

POLICY ISSUE
(Notation Vote)

August 29, 2017

SECY-17-0086

FOR: The Commissioners

FROM: Victor M. McCree
Executive Director for Operations

SUBJECT: INCREASING LICENSE TERMS FOR URANIUM RECOVERY
FACILITIES

PURPOSE:

The purpose of this paper is to request Commission approval of the U.S. Nuclear Regulatory Commission (NRC) staff recommendation to implement a maximum license term of 20 years for new applications and license renewals for uranium recovery (UR) facilities.

SUMMARY:

The NRC staff is proposing to increase the maximum license term from 10 to 20 years for all new UR licenses and license renewals. The NRC staff requests to reserve the option to issue license terms for less than 20 years where the applicant or licensee introduces a new process or new technology. Extending the license term for UR facilities to 20 years would not change the health and safety requirements currently in licenses. A 20-year license would grant the same authorizations and have the same conditions as a 10-year license. Regulatory oversight will be maintained to ensure adherence to requirements and conditions. Thus, given the relatively low level of risk involved in the current operations of these facilities, and their historical performance, the NRC staff has determined that issuing license terms for a maximum of 20 years will not adversely impact the protection of public health and safety and protection of

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the environment. Reducing the license term to less than 20 years on a case-by-case basis for new processes or technology is in concert with historical Commission decisions. This paper is responsive to direction from the Commission in SRM-COMKLS-17-002, "Proposed Fiscal Year 2019 High-Level Planning Guidance."

BACKGROUND:

In 2016, the NRC staff initiated an internal review of UR licenses to determine if initial license terms and renewal terms should be increased. Materials license terms have been reviewed on multiple occasions, and precedent exists for increasing materials license terms. In 1996, the Commission approved the current 10-year UR license term, which had previously been 5 years. The length of Part 40 UR license terms are not codified in the regulations, therefore changing the license term would not require rulemaking. The general history of actions regarding the term of material licenses is provided in Enclosure 1.

DISCUSSION:

Several topics were considered in developing the recommendation to extend the license terms. These topics include: (1) Uranium Recovery Technology; (2) Uranium Recovery Regulations; (3) Institutional Stability; (4) Performance/Inspection History; (5) Risk Associated with Uranium Recovery Facilities; (6) Facility Lifespan and Recent Licensing History; and (7) Resource Implications.

1) Uranium Recovery Technology

The UR industry has been producing uranium since the late 1940s, and is now a mature industry. The currently licensed facilities use technology that is stable and well understood by the NRC staff. Currently, there are three types of UR facilities: conventional, heap leach, and in situ recovery (ISR). The processes and operations at these facilities have been in use for decades and the NRC staff and Agreement States have extensive licensing and inspection experience regulating this industry. A summary of UR technologies is provided in Enclosure 2. The increase in license term would have minimal impact on the NRC or Agreement State ability to safely regulate conventional, heap leach, and ISR facilities.

New and innovative UR technologies are possible. New UR technologies would need to undergo a comprehensive technical, environmental, and legal evaluation by the NRC or an Agreement State. For applications using new technology, a reduced initial licensing term would allow the licensee to demonstrate safe implementation before the NRC granted the full 20-year license term. After a technology is established, the staff would consider renewal terms for 20 years. This approach is consistent with Staff Requirements Memorandum (SRM) SECY-96-252, "Extension of License Term for Material Licensees," where the Commission approved a 10-year license term for materials licensees with the provision that the use of license terms shorter than 10 years is appropriate, on a case-by-case basis, and for situations where the industry or NRC has not had extensive experience in using or regulating the proposed use of the material. Similarly, in SRM-SECY-06-0186, "Increasing Licensing Terms for Certain Fuel Cycle Facilities," the Commission approved of license terms less than the standard 40 years on a case-by-case basis.

2) Uranium Recovery Regulations

Uranium recovery activities are primarily regulated by the NRC, the Environmental Protection Agency (EPA), and Agreement States. The NRC regulations in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 40, Appendix A, which apply to UR facilities, have been in place essentially in their current form since the mid-1980s. These regulations were developed when conventional mills were the dominant form of uranium production and, accordingly, today's regulations are focused primarily on conventional and heap leach facilities. While there are no specific NRC regulations for ISR facilities, the NRC staff's current use of the existing regulations and license conditions provides adequate protection. Recent efforts to issue regulations specific to groundwater protection at ISR facilities by the EPA remain in progress. The NRC staff will propose to issue a conforming rule if the EPA issues regulations specific to groundwater protection at ISR facilities. The NRC and Agreement States have been overseeing groundwater protection at ISR facilities based on the 10 CFR Part 40, Appendix A, regulations, primarily issued for conventional licensees, Commission approved guidance,¹ and other guidance.

Under the risk-informed, performance-based regulatory licensing practices that have been in place at the NRC and incorporated into UR licenses since the late 1990s, licensees have had the ability to make a limited set of operational changes without NRC approval. These changes are proposed, reviewed and approved by the licensee's Safety and Environmental Review Panel (SERP) and are maintained within the safety and environmental boundaries of the license. Licensees are not permitted to change license conditions using the SERP process.

