

**OVERSIGHT HEARING ON FEDERAL ACTIONS TO
CLEAN UP CONTAMINATION FROM LEGACY
URANIUM MINING AND MILLING OPERATIONS**

HEARING

BEFORE THE

SUBCOMMITTEE ON CHILDREN'S HEALTH
AND ENVIRONMENTAL RESPONSIBILITY

OF THE

COMMITTEE ON
ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE

ONE HUNDRED TWELFTH CONGRESS

FIRST SESSION

OCTOBER 6, 2011

Printed for the use of the Committee on Environment and Public Works



Available via the World Wide Web: <http://www.fdsys.gov>

U.S. GOVERNMENT PUBLISHING OFFICE

24-964 PDF

WASHINGTON : 2015

For sale by the Superintendent of Documents, U.S. Government Publishing Office
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OVERSIGHT HEARING ON FEDERAL ACTIONS TO CLEAN UP CONTAMINATION FROM LEG- ACY URANIUM MINING AND MILLING OPER- ATIONS

THURSDAY, OCTOBER 6, 2011

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
Washington, DC.

The subcommittee met, pursuant to notice, at 10 a.m. in room 406, Dirksen Senate Office Building, Hon. Tom Udall (chairman of the subcommittee) presiding.

Present: Senators Udall and Barrasso.

OPENING STATEMENT OF HON. TOM UDALL, U.S. SENATOR FROM THE STATE OF NEW MEXICO

Senator UDALL. The Subcommittee will come to order.

I told the witnesses, but I will tell everybody that is here, we are expecting a vote at 10:30. It looks like it is going to be right in that range. So what we will try to do here is get through the opening statements, your opening statements. Any other members of the Committee that show up, and then we will have to take a short break for that.

My understanding is that it is only one vote, so we will be able to go over and come back quickly and then proceed into the questioning. I hope that we can get you back to your jobs at your offices quickly.

So hello and welcome to the Subcommittee on Children's Health and Environmental Responsibility's Oversight Hearing on Federal Actions to Clean Up Contamination from Legacy Uranium Mining and Milling Operations. We will begin with some brief opening remarks and then we will hear from our witnesses.

This hearing is needed to focus attention on the long legacy of contamination left by the rapid development of uranium in the Southwest during the cold war. We must not forget who paid the price for our national defense. I appreciate the participation of the three Federal agencies here today. They share a responsibility for the cleanup and monitoring of uranium legacy sites.

I also appreciate the participation of communities, groups and tribes in preparation for this hearing. Some of these communities have submitted valuable written testimony for the record and the record will be open for 2 weeks for other stakeholders who would like to submit testimony.

Here is what I hope this hearing will accomplish. First, maintain the focus of these agencies at the headquarters level about the obligation to clean up these abandoned uranium mine and mill sites. Second, meet those obligations with funding of the current 5-year plans and develop and fund followup plans where necessary. Third, ensure Federal agency cooperation, not only with each other, but also with the tribes and affected communities. And finally, ensure regulatory agencies make sure that this type of contamination never happens again, especially at or near existing legacy sites.

The story of uranium development in the United States is a human story, and I must say, a tragic human story. During the early phase of uranium development, miners and mill workers were largely unaware of the dangers of radiation exposure. Even as the understanding of the dangers grew, the Federal Government failed to ensure that uranium workers and their families were safe from the hazards of exposure to radioactive materials.

As a result, numerous illnesses and cancers began to emerge in the men and women who worked and lived near the mines and mills. Communities and families lost their water wells because of unsafe levels of radiation. Wives lost their husbands to cancer and developed their own sicknesses after years of washing clothes covered in yellow cake. Children played on uranium tailings piles and lived in radioactive homes.

Thousands of individuals unwittingly gave their health and many gave their lives to national efforts to develop uranium for our cold war nuclear arsenal during the mid-20th century. While the cold war is over, the communities continue to struggle with contamination. Much of New Mexico's northwestern area is scattered with hundreds of uranium mines that were left abandoned and contaminated as the cold war was won and the uranium boom faded away.

The Pueblo of Laguna was home to the Nation's largest open pit uranium mine. And many mines and mills were opened within the Navajo Nation. There has been so little realization of the uranium legacy outside the Southwest that even the largest release of radioactive material in U.S. history, in 1979, is not widely known outside the Navajo Nation. The catastrophic collapse of the United Nuclear Corporation uranium mill tailings facility near Church Rock, New Mexico, ranks second only to the Chernobyl nuclear reactor accident in total radiation released. The spill of contaminated materials released over 1,000 tons of radioactive tailings and 90 million gallons of toxic wastewater into the Rio Puerco, contaminating about 80 miles of the river. People and livestock were burned by the flowing acidic water.

Finally, in 2008, Federal agencies responsible for the cleanup of legacy uranium on the Navajo Nation created a 5-year plan for cleanup. EPA has followed with an additional 5-year plan for the nearby Grants Mining District in 2010.

While cleanup is moving decades after the initial contamination, some of these communities are faced with new proposals to restart uranium mining for energy purposes, opening up old wounds and arousing new passions. Regardless of our personal beliefs about nuclear weapons, nuclear power or future uranium mining, everyone should agree the Nation and the companies that profited from ura-

uranium development owe a debt to communities with legacy contamination and that can only be paid in full with a complete cleanup.

Before I turn to our witnesses, I want to make one further connection to a related issue at the Judiciary Committee. In this Congress, I am working on a bipartisan basis to update the Radiation Exposure Compensation Act to better cover individuals exposed to radiation at mines, mills and downwind of nuclear test sites. I encourage my colleagues in the Judiciary Committee to take up this bill and ensure that compensation is fair for those who lost their health and lives to uranium development.

And now let me turn to Senator Barrasso, who I welcome for any opening statements he may want to give. I very much appreciate his participation and involvement in this hearing today.

**OPENING STATEMENT OF HON. JOHN BARRASSO,
U.S. SENATOR FROM THE STATE OF WYOMING**

Senator BARRASSO. Thank you very much, Mr. Chairman. I too want to thank the witnesses for being here.

Today's hearing is focused on the cleanup and legacy of cold war uranium mining. As many here may not know, Wyoming actually played an important part in the history of the defense of this Country, because nuclear missile silos have been in Wyoming since the early days of the cold war. Wyoming residents are proud of this legacy.

We also believe that Washington has a responsibility to leave Wyoming as clean as when they found it. I have remained vigilant in ensuring that progress continues to be made in addressing the cleanup of cold war sites in my State. That includes having the Army Corps of Engineers cleanup our TCE contamination in the city of Cheyenne's water wells. TCE was used to degrease the rocket motors of our nuclear missiles to keep them ready during the Cuban missile crisis.

In addition, Wyoming also has two cold war Legacy uranium mines, one in Riverton and the other about 32 miles north of Glenrock. Both have undergone environmental remediation by the Department of Energy. The Department continues to monitor those sites.

As Ranking Member of the Senate Indian Affairs Committee, I understand the concerns of the tribes regarding the legacy of cold war uranium mines. I believe it is a fair question to ask: is the Department of Energy doing all that it can for the tribes and tribal members affected by this legacy?

We must also not forget uranium mining today is much different than it was in what occurred years ago. It would be a mistake to compare cold war uranium mining decades ago with the modern uranium mining today. Wyoming residents understand this because we are an energy producing State with an abundance of uranium. There are people that work at the mines and they see the uranium production process first-hand. They know the importance of developing clean domestic energy for our Nation.

The Department of Energy projects that U.S. energy demand will increase 21 percent between now and 2035. World energy consumption is estimated to grow by 49 percent in that same period of time between now and 2035. Meeting this increased demand is a major

challenge. Access to affordable power is crucial for economic development. Our Country was built on inexpensive power. For our economy to remain competitive, we need cheap power.

Families struggling to balance their budgets deserve access to affordable power. That is why when it comes to American energy, we need it all, nuclear, coal, natural gas and all the renewable sources. Nuclear energy currently provides about 20 percent of our electricity. It generates roughly 70 percent of America's carbon-free power.

Other nations are moving forward quickly on nuclear power. On the floor this week, we have been debating the China currency bill. China is currently building 25 new nuclear reactors. They know that nuclear power is essential to their economic engine.

A key part of the overall issue of providing affordable energy is a nuclear fuel supply. We must have a stable and secure supply of nuclear fuel. We currently import nearly 90 percent of uranium used in the United States nuclear reactors. Building new nuclear capacity without increasing domestic uranium production will make us more dependent on foreign sources for our electricity.

The Administration must do more to support American uranium development, which will help our economy, will strengthen our job security and will create new jobs. I believe we can achieve this in a responsible and environmentally safe way.

Thank you, Mr. Chairman, and I look forward to the testimony.

Senator UDALL. Thank you, Senator Barrasso, for that opening statement.

At this point, we will proceed with our three witnesses. Why don't we start on the right here, with Mr. Michael Weber, with the U.S. Nuclear Regulatory Commission, and then just proceed down the row here. You each will have 5 minutes and your full statement will be put in the record. So that will be there for people to read so that you know that is in there.

Mr. Weber, please proceed.

STATEMENT OF MICHAEL WEBER, DEPUTY EXECUTIVE DIRECTOR FOR MATERIALS, WASTE, RESEARCH, STATE, TRIBAL AND COMPLIANCE PROGRAMS, UNITED STATES NUCLEAR REGULATORY COMMISSION

Mr. WEBER. Good morning, Chairman Udall, Senator Barrasso. It is a pleasure for me to appear before you today to discuss the U.S. Nuclear Regulatory Commission's regulation of uranium recovery facilities to protect public health and safety and the environment.

In my testimony I will focus on several key points. First, most of the environmental contamination associated with uranium production activities in the United States occurred before Congress clarified the authority in this area in 1978, and certainly well before the current regulatory framework was put into place following that clarification. Second, today's conventional uranium mills and in situ recovery facilities are operating safely and in a manner that is protective of the environment. And third, NRC regulates these facilities in close coordination with other Federal agencies as well as State and tribal governments.

Uranium mining and milling in the United States expanded considerably in the 1950's, 1960's and 1970's, driven by an increased demand for uranium to support both our national military uses and commercial nuclear power. Concerns about potential environmental and health hazards associated with mill tailings led the Congress to hold hearings in the late 1970's. These concerns compelled the Congress to enact what is referred to as the Uranium Mill Tailings Radiation Control Act, or otherwise known as UMTRCA, as an amendment to the Atomic Energy Act.

With the enactment of UMTRCA, mill tailings and other associated wastes generated after 1978 became subject to NRC regulation. Contamination associated with hard rock and open pit mines that produced uranium ore was not addressed by this legislation.

For facilities that were licensed on or after November 8th, 1978, the NRC has jurisdiction over mill tailings under Title II of UMTRCA and implements standards issued by the Environmental Protection Agency through a comprehensive regulatory program.

NRC is also cooperating with other Federal agencies in a coordinated effort to address uranium contamination at legacy mine sites in the Navajo Nation under the 5-year plan. Similarly, we are working with EPA and the State of New Mexico to address uranium contamination in and around Grants, New Mexico.

UMTRCA authorized the inclusion of uranium recovery facilities within the framework established under the Atomic Energy Act, thus allowing NRC to enter into agreements with States to regulate uranium recovery facilities in lieu of Federal regulation. NRC has established agreements with Texas, Colorado, Utah and Washington to regulate uranium recovery facilities in those States.

The State of New Mexico's agreement with the NRC included uranium recovery facilities until this part of the program was withdrawn by the State in 1986. NRC evaluates State regulatory activities through an integrated materials performance evaluation program to ensure that State regulatory activities remain both adequate to protect public health and safety and compatible with NRC's requirements. Under Title II of UMTRCA, NRC and agreement States regulate uranium waste generated during the operation to ensure protection of public health and safety and the environment. Our comprehensive regulatory framework ensures safe operation and decommission of both existing facilities and planned facilities. This includes comprehensive safety and environmental review of new applications for uranium recovery.

After a license is issued for a new facility, the NRC or agreement State provides continued oversight of operations through periodic licensing reviews, inspections, assessment, enforcement and investigation.

NRC works closely with other Federal agencies, State agencies and tribal governments. NRC recently issued three new licenses for uranium recovery facilities in Wyoming. The licensing process required extensive coordination with the Bureau of Land Management, with EPA, the Wyoming Department of Environmental Quality and the Wyoming State Historic Preservation Office.

As part of our review on both the National Environmental Policy Act and the National Historic Preservation Act, we consulted with State agencies and tribal governments that expressed interest in

protecting environmental and cultural sites near these facilities. We are currently conducting additional licensing reviews for three new facilities or expansions of new facilities.

Based on the letters of intent from uranium recovery companies, more applications for new facilities, possibly as many as up to 19 applications, could be submitted in the next several years. With this projected workload, we certainly expect extensive coordination and consultation with our Federal partners as well as State agencies and tribal governments.

Mr. Chairman and members of the Subcommittee, I appreciate the opportunity to appear before you today to describe NRC's regulatory program for uranium recovery. I would be pleased to respond to your questions.

[The prepared statement of Mr. Weber follows:]

WRITTEN TESTIMONY OF
MR. MICHAEL WEBER, DEPUTY EXECUTIVE DIRECTOR FOR MATERIALS,
WASTE, RESEARCH, STATE, TRIBAL AND COMPLIANCE PROGRAMS
UNITED STATES NUCLEAR REGULATORY COMMISSION

TO THE
SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
SUBCOMMITTEE ON CHILDREN'S HEALTH AND ENVIRONMENTAL
RESPONSIBILITY

October 6, 2011

INTRODUCTION

Good morning, Chairman Udall, Ranking Member Alexander, and Members of the Sub-Committee. It is a pleasure to appear before you today to discuss the U.S. Nuclear Regulatory Commission's (NRC) regulation of uranium recovery facilities to protect public health and safety and the environment.

In my testimony, I will focus on several key points. First, most of the environmental contamination associated with uranium production activities in the United States occurred before Congress clarified authority in this area in 1978, and well before the current regulatory framework was put in place. The NRC does not regulate uranium

mining, but does have authority over milling of mined materials or in situ processes used to recover uranium, as well as mill tailings. Second, today's conventional uranium mills and in-situ recovery (ISR) facilities are operating safely and in a manner that is protective of the environment. Third, NRC regulates these facilities in close coordination with other Federal agencies and State and Tribal governments and provides technical support and guidance to those Agreement States that have authority over uranium recovery activities under the Atomic Energy Act (AEA), as amended.

Legacy Contamination

Uranium mining and milling in the U.S. expanded considerably in the 1950s, 60s, and 70s, driven by expanded demand for uranium to support both military uses and commercial nuclear power. Concerns about the potential health and environmental hazards associated with uranium mill tailings led to Congressional hearings in the late 1970s. At that time, the Atomic Energy Commission (and later the NRC) regulated the mills because they possessed source material, but the government's authority to regulate the tailings that resulted remained somewhat uncertain. The uranium mill tailings contain both radioactive and chemical wastes left over from the processing of uranium ore to recover uranium and other valuable elements. Lax controls over the mill tailings allowed their use as backfill in thousands of locations, including building foundations, water and sewer lines, roadbeds, and baseball infields, exposing members of the public to elevated radiation dose rates and radon. These concerns compelled

Congress to enact the Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA) as an amendment to the AEA.

With the enactment of UMTRCA, mill tailings and other associated wastes generated after 1978 became subject to NRC regulation. Contamination associated with hard rock and open pit mines that produced uranium ore was not addressed by UMTRCA. The statute established a remedial action program operated by the Department of Energy under Title I of UMTRCA for uranium mills that were not licensed and largely abandoned at the time the law was enacted. For facilities licensed on or after November 8, 1978, the NRC has jurisdiction over mill tailings under Title II of the law. Consistent with UMTRCA, the Environmental Protection Agency (EPA) promulgated standards for both the "inactive" and the "active" tailings sites in 1983, which the NRC has since been implementing and enforcing through our comprehensive regulatory program.

NRC is cooperating with other Federal Agencies in a coordinated effort to address uranium contamination at legacy mine sites in the Navajo Nation under a Five-Year Plan. Similarly, we are working with EPA and the State of New Mexico to address uranium contamination in the Grants Mineral Belt in and around Grants, New Mexico.

Regulation of Operating Facilities

When Congress clarified the NRC's authority to regulate uranium mill tailings and associated wastes, it focused the agency's activities on the radioactive and non-

radioactive wastes produced by uranium recovery facilities. UMTRCA also authorized the inclusion of uranium recovery facilities within the framework established in the Atomic Energy Act, allowing NRC to enter into agreements with States to regulate uranium recovery facilities in lieu of NRC regulation. Through these agreements, the NRC works with the Agreement States to protect public health and safety and the environment. The NRC has established agreements with Texas, Colorado, Utah, and Washington to regulate uranium recovery facilities in those states. The State of New Mexico's agreement with the NRC included uranium recovery facilities until this part of the program was withdrawn by the state in 1986. NRC evaluates State regulatory activities through the Integrated Materials Performance Evaluation Program to ensure that State regulatory activities remain adequate to protect public health and safety and are compatible with NRC requirements.

The NRC and Agreement States regulate conventional mills and ISR facilities. A conventional mill processes uranium ore that has been removed from the earth by either surface or underground mining. The ore is then crushed and sent through a mill, where extraction processes concentrate the uranium. Conventional milling produces a substantial amount of mill tailings, which poses a potential hazard to public health and safety due to its radioactive and chemical content. NRC regulates the recovery process to ensure the safety of operations, storage, and disposal of mill tailings.

In the ISR process, wells are drilled into rock formations containing uranium ore. A solution -- groundwater, usually fortified with oxygen and sodium bicarbonate -- is

injected into the wells to dissolve the uranium in the rock. The uranium-bearing solution is then pumped to the surface through recovery wells to a central processing plant, where the uranium is extracted from the solution. Although these ISR facilities are often referred to as "mines," the entire uranium extraction process, below and above ground, is considered "processing" and is under NRC jurisdiction. Solid waste from this process, such as piping and other equipment, is relatively small in volume and can be disposed of in a tailings impoundment at a conventional mill site or at a licensed disposal facility. Liquid wastes are generally disposed of in deep disposal wells permitted by the State. Unlike conventional mining, the ISR process does not generate tailings.

Under Title II of UMTRCA, NRC and the Agreement States regulate uranium wastes generated during operation to ensure protection of public health and safety and the environment. The NRC's comprehensive regulatory framework ensures safe operation and decommissioning of the existing facilities, as well as any planned facilities. The Agency's standards conform to standards promulgated by EPA. The NRC or Agreement State conducts a comprehensive safety and environmental review of any new application for a uranium recovery facility. After a license is issued for a new uranium recovery facility, the NRC or Agreement State provides continued oversight of the operations through periodic licensing reviews, inspections, assessment, enforcement, and investigations.

During operation of conventional mills and ISR facilities, monitoring wells are required to help assure that fluids used to extract uranium do not leave the facility and contaminate

groundwater above acceptable levels. In-situ recovery licensees are required to decommission well fields when those wells are no longer producing uranium. Decommissioning of the well fields includes restoration of the groundwater to meet NRC or Agreement State requirements.

In-situ recovery facilities and conventional mills must be decommissioned at the end of operations. Licensees are required to remove contaminated structures, decontaminate soil, stabilize sites, and safely dispose of radioactive waste. These steps must be completed in accordance with NRC or Agreement State requirements. In all circumstances, NRC terminates a license for uranium recovery only after it has been determined that the site has been remediated and stabilized in accordance with the applicable requirements. After license termination, UMTRCA allows sites that contain tailings and other wastes that have been stabilized to be transferred to the Federal government or a State government. Under agency regulations, the NRC continues to regulate these sites during the long-term care period under a general license.

