project is the cleanup of residences, commercial buildings or open lands - called vicinity properties - where tailings were used as construction materials before the potentially harmful effects of the tailings were recognized, or where tailings were transported away from the site by wind or water erosion. Over the past 14 years, the DOE identified over 5,300 vicinity properties for remedial action. Properties were surveyed, and if uranium mill tailings were found to cause radiation levels in excess of standards set by the EPA, then, at the landowner's request, the DOE officially included the property for remedial action under the UMTRA Project. Currently, remedial action for more than 97 percent of those properties has been completed.

Ground Water Compliance

A second phase of the UMTRA Project initiated over the past three years addresses ground water compliance at the 24 former processing sites. Before becoming inactive, milling operations at many of those sites may have resulted in the contamination of ground water. The ground water project addresses subsurface contamination with the goal of complying with EPA ground water protection standards, which are designed to protect human health and the environment. After assessing the condition of the ground water, the UMTRA Project will develop a strategy to comply with EPA standards based on the specific conditions at each site. Options include: (1) no remediation at sites where milling-related contamination of ground water is not considered a risk to human health; (2) natural cleansing of milling-related ground water contamination (natural flushing); and (3) active programmes to clean ground water using engineered systems. The UMTRA Ground Water Project is the responsibility of DOE's Grand Junction Projects Office, Grand Junction, Colo.

UMTRA Team Office

The UMTRA Team in Albuquerque, NM, is responsible for (1) planning, scheduling and budgeting; (2) federal, state, tribal and local coordination; (3) engineering, design and remedial action; and (4) health, safety, environmental protection, quality assurance and public affairs.

2. ACCOMPLISHMENTS

The UMTRA Project achieved new milestones in FY 1995-96 in both the surface and ground water phases of the Project. The UMTRA Project Team completed surface remedial action at the 13th through 17th of the 24 UMTRA sites -- Mexican Hat, Utah, Monument Valley, Arizona., Ambrosia Lake, New Mexico, Rifle and Gunnison, Colorado. -- and started surface work at Maybell, Naturita, and Slick Rock, Colorado. The team also took a giant step forward with the ground water phase through the release of the draft UMTRA Ground Water Programmatic Environmental Impact Statement (PEIS) for public comment.

Major FY 1995-96 Accomplishments: Surface Project

As of September 30, 1996, surface cleanup is now complete at Monument Valley and Tuba City, Ariz.; Durango and Grand Junction, Colo.; Lowman, Idaho; Ambrosia Lake and Shiprock, N. M.; Lakeview, Ore.; Canonsburg, Pa.; Falls City, Texas; Green River, Mexican Hat and Salt Lake City, Utah; Rifle and Gunnison, Colorado; and Riverton and Spook, Wyoming. Remedial action is in progress at four Colorado sites -- Maybell, Naturita, and Slick Rock (two sites). All activities related to the two North Dakota sites -- Belfield and Bowman -- are on hold pending a request by the state that these two sites not be remediated.

- Held closing ceremonies signifying completion of remedial action at the Mexican Hat and Monument Valley (joint ceremony), Gunnison, Rifle, and Ambrosia Lake sites.
- Completed phase I remedial action at the Naturita, Slick Rock, Maybell.

- Completed the NEPA process with the approval of the environmental assessments (EAs) for Maybell, Naturita and Slick Rock, and issued Findings of No Significant Impact (FONSIs) for each.
- Conducted opening ceremonies and started remedial action at Maybell, Slick Rock and Naturita.
- Submitted to NRC and the state of Colorado for review the final Remedial Action Plans (RAPs) for Maybell, Slick Rock, Naturita.
- Received title to the Canonsburg and Lakeview sites from the states of Pennsylvania and Oregon.
- Obtained NRC certification for Canonsburg and Riverton.
- Obtained NRC licensing for Lakeview, Lowman, Canonsburg, Shiprock, and Tuba City.
- Transferred the long-term surveillance and monitoring responsibility for Canonsburg, Lakeview and Lowman to the DOE Grand Junction Projects Office (GJPO).
- Completed cleanup of the 5,000 VP at Grand Junction.
- Finished remediation of Residual Radioactive Material (RRM) at the former uranium processing site in Gunnison to the disposal cell.
- Finished remediation RRM from the Old Rifle processing site to the Estes Gulch disposal site.
- Decided to relocate the RRM from the former uranium processing site in Naturita to a disposal cell at a currently licensed Title II facility at Uravan, Colo.
- Prepared completion reports for Ambrosia Lake, Falls City, Grand Junction, Lowman, Mexican Hat, Monument Valley and Salt Lake City.
- Completed final LTSPs for Durango, Falls City, Lowman, Tuba City, Shiprock, and Lakeview.
- Submitted ground water compliance changes for Green River to the NRC in a proposed modification to the RAP.
- Completed negotiations with the Navajo Nation for custodial access agreements (CAA) for Shiprock and Mexican Hat and with the Navajo Nation and the Hopi Tribe for Tuba City. CAAs are documents that must be included in the final LTSPs before NRC can license these sites. This documentation of perpetual access to tribal sites is necessary for NRC licensing in place of documentation of site transfer to the DOE.
- Instituted the “permit by rule” provision of the *Resource Conservation and Recovery Act (RCRA)* for the state of Colorado to allow treatment of commingled waste properties in Grand Junction.

