# Current Status of the U.S. Nuclear Regulatory Commission's Uranium Recovery Activities [1] - 10418

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## ABSTRACT

As part of the world-wide nuclear renaissance, the U.S. Nuclear Regulatory Commission (NRC) has planned for an increase in uranium recovery (UR) activities in the United States. Note that the NRC regulates uranium milling, not uranium mining. Since it has been approximately 20 years since the last major new UR licensing activities in the United States, the NRC has updated the safety/environmental review processes, modified organizational activities, and expanded outreach activities. Particular focus in the paper will be given to the status of licensing activities, organizational state of preparedness, development/issuance of the in-situ recovery generic environmental impact statement, outreach activities to Native American Tribal Governments and Stakeholders, and challenges. The NRC is prepared, uses an open process, addresses Native American Tribal Governments and Stakeholders concerns, and regulates in a manner resulting in safe UR activities in the United States.

## INTRODUCTION/BACKGROUND

### Price of Uranium [2]

Uranium prices were at their all-time historical low at the very beginning of the commercial market, which began in the mid-1960's when the U.S. government was no longer the exclusive buyer of uranium (yellowcake). However, in the mid-1970s, nuclear power became more widely accepted (and proven economical) as a source of electricity by the world's utility industry, and the years 1973-1976 saw massive orders of nuclear power capacity, indicating large future demand for uranium. The price consequently rose rapidly from $7 per pound $U_3O_8$ at the end of 1973 to $14 in October 1974 to $21 in May 1975 to $40 in April 1976 before peaking at $43.40 in May-July 1978. By the end of 1979, it became clear that the annual growth in electricity demand was suffering from the economic impact of the OPEC oil embargo and, consequently, the backlog of nuclear plant orders became at risk for lack of anticipated future demand for electricity. Throughout most of the 1980's, the price hovered in the $15-17 per pound $U_3O_8$ range and a sustained decline ensued thereafter, due to pressure from the excess commercial inventories and the entry of supplies from the Soviet Union into the West. The uranium spot price dropped below $10 per pound $U_3O_8$ in May 1989 and remained there for over a decade.

After a rise to a plateau of about $10 per pound $U_3O_8$ in early 2001, the spot price began rising in April 2003 as a shift from a buyers' market to a sellers' market began. This trend continued into 2004 with gradual increases in the spot uranium price and gained even more momentum the following year. The year 2005 was a watershed year for the uranium market, marking the most dramatic rise in the spot uranium price since 1975. The spot price at the beginning of 2005 was $21.20 per pound $U_3O_8$ and by the end of 2005 the price had continued rising to $36.50. The

spot uranium price rose to \$40 per pound $U_3O_8$ on March 20, 2006, which was the first time since January 1980 that the uranium market has seen a spot price reach this level. By the end of August 2006, the spot price had climbed to \$52 per pound $U_3O_8$, marking a record level in the history of uranium price reporting

The price run-up continued and peaked at an all-time high of \$138.00 per pound $U_3O_8$ on June 1, 2007. However, due to changing market conditions, over the past two years the price dropped and has been somewhat volatile in the \$40 to \$50 range.

The historical significant fluctuation in the price of uranium (see Fig. 1. [3]) demonstrates, as expected, that the price greatly affects the level of activity of the uranium recovery industry in the U.S. This, in turn, affects the volume and type of uranium recovery regulatory activity conducted by the NRC.