Cooperation with Agencies and Tribal Governments

The NRC works closely with other Federal agencies, State agencies, and Tribal governments to ensure protection of public health and safety and the environment throughout the licensing, operation, and decommissioning process. The NRC has recently licensed three new uranium recovery facilities in Wyoming. The licensing review process required extensive coordination with the Bureau of Land Management,

EPA, the Wyoming Department of Environmental Quality, and the Wyoming State Historic Preservation Office, as there are some overlapping responsibilities. As part of our review under the National Environmental Policy Act and the National Historic Preservation Act, we also consulted with State agencies and Tribal governments that expressed interest in protecting environmental and cultural sites near these facilities.

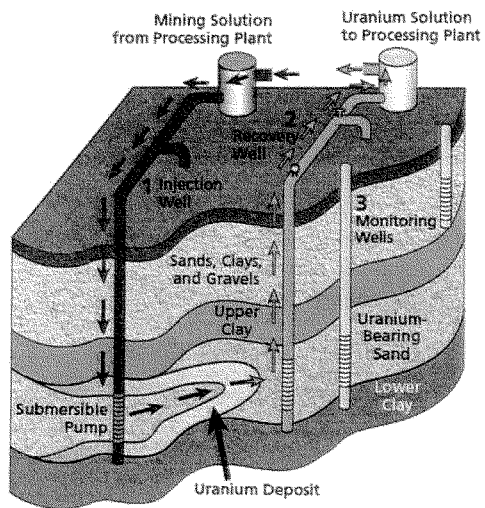
We are currently conducting licensing reviews for an additional three new facilities or expansions of existing facilities. Based on letters of intent from uranium recovery companies, more applications for new uranium recovery facilities, or restarts and expansions of existing facilities – possibly as many as 19 applications – could be submitted in the next several years. This projected workload suggests that we will be conducting extensive consultation and coordination with Federal and State agencies, and Tribal governments for the foreseeable future.

Conclusion

Mr. Chairman and Members of the Subcommittee, I appreciate the opportunity to appear before you today to describe NRC's role with regard to uranium recovery regulation. I would be pleased to respond to your questions.



The In Situ Uranium Recovery Process



- NRC-licensed uranium recovery facility sites
- States with authority to license uranium recovery facility sites
- States where the NRC has retained authority to license uranium recovery facilities

Senator Tom Udall

QUESTION 1.

In-Situ Recovery:

- **Has groundwater quality been restored to its pre-mining state in every case of in-situ uranium recovery that has been regulated by the NRC and EPA? If not, what is the groundwater restoration record?**

ANSWER:

No site has been restored to baseline (pre-mining) conditions for all groundwater quality constituents, but the groundwater has been restored to levels that are protective of public health and the environment. It is important to note that, before beginning in-situ recovery operations, the Environmental Protection Agency (EPA) must "exempt" the aquifer being used for in-situ uranium recovery. This means that the groundwater must not be a source of drinking water or of a quality that would allow it to be used as a public water supply system in the future. Operators of uranium in-situ recovery facilities are required to restore groundwater quality to meet one of the following three options: (1) baseline conditions (pre-mining state); (2) drinking water maximum concentration limits (MCLs); or (3) alternate concentration limits (ACLs).

NRC's goal for groundwater restoration at uranium recovery facilities is to ensure protection of potential sources of drinking water outside of the exempted aquifer in which uranium is extracted. NRC accomplishes this goal by ensuring that radionuclide and chemical constituents are returned to agency standards – baseline condition, MCLs, or ACLs. NRC staff has approved 11 wellfield restorations at the three existing NRC licensed in-situ recovery (ISR) facilities: Uranium One's Willow Creek Project (WY); Power Resources, Inc.'s Smith Ranch-Highlands Uranium Project (WY); and Crow Butte Resources' ISR facility (NE). Each of the approved restorations had one or more groundwater quality "constituents of concern" – radionuclides and chemicals associated with uranium recovery above baseline levels in portions

of the aquifers exempted by EPA. The restoration data from these three facilities have shown that baseline is attainable for many constituents, but is not always attainable for others. The most difficult constituents to restore to baseline levels have been iron, manganese, arsenic, selenium, uranium, vanadium and radium-226. The constituents are elevated as a result of the uranium recovery process in the groundwater. After uranium extraction is completed, these constituents must be restored.

Currently, in those cases where baseline levels or MCLs cannot be met within specified time periods, a site operator or licensee must request from its regulator (NRC or Agreement State) approval to continue restoration in an attempt to achieve these levels, or approval of ACLs. The NRC groundwater protection standards include criteria that incorporate the groundwater protection standards imposed by EPA regulations, which apply during site operations prior to the end of closure. The criteria also include the bases for the NRC staff to agree to ACLs for a site. Before approving an ACL for a constituent, the regulatory agency must conclude that these levels are as low as reasonably achievable and protect human health and the environment.

On July 10, 2009, an NRC "Staff Assessment of Groundwater Impacts from Previously Licensed In-Situ Uranium Recovery Facilities" concluded that, for the 11 NRC-approved groundwater restorations at three facilities, more than 60 percent of the constituents were restored to their pre-operational concentrations. Although the remaining constituents were restored to concentrations that were above baseline levels, they were all restored to levels that NRC staff found to be protective of public health and the environment.

- **Does the NRC and/or EPA track the performance in restoring groundwater quality at in-situ recovery sites in agreement states, and if so, have they restored groundwater to pre-mining levels? If not, what is the groundwater restoration record?**

ANSWER:

Under provisions of the Atomic Energy Act of 1954 (AEA), as amended, NRC can relinquish certain portions of its authority to the Agreement State. As such, NRC does not track the ISR restoration performance record in an Agreement State that has such authority. Records are retained at the state level and not provided to the NRC. The NRC reviews ISR restoration activities as part of its periodic review of the Agreement State regulatory program in the Integrated Materials Performance Evaluation Program review. As required by the AEA, NRC also must make a determination that all applicable standards and requirements have been met prior to the Agreement State terminating a uranium milling license following completion of restoration. The only Agreement State to license and approve the restoration of an ISR facility is the State of Texas. NRC is unaware if EPA tracks the restoration record in Agreement States.

QUESTION 2. Homestake Superfund Site: It is my understanding that EPA and NRC have overlapping jurisdiction of the Homestake site, and work under an MOU. In June of this year the EPA sent a letter to the NRC outlining several instances where NRC is failing to comply with Superfund standards and are thus preventing EPA from ensuring compliance.

- **Mr. Weber, has NRC responded to that letter and what was the response?**

ANSWER:

Yes, on October 3, 2011, NRC responded to the July 8, 2011, letter from EPA Region VI pertaining to a June 8, 2011, teleconference call. In our response, the agency took exception to the EPA's finding that "... NRC activities may not comply with [the] Comprehensive Environmental Response, Compensation, and Liability Act." The NRC responded specifically to each of the six EPA-identified issues: (1) exceedance of the standard published in NRC regulations; (2) noncompliance with EPA's Uranium Mill Tailings Radiation and Control Act regulations; (3) noncompliance with potential applicable or relevant and appropriate requirements under 40 CFR Part 61, Subpart B; (4) exceedance of the National Oil and Hazardous Substances Pollution Contingency Plan risk range; (5) administrative record for rulemaking requirements; and (6) community relations requirements. We explained why the NRC believed itself to be in compliance with each of these requirements. The NRC also recommended that the Homestake Executive Steering Committee meet to discuss the path forward for regulating the remediation of the Homestake Mining Company (HMC) site. This Executive Steering Committee, consisting of the NRC, EPA Region VI, and the New Mexico Environment Department, was established in 2008 to provide a forum for senior managers from each agency to address regulatory differences of opinion. The overall goal of the Executive

Steering Committee is to ensure the HMC site will be remediated in a manner that is compliant with all of the three agencies' requirements.

On October 19, 2011, the Director of the NRC Division of Waste Management and Environmental Protection led an Executive Steering Committee meeting with the EPA Region VI Division Director and the State of New Mexico Environment Department Secretary to discuss regulatory roles associated with the oversight of the HMC uranium tailings pile remediation. The outcomes of the meeting were: (1) NRC would continue as the lead agency, (2) EPA would continue its monitoring role by reviewing and providing comments directly to NRC, and (3) New Mexico would continue its role by providing permits and working with the community on indoor radon issues. In addition, all parties agreed that the revised HMC Corrective Action Plan (CAP) was the critical licensing action to be completed for closure of the site. NRC emphasized that requirements placed on HMC must have a firm regulatory basis. There also was general agreement to send one letter signed by all three agencies to HMC that identified those deficiencies that would need to be addressed in the HMC CAP. Furthermore, all parties agreed that there would be a technical staff meeting in November or December 2011, for EPA and NRC to discuss their respective approaches to ensuring that the radon standards would be met at HMC, and that the NRC would hold a facilitated public meeting in the first quarter of calendar year 2012 to reinforce the agencies' roles, to discuss the HMC technical issues, to discuss the revised CAP as a path forward to closure, and to listen to comments and concerns of the public. All three agencies will participate in the public meeting and will continue to work together on remediation of the site.

- **Does there continue to be groundwater contamination at the Homestake site and in the surrounding communities?**

ANSWER:

Groundwater contamination from legacy mining and milling and naturally occurring radioactive material in the Grants Mining District, in which the Homestake site is located, is widespread. Groundwater in the area is contaminated from many sources, including the Homestake site. Federal and State agencies have a five-year plan to assess the broad health and environmental impacts of uranium mining and milling in the Grants Mining District. With respect to Homestake, seepage from the Homestake tailings impoundment was identified in 1975 when the facility was under the regulatory authority of the State of New Mexico. The site, which is currently in decommissioning, began its restoration program in 1977. In 1986, at its request, the State of New Mexico returned its uranium recovery licensing program back to the NRC. Consequently, the NRC assumed regulatory authority over the Homestake site. Remediation of the groundwater contamination is ongoing under the existing CAP. Part of the corrective action program has been to flush the tailings and collect and treat the recovered fluid. The purpose of this flushing is to isolate the contaminants within the tailings pile and then stabilize it for the foreseeable future. In addition, a major revised groundwater CAP is under consideration by NRC, EPA, and the New Mexico Environment Department. If approved by the NRC through a license amendment, the revised CAP would provide the basis for further remediation of that part of the contamination that resulted from Homestake mill operations. In the interim, local citizens are being protected by actions required in the existing CAP that ensures remediation activities are conducted in accordance with NRC regulations.

- **What is the potential timeline for full cleanup of groundwater at the site?**

ANSWER:

The original HMC schedule projected that the remediation would be complete in 2014. Although significant tailings pile cleanup has been completed at the site over the last decade, HMC recognized the need for additional remediation capacity. In the spring of 2010, HMC received a New Mexico Environment Department permit to add a third water processing pond, constructed the new pond later that year, and placed the pond into operation in December 2010. With the addition of the third pond to allow a higher rate of remediation, HMC is projecting that the tailings pile remediation will be completed in 2017. The length of time required for completion is a reflection of the complexity and difficulty of the task.

HMC is working to reduce contamination levels in the tailings pile while at the same time preventing the spread of existing contamination and restoring aquifers in the area. All of these activities will take time to complete. Upon completion of remediation of the tailings pile, the HMC tailings pile will no longer be a source of contamination for the upper groundwater aquifers. Thus, contamination due to licensed activities will be remediated to approved standards. Due to the high concentration of uranium in the area, natural contaminants (e.g., iron, manganese, arsenic, selenium, vanadium, radium-226), and many years of uranium recovery activities in the area, it is difficult to define background level for the mill activities; however, EPA and the New Mexico Environment Department previously agreed to background levels that are being used as the cleanup standard for groundwater at the Homestake mill. These standards are protective of public health and safety.

- **Is the current system of groundwater treatment extensive enough to fully address the problem?**

ANSWER:

Once the NRC approves the revised CAP, these remediation activities are expected to result in the cleanup of the Homestake tailings pile and associated groundwater contamination with the potential to impact health and safety. The EPA Remedial System Evaluation (RSE) Report in 2011 confirmed that the remediation process is effective and made several recommendations for improving the efficiency of the HMC process. HMC is evaluating the RSE recommendations for inclusion in the revised CAP, which is required by the NRC to ensure the remediation activities will result in the cleanup of the site to the standards established under 10 CFR Part 40, Appendix A. As noted earlier, the current goal is for the CAP to address the regulatory concerns of the NRC, EPA Region VI, and the State of New Mexico.

Senator UDALL. Thank you very much.
Mr. Geiser, please go ahead.

**STATEMENT OF DAVID GEISER, DIRECTOR, OFFICE OF
LEGACY MANAGEMENT, DEPARTMENT OF ENERGY**

Mr. GEISER. Good morning, Mr. Chairman, Senator Barrasso. Thank you for the opportunity to discuss the Department of Energy's activities related to uranium mining and milling.

The Department has four primary responsibilities associated with uranium mining and milling. First is long-term surveillance and maintenance of former uranium mill sites. The second is the cleanup of the Atlas site in Moab, Utah. The third is reimbursements for uranium and thorium cleanup that is ongoing. And the fourth is the management of the uranium leasing program in Western Colorado.

The Department's authority related to uranium mill sites is provided by the Uranium Mill Tailings Radiation Control Act, or UMTRCA. UMTRCA originally passed in 1978 and has two major sections, Title I, which addresses the uranium mill sites that were inactive when the law was passed, and Title II, which addresses the mill sites licensed as of 1978.

The Department of Energy currently manages 21 Title I sites and 6 Title II sites. An additional 17 Title II sites are expected to be transferred to DOE by 2020. Title II sites are cleaned up by the commercial site owners.

Funding for long-term surveillance and maintenance of our 27 UMTRCA sites in 2011 was almost \$8 million. In Moab, Utah, the Department is excavating and shipping more than 12 million cubic yards of mill tailings to a new disposal cell near Crescent Junction, Utah. DOE began moving the tailings in 2009 and more than 4.6 million tons have been relocated to Crescent Junction.

Title 10 of the Energy Policy Act of 1992 directed DOE to reimburse certain licensees of uranium and thorium mill sites for the portion of their cleanup costs attributed to sale of material to the Atomic Energy Commission. Licensee claims for reimbursement are audited and eligible costs are reimbursed by DOE on an annual basis. Since 1994, DOE has reimbursed \$628 million under that program.

Last, the Department manages 31 uranium lease tracks, covering approximately 25,000 acres in Southwestern Colorado. The leasing program began in 1948 when Congress authorized the Atomic Energy Commission to withdraw lands from the public domain for the purposes of exploring, developing and mining uranium and vanadium ore bodies.

In closing, DOE has and will continue to work with other Federal agencies, tribal nations, State and local governments to ensure that our actions are protective of human health and the environment. Thank you.

[The prepared statement of Mr. Geiser follows:]

STATEMENT OF
DAVID GEISER
DIRECTOR, OFFICE OF LEGACY MANAGEMENT
DEPARTMENT OF ENERGY

BEFORE THE

SUBCOMMITTEE ON CHILDREN'S HEALTH AND ENVIRONMENTAL
RESPONSIBILITY
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE

October 6, 2011

Good afternoon Mr. Chairman, Ranking Member Alexander, and distinguished members of the Committee. My name is David Geiser and I am the Director of the Office of Legacy Management (LM) at the Department of Energy (DOE). LM is responsible for ensuring that DOE's post-closure responsibilities are met by providing: long-term surveillance and maintenance of environmental remedies; access to historical records and information; contractor benefits continuity; and beneficial reuse of Federal property no longer needed for Departmental missions.

LEGACY MANAGEMENT MISSION AND PROGRAM GOALS

The mission of the DOE Office of Legacy Management (LM) is to manage the Department's post-closure responsibilities at remediated sites and ensure that they continue to protect human health and the environment in the future. LM currently has responsibility for 87 remediated sites. Post-closure site management is the primary activity in support of Goal 1 of LM: protecting human health and the environment. This first goal assures that DOE's environmental remedies continue to perform in a manner that is protective for the long term. LM continually evaluates the effectiveness and cost-efficiency of the remedies. Other LM strategic goals are to preserve, protect, and share records and information; meet commitments to the contractor work force; optimize the use of land assets; and sustain management excellence. More information on LM, including fact sheets on each of the sites it manages, is available at www.lm.doe.gov.

Background Information on UMTRCA

Congress passed the Uranium Mill Tailings Radiation Control Act (Public Law 95-604) or UMTRCA, in 1978. UMTRCA has two major sections: Title I, which addresses uranium milling sites that were inactive when the law was passed; and Title II, which addresses milling sites licensed as of 1978.

Pursuant to Title I, DOE completed remediation of inactive uranium milling sites as well as vicinity properties in 1998. UMTRCA also required all disposal cells that were created as part of milling site remediation to remain the responsibility of DOE in perpetuity. UMTRCA specified that the U.S. Environmental Protection Agency (EPA) would establish the standards to be used during remedial action. The Nuclear Regulatory Commission (NRC) was directed to concur on the type of remedial action that would be performed.

Title II of UMTRCA amended the Atomic Energy Act of 1954 to address the eventual remediation and closure of uranium milling sites that had active licenses as of 1978. All Title II sites must be transferred to either a state (who has first choice of ownership), or DOE. To date, all Title II sites have been transferred to DOE.

LM Management of UMTRCA Title I and Title II Sites

LM took over the long-term surveillance and maintenance of Title I sites, upon its establishment in 2003. LM currently manages 21 Title I sites and 6 Title II sites. An additional 17 Title II sites are expected to be transferred to LM by 2020 (see attached map). UMTRCA Title II sites are

cleaned up by the commercial site owners who hold a NRC license or a license issued by an "Agreement State" that implements NRC regulations. After site remediation is approved by the regulator, the site is transferred to DOE and then regulated by NRC under DOE's General License. In addition to the cost of remediation, the licensee is responsible for a one-time payment to the U.S. Department of the Treasury to offset LM's long-term care costs for the site. LM funding for long-term surveillance and maintenance of UMTRCA sites in fiscal year (FY) 2011 is \$6.6M for Title I sites and \$1.1M for Title II sites and is projected to be \$6.3M for Title I sites and \$1.4M for Title II sites in FY2012.

DOE UMTRCA Vicinity Property (VP) Program

The VP program was established to clean up sites where mill tailings were used for construction, including many residences. Mill tailings were removed from over 4,000 vicinity properties in the City of Grand Junction, Colorado. Although DOE's UMTRCA Title I surface cleanup authority expired in 1998, as required by the UMTRCA extension in 1996, DOE must keep the Grand Junction Disposal Cell open for receipt of tailings discovered in the community.

In 2011, DOE received at the Grand Junction Disposal Cell 7,200 cubic yards (yd³) of tailings materials from the City of Grand Junction, primarily excavated from city streets and sidewalks.

Ongoing UMTRCA Remediation by the DOE Office of Environmental Management

EM is conducting additional remediation under UMTRCA standards or authority. During the summer of 2011, mill-related contaminated soil at the "Highway 160 Site" near the Tuba City UMTRCA Title I was characterized, excavated, and shipped by truck to the Grand Junction Disposal Cell in Colorado. On August 29, 2011 the last shipment of more than 4,500 yd³ of contaminated soil was delivered to the cell. The Omnibus Appropriations Act of 2009 funded DOE to remediate the site, and DOE established a cooperative agreement with the Navajo Nation to perform the work.