- Saved \$10.3 million through the Cost Reduction/Productivity Improvement Programme (CR/PIP). The UMTRA Project has saved \$70 million since the beginning of the programme.

Major FY 1995-96 Accomplishments: Ground Water Project

The ground water project, although in its early stages, achieved the following milestones in FY 1995-96:

- Completed ground water PEIS and published a Notice of Availability in the *Federal Register* inviting public review of the document.
- Held public hearings on the PEIS in nine UMTRA communities to receive public feedback on the document.
- Gathered 500 verbal and written public comments on the draft PEIS.
- Completed draft Baseline Risk Assessments (BLRAs) for Durango, Lakeview, Maybell, Naturita, Rifle (2 sites), Slick Rock (2 sites), Belfield, Durango, Grand Junction, Green River and Riverton.
- Completed the Site Observational Work Plans (SOWPs) for Ambrosia Lake, Falls City, Mexican Hat, Monument Valley, Riverton, Shiprock, Spook and Tuba City.
- Completed the Water Sampling and Analysis Plans (WSAPs) for Falls City, Grand Junction, Green River, Gunnison, Lakeview, Rifle (2 sites), Riverton and Slick Rock (2 sites).
- In conjunction with Sandia National Laboratories (SNL), completed a major field characterization effort at Riverton. This work included the installation of monitor wells, core collection, tracer and aquifer tests and numerous sample collection efforts.

3. STATUS OF DESIGNATED SITES

Ambrosia Lake, New Mexico

The UMTRA Project Team completed remedial action at Ambrosia Lake ahead of schedule in FY 1995-96. DOE conducted a closing ceremony at the Ambrosia Lake disposal site on June 22, 1995. DOE also transmitted a draft completion report and final audit report to the NRC and the state of New Mexico for review. In addition, DOE conducted the final round of water sampling proposed under the surface phase of the UMTRA Project.

For the ground water phase of the UMTRA Project, a draft SOWP was prepared and transmitted to the NRC for review.

Belfield and Bowman, North Dakota

At Belfield and Bowman, DOE suspended all surface and ground water activities. The state of North Dakota has proposed removing the sites from the list of sites that the UMTRCA identified for remedial action.

Canonsburg, Pennsylvania

Licensing activities continued at Canonsburg, with NRC granting its concurrence on site certification, which certifies that the completed remedial action is in compliance with the EPA standards. The USACE has completed its deed acquisitions' review and the state of Pennsylvania transferred the deed to the site to DOE. The only remaining licensing action is NRC acceptance of the LTSP.

The UMTRA Project Team prepared the revised citizen summary for the BLRA.

Durango, Colorado

Durango is in the licensing phase, and the DOE prepared a draft LTSP for the site in FY 1995. DOE transmitted the final LTSP to the NRC in November 1995. The UMTRA Project Team completed a study of the toe drain system for the disposal cell at Bodo Canyon. DOE also developed plans to install a pilot water treatment system. The purpose of the system is to determine the effectiveness of different materials in reducing certain radioactive and heavy metal's constituents from the toe drain water. Sampling for this research should be completed in FY 1996.

In support of the ground water phase, the UMTRA Project Team prepared the final BLRA for the site in FY 1995.