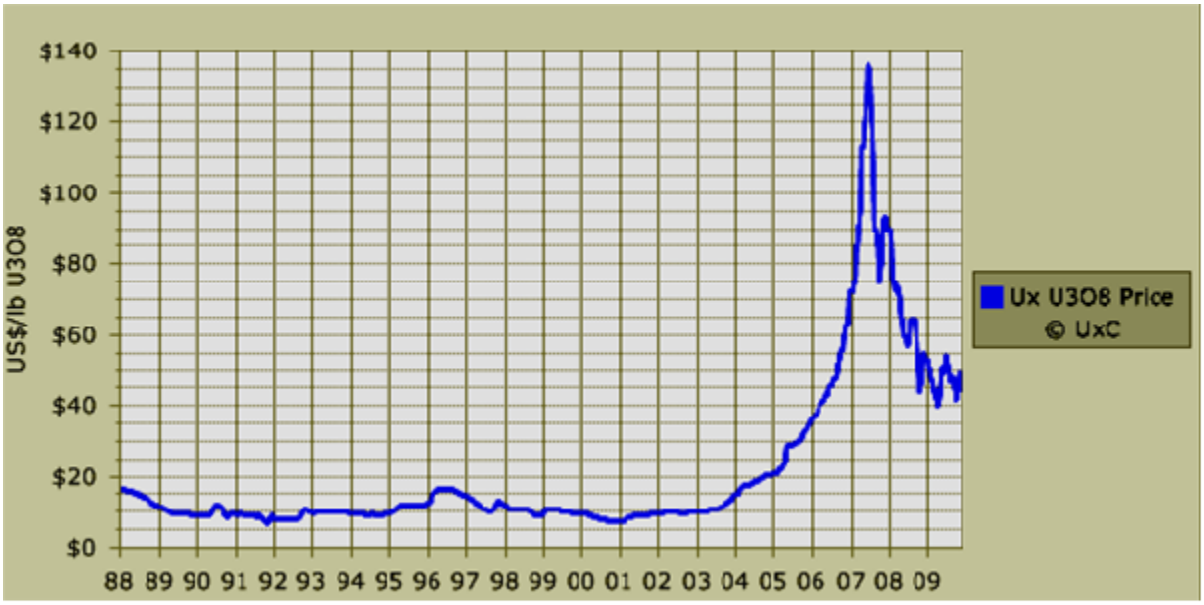


**Fig. 1. The Historical Price of $U_3O_8$**

**Legislative Authority for NRC's Regulation of UR**

The NRC's licensing activities and environmental assessments associated with UR sites are authorized and required by the Atomic Energy Act (AEA) [4], the Uranium Mill Tailings Radiation Control Act (UMTRCA) [5], and the National Environmental Policy Act (NEPA) [6] respectively.

The AEA requires that civilian uses of nuclear materials and facilities be licensed and it empowers the NRC to establish, by rule or order, and to enforce such standards to govern these uses as "the Commission may deem necessary or desirable in order to protect health and safety and minimize danger to life or property." The AEA defined source material as "uranium, thorium, or any other material which is determined by the Commission pursuant to the provisions of Section 61 to be source material," and byproduct material as "the tailings or wastes

produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content." The AEA further provides for the licensing of those materials as follows: "The processing and utilization of source, byproduct, and special nuclear material must be regulated in the national interest and in order to provide for the common defense and security and to protect the health and safety of the public."

In 1978, UMTRCA established programs for the stabilization and control of mill tailings at uranium or thorium mill sites, both active (licensed) and inactive (abandoned/non-licensed). Title I of UMTRCA established the U.S. Department of Energy (DOE) program to remediate 22 uranium mill sites that were abandoned prior to 1978. Congress directed the U.S. Environmental Protection Agency (EPA) to promulgate the standards for remediation. The EPA formulated standards to limit the release of radon gas into the environment and to require that any disposal methods be designed to control radiological hazards for up to 1,000 years, to the extent achievable, and in any case for at least 200 years. These standards primarily address stabilization of the tailings pile and the cleanup of contamination, including contaminated groundwater. Under Title I, DOE is responsible for remediation of these abandoned sites. The NRC is required to evaluate the DOE's design and implementation of its remedial action and, after remediation and NRC evaluation, concur that the sites meet the standards set by the EPA. Title II of UMTRCA established the framework for NRC and States to regulate mill tailings and other wastes at uranium and thorium mills that were licensed by the NRC at the time of UMTRCA's passage in 1978. Under Title II, NRC regulates this byproduct material during recovery operations and requires that each site be closed properly prior to terminating the license. The NRC standards for Title II site closures, contained in Appendix A of 10 CFR Part 40 [7], conform to standards promulgated by EPA. After closure of mill tailings at the Title I and II sites, DOE becomes the perpetual custodian of each site under an NRC general license.

NEPA established U.S. environmental policy, including a multidisciplinary approach to considering environmental effects in federal government agency decision making. Before implementing any "major" or "significant" federal action, an agency must perform an environmental review and consider the environmental impacts of that action, identify unavoidable environmental impacts, and make this information available to the public. The environmental review may be an Environmental Impact Statement (EIS), Environmental Assessment, or a Categorical Exclusion. For an EIS, NEPA requires that it include descriptions of:

- the environmental impacts of the proposed action;
- any unavoidable impacts of the proposed action;
- alternatives, including no action;
- the relationship between the short-term uses of the environment and maintenance of long-term ecological productivity irreversible and irretrievable commitments of resources; and
- secondary/cumulative effects of implementing the proposed action.