A larger effort is the Moab Project, where more than 16 million tons (12 million yd³) of mill tailings and other contaminated material is being excavated and shipped by train from the former Moab mill site to a new disposal cell near Crescent Junction, Utah. The project was authorized under UMTRCA Title I by the Floyd D. Spence National Defense Authorization Act for FY2001. EM began moving the tailings in 2009, and by the end of FY2011 approximately 29 percent (more than 4.6 millions tons) of the total material at the mill site has been relocated to Crescent Junction. EM is also characterizing groundwater contamination associated with the Moab tailings which are located adjacent to the Colorado River. As with other UMTRCA sites, the Crescent Junction disposal cell and any groundwater remediation systems in Moab will eventually be transferred to LM for long-term surveillance and maintenance.

Groundwater Program

EM's groundwater work at Moab is consistent with amendments to UMTRCA in 1998 that authorized DOE to remediate groundwater exceeding EPA standards at former uranium milling sites. Groundwater restoration by LM is ongoing at nine Title I sites and one Title II site. Groundwater cleanup strategies include natural flushing, which must be completed within 100 years. Other "active" remediation being performed at some sites include a pump and treatment system at Tuba City, AZ; a pump and evaporation system at Shiprock, NM; a phytoremediation system at Monument Valley, AZ; and a nutrient enhancement/ biological remediation system at Rifle, CO.

LM UMTRCA Long-Term Surveillance Plans

LM uses NRC-approved Long-Term Surveillance Plans (LTSPs) to manage UMTRCA sites. The LTSPs are a condition of the NRC license issued to DOE for the long-term care and maintenance of UMTRCA disposal cells. As part of the LTSPs, LM performs annual site management activities, including inspections and maintenance. The primary objective of LTSPs is to ensure that the management of UMTRCA sites continues to protect public health and the environment. LTSP activities can include: inspecting disposal cells for subsidence, erosion, and other damage; performing cell maintenance, erosion control, weed control, fence repair, and property management; evaluating the adequacy of institutional controls; and conducting groundwater monitoring.

LM UMTRCA Activities in New Mexico

LM manages four former uranium milling sites in the State of New Mexico, three of which are located in the Grants Mineral Belt: Ambrosia Lake, L-Bar, and Bluewater. Two additional sites in the region (Homestake and Rio Algom) are being remediated by private firms under UMTRCA Title II and will be transferred to DOE after remediation is complete. In 2009, the New Mexico Environment Department (NMED) initiated the Five-year plan, Grants Mining District, New Mexico, (2010-2014): *Assessment of Health and Environmental Impacts of Uranium Mining and Milling (Five-year Plan)*. DOE, EPA and NRC are participants in the plan. DOE has committed to continue all long term surveillance, maintenance and groundwater monitoring at its UMTRCA sites. In addition, DOE is working with the State of New Mexico to better understand groundwater quality in the region.

Recent activities in response to concerns raised by NMED under the Five-year Plan include drilling additional groundwater wells at the Ambrosia Lake and Bluewater disposal cells, increasing groundwater sampling from once to twice a year, and monitoring additional analytes. In FY2012, another well will be drilled at Bluewater.

Title X Uranium and Thorium Reimbursement Program

Title X of the Energy Policy Act of 1992 directed DOE to reimburse certain licensees of uranium and thorium milling sites for the portion of their cleanup costs attributed to sale of material to the Atomic Energy Commission (AEC), the predecessor agency to DOE. Licensee claims for reimbursement are audited by LM and the Defense Contract Audit Agency, and eligible costs are reimbursed by EM annually, subject to the availability of appropriations.

Two New Mexico sites in the Title X Program are UMTRCA Title II sites (Rio Algom and Homestake) will become the responsibility of LM for conducting long term surveillance and maintenance and groundwater remediation. The Bluewater site, already managed by LM, also received Title X funds prior to closure. Since 1994, DOE has reimbursed \$628M under the program. Total federal payments under Title X are capped. The maximum remaining authorized payments are approximately \$210M.

LM Uranium Leasing Program

Other LM activities include the Uranium Leasing Program (ULP) and its 31 uranium lease tracts located in the Uravan Mineral Belt of southwestern Colorado (approximately 25,000 acres). The ULP began in 1948 when Congress authorized the U.S. Atomic Energy Commission to withdraw lands from the public domain for the sole purpose of exploring for, developing, and mining uranium-vanadium ore bodies for national defense purposes.

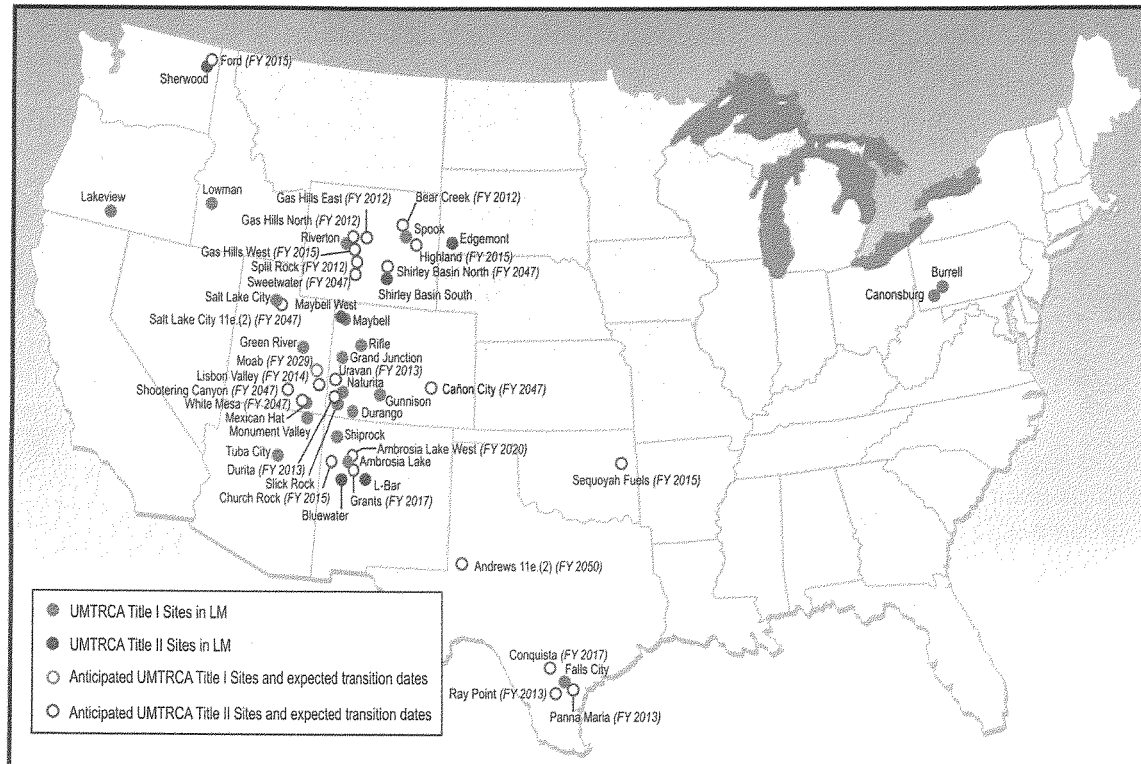
In 1994, DOE recognized the lack of regulations pertaining to the reclamation of legacy mine sites, and collaborated with BLM to develop reclamation criteria tailored to abandoned uranium mines. From 1995 through 2001, DOE reclaimed 161 mine sites on the DOE lease tracts. During that time, DOE negotiated contracts with its lessees to perform reclamation at these legacy sites in lieu of annual royalty payments owed to the Government pursuant to 10 CFR 760.1.

By the late 1990s, various Bureau of Land Management (BLM) field offices began to recognize DOE's experience and expertise in reclaiming legacy mine sites and in 2000, BLM executed an interagency agreement with DOE, requesting DOE's assistance in performing mine closures and reclamation on BLM-administered public lands throughout the Uravan Mineral Belt. During an 8-year span, BLM funded DOE to perform reclamation activities at 182 mine sites.

Closing

DOE will continue to work with other Federal agencies, tribal nations, and state and local governments to ensure that the legacy of uranium milling and processing sites is one that is protective of human health and the environment. It will also continue to be respectful of the concerns and values of stakeholders that live near the sites or on whose land the former milling sites are located.

UMTRCA Title I and Title II Site Locations



QUESTION FROM SENATOR UDALL

Tuba City

Q1. I understand that DOE is responsible for two sites near Tuba City the Highway 160 site and the disposal cell nearby. DOE was allocated \$5 million through the Fiscal Year 2009 Omnibus Appropriations Act for cleanup of these sites.

Q1a. How much of those funds have been spent and what has been accomplished?
(*Highway J 60 site should be complete.*)

A1a. As of October 18, 2011, \$3.7 million of the \$5 million obligated to the Tuba City Highway 160 Project has been costed. Final shipment of remediated waste and materials was sent to the Grand Junction Disposal Site on August 26, 2011 and completed backfill activities at the site on October 3, 2011. Remaining work includes the finalization of project closeout reporting and invoicing.

Q1b. Is there any statutory or other obstacle to transferring any remaining funds to cleanup of the Tuba City Dump, or is there any other funding available?

A1b. The 2009 Omnibus Appropriations Act statutory language states: "...of the amounts provided, \$5,000,000 is available for necessary expenses for the purpose of carrying out remedial actions under this title at real property in the vicinity of the Tuba City processing site designated in section 102(a)(1), of the Uranium Mill Tailings Radiation Control Act of 1978 (Public Law 95-604, as amended; 42 U.S.C. 7901, *et seq.*), notwithstanding section 112 of the Act, at a dump site immediately adjacent to the north-northwest section of the Tuba City processing site, and on the north side of Highway 160..."

That statutory text is specific and limited to the Highway 160 site, an area distinct from the Tuba City Dump. Because the statutory language is so specific, the Department may only use those funds for the Highway 160 site, and has no ability to reprogram the funds to any other cleanup efforts. There are no other DOE funds available for cleanup of the Tuba City Dump.

COMMITTEE: SENATE ENVIRONMENT AND PUBLIC WORKS,
SUBCOMMITTEE ON CHILDREN'S HEALTH AND
ENVIRONMENTAL RESPONSIBILITY

HEARING DATE: OCTOBER 6, 2011

WITNESS: DAVID GEISER
Page 26, Lines 6-24
Page 27, Lines 1-7

INSERT FOR THE RECORD

Status of Wyoming (WY) Uranium Mill Tailings Radiation Control Act sites in response to Senator Barrasso's request:

As I stated in my testimony on October 6, 2011, the Department has four primary responsibilities associated with uranium mining and milling. The first is long-term surveillance and maintenance of former uranium milling sites. The second is the cleanup of the former Atlas milling site in Moab, Utah. The third is reimbursements for a portion of certain uranium and thorium cleanups that is ongoing at licensed uranium milling sites. And the fourth is the management of the uranium leasing program in Western Colorado.

The Department's authority related to uranium milling sites is provided by the Uranium Mill Tailings Radiation Control Act of 1978, as amended.

<u>Site</u>	<u>Acquisition</u>	<u>Status</u>
Riverton, WY, Processing Site	1991	Legacy Management (LM) is conducting Monitoring & Maintenance in accordance with the LM Long-Term Surveillance Plan (LTSP).
Spook, WY, Disposal Site	1993	LM is conducting Inspection & Maintenance in accordance with the LM LTSP.
Shirley Basin South, WY, Disposal Site	2005	LM is conducting Monitoring & Maintenance in accordance with the LM LTSP.

<u>Site</u>	<u>Acquisition</u>	<u>Status</u>
Bear Creek, WY, Disposal Site	Pending	Transfer of the site from the licensee to LM should be completed in FY12.
Gas Hills North, WY, Disposal Site	Pending	Transfer of the site from the licensee to LM, should be completed in FY12.
Split Rock, WY, Disposal Site	Pending	Transfer of the site from the licensee to LM, should be completed in FY12.
Gas Hills East, WY, Disposal Site	Pending	Transfer of the site from the licensee to LM, should be completed in FY13.
Gas Hills West, WY, Disposal Site	Future	The State of WY is conducting remediation in consultation with NRC. DOE acquisition of the site is anticipated by 2015.
Highland, WY, Disposal Site	Future	The licensee is performing remediation under NRC license. DOE acquisition of the site is anticipated by 2015.
Shirley Basin North, WY, Disposal Site	Future	The licensee is operating the disposal cell under NRC license. DOE acquisition of the site is anticipated by 2047.
Sweetwater, WY, Disposal Site	Future	The mill is on standby with a five-year postponement of decommissioning. DOE acquisition of the site is anticipated by 2047.

(See attached for additional information)

U.S. DEPARTMENT OF
ENERGYLegacy
Management**Riverton, Wyoming, Processing Site****FACT SHEET**

This fact sheet provides information about the Uranium Mill Tailings Radiation Control Act of 1978 Title I processing site at Riverton, Wyoming. This site is managed by the U.S. Department of Energy Office of Legacy Management.

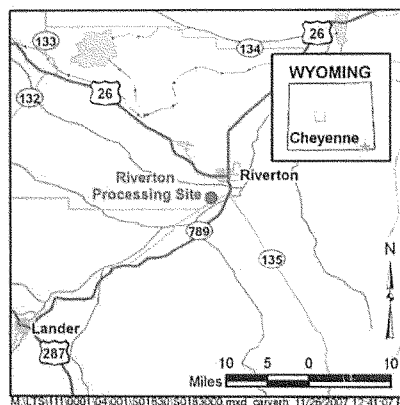
Site Description and History

The former Riverton, Wyoming, Processing Site is in Fremont County, 2 miles southwest of the town of Riverton and within the boundaries of the Wind River Indian Reservation (Northern Arapaho and Eastern Shoshone) on land now owned by the State of Wyoming. The site is the location of a former uranium- and vanadium-ore processing mill that operated from 1958 to 1963. Past milling operations created radioactive mill tailings, a predominantly sandy material, and uranium, radium, and thorium contamination in soils and construction debris. The tailings pile covered about 72 acres of the 140-acre site to an average depth of 4 feet. In 1988, about 1.8 million cubic yards of the contaminated materials were removed from the site and relocated to the Gas Hills East Disposal Site 45 miles away. The U.S. Department of Energy (DOE) completed surface remediation of the Riverton site in 1989.

Milling operations at the site caused both surface and groundwater contamination. Three aquifers underlie the site: an unconfined surficial aquifer, an underlying semiconfined sandstone aquifer, and a deeper confined sandstone aquifer. Only groundwater in the surficial aquifer has been contaminated by ore-processing operations at the site.

Regulatory Setting

Congress passed the Uranium Mill Tailings Radiation Control Act (UMTRCA) in 1978 (Public Law 95-604) and DOE remediated 22 inactive uranium ore-processing sites under the Uranium Mill Tailings Remedial Action Project in accordance with standards promulgated by the U.S. Environmental Protection Agency in Title 40 Code of Federal Regulations (CFR) Part 192. Subpart B of 40 CFR 192 regulated cleanup of contaminated groundwater at the processing sites. The radioactive materials were encapsulated in U.S. Nuclear Regulatory Commission-approved disposal cells. The U.S. Nuclear Regulatory Commission general license for UMTRCA Title I sites is established in 10 CFR 40.27.



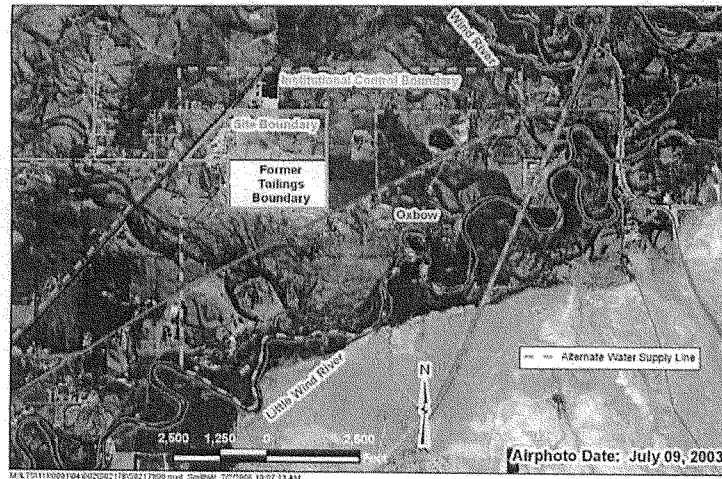
Location of the Riverton Processing Site

Processing Site

The site is on alluvial deposits between the Wind River, 1 mile north, and the Little Wind River, about 3,200 feet south.

The surficial aquifer consists of 15 to 20 feet of alluvial sand and gravel; depth to groundwater typically ranges from 3 to 6 feet below ground surface. Groundwater flow is generally to the southeast toward the Little Wind River. Concentrations of milling-related molybdenum and uranium measured in samples from the surficial aquifer have been 10 to 40 times greater than their respective maximum concentration limits in 40 CFR 192.

The semiconfined aquifer consists of sandstone 15 to 30 feet thick and is continuous throughout the Riverton site. A layer of shale 5 to 10 feet thick partially



Institutional Control Boundary, Site Boundary, Former Tailings Boundary, and Alternate Water Supply Lines at the Riverton Processing Site

separates the surficial and semiconfined aquifers. Concentrations of molybdenum and uranium in the semiconfined aquifer typically have been low and within the range of background concentrations.

Compliance Strategy

The groundwater compliance strategy for the Riverton site is natural flushing in conjunction with institutional controls and monitoring. Groundwater modeling predicts that site-related molybdenum and uranium in the surficial aquifer will flush naturally to levels below their maximum concentration limits within the 100-year time frame allowed in 40 CFR 192. DOE will collect samples semiannually at groundwater and surface water monitoring locations to track the progress of natural flushing and to verify that contaminant concentrations are decreasing as predicted.

Although contaminated groundwater is assumed to discharge to the Little Wind River, groundwater contaminants have had no measurable effect on river water quality. An oxbow lake formed by a shift in the river path in 1994 receives inflow from contaminated groundwater, and concentrations of uranium in the oxbow are elevated but variable. The variability is attributed to inflow from the river during high river stage, which causes dilution of uranium concentrations.

Institutional Controls

Institutional controls at the Riverton site consist of three components: (1) an alternate drinking water supply system (in place), (2) restrictions on new wells and land use, and (3) a deed restriction on state-owned property at the site (in progress).

DOE is working with the Arapaho and Shoshone Tribes and the State of Wyoming to obtain enforceable institutional controls at the site. DOE funded an alternate drinking water supply system in 1998 to provide potable water to residents within the institutional controls boundary. However, elevated concentrations of radionuclides were detected in the system in 2002 and were confirmed in samples collected in May 2004. In response to elevated concentrations of radionuclides in the system, DOE conducted a 2-year flushing and monitoring program. Results of the flushing and monitoring program prove that a unidirectional flushing program is effective in controlling radionuclide build-up within the system. A perpetual deed restriction is being developed for the former millsite property owned by the state that will restrict land development and prohibit well drilling.

Legacy Management Activities

DOE will manage the Riverton Processing Site according to a site-specific Long-Term Management Plan that is currently being developed. Monitoring during the natural flushing period is referred to as verification monitoring because its purpose is to verify that the strategy is progressing as predicted and that institutional controls are in place and functioning as intended. DOE will collect groundwater and surface water samples semiannually once in June when the water table and river flow are typically highest and once in October when the water table and river flow are typically lowest. Data from these sampling events will be used to assess variations in contaminant concentrations attributable to seasonal fluctuations and to track contaminant concentrations over time.