Edgemont, South Dakota

DOE was not required to conduct remedial action in Edgemont. All the RRM from the former processing site was stabilized on the site by the owners prior to enactment of the UMTRCA; however, the UMTRCA was amended in 1978 to include cleanup of all VPs contaminated with tailings from the Edgemont site. DOE remediated all VPs in Edgemont subsequent to FY 1992. To date, the NRC has certified 129 VPs of the 135 requiring certification. Two properties will not be cleaned because their owners refuse to participate in the programme.

Falls City, Texas

With the completion of all Falls City site remedial activities, DOE efforts in FY 1995 focused on documenting the completion of site activities with the submittal of the disposal site completion report to the state of Texas and the NRC. This report documents the surface remedial activities conducted at the site and its current condition. Following NRC and state of Texas review and comment resolution, the DOE will finalize the completion report. NRC licensing of the site is expected in 1996. In addition, DOE completed radon sampling at the site and removed the alpha track radon detectors and their holders. DOE also completed the draft LTSP and delivered it to the state of Texas and NRC for review.

Under the ground water phase, DOE collected domestic water samples from private properties in the vicinity of the disposal site. The samples were part of the data collection objectives identified in the SOWP, which is undergoing stakeholder review. DOE also planned for the associated SOWP field effort, which will include the installation of 12 monitoring wells to determine the extent of downgrading contamination. As part of the data

collection effort at the site, a DOE contractor installed ground water elevation data loggers and collected the data, in addition to conducting slug tests at selected wells.

Grand Junction, Colorado

Following the planting of vegetation at the former Climax Mill processing site, DOE completed all surface-related activities in Grand Junction in FY 1995. Future plans for the site include a project by the state of Colorado, Mesa County and the city of Grand Junction to construct a state park facility and possibly a foot bridge across the Colorado River.

To document the completion of the site, DOE transmitted the completion report to the NRC and state of Colorado for approval. The report documents the surface remediation activities conducted at the processing site and its current condition. Once NRC and the state of Colorado review and comment on the report, DOE will finalize it and ask NRC to certify that the site meets EPA standards. Certification of the processing site is expected in mid-FY 1996.

In the past year, VP assessment and remedial activities continued in Grand Junction. Construction activities are complete at 4,186 of the 4,266 VPs included in the cleanup (98 percent), and DOE has certified that 3,764 (88 percent) are complete. The remaining properties are in various stages of investigation, remediation or certification. DOE's major VP remedial action activities in FY 1995 were conducted at the Hansen Container, Colorado National Monument, Industrial Construction Corporation and Doug Jones Sawmill VPs.

At the Cheney disposal site, the RAC has continued operations and monitoring activities to insure safe placement of contaminated materials from VPs in a reserved area of the cell. The RAC also installed two monitoring wells for long-term monitoring of the site. The wells collect daily water level measurements and semiannual analytical samples. In addition, DOE conducted a vegetation study at the site to look at plant species, their densities and their impact on the cell.

Under the ground water phase, DOE modified the final BLRA to incorporate the final EPA ground water standards and a revised risk assessment methodology. In addition, DOE initiated the processing site SOWP to build on the data gathered for the BLRA and provide a comprehensive picture of the ground water regime beneath the processing site. This document will identify possible alternatives for ground water remediation at the site and identify potential data gaps.

Green River, Utah

In FY 1995-96, DOE submitted the new Green River ground water protection strategy to the NRC and the state of Utah for concurrence. The related revisions of the LTSP and RAP was completed in FY 1996. The USACE site acquisition efforts were completed in 1995.

The UMTRA Project Team completed the revised final BLRA in FY 1995, while routine ground water sampling continued at the site .

Gunnison, Colorado

Construction crews in Gunnison completed hauling RRM from the former mill processing site to the disposal site in October 1994. Backfilling and restoration of the processing site was nearly completed by the end of FY 1995. Seeding and planting of cottonwood trees at the site were completed in early FY 1996. Similarly, work to reclaim the Tenderfoot Mountain haul road, the route that was used to transport the contaminated materials to the disposal site, was also nearly complete by the end of FY 1995.

Construction of the disposal cell was completed in FY 1996.

The UMTRA Project performed monitoring activities at nine sites which were constructed on BLM lands to mitigate the impact to wetlands and wildlife during remedial action construction.

Lakeview, Oregon

DOE resolved the remaining title transfer issues and the state of Oregon transferred the Collins Ranch disposal site title to the federal government. The NRC accepted the Lakeview site under its general license in September 1995. The UMTRA Project transferred the site to the DOE GJPO in September 1995 for LTSM.