**NRC's UR Program**

UR focuses on extracting (or *mining*) natural uranium ore from the earth and concentrating (or *milling*) that ore. These recovery operations produce uranium oxides and generate waste byproduct materials that contain low levels of radioactivity. For mining activities, the regulatory

responsibility depends on the extraction method that a given facility uses. Specifically, conventional mining (where uranium ore is removed from deep underground shafts or shallow open pits) is regulated by the Office of Surface Mining at the U.S. Department of the Interior and the individual State where the mine is located. By contrast, the NRC regulates in situ recovery (ISR) (where the uranium ore is chemically altered underground before being pumped to the surface for further processing).

The distinction between these regulatory responsibilities is that the NRC becomes involved in uranium recovery operations when the ore is processed and chemically altered. This happens either in a uranium mill (the next step in processing ore from a conventional mine) or during ISR operations. For that reason, the NRC regulates ISR facilities as well as uranium mills and the disposal of liquid and solid wastes from uranium recovery operations (including mill tailings). Currently, the NRC regulates uranium recovery facilities in Wyoming, New Mexico, and Nebraska. However, the NRC does not regulate the uranium recovery facilities in Texas, Colorado, and Utah because they are Agreement States, which means that those States have entered into Agreements with the NRC to exercise regulatory authority over these types of activities.

In accordance with its mission, the NRC focuses its regulatory actions on protecting the health and safety of the public and the environment during the active life of a UR operation (including during decommissioning) and after the facility has been decommissioned. The NRC staff accomplishes this mission by performing activities, including the following;

- develops regulations and guidance for the regulated community;
- licenses facilities by review of license applications and amendments;
- performs environmental reviews to support the license applications and amendments;
- performs inspections; and
- reviews decommissioning plans and activities.

As discussed above in the section on historical uranium prices, the NRC regulatory activities change with the state of the UR industry. For example, during the long period of time through the 1990's when prices were low, the industry's focus was on decommissioning old uranium mills, reclamation of tailings, and termination of licenses. As such, the NRC regulatory activities primarily consisted of reviewing DOE's remediation of abandoned Title I tailings sites, reviewing Title II licensee's decommissioning actions, and licensing the tailings sites for long-term care. With the uranium price increase and subsequent increase in new UR activities, the NRC's main focus has shifted to reviewing new applications as well as updating regulations and guidance.

## NRC'S CURRENT UR ACTIVITIES

### New Applications and Operational Facilities

With the significant increase in the price of uranium, the NRC began to see the submittal of new UR license applications in 2007. Since that time, the NRC has received five new applications for ISR facilities and has received two major expansion amendments along with one restart application for existing licensed ISR operations. See www.nrc.gov/materials/uranium-

recovery.html for information Uranium Recovery, including links to the industry and NRC documents. The plant upgrade expansion of the Crow Butte facility and the restart of the Cogema Christensen Ranch facility were completed in 2007 and 2008 respectively. The reviews of the Crow Butte North Trend expansion and the 5 new ISR facility applications are currently in progress. In addition, the NRC has received letters of intent for the projected submittals of 19 more applications for new ISR and conventional milling facilities or for additional expansions of existing facilities through 2012 (see Fig 2.).