Contacts

Documents related to the Riverton Processing Site are available on the DOE Office of Legacy Management website at <http://www.lm.doe.gov/riverton/Sites.aspx>.

For more information about DOE Office of Legacy Management activities at the Riverton Processing Site, contact

U.S. Department of Energy
Office of Legacy Management
2597 Legacy Way, Grand Junction, CO 81503
(970) 248-6070 (monitored continuously), or
(877) 695-5322 (toll-free)

U.S. DEPARTMENT OF
ENERGYLegacy
Management

Shirley Basin South, Wyoming, Disposal Site

FACT SHEET

This fact sheet provides information about the Uranium Mill Tailings Radiation Control Act Title II Shirley Basin South Disposal Site in Carbon County, Wyoming. The U.S. Department of Energy Office of Legacy Management manages the site.

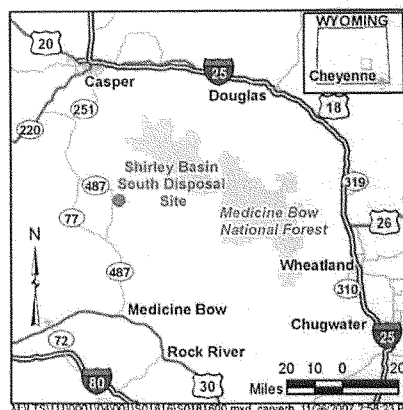
Site Description and History

The Shirley Basin South disposal site is located in rural Carbon County about 60 miles south of Casper and 35 miles north of Medicine Bow, Wyoming. The site is at an elevation of about 7,100 feet.

A uranium mill at the site processed uranium ore from 1962 to 1974 and from 1978 to 1985. The mill used a conventional acid leach process to extract uranium from the ore, which was mined from nearby open pit mines. The milling process created radioactive tailings, a predominantly sandy material. Tailings and process solution were conveyed in a slurry to a 142-acre tailings impoundment on site. Because of a depressed uranium market, the mining and milling operations shut down in 1985, and mill decommissioning began. The Petrotonics Company, the mill operator, completed site reclamation and encapsulated the tailings, contaminated site soils, and contaminated building materials in an engineered, on-site disposal cell in 2001.

Regulatory Setting

Congress passed the Uranium Mill Tailings Radiation Control Act (UMTRCA) in 1978 (Public Law-95-604). The Shirley Basin South site qualifies as an UMTRCA Title II site because it was operating under an active U.S. Nuclear Regulatory Commission (NRC) license when UMTRCA was passed. Title II of the legislation specifies that after reclamation is completed, long-term custody of the site is the responsibility of either the Federal Government or the host state, at the option of the state. Wyoming declined to become the long-term custodian of the Shirley Basin South site, and the U.S. Department of Energy (DOE) assumed custodial responsibility for the site. Under Title II of UMTRCA, the licensee, Petrotonics, was responsible for remedial action. NRC's cleanup and reclamation standards are promulgated in Title 10 *Code of Federal Regulations* (CFR) Part 40, Appendix A. These standards conform to U.S. Environmental Protection Agency standards specified in 40 CFR 192. NRC concurred with DOE's Long-Term Surveillance Plan for the site in June 2005, and the site was included under NRC's general license



Location of the Shirley Basin South Disposal Site

for long-term custody. At that time, title to the site transferred from Petrotonics to DOE.

Shirley Basin South Disposal Site

Cleanup and reclamation at the millsite consisted of demolishing site structures and removing contaminated soils. Mill components that were not salvaged and sold were buried in a mine pit, the tailings pile, or on-site disposal trenches.

Past seepage from the tailings pile has contaminated shallow site groundwater in the Upper Sand and Main Sand aquifers beneath the site. From about 1980 to the mid-1990s, Petrotonics pumped pore water from the tailings pile and shallow aquifers to reduce seepage and control downgradient migration of contaminants. Although pumping removed significant volumes of contaminants from tailings pore water and the aquifers, groundwater quality improved only slightly during 15 years of active remediation. The extensive pumping

essentially dewatered the tailings pile and the Upper Sand aquifer, and well yields decreased to the point that recovery of contaminants was no longer effective. Further studies indicated that continued pumping of the Main Sand aquifer would not reduce contaminant concentrations to established standards.

Compliance Strategy

In 1996, Petrotomics applied to NRC for alternate concentration limits for the contaminants of concern. After amendments to the application, NRC concurred with the request and approved alternate concentration limits in 1998 for cadmium, chromium, lead, nickel, radium-226, radium-228, selenium, thorium-230, and uranium. Alternate concentration limits may be adopted within specified areas when established concentration limits are unattainable and the alternate limits will not pose a present or potential future hazard to human health and the environment.

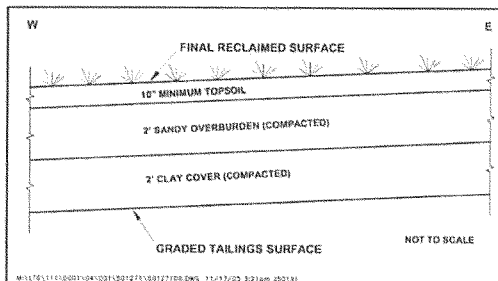
A groundwater monitoring network will be sampled annually to verify compliance with alternate concentration limits and other designated groundwater protection standards. Noncompliant results will be addressed in accordance with the site-specific Long-Term Surveillance Plan to ensure protectiveness of human health and the environment.

Disposal Cell Design

The objective of the tailings impoundment cover is to isolate the uranium mill tailings from the surrounding environment. To be effective, the cover must reduce radon gas emissions to rates below regulatory standards, minimize infiltration of precipitation that could potentially leach contaminants into the subsurface, and physically contain the contaminated materials to prevent dispersion.

The tailings cover consists of 2 feet of compacted clay, 2 feet of compacted sandy overburden, and a minimum of 10 inches of topsoil. The topsoil was seeded primarily with grasses that are well adapted to the area. The tailings cover was sloped to shed water to discharge points that are protected by riprap. A surface water diversion system, consisting of a combination of contoured surfaces and drainage and collection channels, is designed to divert rainwater away from the disposal cell. Riprap armor was placed on steeper slopes and flow concentration points where flow velocities would have the potential to erode the tailings encapsulation surfaces.

The disposal cell encapsulates 6.3 million tons (about 4.5 million cubic yards) of tailings, which contain 974 curies of radium-226.



West-East Cross Section of the Shirley Basin South Disposal Cell

Legacy Management Activities

DOE manages the disposal site according to a site-specific Long-Term Surveillance Plan to ensure that the disposal cell systems continue to prevent release of contaminants to the environment. Under provisions of this plan, DOE conducts annual inspections of the site to evaluate the condition of surface features, performs site maintenance as necessary, and monitors groundwater to ensure the continued integrity of the disposal cell. The encapsulated materials will remain potentially hazardous for thousands of years.

In accordance with 40 CFR 192.32, the disposal cell is designed to be effective for 1,000 years to the extent reasonably achievable and, in any case, for at least 200 years. However, the general license has no expiration date, and DOE's responsibility for the integrity of the Shirley Basin South Disposal Site will last indefinitely.

Contacts

Site-specific documents related to the Shirley Basin South Disposal Site are available on the DOE Office of Legacy Management website at http://www.lm.doe.gov/shirley_basin/Sites.aspx.

For more information about DOE Legacy Management activities at the Shirley Basin South Disposal Site, contact

U.S. Department of Energy
Office of Legacy Management
2597 Legacy Way, Grand Junction, CO 81503
(970) 248-6070 (monitored continuously), or
(877) 695-5322 (toll-free)

U.S. DEPARTMENT OF
ENERGYLegacy
Management

Spook, Wyoming, Disposal Site

FACT SHEET

This fact sheet provides information about the Uranium Mill Tailings Radiation Control Act of 1978 Title I disposal site located at Spook, Wyoming. The site is managed by the U.S. Department of Energy Office of Legacy Management.

Site Description and History

The Spook Disposal Site is a former uranium-ore upgrading facility in Converse County, Wyoming, about 32 miles north of Glenrock. The site is located on a 14-acre tract of land surrounded by large, privately owned sheep and cattle ranches.

Wyoming Mining and Milling Company operated the facility from 1962 until 1965 to upgrade uranium ore to a concentrated slurry precipitate before shipment to the Western Nuclear Mill at Jeffrey City, Wyoming. The upgrading operations created process-related waste and radioactive mill tailings, a predominantly sandy material. Initially, the mill tailings were placed on the surface at the millsite or into an open-pit mine. The solutions used in the milling process were disposed of on the tailings pile and in an acid pond located 1,500 feet south of the mill.

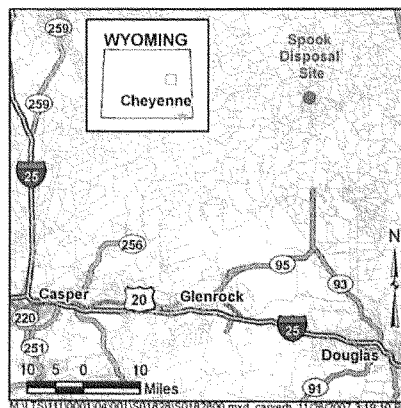
The U.S. Department of Energy (DOE) encapsulated the contaminated materials in the bottom of an open-pit uranium mine at the millsite in 1989. The State of Wyoming Abandoned Mine Lands Program participated in filling the open pit mine and restoring the surface to its pre-mining condition.

Regulatory Setting

Congress passed the Uranium Mill Tailings Radiation Control Act (UMTRCA) in 1978 (Public Law 95-604) and DOE remediated 22 inactive uranium-ore processing sites under the Uranium Mill Tailings Remedial Action Project in accordance with standards promulgated by the U.S. Environmental Protection Agency in Title 40 Code of Federal Regulations (CFR) Part 192. Cleanup of contaminated groundwater at the processing sites was regulated by Subpart B of 40 CFR 192. The radioactive materials were encapsulated in U.S. Nuclear Regulatory Commission-approved disposal cells. The U.S. Nuclear Regulatory Commission general license for UMTRCA Title I sites is established in 10 CFR 40.27. The Spook Disposal Site was included under the general license in 1993.

Disposal Site

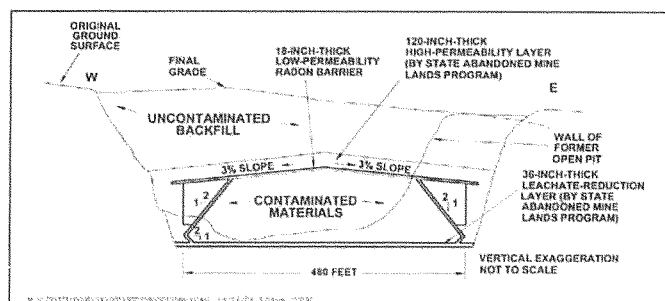
The Spook Disposal Site is unique among UMTRCA sites because the disposal cell is completely buried.



Location of the Spook Disposal Site

The other disposal cells are surface impoundments. An open-pit uranium mine, approximately 1,600 feet long, 500 feet wide, and 100 feet deep, was located adjacent to the former upgrading plant. Contaminated materials, including mill tailings, pond sludge, and building debris, were encapsulated in the south-central part of the mine excavation. The cell contains approximately 315,000 cubic yards of contaminated materials with a total activity of 125 curies of radium-226. Stockpiles of overburden materials around the perimeter of the mine were used to fill the pit after the disposal cell was completed.

Groundwater occurs beneath the site in two sandstone aquifers in the Tertiary Age Wasatch Formation. The upper and lower aquifers are separated by thick silty shale, and the aquifers have no observed hydraulic connection. Water quality in the upper aquifer is affected by naturally occurring mineral deposits that contain uranium and selenium in concentrations exceeding maximum concentration limits in 40 CFR 192. A plume of groundwater in the upper



West-East Cross Section of the Spook Disposal Cell

aquifer with milling-related contamination extends approximately 2,500 feet downgradient of the pit. Chromium, nitrate, radium, selenium, and uranium concentrations in the plume exceed background groundwater concentrations. Groundwater in the lower aquifer has not been contaminated.

Because of poor quality and low yield, groundwater from the upper aquifer is not a current or potential source of drinking water in the vicinity of the Spook site. Several wells in the area tap the lower aquifer, which is not affected by the milling operations or natural mineralization.

Compliance Strategy

The groundwater compliance strategy for the uppermost aquifer at the Spook site is no remediation with application of supplemental standards. Supplemental standards may be applied at locations where groundwater is classified as limited use (not a current or potential source of drinking water) because it meets any of several criteria. At the Spook site, groundwater is classified as limited use because of widespread ambient contamination not related to milling activities that cannot be cleaned up using treatment methods reasonably employed in public water systems (40 CFR 192.11[e][2]). Naturally occurring uranium and selenium in the aquifer exceed maximum concentration limits in 40 CFR 192. Because the upper aquifer is contaminated by naturally occurring minerals, groundwater monitoring is not required.

Disposal Cell Design

The disposal cell occupies approximately 5 acres of the 14-acre tract of land. The floor of the open-pit mine was leveled and a 3-foot-thick layer of low-permeability material was placed in the bottom of the pit. The pit was backfilled with contaminated materials to within 45 feet of the surface, and the top was sloped 3 percent. The cover of the polygonal disposal cell is a multi-component system designed to encapsulate and protect the contaminated materials. The disposal cell

cover consists of (1) a low-permeability radon barrier (first layer placed over compacted tailings), which consists of clayey soil, and (2) a layer of high-permeability material to minimize infiltration. The surface was graded to blend with the surrounding topography to protect the site from erosion. Disturbed areas have been successfully revegetated with native grasses and shrubs.

Legacy Management Activities

DOE manages the disposal site according to a site-specific Long-Term Surveillance Plan. Under provisions of this plan, DOE conducts annual inspections of the site to evaluate the condition of surface features and performs site maintenance as necessary.

In accordance with 40 CFR 192.32, the disposal cell is designed to be effective for 1,000 years, to the extent reasonably achievable, and, in any case, for at least 200 years. However, the general license has no expiration date, and DOE's responsibility for the safety and integrity of the Spook disposal cell will last indefinitely.

Contacts

Site-specific documents related to the Spook Disposal Site are available on the DOE Office of Legacy Management website at <http://www.lm.doe.gov/spook/Sites.aspx>.

For more information about the DOE Office of Legacy Management activities at the Spook Disposal Site, contact

U.S. Department of Energy
Office of Legacy Management
2597 Legacy Way, Grand Junction, CO 81503
(970) 248-6070 (monitored continuously) or
(877) 695-5322 (toll-free)

July 29, 2011

Jeff Bingaman
703 Hart Senate Office Building
Washington, DC 20510

Tom Udall
110 Hart Senate Office Building
Washington, DC 20510

Martin Heinrich
1505 Longworth House Office Building
Washington, D.C. 20515

Ben R. Lujan
502 Cannon HOB
Washington, D.C. 20515

Steve Pearce
1007 Longworth HOB
Washington, D.C. 20515

Lisa Jackson, Administrator
U.S. Environmental Protection Agency
Ariel Rios Building^[1]
1200 Pennsylvania Avenue, N.W.^[2]
Washington, DC 20460^[3]

Sai Appaji
USEPA Region 6
1445 Ross Ave., Suite 1200
Mail Code 6SF-LT
Dallas TX 75202-2733

David Martin, Secretary
New Mexico Environment Department
Harold Runnels Building
P.O. Box 26110
Santa Fe, NM 87502

Jerry Schoeppner, Angelo Orтели, Dana Bahar
New Mexico Environment Department,
Superfund Oversight, Groundwater Bureau
1190 St. Francis Dr. Suite N2350
Santa Fe, NM 87505

Dear New Mexico Congressional Delegation and H/BG Regulators:

On behalf of the Bluewater Valley Downstream Alliance, a community impacted by the Homestake/Barrick Gold Corporation's Uranium Mill Tailings Superfund site near Milan, New Mexico, I am writing to update you on our latest meeting with the US Environmental Protection Agency, the US Nuclear Regulatory Commission, and the New Mexico Environment Department. We are also submitting this letter as testimony in the hearings before Senator Udall's Subcommittee on **Children's Health and Environmental Responsibility** of the Senate Environment and Public Works Committee. Again, we look to you, our official representatives, to help us solve this problem.

Senator Udall's hearings are a good example of why our community relies on you. Word of these hearings came to us suddenly and unexpectedly. We have organized to the point that, financially, we might now be able to send representatives to present our testimony to you in person. However, because we are working class citizens, we have jobs and need notice of these hearings or need your help when sufficient notice is not given.

History. To remind you what has been taken from us:

- Our wells—Homestake/Barrick Gold contaminated our drinking water. Who knows how long families were exposed to the contaminated water before they were connected to a cleaner community water supply. We now pay for water we used to have for the cost of pumping. Some families were not connected to clean water until just recently, when BVDA finally forced the United States Environmental Protection Agency (EPA) and the New Mexico Environment Department (NMED) to test area wells again and prove what we knew—that the contamination had spread. Again, who knows how long these additional families were exposed to contaminated water. Remember, too, that New Mexico has lost over a million acre feet of water as a result of uranium mining in our area. These are critical resources that must be restored to our state for future generations.
- Radon—Because the Nuclear Regulatory Commission (NRC) has colluded with Homestake/Barrick Gold and has allowed the company to simply pretend to remediate this site for over 30 years now, our community has been exposed to much higher levels of radon under NRC guidelines than would have been allowed under EPA regulations. Recently, many of us received reports from the EPA that our houses are contaminated with radon and we need to hire contractors to remediate this situation. One of the recommended EPA contractors estimated the price of remediation for my home would be over \$5,000. Many in our community will not be able to afford this. My husband and I plan to do the work ourselves, and hope for the best. Again, who knows how long our families have been exposed to these dangerous radon levels and how much longer they will have to be exposed due to a lack of financial resources.
- Health effects—Despite the clear risks to our health, there have been no epidemiological studies conducted in our community. BVDA did an informal health survey and found high incidences of cancer and other diseases. After over 30 years of exposure, the EPA is finally conducting a risk assessment of our community, but this is not a health study. In the past, we have been told a health study would be impossible because many in our community worked in the uranium mines and there would be no way to tell if the health effects were from exposure from the tailings pile or past worker exposure. We believe no one wants to know what the health effects have been for our community because then someone would be expected to take responsibility. Ours is a history of regulatory agencies making excuses for the responsible parties and each agency trying to pass the responsibility to another agency.

Moving forward. Currently, there may be a window of opportunity. We recently met with officials from the NMED and EPA. These officials verbally committed to two things:

1. **Finding a mechanism for studying how to move the tailings pile to a safe, permanent location.** One or several regional repositories are needed for removal of our waste (EPA Region 6) and for removal of the Red Water Pond Road contamination (EPA Region 9) and possibly other sites. This would keep the tailings pond from leaking in our community and continuing to contaminate

groundwater for hundreds of years and would eliminate radon risks. It would also provide much-needed jobs for the communities.

2. **Meeting with BVDA and our Congressional Delegation to explain what prevents them, as regulators, from forcing full cleanup.** Full cleanup would not bring back our health, but it would bring peace of mind for the future. It could bring much-needed jobs and would allow our elders to die knowing future generations might be able to carry on the traditions we hold dear in this rural community. If you, as our elected officials, understood what was holding the regulators back, we feel certain you could and would help us solve this incredible injustice.