For the ground water phase, the UMTRA Project prepared a draft BLRA and updated the WSAP. The ground water at the former processing site was sampled in FY 1995.

Lowman, Idaho

The UMTRA Project Team transferred the Lowman site file to the DOE GJPO in March 1995 while continuing "point of compliance" ground water monitoring, as dictated by the LTSP. The results are being evaluated in support of termination of ground water activities at the Lowman site as recommended in the NRC's Technical Evaluation Report.

Maybell, Colorado

DOE Headquarters approved the Maybell final EA in January 1995, and remedial action construction started in May 1995. The remedial action will stabilize the RRM on the existing tailings pile, i.e., consolidate windblown and mill demolition debris and reshape the tailings. Primary construction activities consisted of:

- Site preparation and mobilization
- Demolition of mill-related structures and placement of the debris in the disposal cell
- Cleanup of windblown contamination
- Reshaping the tailings pile
- Site grading.

As part of the ground water phase, the UMTRA Project Team completed BLRA in 1996.

Mexican Hat, Utah

DOE completed all remedial action construction activities at Mexican Hat in FY 1995, including LTSM features, e.g., site fencing and survey monuments. DOE conducted a closing ceremony for the combined Mexican Hat and Monument Valley surface remedial action on October 5, 1994.

DOE finalized the draft completion report and initiated preparation of the draft LTSP for the disposal cell in FY 1995. GJPO and UMTRA Project Team personnel conducted a prelicensing inspection of the site.

Monument Valley, Arizona

Remedial action at the Monument Valley UMTRA Project site was completed in March 1994 following removal of the on-site RRM to the Mexican Hat disposal cell.

For the ground water phase, the DOE completed the first draft of the SOWP. The SOWP process allows for flexibility in investigating and assessing the ground water at the site, and selecting a remedial action. The process involved seeking Navajo Nation review, comments and approval.

Naturita, Colorado

Phase I of the remedial action in Naturita, which consisted of demolishing the structures at the former processing site, was completed in November 1994. DOE Headquarters approved the EA and published the FONSI in FY 1995.

Disposal of the contaminated material from the former mill site will be at an existing Title II facility located at Uravan, Colo. The RAP and cell design, developed by Umetco Minerals Corporation, have been submitted to the NRC and the state of Colorado for review and approval. The actual disposal site, the Upper Burbank Repository, will be acquired by DOE prior to the placement of any contaminated materials.

Phase II of the cleanup, the relocation of the RRM from the former mill site and associated VPs to the repository, began in the Spring of 1996.

The final document was completed in early FY 1996.

Rifle, Colorado

DOE is remediating two former uranium processing sites along the Colorado River in Rifle: the Old Rifle site on the east side of the city and the New Rifle site to the west.

Construction crews completed surface remedial action at the Old Rifle site and from the New Rifle site. Approximately 3.5 million cubic yards of tailings and RRM were placed in the Estes Gulch disposal site. Construction of the disposal cell cover began in FY 1995. The cover is expected was completed in mid-FY 1996.

The UMTRA Project prepared a white paper on private wells and springs in the Rifle area, and prepared responses to comments on this position paper from the state of Colorado and the city of Rifle. The white paper described the hydrochemical relationship between the New Rifle and Old Rifle processing sites and the domestic wells in the vicinity of the former processing sites.

The final BLRA for both sites was also completed in FY 1995.

Riverton, Wyoming

NRC signed the site certification for the Riverton site in January 1995, signifying that remedial action was complete and that the site meets applicable EPA standards.

FY 1995 was a busy year for the Riverton site under the ground water phase. DOE transmitted the draft SOWP to the NRC, the state of Wyoming and the Northern Arapaho and Shoshone Tribes for review. The UMTRA Project Team also sent the revised final BLRA to the tribes for review, and prepared a supplemental WSAP to define the additional characterization proposed in the draft SOWP.

The Riverton draft SOWP field characterization programme was conducted during the summer of 1995 with the assistance of the Tribes and SNL. A DOE contractor installed nine new monitor wells and 10 tracer study wells to further characterize the hydrologic regime at the site. Another well was installed in response to the request of local residents northwest of the site who were concerned about the effect of the site on their ground water.