| Expected Uranium Recovery Facility Applications / Restarts / Expansions | | | | | |
|---|---|---|---|---|---|
| Company | Site | Design type | Estimated Application Date | State | Letter of Intent |
| Fiscal 2007 Applications | | | | | |
| Cogema | Christensen Ranch | ISR - Restart | Rec. 4/07, Comp. 9/08 | WY | None |
| Cameco (Crow Butte Resources, Inc.) | North Trend | ISR - Expansion | Received June 2007 | NE | None |
| Cameco (Crow Butte Resources, Inc.) | Plant Upgrade | ISR - Expansion | Rec. 10/06, Comp. 12/07 | NE | None |
| Fiscal 2008 Applications | | | | | |
| Lost Creek ISR, LLC | Lost Creek | ISR - New | Resubmitted Mar 2008 | WY | 05/23/07 |
| Uranerz Energy Corp. | Hank and Nichols | ISR - New | Received December 2007 | WY | 05/27/07 |
| Uranium One (Energy Metals Corporation) | Moore Ranch | ISR - New | Received October 2007 | WY | 05/31/07 |
| Uranium One (Energy Metals Corporation) | Jab and Antelope | ISR - New | Received September 2008 | WY | 05/31/07 |
| Fiscal 2009 Applications | | | | | |
| Powertech Uranium Corporation | Dewey Burdock | ISR - New | Received 2/27/09 | SD | 01/26/07 |
| Fiscal 2010 Applications | | | | | |
| Uranium One (Energy Metals Corporation) | Ludeman | ISR - New | Nov-09 | WY | 02/26/09 |
| Lost Creek ISR, LLC | Lost Creek | ISR - Expansion | Apr-10 | WY | 03/21/08 |
| UR-Energy Corp | Lost Soldier | ISR - Expansion | Apr-10 | WY | 03/02/09 |
| Uranium One (Energy Metals) | Allemand-Ross | ISR-Expansion | Dec-09 | WY | 02/26/09 |
| Cameco (Crow Butte Resources, Inc.) | Three Crow | ISR - Expansion | Mar-10 | NE | 03/04/09 |
| Rio Grande Resources | Mt. Taylor | Conv. - New | Apr-10 | NM | 03/21/08 |
| Fiscal 2011 Applications | | | | | |
| Concentric | Yavapai County | Conv. - New | Oct-10 | AZ | 03/20/08 |
| Peninsula Minerals, Ltd. | Ross | ISR - New | Dec-10 | WY | 10/05/09 |
| Wildhorse Energy | West Alkali Creek | ISR - New | Dec-10 | WY | 03/20/08 |
| Cameco (Power Resources, Inc.) | Smith Ranch/Highland CPP | ISR - Expansion | FY 2011 | WY | 03/20/08 |
| Uranium Energy Corporation | Grants Ridge | Heap Leach - New | Jan-11 | NM | 02/22/08 |
| Strathmore Minerals Corporation | Reno Creek | ISR - New | Mar-11 | WY | 03/18/09 |
| Neutron Energy | Marquez | Conv. - New | May-11 | NM | 10/27/09 |
| Wildhorse Energy | Sweetwater | ISR and Conv. - New | May-11 | WY | - |
| Fiscal 2012 Applications | | | | | |
| Cameco (Power Resources, Inc.) | Ruby Ranch | ISR - Expansion | Oct-11 | WY | 03/20/08 |
| Strathmore Minerals Corporation | Gas Hills | Conv. - New | Oct-11 | WY | 03/18/09 |
| Strathmore Minerals Corporation | Roca Honda | Conv. - New | Dec-11 | NM | 03/18/09 |
| Cameco (Crow Butte Resources, Inc.) | Marsland | ISR - Expansion | Sep-12 | NE | 03/04/09 |
| Uranium King Corporation | Apex Mill | Conv. - New | To Be Determined | NV | 09/27/08 |
| | | | 6 year projected total reviews = | | 27 |
| | | | Total Uranium Recovery Applications Received = | | 8 |
| | | | Total New Uranium Recovery Applications = | | 17 |
| | | | Total Restart/Expansion Uranium Recovery Applications = | | 10 |

**Fig. 2. New Uranium Recovery Applications to NRC from 2007 through 2012**.

The NRC also is actively involved in the day-to-day licensing and inspection activities associated with operational UR facilities under an NRC license. These include three ISR facilities (one just restarting), one ISR (which has yet to operate), and one conventional mill in standby.

**Decommissioning UR Site Activities**

In addition to the new application review activities, The NRC's UR program continues its work to ensure old sites are decommissioned safely and reclaimed tailings cells are placed under long-term care by DOE. This work includes ongoing interaction with DOE on activities to remediate

and provide long-term surveillance and monitoring at the Title I sites and licensing activities associated with Title II licensed sites that are in the process of closure.