Our community's problems with toxic waste seem technically complicated. However, we believe there is a very simple solution. The uranium tailings pile should be slurried, conveyed, or otherwise moved out of our community to a safe, permanent location that could be perpetually maintained. The currently contaminated groundwater would then be cleaned to pre-mining and milling conditions. It really is as simple as that. With the current price of gold, this multi-billion dollar company can afford this solution. You could begin this process by planning a meeting between all of you, us, NMED, and USEPA. We are reasonable people, but waiting over 30 years for a cleanup is unacceptable.

BVDA, in alliance with MASE (Multicultural Alliance for a Safe Environment) and other regional environmental groups, implores this committee and the recipients of this letter to help our community attain justice and protect our health. We have no way of knowing how our own health, the health of our children, and the health of future generations may have been affected by over 30 years of exposure to radon and contaminated water. We are willing to simply move forward and seek a permanent solution to this injustice. Once more, we are asking for our government's help. Please do not deny us again.

Sincerely,

Candace Head-Dylla, President
 Bluewater Valley Downstream Alliance
 # 6 Ridgerunner Rd.
 Grants, NM 87020
 cheaddylla@gmail.com
 505-401-4349

Senator UDALL. Thank you very much for your testimony.
Mr. Woolford, please go ahead.

**STATEMENT OF JAMES WOOLFORD, DIRECTOR, OFFICE OF
SUPERFUND REMEDIATION AND TECHNOLOGY INNOVA-
TION, OFFICE OF SOLID WASTE AND EMERGENCY RE-
SPONSE, U.S. ENVIRONMENTAL PROTECTION AGENCY**

Mr. WOOLFORD. Mr. Chairman, Senator Barrasso, my name is James Woolford. I am Director of the Office of Superfund Remediation and Technology Innovation at the U.S. Environmental Protection Agency.

Thank you for the opportunity to provide an overview of the status of EPA's efforts in addressing legacy uranium mining contamination on Navajo and other lands, and EPA's efforts related to uranium in situ recovery operations. I am accompanied today by my colleagues from EPA's Office of Groundwater and Drinking Water and from EPA's Office of Radiation and Indoor Air, who will be available to answer questions related to the agency's air and water programs referenced in my testimony.

Decades of uranium mining in Arizona, New Mexico and Utah, primarily on Navajo Nation land, have left a legacy of uranium contamination, including more than 600 abandoned uranium mines, dozens of homes built with contaminated mine waste rock and contaminated groundwater wells. EPA has led the development and implementation of a coordinated Federal plan to address the uranium legacy on the Navajo Nation.

The 5-year plan was developed in 2008 in conjunction with the Bureau of Indian Affairs, the Indian Health Service, Centers for Disease Control, Department of Energy, the Nuclear Regulatory Commission and the Navajo Nation. We are now in the fourth year of implementing that plan. The 5-year plan outlines, among other items, the Federal commitments to address contaminated homes, water sources and abandoned uranium mines.

EPA maintains a strong partnership with the Navajo Nation, and since 1994, EPA has provided technical assistance and funding to assess potentially contaminated sites and develop and implement response actions. Since October 2007, USEPA and Navajo EPA have assessed 683 structures, 240 unregulated water sources and 452 abandoned uranium mines. The agencies plan to complete the screening of the remaining mines by the end of 2011 and identify and prioritize response actions for the highest risk mines sites.

In addition, 33 contaminated homes and other structures have been demolished, and 14 replacement homes have been constructed. We have identified 28 uranium contaminated wells and water systems have been built for more than 300 residents to replace contaminated water supplies.

Last week, EPA released its cleanup plan for the Northeast Church Rock Mine in Northwestern New Mexico, which is the largest abandoned uranium mine site in the Navajo Nation. EPA also uses its enforcement authorities to address contaminated sites, and we have taken enforcement actions against five responsible parties and cleanup work has begun at four sites. Additional actions are planned.

In addition to the Federal 5-year plan to address uranium legacy mining on Navajo lands, EPA and other Federal agencies developed a 5-year plan with New Mexico in 2010 to address releases from legacy uranium mining and milling operations in the Grants Mining District in New Mexico.

I would like to quickly mention the USEPA's efforts related to in situ uranium recovery. There is growing interest in developing uranium mining sites in several States due to significant increases in the price of uranium. In situ leaching, or ISL, uses injection wells to introduce alkaline fluids into underground formations to mobilize uranium in the groundwater. Production wells subsequently bring the uranium-bearing fluids to the surface where they are processed for use by the nuclear industry. The Office of Radiation and Indoor Air is the lead EP office for this effort.

EPA shares authority with the NRC and with States in overseeing operations at ISL leaching facilities. However, if the operation is occurring on Federal lands, the Federal Land Management Agency will also have a role. NRC and agreement States regulate ISL operations, including the injection of fluids using environmental radiation and groundwater protection standards developed by EPA in accordance with the Uranium Mill Tailings Radiation Control Act.

In 2010, the agency began an effort to review our regulations for uranium and thorium to determine if they should be updated. In the meantime, NRC has deferred its own regulatory effort while EPA continues its regulatory review.

EPA's Office of Radiation and Indoor Air requested the agency's science advisory board conduct an advisory review to provide scientific and technical advice on ISL post-closure groundwater monitoring issues. Those efforts are ongoing. EPA, NRC, States and as appropriate Federal land management agencies, will continue to work together to coordinate our regulatory efforts.

Thank you, Mr. Chairman. This concludes my remarks. I or one of my EPA colleagues would be pleased to answer any questions regarding EPA's efforts related to uranium legacy mining or recovery issues.

[The prepared statement of Mr. Woolford follows:]

**Testimony of James Woolford
Director
Office of Superfund Remediation and Technology Innovation
Office of Solid Waste and Emergency Response
U.S. Environmental Protection Agency
Before the
Subcommittee on Children's Health and Environmental Responsibility
Committee on Environment and Public Works
United States Senate**

October 6, 2011

Mr. Chairman and Members of the Subcommittee, my name is James Woolford. I am Director of the Office of Superfund Remediation and Technology Innovation at the U.S. Environmental Protection Agency (EPA). Thank you for the opportunity to provide an overview of the status of the EPA's efforts in addressing legacy uranium mining contamination on Navajo and other lands, and Agency efforts related to uranium *in-situ* recovery operations.

BACKGROUND – URANIUM MINING LEGACY ON NAVAJO LANDS

From 1944 to 1986, nearly four million tons of uranium ore were extracted from lands in Arizona, New Mexico and Utah, primarily on Navajo Nation land. Today the mines are closed, but a legacy of uranium contamination remains from more than 600 abandoned uranium mines, homes built with contaminated mine waste rock, and contaminated water wells. Chronic human exposure to these contaminants could pose a variety of health risks, including lung cancer, bone cancer, and impaired kidney function.

FIVE-YEAR PLAN FOR NAVAJO NATION LANDS

EPA has led the development and implementation of a coordinated Federal plan to address the uranium legacy on the Navajo Nation. This federal Five-Year Plan was developed in 2008 in conjunction with the Bureau of Indian Affairs, Indian Health Service, the Agency for Toxic Substances and Disease Registry, Department of Energy, Nuclear Regulatory Commission (NRC), and the Navajo Nation. We are now in the federal Five-Year Plan's fourth year of implementation. A map identifying legacy uranium mining sites on the Navajo Nation is included as an attachment to my testimony. The federal Five-Year Plan outlines the federal commitments to address contaminated homes, water sources, and abandoned uranium mines, and lays out a framework for addressing the highest risks while gaining a solid understanding of longer-term problems.

EPA maintains a strong partnership with the Navajo EPA, and, since 1994, EPA has provided technical assistance and funding to assess potentially contaminated sites and develop a response, including demolition and replacement of contaminated homes. Since October 2007, U.S. EPA and Navajo EPA have assessed 854 structures, 240 wells, and 452 abandoned uranium mines to determine threats to residents. In addition, 34 contaminated homes and other structures have been demolished, and 28 uranium-contaminated water sources have been identified. The EPA is building water systems for more than 300 residents living near contaminated water supplies. The EPA has also built 14 replacement homes and expects to complete three more in fall 2011. U.S. EPA Region 9 has issued enforcement actions against five responsible parties, and has begun cleanup work at four of the highest risk abandoned uranium mines. The Agencies plan to complete the screening of remaining mines by the end of 2011, identify and prioritize

response actions for the highest risk mines, and continue to identify additional parties responsible for site cleanup.

FIVE-YEAR PLAN FOR NON-TRIBAL LANDS

In addition to the federal Five-Year Plan to address legacy uranium mining on tribal lands, EPA, the Agency for Toxic Substances and Disease Registry, the Department of Energy, the Nuclear Regulatory Commission (NRC), the Department of the Interior, and the State of New Mexico developed a Five-Year Plan in 2010 that lays out the goals, objectives, and tasks for multiple agencies to assess and address health risks and environmental impacts resulting from the extraction, processing, disposal, and releases from legacy uranium mining and milling activities in the Grants Mining District in New Mexico. While the Grants Mining District has been the primary location of uranium mining historically, there are additional legacy uranium mines located throughout New Mexico. In deciding which uranium mines to investigate and prioritize, the New Mexico Five-Year plan focuses on legacy uranium mines with reportable production and mining activities with surface disturbances. There are 97 legacy uranium mines in the district with the potential for physical hazards such as open adits and shafts, and for potential releases to soil, surface water, and ground water.

Within the Grants Mining District, there are also five legacy uranium milling sites. Four are located in the Ambrosia Lake sub-district and one in the Laguna sub-district. The Homestake Mining Company site and the Ambrosia Lake-Rio Algom Mill sites are currently under the jurisdiction of the NRC until reclamation is complete. The Department of Energy is responsible for the long-term surveillance, maintenance and ground water monitoring at the Ambrosia Lake-Phillips Mill site, the Anaconda Bluewater Mill site, and the L-Bar Mill site since reclamation activities have been completed.

Agencies have completed 66 site screenings of legacy uranium mines, completed an Engineering Evaluation and Cost Analysis for the San Mateo Mine located on U.S. Forest Service land and created a technical workgroup with representatives from state and federal agencies to develop a characterization protocol for legacy uranium mine sites and cleanup criteria. Site screenings for the remaining 31 legacy uranium mines are scheduled for completion in fall 2011.

The agencies also plan to complete more detailed assessments on at least seven previously screened mines to determine the impact from mining activities, assess radiation levels at two mine sites located on Bureau of Land Management property, conduct emergency action at mine sites when warranted due to releases to the environment or physical hazards, and prioritize all remaining sites and determine appropriate action.

IN-SITU RECOVERY OF URANIUM

There is growing interest in developing uranium mining sites in several states due to significant increases in the price of uranium. In the U.S., uranium has been mined through conventional open pit and underground mining practices. However, most of the uranium extracted in the U.S. is now produced by *in-situ* leaching. This practice uses injection wells to introduce alkaline fluids into underground formations to mobilize uranium into the ground water. Production wells subsequently bring the uranium-bearing fluids to the surface, where they are processed into “yellowcake” for use by the nuclear industry. EPA understands that there are states, tribes and communities concerned about the potential development of new uranium in-situ leaching mining operations. EPA will work with our federal partners and state co-regulators to ensure that these practices do not adversely impact ground water resources.

EPA shares authority with NRC and with the states in overseeing operations at *in-situ* leaching facilities. However, if the operation is occurring on federal lands, the federal land management agency will also have a role. NRC and Agreement States regulate *in-situ* leaching facility operations, including the injection of fluids, using environmental, radiation, and ground water protection standards developed by EPA in accordance with the Uranium Mill Tailings Radiation Control Act (UMTRCA). In addition to NRC requirements, operators of injection wells used at *in-situ* leaching facilities also must apply for and receive a Class III well permit and if needed, a Class I well permit for disposal of fluids, under the authority of the Safe Drinking Water Act's Underground Injection Control (UIC) program requirements. Permits for Class III solution mining wells are issued either by EPA or the authorized state UIC agency in those states that have been granted primary enforcement responsibility for the UIC program, which in New Mexico is the New Mexico Environment Department. State UIC programs may have requirements that are more stringent than EPA requirements.

In 2009, NRC started to develop ground water regulations for *in-situ* leaching operations to improve the current guidance and licensing approach. EPA worked with NRC to help ensure that revisions would incorporate EPA regulatory requirements developed under UMTRCA and be consistent with EPA regulations for RCRA and Class III injection wells. In 2010, EPA began an effort to review our own regulations regarding uranium recovery operations. NRC has deferred its regulatory effort while EPA continues our regulatory review. In addition, the EPA has convened the Agency's Science Advisory Board to request scientific and technical advice on *in-situ* leaching post-closure ground water monitoring issues. EPA, NRC, states, and if relevant, federal land management agencies, will continue to work together and coordinate our regulatory efforts.

EPA or state UIC programs will continue to maintain responsibility for permitting *in-situ* leaching injection wells. Permits include requirements based on the siting of wells, construction standards, operational practices, monitoring and reporting, closure, financial responsibility, and cleanup. Current NRC guidance and licenses require operators to take action to prevent off-site excursions of fluids used in uranium production into ground water aquifers during operations, and to restore ground water after operations are completed.

CONCLUSION

EPA will continue to work with its federal, state, and tribal partners in addressing sites contaminated from abandoned uranium mines and will continue to identify parties responsible for site cleanup. Efforts are underway under both the Five-Year Plan for Navajo Lands and Five-Year Plan for non-tribal lands. EPA will continue its regulatory work with NRC to help ensure that *in-situ* leaching injection and recovery operations are protective of groundwater resources. EPA remains firmly committed to protecting public health and the environment by addressing the environmental effects of legacy uranium mines. We will continue to work closely with our Navajo and other federal, state and local partners on this important matter.

**The Senate Committee on Environment and Public Works
Post Hearing Questions and Answers for the Record from the
Oversight Hearing on Federal Actions to Clean up Contamination from
Uranium Mining and Milling Operations**

1. Homes

Q 1a: *How many homes have been screened for radioactive contamination in both the Navajo Nation and the Grants Mineral Belt?*

A 1a: The U.S. Environmental Protection Agency (EPA or the Agency) Region 9 and the Navajo Nation Environmental Protection Agency have screened 683 homes for radioactive contamination on Navajo Nation land. EPA Region 6 has screened 451 homes for radioactive contamination in the Grants Mineral Belt.

Q 1b: *How many more homes do you expect to screen during the current five-year plans?*

A 1b: In the current Five-Year Plan, EPA Region 9 and the Navajo Nation Environmental Protection Agency expect to screen at least 100 more homes on Navajo land. EPA Region 6 plans to screen 250 structures during the current Five-Year Plan in the Grants Mineral Belt.

Q 1c: *How many homes have been demolished due to contamination in areas covered by the Navajo Nation and the Grants Mining District Five-Year Plans?*

A 1c: Due to radioactive contamination, 34 homes have been demolished on Navajo Nation land. EPA Region 9 has rebuilt 10 homes in that area. EPA Region 6 has not demolished any homes in the Grants Mineral Belt.

2. Water

Q 2a: *How many wells have been screened for radioactive contamination in both the Navajo Nation and the Grants Mineral Belt?*

A 2a: EPA Region 9 screened 250 wells on the Navajo Nation land for radioactive contamination. EPA Region 6 has screened 123 wells in the Grants Mineral Belt for radioactive contamination.

Q 2b: *How many more wells do you expect to screen during the five-year plans?*

A 2b: Neither EPA Region 9 nor Region 6 expect to screen additional wells as part of the Five-Year Plan. However, Regions 6 and 9 will respond to requests as needed.

Q 2c: *How many wells have been closed in both the Navajo Nation and the Grants Mineral Belt?*

A 2c: EPA Region 9 has permanently closed 3 contaminated wells on the Navajo Nation land. Regarding wells located on non-Navajo land, the State of New Mexico has sent letters to the owners of all wells that exceed drinking water standards providing precautionary information and recommendations for using public water supplies or bottled water for consumption. No owner of private wells in the Grants Mineral Belt has requested that EPA close wells that exceed drinking water standards.

Q 2d: *It is my understanding that some of these contaminated wells are still open for use for livestock at the request of local residents. Is the health of these animals being monitored and what has any monitoring shown about risk?*

A 2d: The use of water sources on Navajo Nation land is generally addressed by local chapters. EPA is not monitoring animals at this time on the Navajo Nation land or in the Grants Mineral Belt. Studies in other locations have indicated that health risk to animals or humans consuming animals is not a concern at the levels of uranium present in the associated wells.

3. Abandoned Mines

It is my understanding that there are at least 500 abandoned uranium mining sites in the Navajo Nation and potentially as many in the State of New Mexico and surrounding states.

Q 3a: *Does the federal government have a complete understanding of the number and location of all abandoned uranium mines nationwide?*

A 3a: EPA has compiled mine location information from Federal, state and tribal agencies into a single national database as part of its investigation into the potential environmental hazards of wastes from abandoned uranium mines. The information in this database primarily focuses on uranium mines in the western

continental United States, where most of the abandoned uranium mines are located. From this dataset, the Agency found that about 75% of the uranium mines and mills are located on Federal or tribal lands. This Uranium Location Database Compilation, designed for use with geographic information system (GIS) software, is available to the public. To download the database and supporting documentation, please visit our website at: <http://epa.gov/radiation/tenorm/pubs.html>

Q 3b: *What is the range in size, contamination level, and threat to public health of these mines?*

A 3b: The Superfund program has listed two abandoned uranium mines on the National Priority List (NPL). The site name, size, and contaminants posing potential threats to public health at these sites are provided in the attached Table 1 as follows:

Table 1: Uranium Mining Sites on the National Priorities List ¹

SITE NAME	State	Site Size	Contaminants of Concern
MIDNITE MINE	Washington	140 acres	uranium, radium, radon, arsenic
FREMONT NATIONAL FOREST/WHITE KING AND LUCKY LASS URANIUM MINES (USDA)	Oregon	350 acres	uranium, radium, radon, lead

Federal land management and regulatory agencies such as the Department of the Interior and Department of Agriculture are responsible for assessing and addressing abandoned uranium mines and mills under their jurisdiction and not listed on the NPL.

Q 3c: *What is the EPA's long-term plan for ensuring safe closure of the hundreds of abandoned uranium mines?*

A 3c: The safe closure of abandoned mines in general and uranium mines in particular is a national problem. Solving the issues associated with abandoned uranium mines will involve the collaboration of Federal, state and tribal agencies, with multiple authorities and resources. EPA intends to use its available tools, including statutory authorities under CERCLA and the Clean Water Act, as well as policy and guidance documents developed by EPA's Abandoned Mine Lands

¹ The table does not include the six uranium mill sites that have been listed on the NPL.

Program to address some of the highest priority problems associated with abandoned uranium mines. For example, EPA Region 6 and 9 have Five-Year Plan strategies to assess and, if needed, address uranium contamination from mining operations on public, private and tribal lands. Additional information on the Region 6 Five-Year Plan can be found at:
http://www.epa.gov/region6//6sf/newmexico/grants/nm_grants_5yr_plan.pdf
 For details regarding EPA Region 9's current work on the Navajo Nation as part of the 5-Year Plan, please see the attached link.
<http://www.epa.gov/region9/superfund/navajo-nation/index.html> .