The UMTRA Project Team also collected core samples during the well installation programme for SNL to use in aquifer matrix studies, and jointly conducted aquifer and tracer tests with SNL in the latter part of the summer programme. They collected sediment, surface water and biota samples throughout the site area, and sampled all of the new wells. Finally, they surveyed all new well locations, sample locations and several water level points along the river and at wetlands adjacent to the site.

Salt Lake City, Utah

Surface remedial action and prelicensing activities in Salt Lake City focused primarily on developing the completion reports for the Clive disposal site, Vitro processing site and Central Valley Water Treatment Facility, a nearby VP. These reports are in various stages of review by the NRC.

The UMTRA Project developed a plan to address the outstanding issues related to the licensing of the Clive site. This included an inspection of site conditions by a team consisting of people from the DOE, TAC, RAC and NRC. The GJPO also conducted a prelicensing inspection of the Clive site.

Routine ground water sampling continued at the Vitro site. Quarterly monitoring of water levels at a local golf course continued and a contractor installed three additional data loggers. DOE also evaluated the potential effects and risks of proposed expansion of the golf course. The UMTRA Project prepared the final BLRA in September 1995.

Shiprock, New Mexico

The Shiprock UMTRA Site was licensed in 1996.

DOE completed the draft SOWP in FY 1995. The document discusses the two distinct ground water regimes and proposals for investigating and mitigating the ground water.

Slick Rock, Colorado

DOE approved the Slick Rock final EA in January 1995 and published a FONSI in the *Federal Register* on February 23, 1995. Resolution of NRC and CDPHE comments on the final RAP was completed in 1996. DOE sent the final RAP to NRC and CDPHE for concurrence.

Slick Rock is another UMTRA Project location with two former processing sites that DOE is remediating. The North Continent site and the Union Carbide site are both adjacent to the Dolores River about one mile apart. Remedial action and relocation of the RRM to the Burro Canyon disposal site, about six miles from the processing sites, started in March 1995.

Excavation of the cell and relocation of the RRM from the North Continent site were the primary activities initiated in FY 1995; however, the subcontractor did not make appropriate progress and the contract was terminated in September 1995. The RAC is taking steps to complete cell excavation, North Continent site material placement and Union Carbide site temporary construction facilities early in FY 1996. The RAC will also seek new bids from experienced contractors for the remaining work, and proposes to complete the remedial action on schedule in the first quarter of FY 1997.

DOE completed the ground water BLRA for both sites in FY 1995, preparing it for transmittal to stakeholders.

Spook, Wyoming

The UMTRA Project prepared the ground water draft SOWP and sent it to the NRC and state of Wyoming for review. No water sampling is proposed under the ground water phase.

Tuba City, Arizona

The Tuba City UMTRA site was licensed in FY1996.

The UMTRA Project Team finalized the completion report for the disposal site in FY 1995. The Project Team also completed the draft SOWP and sent it to stakeholders for review.

At the end of FY 1995, DOE made final preparations for the initiation of field activities at the disposal site in early FY 1996. The field activities include installation of:

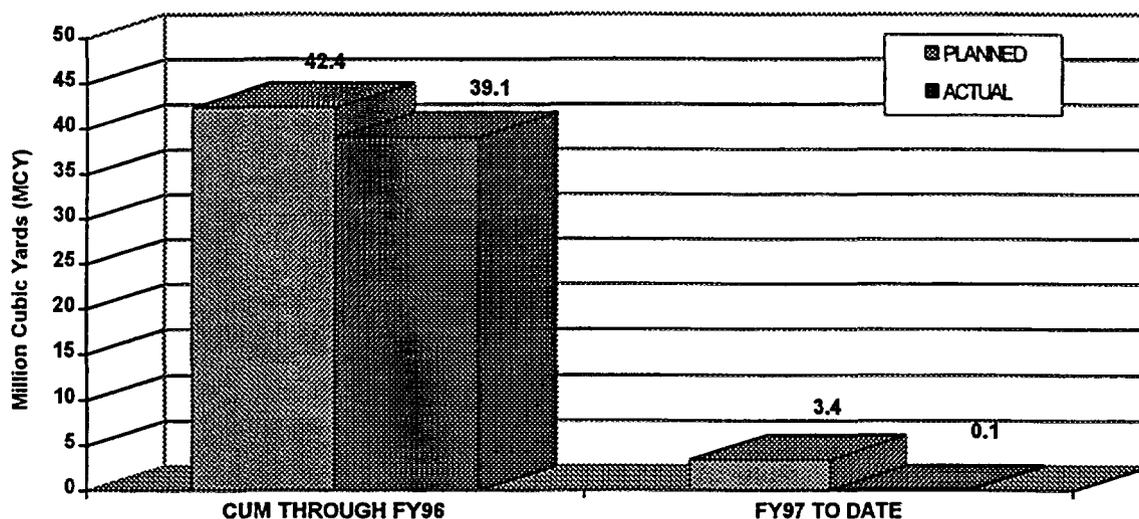
- A clean water well to support a University of Arizona project to reestablish native vegetation in the area