Title I of UMTRCA designated 22 inactive uranium ore-processing sites for remediation. Remediation of these sites resulted in the creation of 19 disposal cells that contain encapsulated uranium mill tailings and associated contaminated material. Inspection, reporting, and record-keeping requirements for these cells are defined in 10 CFR Part 40.27, "General License for Custody and Long-Term Care of Residual Radioactive Material Disposal Sites [8]." The NRC general license for long-term custody is indefinite in duration. Residual radioactive material was removed from some of the Title I processing sites to off-site disposal locations. NRC does not require a license for remediated processing sites that do not have disposal cells, but NRC is still involved if contaminated groundwater remains. Groundwater compliance strategies that range from natural flushing to active remediation have been or are being developed by DOE for sites that have contaminated groundwater and NRC is actively involved in review and concurrence of these documents. To date, groundwater remedies have been approved and implemented at several Title I sites. Recently, the Atlas site in Moab, Utah was added to the Title I sites. NRC has concurred in DOE's plans for remedial action at this site and DOE is currently conducting these remedial activities to move the tailings to a new location.

NRC currently has under license 11 old conventional mill sites that are in various stages of decommissioning, license termination, and transfer to DOE. Four other sites have already been terminated and are under DOE's long-term custody. NRC's ongoing activities for the 11 sites in decommissioning include review and approval of license amendments, review of decommissioning completion reports, inspection of decommissioning activities, and review of Long-Term Surveillance plans, submitted by DOE prior to transfer. NRC regulations also require that decommissioning for UR facilities be done in a timely manner after sites make a determination to close operations.

**UR Staffing**

At NRC, UR program activities fall under the responsibility of the Decommissioning and UR Licensing Directorate within the Division of Waste Management and Environmental Protection. The UR Licensing Branch under this Directorate is the primary organization within the NRC responsible for regulating UR. In addition, the Division's Environmental Review Branch performs UR environmental reviews and several staff in the Division's decommissioning branches are performing project management of UR sites in closure. With the influx of new applications, the UR Licensing Branch has hired several new staff over the past couple of years and is using part-time retired consultants to address the increased licensing activities. However, the dynamic nature of new application submittals continues to make UR budgeting and staffing a challenge.

**Development of the Generic EIS for UR ISR**

To facilitate the NRC's review of the large number of new UR ISR applications, the NRC prepared a Generic Environmental Impact Statement (GEIS) for UR ISR operations [9]. The GEIS addresses common environmental issues associated with the construction, operation,

decommissioning, and groundwater restoration for ISR facilities, assuming that they were located in particular areas of the Western United States. The NRC encouraged public involvement in the GEIS process and solicited public comments on the proposed scope and content of the GEIS. As part of the GEIS process, the NRC held three public scoping meetings and eight public meetings following publication of the draft GEIS as well as met with Native American Tribal Governments to solicit both oral and written comments from interested parties. During these meetings, the NRC staff described the NRC's role and mission, its environmental review process, the goals of the meeting, and received oral comments from attendees. In addressing environmental issues associated with operation at ISR facilities, the NRC staff will use the GEIS as a starting point for its site-specific environmental reviews of license applications for new ISR facilities and for applications to renew or amend existing ISR licenses, as appropriate.

**UR Rulemaking and Guidance**

The influx of new UR applications also has created a need to update and revise the NRC regulations and guidance associated with the UR program. The NRC has initiated a rulemaking effort, which is specifically tailored to groundwater protection programs in the well-field production zone at ISR facilities. The NRC is working with the EPA and appropriate States to establish standards to protect the health and safety of the public and the environment, while reducing or eliminating dual regulation between EPA and NRC. The ISR rule is not expected to significantly alter the licensing requirements for these facilities, but is expected to clarify the requirements for ISR facilities and provide the industry and the public with a clearer regulatory basis for conducting licensing activities.

In response to the resurgence of UR applications, the NRC staff initiated several efforts to improve the regulatory framework that supports the licensing of UR facilities. These efforts focused on the development or revision of Standard Review Plans (SRPs) for the conduct of safety reviews of new facility license applications and the update or revision of existing UR NRC Regulatory Guides. Over the next several years, the staff expects the submittal of license applications for conventional uranium mill and heap leach facilities. Accordingly, the staff has initiated the development of an SRP for conventional mill and heap leach facilities that will enhance the quality and uniformity of the staff's safety reviews of these license applications. The staff has received applications for five new ISR facilities to date and expects many other ISR applications over the next several years. While the staff has an existing SRP for these facilities (NUREG-1569, Standard Review Plan for In Situ Leach Uranium Extraction License Applications [10]), the SRP is outdated, and in need of revision, to reflect the NRC's policy regarding the protection of groundwater and to provide a plan that focuses solely on the safety review of a license application. The NRC staff has initiated the revision to NUREG-1569 to address these areas.