Q 3d: *Does the EPA have a long-term or comprehensive plan to address the thousands of abandoned mines and contaminated mill sites in the United States?*

A 3d: In general, EPA under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) addresses contaminated mining sites in the same manner as other contaminated sites. If EPA becomes aware of concerns related to a mining site, through citizen complaints, state requests or federal land manager information, EPA will assess that site and take action when necessary. EPA addresses the highest priority sites as those posing the greatest risks or potential risks, regardless of the type of site.

4. Responsible Parties

The Superfund law provides authority for EPA to seek cleanup costs from responsible parties and the successor companies to those responsible parties.

Q 4a: *When did EPA begin seeking responsible parties to ensure the cleanup of abandoned uranium mines?*

A 4a: The Agency has been identifying potentially responsible parties (PRPs) for a number of years. EPA Region 9 began identifying PRPs in 2001. More recently, in 2008, Region 9 sent CERCLA 104(e) letters to 10 companies requesting information, such as leases, maps, and disposition of waste that could establish when and where they may have mined on the Navajo Nation. To date, the region is working with four PRPs through administrative orders to clean up abandoned uranium mines. Region 9 is currently also evaluating information on mine leases and supplementary information to help identify additional PRPs. Region 6 began a process to identify PRPs in the Grants Mineral Belt in late 2009. Region 6 researched the operational histories of mines in its jurisdiction in 2010, which led

to the issuance of CERCLA 104(e) letters requesting information on ownership history of the mine, historical mining operations, and corporate history of the owners and operators to 5 PRPs in 2011. The efforts to identify additional parties throughout the mining district will continue.

Q 4b: *How many responsible parties are involved and how much are they contributing to cleanup?*

A 4b: Currently, EPA Region 6 is working with one responsible party for the cleanup of a uranium mine, but no PRP work or monetary contributions have yet been made. EPA Region 6 will continue its enforcement process of collecting information from PRPs regarding ownership, mine operations, and related data to identify responsible parties. This information will determine whether PRPs have liability for an abandoned mine and responsibility for any cleanup.

EPA Region 9 is currently working with three PRPs on mine sites (Rio Algom, Chevron, and United Nuclear Corporation/General Electric (UNC/GE)) and with the Bureau of Indian Affairs on the Tuba City Dump. The PRPs have expended approximately \$12 million for work at contaminated sites to address cleanup and assessment activities. The work conducted at this point, has included site assessment efforts for Rio Algom, Chevron and the BIA. UNC/GE expended the majority of the \$12 million, which was used to clean up contaminated areas near residences at the Northeast Church Rock site (NECR). In addition, a bankruptcy settlement with Tronox/Kerr McGee provided \$13.2 million for the cleanup of abandoned mine sites.

Q 4c: *Is the EPA investigating any additional potentially responsible parties for further contribution to cleanup?*

A 4c: Yes, EPA is actively working to pursue additional responsible parties to pay for cleanup at abandoned mines.

5. Tuba City

It is my understanding that there is significant groundwater contamination at the site of the Tuba City Dump, and since 1995 there have been more than 35 studies conducted on the Tuba City Open Dump. I further understand that EPA Region 9 did a study of one

area of the dump, looking for waste that could be contributing to high levels of uranium in groundwater.

Q 5a: *Can you provide the committee with a copy of the EPA Region 9 study and findings on the Tuba City Open Dump?*

A 5a: Please find enclosed, the *Draft Data Summary Report: Soil Core Characterization, Tuba City Open Dump* and the *Resource Conservation and Recovery Act Enforcement, Permitting and Assistance Contract* report.

Q 5b: *What does the EPA believe is the source of contamination at the Tuba City Dump?*

A 5b: The Agency has not yet determined the source of uranium or other contaminants in groundwater near the Tuba City Open Dump.

Q 5c: *What is the plan for remediation of the dump, and are cleanup efforts underway at this point? What are the remaining hurdles to such action?*

A 5c: As of 2010, EPA is investigating and evaluating cleanup options for the Tuba City Dump using Superfund authorities. EPA is overseeing work by the BIA under an enforceable agreement to perform a Remedial Investigation and Feasibility Study (RI/FS), after which EPA plans to select a cleanup remedy. The Agency and BIA are performing this process, which will involve opportunities for public comment as well as input and coordination from representatives of the Hopi Tribe and the Navajo Nation, which are especially affected by this site. It is of primary concern to EPA to protect the health of residents using groundwater in this area, and to preserve the scarce water resources.

6. Northeast Church Rock

Q 6a: *Is there a responsible party engaged with EPA on cleanup of the Northeast Church Rock site?*

A 6a: Yes, United Nuclear Corporation is the responsible party working with EPA on the cleanup of the Northeast Church Rock site (NECR).

Q 6b: *What kind of a cost share was established between the responsible party and the federal government?*

A 6b: The cost share recently agreed to by the federal government and United Nuclear Corporation is apportioned at 33% and 67%, respectively, except if the Federal government conducts long-term operation and maintenance, the federal share will be reduced to 30%.

Q 6d: *Where are these families currently located, and what are the other options available for where they can move given that this is a very rural area with limited road and water infrastructure?*

A 6d: Families in the NECR area are currently located within 5 miles of the mine. While options in this area are limited, EPA is working with the residents, the Navajo Nation Environmental Protection Agency and the Navajo Nation Department of Justice, to develop housing options that are consistent with EPA's relocation guidance and the relevant relocation laws.

Q 6e: *Do you expect that waste from other sites will be stored in the Northeast Church Rock disposal cell as well?*

A 6e: EPA Region 9 plans to discuss the option of storing waste from other nearby sites at the NECR Mill site disposal cell with EPA Region 6, the Navajo Nation Environmental Protection Agency, the US Department of Energy, the Nuclear Regulatory Commission (NRC) and the United Nuclear Corporation.

7. Homestake Superfund site

It is my understanding that EPA and NRC have overlapping jurisdiction of the Homestake site, and work under an MOU. In June of this year the EPA sent a letter to the NRC outlining several instances where NRC is failing to comply with Superfund standards and are thus preventing EPA from ensuring compliance. One of the concerns expressed in the letter was regarding public consultation.

Q 7a: *Mr. Woolford, are the statutory requirements under the Superfund law for consultation with communities impacted by contamination and cleanup?*

A 7a: Section 117 of CERCLA, titled "Public Participation" requires before adoption of any plan for remedial action:

- 1) Publication of a notice of the proposed plan and making the plan available to the public; and
- 2) An opportunity for submission of written and oral comments and an opportunity for a public meeting.

Section 117 also requires publication of a notice of the final remedial action plan, and making the plan available to the public prior to beginning any remedial action. The final plan must include a discussion of any significant changes in the proposed plan, and a response to each of the significant comments received on the proposed plan. After adoption of the final remedial action plan, if there are any significant differences between the final plan and the actions taken, publication of an explanation of the significant differences and the reasons such changes are made is required.

Finally, Section 117 provides the authority for grants to any group of individuals, which may be affected by a release or threatened release at any facility listed on the NPL. The grants may be used to obtain technical assistance in interpreting information with regard to the nature of the hazard, RI/FS, record of decision, remedial design, selection and construction of remedial action, operation and maintenance, or removal at the facility.

Q 7b: *Does there continue to be groundwater contamination at the Homestake site and in the surrounding communities?*

A 7b: Yes, the private groundwater wells in the community near the Homestake site have contaminant concentrations above drinking water standards. However, in a settlement with the EPA, the Homestake Mining Company paid for infrastructure development that connected 86 affected homes in Broadview Acres, Felice Acres, Murray Acres and Pleasant Valley Estates to the Village of Milan's public drinking water system in 1985. In 2006, the EPA discovered more groundwater contamination in the neighboring community. As a result, under an agreement with the New Mexico Environment Department, the Homestake Mining Company connected an additional 13 homes to the Village of Milan's public drinking water system in 2010. There are approximately five remaining properties that require resolution of drinking water issue.

Q 7c: *What is the potential timeline for full cleanup of groundwater at the site?*

A 7c: The completion of the groundwater remedy is currently expected to occur by 2022.

Q 7d: *Is the current system of groundwater treatment extensive enough to fully address the problem?*

A 7d: While, the current remediation system is extensive, it will require additional enhancements to achieve the final cleanup goals. Homestake Mining Company is currently evaluating pilot studies to evaluate these enhancements. The EPA will continue to work with Homestake to ensure the most effective groundwater treatment. To ensure the long-term protectiveness of the remedy, EPA will review the site every 5 years.

8. Homestake Superfund site

Q 8a: *I believe the EPA is tracking indoor and outdoor radon at the Homestake Superfund site.*

A 8a: In November 2011, the EPA will complete a year-long sampling plan of indoor and outdoor radon at the Homestake site. The EPA will evaluate the data as part of the risk assessment for the nearby neighborhood.

Q 8b: *What is the status of radon in homes?*

A 8b: To date, EPA has identified 11 homes that exceed the EPA radon guidance for indoor air of 4 pico curie per liter.

Q 8c: *What is the source of elevated radon levels?*

A 8c: The source of elevated radon in indoor air has not been determined. Pinpointing the source of radon in indoor air is complex due to naturally occurring deposits of uranium. The EPA risk assessment will evaluate the extensive data collected in the neighborhood to ascertain the source of the elevated levels.

Q 8d: *How will elevated radon levels be addressed?*

A 8d: The EPA is currently evaluating options to mitigate the 11 homes identified affected by radon contamination.

9. Groundwater Protection Rules

Q 9a: *Please describe current state of the EPA process to update its groundwater protection rules under UMTCA for in-situ uranium recovery? When do you expect to issue draft and final rules?*

A 9a: In May 2010, EPA began an effort to review the regulations for uranium extraction facilities (40 CFR Part 192), particularly in light of new uranium recovery technologies (i.e., in-situ uranium recovery). EPA continues to review, and will potentially revise, the regulations for these facilities. Earlier this year the Agency's Science Advisory Board convened and was asked to supply expert knowledge on post-closure monitoring issues for in-situ uranium recovery. The expected date of release of the final Advisory Report is November 2011. EPA will take the Science Advisory Board's conclusions into account in assessing whether further rulemakings are necessary.

Q 9b: *Please describe the scope and nature of the aquifer exemption(s) granted by EPA for the HRI ISL project and how EPA and other regulatory agencies will ensure the maintenance and restoration of groundwater quality under that exemption?*

A 9b: The New Mexico Environment Department (NMED), implements the EPA approved Underground Injection Control (UIC) program that grants temporary aquifer designations for approved *in-situ* uranium mining operations. However, before a designation may take effect, NMED must submit to EPA a request for an aquifer exemption approval as a revision to its approved UIC program. In the case of Hydro Resources Inc.'s (HRI) proposed *Church Rock in-situ* uranium mining project, EPA approved a program revision request for an aquifer exemption on June 21, 1989, based on criteria found at 40 CFR 146.4.

The approved 1989 aquifer exemption covers a portion of the Westwater Canyon Aquifer. Based on the information now in its possession, EPA Region 6 understands that the exempted area is coextensive with the Southeast Quarter of Section 8 of Township 16N, Range 16W. That understanding is consistent with the views of HRI and NMED, and is the basis on which NMED is relying on in its current consideration of HRI's application for renewal of a Class III UIC permits that relate to in-situ uranium mining

NMED's Class III UIC permits require operational controls during mining, such as maintaining a monitoring well ring around the production area to prevent

offsite excursions. Post-mining restoration of an exempted aquifer is not a requirement of EPA's or the state's Class III UIC program. However, approved state programs, including NMED, commonly require any restoration actions to comply with the minimum federal plugging and abandonment requirements standard at 40 CFR 146.10(a)(4). At this site, NRC also requires restoration in accordance with corrective action standards at 10 CFR Part 40, which are NRC's conforming regulations to EPA's regulations at 40 CFR Part 192.

Senator UDALL. Thank you, and thanks to all three of you for your testimony today.

I don't know whether you all were involved or at the agencies when Congressman Waxman held his hearings back in 2007 over at the House. But the thing that was apparent then was that we had these massive cleanup problems and contamination problems, and there wasn't much coordination with the agencies. I think what grew out of those hearings that was very positive was the 5-year plan, all of your agencies including other agencies like the Bureau of Indian Affairs, came forward and participated in the development of those plans.

As we have seen, we have made some real progress. I think that has been noted in your testimony.

My first question really to each of you is, from your level in the agency, will you make the commitment to continue to do this until the job is done, until we get this cleanup done? Mr. Weber?

Mr. WEBER. We will certainly continue coordinating with our Federal colleagues as well as with the State of New Mexico and the Navajo Nation, within the scope of our authority. As you know, NRC is a regulatory agency. So we have specific authorization from the Congress to regulate the uranium recovery activities.

Mr. UDALL. We appreciate that, and we understand each of your agencies have overlapping responsibilities. But I think the important thing about this hearing is to have an understanding that you are going to work together and that we are going to move forward to get the job done as far as cleanup.

Mr. Geiser.

Mr. GEISER. Yes, sir, I actually had the opportunity to testify before Congressman Waxman on behalf of the Department. I totally agree with your statement, it really helped get all the agencies together in a coordinated manner.

The Department of Energy established the Office of Legacy Management in 2003 with the express purpose of having a long-term, sustainable management of closed sites. So today we have 87 sites around the Country that legacy Management is responsible for. Those include the former uranium mill sites that have been remediated and put in the Department's responsibility.

So the Department set up the office explicitly for that long-term purpose.

Senator UDALL. And you all are committed to move forward to get the job done on cleanup, and to work with the other agencies?

Mr. GEISER. Yes, sir.

Senator UDALL. Mr. Woolford, same question.

Mr. WOOLFORD. Thank you, Senator.

Recently, the Navajo Nation informed EPA that they intend to request a second 5-year review plan. I think we all are in agreement that those plans help us organize and prioritize our work. The agency plans to work with the Navajo Nation and our colleagues to put together that plan over the next year.

So yes, you have our commitment, Senator, that we will continue to do what is necessary here.

Senator UDALL. And for your agency perspectives, all three of you believe that an additional 5-year plan is probably going to be needed to get the job done out there? Mr. Weber?

Mr. WEBER. Yes, sir.

Senator UDALL. Why is that?

Mr. WEBER. There is a lot of work that remains to be done.

Senator UDALL. Mr. Geiser.

Mr. GEISER. I think another 5-year plan would be helpful to get all the different agencies' activities in one place. I don't anticipate it would actually change what we will do with respect to the Navajo Nation. But it helps to see what the other agencies are doing and making sure that we have the time and planning to coordinate.

Senator UDALL. Thank you. Mr. Woolford.

Mr. WOOLFORD. As Mr. Weber indicated, there is still a lot more work to be done. We think the next 5-year plan will help us identify the mining sites that need additional work, and work to coordinate among the Federal agencies and with the Navajo Nation. So yes, there is a lot more to be done, and I think we all see the necessity of having an additional 5-year plan.

Senator UDALL. Thank you very much.

Senator BARRASSO, I am going to turn to you now for your questioning.

Senator BARRASSO. Thank you, Mr. Chairman.

Mr. Geiser, you may not know the specifics, but with regard to the legacy uranium mill sites that I had mentioned, I don't know if you can explain how things are at the sites now, or if not, if you could get that information to me.

Mr. GEISER. Sir, I am somewhat familiar with the sites in Wyoming. I know we have three at this point, Riverton, Shirley Basin South and Spook. We have, I think the site that has risen to my attention in particular in Wyoming is the Rivertonsite. We have had a fairly long relationship with the Wind River Environmental Quality Council and the individual tribes of the Northern Arapaho and the Shoshone.

We recently put a new cooperative agreement in place with the Northern Arapaho for activities at Riverton. Unfortunately, the cooperative agreement we had with the Wind River Council was extended twice and has currently expired. Our intention is to continue to work with them and get a new cooperative agreement in place as soon as we can work through the remaining issue with them.

The primary institutional control that we installed was a drinking water supply system for the local population. We have had some problems with that we have worked on with the tribes. We currently believe that we are being protective of human health and the environment and we do have a commitment to continue to work with those tribes.

Senator BARRASSO. Thank you. If I could perhaps get in writing some of the followup on the other side. Thank you.

Mr. Weber, when I was making my opening statement, I saw you nodding in agreement. Could you describe for me some of the differences between today's uranium mining and mining that occurred back during the cold war?

Mr. WEBER. Certainly, sir. As I alluded to in my testimony, we learned the lessons from the early experiences with the legacy sites, primarily from the uranium recovery facility perspective. So if you look at the requirements that we have in place today and

that we actively enforce, they are in place to ensure protection of people and the environment.

If you take, for example, the 1979 failure of the embankment at the Church Rock site that Senator Udall referred to, our regulations today ensure that you are not going to see the same kind of dam failure that occurred back then. So we have made substantial progress, not only in ensuring the protection of people that work at the mills or that work in the nearby or live in the nearby area, but also more stringent groundwater protection requirements, more stringent long-term isolation requirements for the mill tailings and the other wastes that are generated through the uranium recovery process.

Senator BARRASSO. Thank you.

Mr. Weber, and Mr. Woolford, I will start with you. Mr. Woolford, you stated in your testimony that the EPA will continue to maintain responsibility for permitting the in situ leading injection wells.'> I note in your testimony, Mr. Weber, that the NRC regulates the uranium recovery. It sound a bit like dual regulations to me. I am just wondering if you two would please clarify your respective authorities with regard to the in situ recovery. Mr. Woolford, do you want to start?

Mr. WOOLFORD. Senator, I would need to defer that to my colleague who is here, from the Office of Radiation and Indoor Air. It is not within my purview.

Senator BARRASSO. Mr. Chairman, with your permission, if we could get that answered?

Senator UDALL. That would be just fine.

Senator BARRASSO. Thank you, Mr. Chairman.

Senator UDALL. Please State your name and the division that you are with within the agency.

Mr. SIMON. Thank you. It is Roy Simon, I am with the Office of Groundwater and Drinking Water in the Office of Water in EPA. We spend a lot of time working with NRC on uranium mining sites, and we have cooperated. I have been involved for 4 years in working with NRC. We don't see it as duplicating, we see it as complementary. We both deal with the injection wells, we deal with the injection wells in EPA under the Safe Drinking Water Act, and we regulate the injection wells. But they perfectly in tune with the licensing processes.

Mr. WEBER. Just to build on that, NRC regulates the in situ recovery process in toto. The purpose of that is to ensure that the operations, if they are conducted, are conducted in accordance with our requirements. We consider all the way from the injection of the lixiviant into the reservoir or into the aquifer where the mining takes place all the way through to the extraction and concentration of the uranium and the production of the yellow cake product as constituting processing. Therefore, it meets out authority under the Atomic Energy Act.

But I agree with my colleague from EPA, both colleagues, that we are working together collaboratively. There was a point last decade where NRC actively considered whether we should give up the regulation of groundwater and yield to EPA in order to avoid any apparently duplication. Based on a lot of analysis and involvement from the Commission, the Commission ultimately decided

that was not the way to go, and that in fact the two programs are complementary. By close coordination with each other, we can carry out our respective jurisdictions in a way that makes sense and accomplishes both human and environmental protection.

Senator BARRASSO. Thank you. Thank you, Mr. Chairman.

I have additional questions I could submit in writing. I know we have already started a roll call vote, and I wanted to provide additional time for you. Thank you, Mr. Chairman.

Senator UDALL. Senator Barrasso, did you have any more specifics you wanted to get out on that particular issue? OK.

Senator Barrasso is correct, at about 10:31, a 15-minute roll call vote went off. So my intention is to go to about 10:41 and then adjourn and go over and vote and come back right afterwards. My understanding, it is still only one vote. So if that is acceptable we will go ahead and proceed here for another 7 minutes or so, and then take a break. I would guess we will be back in 15 to 20 minutes, something like that, from the time we adjourn.