- Seventeen ground water monitoring wells for use in the ground water phase of the UMTRA Project
- Four extraction wells for removing contaminated transitory drainage moving downgrading from the cell. Transient drainage is a predicted phenomenon caused when the weight of the constructed cell “squeezes” water and contaminants into the ground below it.

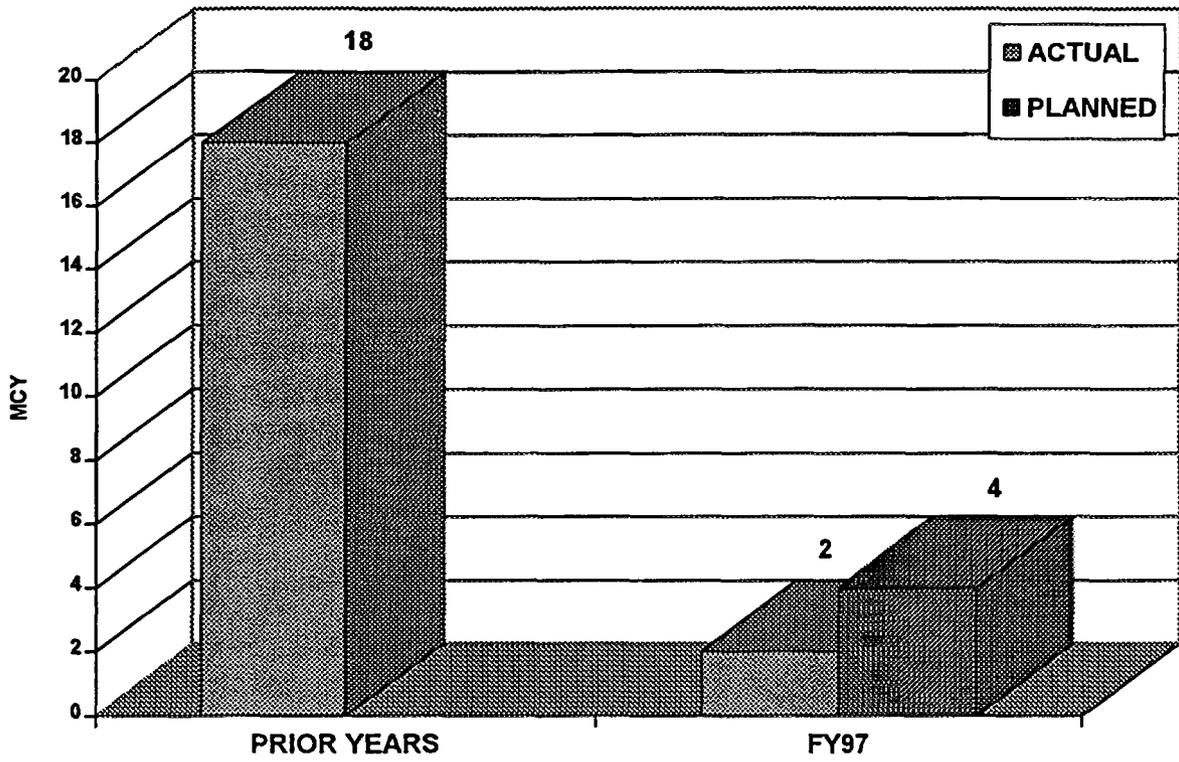
In addition, DOE contractors have constructed three holding ponds for containing the water pumped by the extraction wells. These ponds will be used to test various treatment methodologies for possible groundwater remediation.

4. CONCLUSION

The UMTRA project continues to move ahead towards its goal of having all UMTRA sites brought under the general NRC license by 1998 (i.e. completion of surface remediation). Significant progress has been made in the area of contaminated groundwater characterization at many of the UMTRA sites and will continue well into the future.



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