In parallel with the SRP development and revision effort, the staff initiated the update and revision of other UR Program NRC Regulatory Guides to support licensing reviews of applications for UR facilities. The staff has revised NRC Regulatory Guide 3.11 on design, construction, and inspection of embankment retention systems [11]. Other guides to be revised include those for: the standard format and content of license applications for UR facilities

(conventional mill/heap leach facilities and ISR facilities), health physics and radiation protection, radiological effluent and environmental monitoring, and onsite meteorological measurement programs.

## UR OUTREACH ACTIVITIES

With the submittal of new UR applications, restarts, and expansions, it has become evident that interest is high from Native American Tribal Governments and stakeholders, including States. Interest in the NRC processes for review of new UR applications, ongoing licensing of operational UR facilities, and decommissioning of UR sites ready for closure is strong from affected Native American Tribal Governments, local and State government agencies, members of Congress, other Federal agencies, and members of the public. The NRC has a long-standing practice of conducting its regulatory responsibilities in an open manner and keeping everyone informed of its regulatory, licensing, and oversight activities. For that reason, the NRC is committed to informing everyone about its UR regulatory activities and providing opportunities for everyone to participate in the process.

### UR and Native American Tribal Governments

NRC has actively interacted with Native American Tribal Governments on existing UR facilities because some of the sites are located on or near reservation lands in the Western United States. The NRC outreach strategy for UR sites focuses on government-to-government consultation and coordination with Federally-recognized Tribes that have a known or potential interest in existing licensed UR facilities or applications for new UR facilities. The government-to-government interaction begins early in the process of NRC review of a proposed licensing action. Following the receipt and acceptance of UR license application, the NRC staff meets or communicates with all known Federally-recognized Tribes in the area with a potential interest to establish protocol and procedures for government-to-government interaction on the matter. This includes determination of points of contact within the Tribes, areas of Tribal interest or concern about the proposed action, and Tribal interest in being a Commenting or Cooperating agency in the NEPA required environmental review.

These outreach efforts to interact with Native American Tribal Governments are in addition to notification and consultation procedures required by law or the NRC standard process of providing publicly available information on its public website or in *Federal Register* notices. Outreach efforts may include phone calls, e-mails, direct correspondence with Tribal officials, presentations at Tribal Chapter Houses, or meetings with Tribal leaders. These efforts will provide Native American Tribal Governments with opportunity to participate in the licensing process and with information that is timely and complete on matters of interest related to NRC's authority and oversight of sites associated with UR facilities.

### UR and State and Federal Agency Coordination

Through the Federal, State, and Tribal Liaison Program, NRC works in cooperation with Federal, State, and local governments, interstate organizations, and Native American Tribal

Governments to ensure that NRC maintains effective relations and communications with these organizations.

For the UR program, interactions with the EPA are frequent. Several areas of EPA's regulations apply to UR facilities, so the UR Licensing Branch involves EPA in its workshops with the industry and coordinates with EPA staff on many of its regulatory activities. For example, EPA has been involved heavily in the ISR rulemaking discussed above.

Many proposed new UR facilities would be located on Bureau of Land Management (BLM)-administered land. As such, the NRC staff entered into discussions with BLM staff to minimize duplicative environmental reviews. In November 2009, NRC signed a Memorandum of Understanding (MOU) with the BLM [12]. This MOU defined the cooperative working relationship that will be used to support the common goals of each agency's preparation of the NEPA environmental documents related to UR on public lands administered by the BLM. The MOU will improve interagency communications, facilitate the sharing of special expertise and information, and coordinate the preparation of studies, reports, and environmental documents. To the fullest extent possible, NRC and BLM will participate either as lead agency, co-leads, or cooperating agency on the preparation of site-specific environmental documents.

NRC staff participated in a UR Workshop held by the U.S. Forest Service to inform the Forest Service of the NRC's UR licensing process and upcoming applications on or near Forest Service lands.