Mr. Woolford, could you talk a little bit about the basic health issues that we deal with when somebody lives near a contaminated, abandoned uranium mine? There are children and families in these areas exposed to contamination from abandoned mines. Has the legacy uranium mining and milling contamination impacted drinking water? Some of those kinds of questions. I think it is important to just lay the general groundwater of what has happened here on the health side.

Mr. WOOLFORD. Thank you, Senator. The exposure could occur via several routes. First, there could be wind-blown contamination that could affect individuals living nearby. There is also erosion that occurs on many of these tailing sites, which transports the contamination to other areas. Then we have seen that people will, children especially, will sometimes play in the contaminated tailings that are there.

In addition, as you mentioned, there is the groundwater contamination that can occur at the site. So I think it is important for us to look at, examine really all three exposure routes, from the wind, from the erosion and then from the potential exposure to groundwater.

Senator UDALL. Is it also the case that we have had homes where they have built the homes out of material that has come from the tailings, and therefore we have had, when I said in my opening statement, radioactive homes, what you are talking about, I think, is the release of radon daughters that create radon gas. That can, if in a contained area, that would usually disperse, but in a contained area like a home or a closed mine without ventilation, you can have the buildup of that gas. It is a known carcinogen, causing lung cancer. That I think has happened in some circumstances at these sites, has it not?

Mr. WOOLFORD. Yes, sir, precisely. In fact, EPA has gone in and sampled several homes in the Navajo Nation. We have demolished 34 of their homes due to the unacceptable risks that those homes pose.

Senator UDALL. Was that an unacceptable risk in terms of too high of a radiation level from the radon?

Mr. WOOLFORD. Yes. And we have replaced 14 homes.

So yes, we have heard, as I mentioned in my opening remarks, there are homes, hogans, et cetera, that are built with the waste rock. We have been working with the Navajo Nation to assess those properties, and where they do pose a risk, then demolish those homes and replace them.

Senator UDALL. And the families that have lived in those homes for a period of time, what has been done there in terms of evaluation of the impact on their health in these kinds of circumstances? It takes, as I understand it, I am no expert or anything, but if you have exposure to radon over a certain period of time, it raises, the more exposure you get, the higher cancer risk, lung cancer risk you have. What happens there as far as the families and their health impacts? What is recommended?

Mr. WOOLFORD. Our first recommendation is obviously disassociation from the facility. So we provided alternate living quarters. But then we would have to monitor their health. Precisely what is happening with respect to the individual families, I would have to get back to you on those, Senator, to find out what monitoring and health assessments have been done.

Senator UDALL. But it is clear that after a period of exposure that some kind of monitoring and health inquiry should be done to see where they are in terms of their health?

Mr. WOOLFORD. Yes.

Senator UDALL. We have reached the point where I think it is probably best to just terminate the questioning here, and temporarily recess while we do the vote. Then we will be back. I apologize for that. I know that all of you are very busy in the responsibilities that you have. But I will get over and back as quickly as I can and look forward to continuing. Thank you very much.

[Recess.]

Senator UDALL. Thank you very much for being patient with us on the break there. We will get going again. I think I have been given permission by the minority staff to proceed until Senator Barrasso either gets back here or we get other members of the Committee here.

So we will come back into session. The Committee comes back into session.

Let me ask a few questions here about the 5-year plans and funding questions. I think these are basically directed to all three witnesses. What I want to try to get at is the feel for the funding. Where does the funding for the 5-year plans come from in your agency budgets? What is the funding status for the two 5-year plans in Fiscal Year 2012 and 2013 agency budgeting? Why don't we just start with Mr. Woolford and move to your left.

Mr. WOOLFORD. Thank you, Senator.

As to the source of the funding for the 5-year plan within EPA, EPA has been obligating approximately \$12 million a year for the 5-year plan. This is done through our Region IX office, which is located in San Francisco, which has responsibility for the Navajo Nation.

The funding comes from several line items in our budget. We have a removal line item and an enforcement line item. Those are the principal ones that we have. We also provide grant dollars to the Navajo Nation as well.

For 2012, as you know, Senator, the EPA does not have a budget yet. And so at this point in time, we cannot commit to a particular dollar figure until we have the budget. The President's budget has not been submitted to the Hill and won't be until February. So there is a great deal of uncertainty, obviously, with our budget levels and our budget authority.

Having said that, the Administration and our Administrator within EPA has made this one of the highest priorities within our program. So while I can't provide you a particular dollar level at this time, I can tell you that we will do our best to fund the work at the maximum level we can. But I just can't commit to a particular dollar figure at this time.

Senator UDALL. You are under now, just so people understand, this 6-week continuing resolution. Do you have any sense of, are we going to be close to the \$12 million level during the 6-week period for this, pro-rated out and all that?

Mr. WOOLFORD. The \$12 million figure is obviously for the entire year. Our regional office has not indicated to myself, I am one of the funding managers in the program at EPA, they have not indicated any funding needs during this timeframe. They will be using dollars that were appropriated in prior fiscal years to carry them through the first quarter of this year.

Senator UDALL. OK, thank you. Mr. Geiser?

Mr. GEISER. The funding for both the 5-year plan for the Navajo Nation and the 5-year plan for grants all comes from the legacy management budget within the Department of Energy, which is other defense appropriations. Historically that has been averaging about \$4 million a year for the four sites we have on the Navajo Nation. And that would be about half of the total of about \$8 million a year we spend on all the UMTRCA sites together.

There was one exception to this. In the 2009 Omnibus Appropriations, there was \$5 million put in that appropriations for the remediation of the Highway 160 site outside Tuba City, Arizona. That work was just completed in August of this year.

Senator UDALL. OK, thank you.

Mr. Weber.

Mr. WEBER. Thank you, Senator. The NRC has a relatively modest involvement in the implementation of the 5-year plans because of the sphere of our responsibilities. So we don't have a specific account set aside to support the implementation of those. When I say modest, it really involves staff involvement in coordination with the other agencies, and then implementation of review activities associated with the licensed activities that we do have responsibilities for. So it is nowhere near as large as my colleagues have described.

But at the present time, provided the Congress enacts the budget that the Administration has requested, we are fine with resources.

As the workload increases or decreases, if there is more work to be done, then provided sufficient priority, we would use those resources and draw that away from other activities that we conduct in the uranium recovery area.

Senator UDALL. And I assume if it grew large enough then you would just make an additional request for additional funding to try to make sure that we got the job done on this.

Mr. WEBER. NRC seldom does that. There are some unique situations. But usually we try to make do with the resources we have to meet the needs of the Nation.

Senator UDALL. OK. Thank you all very much.

I want to ask a question about Crown Point to Mr. Weber. Crown Point is the location of a proposed in situ leach uranium recovery operation near the Church Rock legacy site. I understand the NRC has set up a license for HRI at the Crown Point site that is dependent on several conditions, including legacy cleanup. Can you clarify the status and content of HRI's permit at these sites and how the permitting for the four sites is interconnected with legacy cleanup?

Mr. WEBER. Certainly. The NRC has issued the license to HRI. They are in the process of completing some preparatory activities that they need to conduct. So I would expect that in the near future we would issue letter to HRI authorizing them to proceed under their license, which had been issued some time ago.

It is important to point out that the first activities will take place at some distance from the local residences that could ultimately be affected down the road, if those other well fields are eventually developed. But at this point, they haven't even started on their first well field that they intend to develop. So it will be likely years before they would be in a situation where they would operate under those conditions which would require closure of some existing wells and providing a suitable alternative water supply for the community that would be most directly near where that other development would occur.

Senator UDALL. And really what we are talking about is a community, a Navajo community of some size, for the Navajo Nation, pulling groundwater from the aquifer there right near Crown Point, which is fairly good water, is my understanding. And this community has relied on that for a long time. What HRI has done is propose to come in and do mining in that aquifer. So you and your permit have put a number of conditions as to status and content in their permit.

And my next question really goes to, if the requirements of the permit were fulfilled, could the NRC and the EPA guarantee a safe and consistent water source for the Crown Point community? Because that is the key to them. I think that is the big concern the Crown Point community has.

Mr. WEBER. That is the requirement that is in our license condition that applies to providing alternative water for the local community. I would point out that in the history of in situ recovery regulation that we have not seen a situation where a local supply well has been adversely impacted by the mining. We monitor those sites quite carefully. There are very rigorous requirements that are imposed on the operators of the in situ recovery operations.

They have seen excursions. An excursion is where an elevated level has been detected in either a monitoring well laterally, distant from the mine field, or above or below the aquifer that is being mined. But then if those excursions are detected, the licensee has to take action to correct that situation and at the end of active mining, has to restore the aquifer back to suitable water quality standards.

So in the situation with HRI Crown Point, the objective is really two-fold, that before they start doing any mining, they would have to provide that alternative water supply for the local community. And that is a large requirement in and of itself. But even beyond that, there would be requirements in place to ensure that the groundwater is protected outside of the mining zone and that when the mining, if it is conducted, when it is completed, the aquifer is then restored to a suitable quality.

Senator UDALL. Is that what you have done at other sites over the years, is require that, and you have been able to establish, to some kind of scientific certainty, that can be done?

Mr. WEBER. Yes. We have approved restoration of mine fields that are no longer in use. I would say the provision by the licensee of an alternative water supply is unique. Typically, the in situ recovery facilities are located at some distance from communities. So that doesn't present itself.

But in this situation, because of the unique circumstances involving HRI Crown Point, that was a provision in the licensing of the facility.

Senator UDALL. And I think that is one that has been greatly appreciated by the local community that you put that in there and that you are going to aggressively protect their groundwater supply.

A question now to Mr. Woolford on Church Rock. Let me first say that I applaud the EPA's recent announcement of an improved plan to clean up the Northeast Church Rock Mine, the largest and highest priority uranium mine on the Navajo Nation. I would like first to get a little more information from you on the details of this plan and the potential time line for completion.

Could you please describe the high points of the approved clean-up plan?

Mr. WOOLFORD. Thank you, Senator. I would be happy to do that.

This plan is the culmination of many years of efforts between the EPA and the Navajo Nation and the Redwater Pond Road community living near the site. We have held extensive meetings with the community to come up with a remedy that we have selected. And we believe the plan has the general support of the Navajo Nation and the local community.

We considered 14 disposal sites. Ultimately we chose what in concept is a pretty simple remedy to move the contaminated waste rock and contaminated soils from the Northeast Church Rock Mine site literally almost across the street to the UNC site. But it is over 870,000 cubic yards of contaminated waste rock and over 100,000 cubic yards of contaminated soil.

The cleanup will involve first and foremost working with the community to ascertain whether the work we are going to be doing will impact them. We will offer the community members relocation opportunities. We will then, and that will be the first thing that we do. So we are going to start that activity this fall.

We then have to design the repository for the final mine cleanup. We will be doing that in conjunction with the Navajo Nation, New Mexico DP, the NRC, the Department of Energy and General Elec-

tric. This will probably take about a year. So we are looking at, that will probably take 2012 into 2013.

The NRC and the Department of Energy, DOE will be the ultimate overseer of this remedy. So we have to work with my colleagues from the Department of Energy to ensure that what we are doing is consistent with their requirement and with the NRC requirements.

We also, because this is going to a separate Superfund site, we are working on a remedy there. That remedy has to be selected before we can do all that?

Then we have to go through the licensing amendment process, with the NRC. All told, we are thinking that will probably take into 2014. At that time, assuming there are no glitches, we will begin the cleanup process. And then we think we will complete the cleanup actions by 2018 or 2019.

Senator UDALL. I think you have said this here, but there are two separate areas that the contaminated mine waste goes to. I think one is offsite, which will be trucked to a licensed disposal site. Then there will also be a disposal cell designed.

Mr. WOOLFORD. Yes.

Senator UDALL. I want to ask a question about, to what extent has the disposal cell been designed and how has or will the surrounding community be involved in that decision and be able to comment on that?

Mr. WOOLFORD. The disposal cell has yet to be designed. That is what we will need to work on with my colleagues to my left, the State of New Mexico and the Navajo Nation. When the design is completed, we will offer an opportunity for public comment on that disposal cell. So there will be extensive, as we committed to with our prior actions, there will be extensive community interaction and an opportunity for community comment on that disposal cell.

Senator UDALL. Thank you.

Mr. Geiser, do you have any comment on what you just heard, or anything to add to that? Is that your understanding as to how the agencies are proceeding on this, and specifically your agency?

Mr. GEISER. Yes, sir. EPA approached us about 2 years ago with the idea of combining the mining waste with the mill waste. For the last 10 to 12 years, the Department has agreed to accept non-mill waste in the disposal cells under certain conditions.

So this has a precedent that we have been able to do this in the past. This is the single largest volume of non-11(e)(2) material that would be put in the disposal cell. We appreciate EPA inviting us to be on the design team for the disposal cell. We feel we have a lot of expertise to offer in that area. And particularly since we would be the long-term manager for the disposal cell, we are interested in making sure that design works for the long term.

So it seems like a practical solution, and we will continue to work with EPA and NRC on how to accomplish that.

Senator UDALL. Mr. Weber, do you have anything else to add to that?

Mr. WEBER. Sure thing, thanks, Senator. As Jim talked about, there will be a license amendment that will be required, because it will require a revision to the reclamation plan for UNC's tailings enpanelment. You asked about public involvement, just like under

the EPA Superfund process, there will be the complementary process that we conduct where there will be an opportunity for public comment. We anticipate preparing an environmental assessment to support this revision. That would be going out for public comment. There would be opportunities for parties to request an opportunity for a hearing associated with reclamation plan revision.

So there are numerous opportunities. I think it behooves all of us to work together to do that in a collaborative way so that we don't confuse the public and involve them and give them more opportunities. I think we want to give them meaningful opportunities to be involved early on in the process, as they already have had under the EPA Superfund process.

Senator UDALL. Great. Thank you very much.

A question now on the Tuba City site. And this is to Mr. Woolford, but if any of the other witnesses have any comment, we are happy to hear that. It is my understanding there is a significant groundwater contamination problem at the site of the Tuba City dump. Since 1995, there have been more than 35 studies conducted on the Tuba City open dump.

I further understand that an EPA study did not find evidence of tailings in the dump. Can you describe the findings of EPA's recently completed study of the Tuba City open dump and what does the EPA believe is the source of contamination at the Tuba City dump?

Mr. WOOLFORD. Senator, I am not familiar with any recent EPA study. I am familiar with a study that was conducted by the Hopi Tribe, which they submitted to EPA in August. And that study concluded that there was groundwater contamination adjacent to the dump.

Senator UDALL. Do you all agree with that?

Mr. WOOLFORD. We received it in August. We are currently reviewing it, and we have plans to meet with the tribe at the end of October to go over the study.

We have an enforceable agreement with the Bureau of Indian Affairs to actually conduct a comprehensive investigation and feasibility study to ascertain whether or not the dump is actually contaminating the groundwater. The groundwater is contaminated. Everyone knows that. We are not 100 percent sure of the source. That is what the RFS that we are working on is designed to accomplish.

However, if it turns out that there is good information in this Hopi study, we would certainly use it to accelerate our process.

Senator UDALL. Does the Tuba City open dump site pose a threat to drinking water of the Navajo Nation or the Hopi Tribe?

Mr. WOOLFORD. Yes, we believe it does.

Senator UDALL. And what is the plan for the remediation of the dump, and are efforts underway at this point? What are the remaining hurdles?

Mr. WOOLFORD. It would be premature, we haven't selected a remedy as yet. That is what would be the outcome of the RFS process that we are currently engaged in with the Bureau of Indian Affairs. So it would be premature for me to say what the remedy would be without the completion of that study.

Senator UDALL. I fully understand. Mr. Geiser or Mr. Weber, do you have any comment on that?

Mr. GEISER. There is, both the Navajo and Hopi believe that there was mill tailing material dumped in the Tuba City open dump and that is the source of the uranium contamination. There have been over 200 borings taken of the open dump. None of them found mill material. EPA recently led an effort, about a year ago, to excavate areas near the highest recorded uranium in the open dump and again found no evidence of mill material.

Our belief is that the mill that operated near Tuba City, about four miles out of town, dumped all the mill material at the mill site, and that is now in our Title I disposal cell there. There was also some discussion about the disposal cell site, that contamination was migrating in the subsurface from the disposal cell site to the Moenkopi Village wells. At the request of the Navajo Nation, we installed additional wells, or actually worked with the Navajo, who installed the additional wells.

All those wells came up clean for uranium. So we don't believe there is a hydrological connection between our disposal cell and the Moenkopi Village wells. There is no evidence to date that there is mill tailing waste in the Tuba City open dump, which is closer to the town.

Senator UDALL. Thank you.

One final question here, and this is a little bit different direction, but I think it helps address the overall issue, and that is the issue of 1872 mining law reform and potential abandoned mine funding. The President's Fiscal Year budget for 2012 includes a proposal for fees and royalties for hard rock mining leasing and production, similar to the process we have for oil, gas and coal leasing. In the President's proposal, part of the revenue would be used for an abandoned mine land cleanup fund.

In your experience, is there a need for a reliable source of funding for abandoned uranium mine cleanup? Mr. Woolford? And you can answer that just yes or no if you want.

Mr. WOOLFORD. I would say, yes, it would be nice to have, Senator.

Senator UDALL. Mr. Geiser.

Mr. GEISER. Senator, I had the opportunity to testify before the Senate Energy and Natural Resources Committee in March 2008 on the Department's uranium leasing program. In that program, we do collect royalties, both a base fee and any kind of production related royalties. The companies also have, in lieu of payments, done mine waste reclamation on those lease tracks. So there seems to be value in collecting those royalties, and also other forms, financial mechanisms such as bonds, to make sure that as the company completes their mining activity, there is money available to do the reclamation immediately following the end of the mining.

Senator UDALL. Great. Mr. Weber, do you have a yes or no answer on that?

Mr. WEBER. Your question falls well outside of NRC's scope of authority, so I would not offer a response.

Senator UDALL. Thank you.

Let me just once again thank all of our witnesses. I am at this point going to conclude the hearing. We will keep the record open

for 14 days and will submit any further questions in writing to our witnesses. We hope that you will diligently work on those.

With that, the hearing is adjourned.

[Whereupon, at 11:25 a.m., the subcommittee was adjourned.]

[Additional material submitted for the record follows.]

**URANIUM PRODUCERS OF AMERICA**

141 EAST PALACE AVENUE, POST OFFICE BOX 669, SANTA FE, NEW MEXICO 87504-0669
TELEPHONE (505) 982-4611; FAX (505) 988-2987; WWW.URANIUMPRODUCERSAMERICA.COM

**OVERSIGHT HEARING ON FEDERAL ACTIONS TO CLEAN UP
CONTAMINATION FROM URANIUM MINING AND MILLING OPERATIONS**

**Children's Health and Environment Health Subcommittee of the
Environment and Public Works Committee
United States Senate**

October 13, 2011

The Uranium Producers of America ("UPA") is a group of domestic uranium mining and conversion companies whose mission is to promote the viability of the front end of the nation's nuclear fuel industry. UPA members are conducting uranium exploration, development and mining operations in Arizona, Colorado, Nebraska, New Mexico, South Dakota, Texas, Utah, and Wyoming. The sole domestic conversion company operates in Illinois. UPA members operate and are developing valuable, uranium deposits that provide high paying jobs and tax revenues and produce clean energy for the citizens of the United States. Growth in domestic uranium mining and conversion will be required to support the U.S. government's plans to increase use of nuclear power and foster new domestic uranium enrichment plants as evidenced by multi-billion dollar loan guarantee programs underway. The UPA appreciates the opportunity to offer a written statement on the advances made in assuring in the area of mining and milling uranium ores in a manner that will protect the environment, its workers and the public.

1. Introduction

Uranium producers in the United States currently employs two methods for extracting uranium; *in situ* recovery (ISR) and conventional underground mining. In 2010, there were four underground mines in production located in Utah, Colorado and Arizona.¹ The ore produced in these mines was milled at the Denison White Mesa Mill in Blanding Utah. Other conventional mines are in the permitting or development stage. These projects are located in the above-mentioned states, New Mexico and Wyoming. ISR mining is currently occurring in Wyoming, Nebraska and Texas. The Nuclear Regulatory Commission has recently licensed three ISR projects in Wyoming. Other ISR projects in New Mexico, North Dakota, Texas and Wyoming are in the licensing or licensing renewal process. The method of uranium extraction is dictated by the type and depth of the ore resource, the grade of the ore and whether the ore is located in an aquifer.

2. Underground Mining

Underground mining of uranium evolved from small scale operations in the rugged and remote rimrock and canyon land country of the Colorado Plateau region of southeastern Utah and southwestern Colorado. Vanadium deposits were mined in this region for decades, and uranium mining later took place at many of these same deposits, which contain both vanadium and uranium mineralization. The growth of the uranium industry in the 1960's and 1970's resulted in larger scale underground mining operations, and mines were opened across the West in Colorado, Utah, New Mexico, Arizona, Wyoming, Washington, and South Dakota.

¹ See Energy Information Administration 2010 Uranium Production Report, June 2011.

The majority of the commercially viable uranium deposits in the U.S. occur in sandstone host rocks. These sands were deposited by ancient meandering rivers carrying sediment derived from weathering of distant highlands. Over time, natural ground water flowing through these sands, under the right conditions, transported dissolved uranium. The uranium mineralization stayed in solution until changing chemical or hydrologic conditions resulted in precipitation of uranium in bodies large enough and with adequate uranium content to be commercially mined. Given this geologic environment, the mining methods used to exploit these types of uranium deposits need to be flexible to follow the laterally sinuous and variably thick uranium mineralization.

Underground uranium mining requires the same basic sequence of development steps as required for any other type of underground mining. The ore deposits must be accessed, the mineralized material must be “developed” by constructing workings to provide access to the ore, the ore must be extracted (usually through drilling small diameters holes and blasting the ore), the broken ore must be transported to the surface, and finally the ore must be sent to an ore processing mill to extract the contained metals. Aside from designing and developing a mining operation specifically suited to the physical properties of the ore deposit, underground uranium mining is not unique within the industry.

Uranium deposits today are typically outlined by drilling from the surface. Access into ore deposits is through vertical shafts or inclined openings. In the U.S., shaft mines typically range from a few hundred feet deep to more than 3,000 feet deep.

In sandstone uranium mining, the ore is typically extracted using a “room and pillar” method where pillars of unbroken rock are left in place to support adjoining

openings where ore is removed. Mine workings are also supported by insertion of steel bolts into overlying strata to stabilize the ground, and in high traffic areas, mine openings are often lined with concrete, steel frames, or wood to ensure long term stability.

Each mining region is unique, and underground conditions are variable. The presence or absence of ground water, the quantity of ground water, the strength of the ore and surrounding rock, the geometry and orientation of mineral bodies all must be considered in mine design. When accessing ore bodies through shafts or declines, the surface “footprint” of underground uranium mines is small. Typical surface installations include offices, warehouse, maintenance and repair shops, power facilities, air compressor stations, pumping facilities if required, and stockpile areas. Waste rock from the initial development of a mine is deposited on the surface. This rock volume is small compared to open pit operations where all overburden layers must be removed to access the ore. There are currently no open pit operations active or being developed in the United States. As underground mines are developed and ore is removed, common practice involves placing development waste rock into mined-out areas to avoid moving it to the surface and to minimize surface disturbance.

Underground uranium mining has very stringent regulatory requirements for ventilation. The presence of radon gas in uranium mines, resulting from the natural radioactive decay of uranium, dictates that large volumes of air must be moved through mines to reduce the gas concentrations. The control of radon in mines is monitored closely to ensure that radon concentrations met all Mine Safety and Health Administration (“MSHA”) requirements. The legacy of health impacts to uranium miners in the early years of underground uranium mining has led to today’s very tight

controls. In historical mining operations, the combination of radon gas, silica dust from the sandstone ore, and cigarette smoking combined to result in high incidences of lung cancers and related ailments.² All of these factors have been eliminated or are strictly regulated (no smoking allowed) in the modern mining environment. All underground mines have extensive ventilation systems, incorporating multiple vertical shafts and fans, to supply fresh air into the mines.

Mining operations are authorized under operating permits issued by state agencies.³ State mining laws and regulations require extensive pre-mining sampling to assure baseline goals for reclamation. Closure plans are established to return mined areas to self-sustaining ecosystems and pre-existing mine uses. If mines are on U.S. public domain lands, federal agencies are also extensively involved in the permitting process. A modern mine permit requires that the mine operator provide financial surety to cover all costs required to decommission a mine site, fully reclaim such a site, and return it to its pre-mining beneficial use.

Upon completion of mining operations, mine reclamation is generally straightforward for an underground operation. Following removal of underground equipment and service facilities, all mine openings are permanently sealed (although there have been interesting developments in recent years where mine openings are

² A recent cohort mortality study of uranium miners and millers near Grants, New Mexico during the period from 1955 to 1990 reports that previous studies of underground uranium miners exposed to high levels of radon and radon decay products were at increased risk for lung cancer but apparently no other cancer. Uranium mill workers have not been found to be at increased risk for cancer. See John D. Boice, Sarah S. Cohen, Michael Mumma, Bandana Chadda and William J. Blot; International Epidemiology Institute, Rockville, MD. "A Cohort Study of Uranium Millers and Miners of Grants, New Mexico, 1979-2005," *Journal of Radiological Protection*. Vol. 208 p. 303-325 (2008). Similar results of normal cancer rates were found for populations living near uranium milling operations. See John D. Boice, Jr., Michael T. Mumma and William J. Blot; International Epidemiology Institute, Rockville, MD. "Cancer Incidence and Mortality in Populations Living Near Uranium Milling and Mining Operations in Grants, New Mexico 1950-2004," *Radiation Res.* 174(5) p. 624-636, November 2010.

³ See for example, the New Mexico Mining Act, 69-36-1 et. seq. NMSA 1978.

barricaded, but left accessible to provide excellent “bat habitat” as requested by regulatory agencies). Surface facilities are removed, and the mine site and waste rock dumps can be regarded and reclaimed, with the land surface being returned to its former productive use. Typical underground uranium mine sites range from 10 to 25 acres.

3. Uranium Ore Milling/Processing

After uranium ore is removed from the ground, it must be processed to extract the contained uranium. This process, “milling,” involves a sequence of physical and chemical treatment steps to extract the uranium from the native rock. The final product of milling is yellowcake, which is the commercial product sold by uranium producers to nuclear utility customers. During the peak U.S. uranium production period of the early 1980’s, a total of 26 uranium mills were operating, and the U.S. was the world’s leading uranium producer. Today, there is one uranium mill operating in the U.S. The State of Colorado has licensed a mill in Western Colorado but it has not been constructed. Other operators have begun discussions with the Nuclear Regulatory Commission about the licensing of new mills in New Mexico and Wyoming.

Uranium milling employs equipment and metallurgical processes, adapted from other extractive industries, specifically tailored to uranium recovery. The uranium mills of past decades and the mills in existence today have capacities ranging from 500 ore tons per day up to 3,000 tons per day. At average historical ore grades, annual uranium concentrate production normally ranged from around 1,000,000 pounds of yellowcake up to more than 7,000,000 pounds of yellowcake for the largest U.S. operations. Mills are of two basic designs – employing either acid leach or carbonate leach.

Uranium milling starts with the delivery of mined ore to the mill, where the ore is weighed and sampled to determine the uranium content and to prepare samples for process testing. Ore stockpiles are constructed to store sufficient ore volume to run the mill for a continuous period and to provide a “blend” of ore to ensure consistent feed to the mill. The first stage is crushing and grinding where the ore is reduced down to individual grains to ensure that the uranium mineralization is exposed to the leaching agents.

Pulped ore is fed to a multi-stage leaching circuit. Here the pulp is typically heated to enhance chemical reactivity, and leaching is initiated by addition of sulfuric acid or bicarbonate, depending on the basic mill design and ore amenability. The ore passes through several stages of leaching as leach agent and oxidizer concentrations are adjusted to achieve optimum dissolution of uranium (and also vanadium if present in the ore.) With most of the uranium in solution, the ore slurry passes to a solid/liquid separation circuit, or CCD circuit, which is a series of large vessels where the slurry is mixed with wash water to remove as much uranium as possible and also separate the uranium-bearing liquor from the leached solids. At the completion of the CCD circuit, all recoverable uranium (typically in excess of 95% of the original uranium content) is in solution. The leached solids are pumped to the uranium mill tailings disposal cells.

The uranium-bearing liquor proceeds to a solvent extraction (“SX”) or ion exchange (“IX”) circuit. The SX or IX circuit selectively removes uranium from the uranium-bearing aqueous solution, uranium is preferentially collected by the organic solvent in SX or by resin beads in an IX circuit. This stage of uranium processing also

concentrates the uranium into a smaller solution volume. The barren aqueous solution can be returned to the processing circuit or disposed in the tailings system.

In either SX or IX circuits, the affinity of the selective organic solvent or resin, as the case may be, for uranium is the key stage in removing uranium from a water-based solution. Uranium is stripped from the SX solvent or IX resin by a saline solution. This saline solution is the culmination of several steps to increase the concentration of uranium, and this solution is now ready to yield the final product. Uranium is precipitated from this strip solution by addition of ammonia or peroxide. The precipitated uranium is now a yellow slurry (hence "yellowcake".)

The yellowcake slurry is washed to remove contaminants and dewatered to form a thick paste. Final product preparation involves drying the yellowcake paste to remove free water. Drying is typically conducted in a high temperature furnace which bakes the cake, or it can also be dried in a rotary drum dryer. Yellowcake dryers are typically fired by propane or natural gas.

Dried yellowcake is packaged in steel 55-gallon drums, each containing about 800 to 1,000 pounds of yellowcake. Yellowcake is the final product of uranium mining and milling, and this is the product sold by producers to utility customers. Yellowcake subsequently goes through a number of complex processing steps (conversion, enrichment, fuel fabrication) on its way to becoming fuel for a nuclear power plant.

4. Regulatory and Environmental Requirements for Uranium Mills

Uranium processing facilities are subject to some of the most stringent environmental and regulatory controls of any industrial complex. To recover uranium by any process, a Source Material License (or equivalent) is required. Uranium mill

licensing and regulatory oversight is normally the purview of the U.S. Nuclear Regulatory Commission.⁴ Utah, Colorado, and Texas are “Agreement States” and in charge of licensing and regulatory oversight; however, these states must meet or exceed the requirements of the NRC to attain Agreement State status.⁵

Uranium processing mills must be sited in areas that can meet stringent criteria to ensure that uranium mill tailings can be isolated from the environment. All possible contaminant transport pathways are exhaustively studied to ensure mill tailings can be isolated. Appendix A Criteria I sets forth the Technical Criteria for new mills. The general goal or objective stated in Criteria I in siting and design decisions for mills is “permanent isolation of tailings and associated contaminants by minimizing disturbances and dispersion by natural forces, and to do so without ongoing maintenance.” This goal is achieved by reviewing and selecting from alternative or current sites proposed by a prospective licensee according to the following criteria:

Remoteness from populated areas;

Hydrologic and other natural conditions as they contribute to continued immobilization and isolation of contaminants from ground-water sources; and

Potential for minimizing erosion, disturbance, and dispersion by natural forces over the long term.

Modern regulations require that uranium mill tailings can only be stored in specially designed and constructed cells, with multiple synthetic and clay liners and leak detection mechanisms to prevent any leakage of spent mill solutions. These are zero discharge

⁴ (See 10 CFR Part 40 Appendix A for NRC Regulations.) Appendix A establishes technical, financial, ownership and long-term site surveillance criteria relating to the siting operation, decontamination, decommissioning and reclamation of uranium mills and tailings or waste systems and sites at which such mills and systems are located.

⁵ ISR operations are considered by NRC to be uranium processing operations and are therefore subject to the same regulations as uranium milling operations.

facilities. During operations, mill tailings must be stable and in a strictly controlled area to prevent transport of tailings materials off licensed sites. A plan for final mill decommissioning and closure of the tailing cells, in a manner to ensure isolation of the tailings from the surrounding environment, must be approved by the appropriate regulatory authorities. Prior to the start of milling operations, operators must provide financial surety adequate to fully decommission the mill and reclaim the mill site and tailings cells. This surety is reviewed annually and updated as necessary.⁶

Operators of uranium processing mills are required to own the land on which the mill and tailings facilities are located. Upon completion of milling operations and final closure and reclamations, the reclaimed site is then deeded to the U.S. Department of Energy for perpetual care. Mill operators must fund a perpetual care account prior to starting operations – these funds are in addition to the closure and reclamation surety.

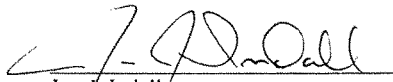
During active operations, uranium recovery facilities adhere to rigorous radiation monitoring and safety programs. These programs cover all workers as well as the surrounding air, soils, vegetation, wildlife, surface water, and ground water systems. These programs include extensive employee indoctrination, employee scans and bioassays, the use of Personal Protective Equipment when required, comprehensive sampling and reporting of all results to appropriate regulatory agencies, external audits and surveys, and direct corporate managerial involvement in all radiation control programs.

⁶ 10 CFR Part 40 Appendix A, Criterion 9 requires sufficient funds be available as a surety to allow for reclamation to be performed by an independent contractor in the event the licensee is unable to conduct or complete final reclamation at a facility.

5. **Conclusion**

Recognition of the advances in mining technologies and standards has created widespread support for uranium mining and milling in the United States. Examples of such support is shown by local government resolutions attached as Exhibits 1 to 3. Standards and regulations in place at state and federal levels will assure that current and future uranium mining and milling conducted in the United States will be conducted in such a manner as to protect the workers, the environment and the public.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Jon J. Indall", written over a horizontal line.

Jon J. Indall
Counsel for Uranium Producers of America
Post Office Box 669
Santa Fe, New Mexico 87504-0669
505-982-4611

STATE OF NEW MEXICO
McKINLEY COUNTY
RESOLUTION NO. DEC-06-088

Supporting the exploration and mining of coal and uranium within the confines of McKinley County

WHEREAS, McKinley County has been endowed with natural resources such as coal and uranium which are alternative sources of energy that can help reduce the dependence on foreign oil and alleviate the energy crisis; and,

WHEREAS, it is the desire of the McKinley County Board of Commissioners to protect the economic base of McKinley County's natural resources in a responsible fashion; and,

WHEREAS, the economic base of McKinley County will be enhanced through the development to offset the loss of the Pittsburgh & Midway Mine in 2008 and the create new jobs for the people of this County; and,

WHEREAS, the economic base of McKinley County will be enhanced through the development of coal and uranium resources to allow the County to continue to provide efficient and critical services and programs for its citizens; and,

WHEREAS, the energy needs of our Country are dependent upon a continued supply of coal and uranium; and,

WHEREAS, it is the desire of the McKinley County Board of County Commissioners to support businesses that employ local citizens and utilize proven technologies that provide community safeguards and balance environmental stewardship with energy production.

NOW THEREFORE, BE IT RESOLVED that the McKinley County Board of County Commissioners supports and encourages the granting of state and federal permits needed to facilitate the operation of coal and uranium mines within the County of McKinley.

PASSED, ADOPTED AND APPROVED this 20th day of December, 2006.

McKINLEY COUNTY BOARD OF COMMISSIONERS

Billy W. Moore
Billy W. Moore, Chairperson

Ernest C. Becenti, Jr.
Ernest C. Becenti, Jr., Commissioner

David Dallago, Jr.
David Dallago, Jr., Commissioner

McKINLEY COUNTY
ATTEST: *Jacqueline Slean*
Seal
Jacqueline Slean, County Clerk

328719 12/20/2006 03:48P RES
1 of 1 328 P238 R 9.00 D 0.00
McKinley County Jacqueline Slean - County Clerk

STATE OF NEW MEXICO } ss.
McKINLEY COUNTY }
I hereby certify that this is a true and correct copy of this
instrument as filed in my office on the 20th day of December, 2006 at 3:48 P.M.
Witness my hand and the seal of said county this 20th
day of December, 2006.
Jacqueline Slean
McKinley County Clerk
V. Charney
Deputy



Cibola County Commission

Bennie Cohoe, Chairman
 Elmer Chavez, 1st Vice Chair
 Jane Pitts, 2nd Vice Chair
 Frank Emerson, Commissioner
 Fred J. Scott, Commissioner

Cibola County

515 West High Street
 Grants, New Mexico 87020
 Phone (505) 287-9431
 Fax (505) 285-5434



David Ulibarri
 County Manager

RESOLUTION 06-35

RESOLUTION OF THE BOARD OF COUNTY COMMISSIONERS OF CIBOLA COUNTY, STATE OF NEW MEXICO SUPPORTING THE EXPLORATION AND MINING OF COAL AND URANIUM WITHIN THE CONFINES OF CIBOLA COUNTY.

WHEREAS, Cibola County is blessed with natural resources such as uranium and coal which are alternative sources of energy that help reduce the existing oil crisis, and;

WHEREAS, it is the desire of the Cibola County Board of Commissioners to encourage and support the strategic use of Cibola County's natural resources for natural security purposes, and;

WHEREAS, Cibola County is economically depressed and it is the desire of the Board of County Commissioners to encourage economic development within the County, and;

WHEREAS, it is the desire of the Cibola County Board of County Commissioners to protect the economic base of Cibola County and insure a continued supply of electricity to New Mexico and the Southwest, and;

WHEREAS, the economic base of Cibola County will be enhanced through the development of coal and uranium resources and the continued operation and expansion of electrical generating facilities that exist within the County, and;

WHEREAS, the energy needs of our country are dependent upon a continued supply of high grade uranium and coal, and;

WHEREAS, the New Mexico sources of coal have been identified as a valuable source of high grade coal that is needed to replace other rapidly depleting sources of energy necessary for the continued operation and expansion of electrical generating facilities and the growing energy needs of the nation, and;

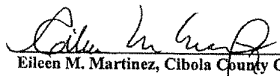
WHEREAS, the development of uranium and coal mining within the County will provide a significant tax base and additional jobs for Cibola County providing for an increased quality of life.

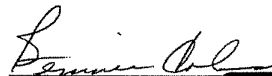
NOW, THEREFORE, BE IT RESOLVED, that the Cibola County Board of County Commissioners supports and encourages the granting of state and federal permits needed to facilitate the operation of coal and uranium mines within the County of Cibola.

PASSED, APPROVED AND ADOPTED this 11th day of September, 2006.

THE CIBOLA COUNTY BOARD OF COMMISSIONERS:

Attest:


 Eileen M. Martinez, Cibola County Clerk


 Bennie Cohoe, Chairman