The NRC staff also interacts heavily with State regulatory agencies involved in UR activities in their respective States. Primarily, the UR Licensing Branch communicates on a day-to-day basis with State regulators in the States in which NRC regulates UR (Wyoming, Nebraska, South Dakota, and New Mexico). The relation of the EPA/State Underground Injection Control Programs to the licensing of ISR facilities necessitates this close interaction. Several States with UR facilities (Utah, Texas, Colorado, and Washington) are part of the NRC's Agreement State Program. As such, those States have assumed regulatory responsibility over UR activities in those states. However, NRC technical assistance to those Agreement States continues after the Agreement is signed.

**UR and Stakeholder Participation**

The NRC regulatory process provides a variety of opportunities for stakeholders interested in UR activities to be heard. NRC affords the public opportunities to comment on proposed rules and policies, licensing actions, and draft technical documents. Public comment opportunities are announced in the *Federal Register*, on the NRC public website, and sometimes through press releases. NRC also encourages public involvement in meetings and rulemakings, provides related information on its Rulemaking webpage, and provides opportunities for public involvement in hearings.

Public meetings are announced on the NRC public website to enable interested members of the public to participate. The public can keep abreast of NRC's UR regulatory activities through a variety of open meetings, including Commission Meetings, Advisory Committee meetings,

hearings, workshops, and staff meetings open to the public. Public meetings about UR may relate to licensed facilities; applications in review; expected applications, restarts, and expansions; or sites undergoing decommissioning. The NRC UR Licensing Branch staff meets annually with the National Mining Association to exchange information. The Workshop is attended by UR licensees/applicants, staff of State and Federal agencies, and the members of the public. In addition, other workshops are held as needed to present policy and discuss specific technical or process issues. In November 2009, the NRC staff held a UR Licensing Workshop to provide information to the UR industry to facilitate the preparation of applications for uranium milling licenses. The NRC records the results of the public meetings through the use of meeting minutes, summaries, and transcripts. Some Commission Meetings are video-streamed to the public and are available for viewing via NRC's webcast archive. Written records of NRC public meetings, which may include transcripts, meeting minutes, meeting handouts, and meeting summaries, are available in NRC's Agency-wide Documents Access and Management System (ADAMS).

The NRC publishes notices of rulemaking in the *Federal Register* to solicit public comment and may also publish a notice of a meeting or workshop to be held regarding a rule. Although rulemaking is most often initiated by the NRC staff, any member of the public also may petition the NRC to develop, change, or rescind a regulation.

The NRC conducts hearings on disputed matters involved in the licensing actions for UR facilities. Individuals or entities whose interests are affected by an NRC licensing actions may request a hearing. Individuals or entities whose interests are affected by enforcement actions may participate in hearings.

The NRC keeps Congress fully informed of its activities. Members of the Commission and NRC senior staff regularly provide information to Congress and reply to inquiries from various committees of the House and the Senate and to Members of Congress who are interested in aspects of NRC responsibilities. Recent UR interaction with members of Congress has occurred related to the NRC outreach to Native American Tribal Governments.

## UR CHALLENGES

Implementation of the current NRC regulatory program for UR presents several challenges. As discussed above, providing adequate resources to handle the recently-received and projected influx of license applications is a challenge from the standpoint of ensuring a sufficient and experienced staff is available for technical review and project management, and predicting the volume of work that can be expected in the near future. In addition, the staff continuously faces challenges associated with the complexity of technical issues associated with conventional mill and ISR facilities. Complex issues include those involving site characterization, groundwater protection and restoration, waste management, dose modeling, and environmental reviews. An additional challenge arises from the old legacy sites that preceded UMTRCA and NRC's development of strong regulations and guidance. Groundwater contamination issues continue at many of these sites under decommissioning and the challenge is not only the technical hydrogeology aspects of cleanup, but also ensuring that stakeholders are aware of the regulatory

improvements that have been put in place to ensure future facilities are fully protective of public health and safety and the environment.

## UR LESSONS-LEARNED

With the experience gained by the NRC performing recent UR safety and environmental reviews, NRC has learned some lessons regarding on how to more effectively and efficiently perform those reviews. These lessons-learned are the following:

It is imperative that there needs to be coordination with and amongst all federal and state agencies involved. The NRC staff determined that many UR sites are on land administrated by the BLM and that the BLM is required to complete an environmental review that is similar to NRC's environmental review. In addition, the states and EPA have regulatory jurisdiction over many of the areas reviewed by the NRC's safety and environmental staff. Therefore, the NRC staff needs to coordinate with these agencies. Also, it is imperative that the applicant file all the necessary permits and licenses with each agency concurrently to ensure maximum efficiency and coordination.

Efficiencies may be gained by applicants if they make their submittals to the NRC, BLM, and the State at the same time to potentially avoid future delays.

Applicants need to submit timey and accurate information in license applications, environmental reports, and in response to NRC requests for additional information.

It is important for early and frequent communications between the NRC staff and applicants on complex environmental and technical issues, such as groundwater and health physics issues.

It is important for NRC staff and the applicant to coordinate with stakeholder groups and interested Tribes. Communication with these groups will help in alleviating concerns or misconceptions, which can take longer to resolve later on in the review.

## SUMMARY

The historical significant fluctuation in the price of uranium has greatly affected the level of activity of the UR industry in the U.S. This has affected the volume and type of UR regulatory activity conducted by the NRC. With the current uranium price increase and subsequent increase in new UR activities, the main focus has shifted from decommissioning sites to reviewing new applications and updating regulations and guidance.

This significant increase in the price of uranium has resulted in a significant increase in the industry's plans for new UR license applications. Since 2007, the UR Licensing Branch has received five new applications for ISR facilities. In addition, the NRC has received letters of intent for the projected submittal of 19 more applications for new ISR and conventional milling facilities or for additional expansions of existing facilities through 2012.

To address this workload increase, NRC has increased its staff dedicated to UR, through new hiring, use of consultants, and reassignment of work. NRC also has issued a GEIS for ISR facilities, and is updating its regulations and guidance. NRC is ensuring openness of its regulatory process through open communication with Native American Tribal Governments, other Federal agencies, State and Local agencies, outreach to stakeholders, and public involvement at all points in the process.

Therefore, the UR Program is prepared to handle the present and future work, is open and committed to stakeholder involvement, and will continue to ensure that its regulatory framework and oversight will provide operation and closure of UR facilities in a manner protective of public health and safety, and the environment.

**REFERENCES**

1. U.S. Nuclear Regulatory Commission Public Website, links that that were used to gather information spread throughout the paper:
www.nrc.gov/about-nrc/governing-laws.html
www.nrc.gov/materials/uranium-recovery.html
www.nrc.gov/public-involve.html
www.nrc.gov/reading-rm/doc-collections/fact-sheets/mill-tailings.html

2. Trade Tech Website link for Uranium Price Information, 2009.
www.uranium.info/index.cfm?go=c.page&id=21

3. Cameco Website link for Historical Uranium Spot Price Information, 2009.
www.cameco.com/marketing/uranium_prices_and_spot_price/spot_price_5yr_history/

4. *The Atomic Energy Act of 1954,* as Amended (AEA), Public Law 83-703, 68 Stat. 919, August 30, 1954.

5. *Uranium Mill Tailings Radiation Control Act of 1978,* (UMTRCA), Public Law 95-604, 92 Stat. 3021, November 8, 1978.

6. *The National Environmnetal Policy Act of 1969,* as Amended, (NEPA), Public Law 91-190, 83 Stat. 852, January 1, 1970.

7. U.S. Nuclear Regulatory Commission, 10 CFR Part 40, Appendix A *"Criteria Relating to the Operation of Uranium Mills and the Disposition of Tailings or Wastes Produced by the Extraction or Concentration of Source Material From Ores Processed Primarily for Their Source Material Content,"* as amended, 50 FR 41862, October 16, 1985.

8. U.S. Nuclear Regulatory Commission, 10 CFR Part 40.27, *"General License for Custody and Long-Term Care of Residual Radioactive Material Disposal Sites,"* 55 FR 45598, October 30, 1990.

9. U.S. Nuclear Regulatory Commission, NUREG-1910, *"Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities*," May 2009.

10. U.S. Nuclear Regulatory Commission, NUREG-1569, *"Standard Review Plan for In Situ Leach Uranium Extraction License Applications,"* June 2003.

11. U.S. Nuclear Regulatory Commission, NRC Regulatory Guide 3.11, *"Revision 3, Design, Construction, and Inspection of Embankment Retention Systems at Uranium Recovery Facilities,"* November 2008.

12. *U.S. Nuclear Regulatory Commission Memorandum of Understanding with the Bureau of Land Management,* 2009.