Financial assurance requirements for UR licensees ensures funding will be available through the decommissioning and reclamation phases of their facilities. Part 40 of 10 CFR, Appendix A, Criterion 9, requires that UR licensees establish a surety to cover the anticipated costs of decommissioning and reclamation of their facilities. Licensees are also required to reevaluate their sureties on an annual basis and submit an annual surety update to the NRC to demonstrate that the appropriate funds will be available if needed.

The NRC staff completes an environmental review of licensing actions in accordance with 10 CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions." The NRC staff generally uses the environmental review process under 10 CFR Part 51 to fulfill its obligations under Section 106 of the National Historic Preservation Act and Section 7 of the Endangered Species Act.

Given the relatively stable guidance and regulatory environment for UR facilities, the impact of increasing license terms will be minimal.

¹ The Commission approved the publication of NUREG-1569, "Standard Review Plan for In Situ Leach Uranium Extraction License Applications" in SRM-SECY-02-0204.

3) Institutional Stability

As previously noted, the UR industry is a mature industry. Several of the current UR facilities have been licensed for many years, in some cases over 40 years. Newer licensees generally have personnel with extensive UR experience from working at other licensed facilities. The NRC staff have observed that industry staff from companies in a geographic area routinely move from one company to another as promotional and professional growth opportunities arise. This movement of industry staff among companies has appeared to add stability and a good knowledge base to the industry on the whole as best practices become integrated throughout the industry. Increasing license terms will have little impact on the personnel and experience within the industry and the ability to operate facilities safely.

4) Performance/Inspection History

The NRC staff conducts routine announced, routine unannounced, and reactive inspections of the UR facilities. Inspections are conducted by Region IV staff, often with the accompaniment of headquarters UR staff that are subject matter experts in ISR operations, hydrology, or health physics, depending on the focus of the inspection. Operational facilities with an excellent performance history are inspected at a minimum of once per year, while new operators and others with past identified operational issues or violations are generally inspected twice per year. Most licensees have had only minor violations, typically not exceeding Severity Level IV. Licensees generally have responded effectively to cited violations and have enacted appropriate corrective measures in a timely manner.

Uranium recovery licensees are required to submit semi-annual effluent monitoring reports, annual as low as is reasonably achievable reports, and annual SERP reports. Information provided by licensees in the required reports, coupled with the NRC staff's licensing and inspection activities, enables the NRC staff to effectively monitor licensee and facility performance. The NRC's oversight program provides assurance that operations are completed safely during the license term. An increase in the license term will not impact oversight activities.

In the past, the Commission has given the NRC staff the flexibility to issue licenses with reduced terms for past poor performance. However, a reduced license term has never been issued due to poor performance, and industry performance history has shown that violations greater than Severity Level IV are uncommon. The NRC staff has considered the option of reducing the maximum license term for poor licensee performance, as has been approved in previous Commission decisions. However, to date, the NRC staff has found the use of increased oversight, increased inspections, confirmatory orders, and enforcement processes adequate to address licensee performance issues. Therefore, the NRC staff is not proposing consideration of licensee performance in determining the length of a license term.

5) Risk Associated with Uranium Recovery Facilities

Uranium recovery facilities present low risk to the short- and long-term health of the public from exposures to hazardous substances and radiation. Many UR facilities are located in remote areas, so doses to population centers are inherently limited. However, there are some facilities that are proposed or located near residences. While the risk from a regulated UR facility is typically low, the risk to the public can increase if a population center or residences are located near a facility. These risks have been addressed through the application of NRC regulations in

10 CFR Parts 20, 40, 71, Appendix A to Part 40, and EPA regulations in 40 CFR Parts 190 and 192, and regular NRC staff inspections and oversight.

The UR industry continues to address legacy contamination left over primarily from conventional uranium milling and associated tailings impoundments. Legacy contamination associated with conventional mills has been primarily related to groundwater contaminant plumes extending from tailings impoundments. Legacy contamination occurred primarily from tailings impoundments that were constructed before the design and siting requirements in 10 CFR Part 40, Appendix A, were enacted. Increasing the licensing term to a maximum of 20 years will not affect the design of new tailings impoundments that will be designed to the standards in 10 CFR Part 40, Appendix A.

The dominant form of UR regulated by the NRC is ISR. While the potential exists for groundwater contamination at ISR sites, to date, contamination has been limited and localized to minor excursions near the production area. There have been surface spills of contaminated fluids at ISR facilities, and equipment failures that have led to yellowcake slurry spills, however, due to the remote locations and distance from water bodies, the spills have been localized, the contamination minimized, and spills cleaned up or planned for cleanup under a decommissioning plan. There also have been worker inhalation exposures involving ejection of yellowcake from pressurized yellowcake drums, but the exposures have been minimal. Radioactive material releases from transportation incidents have occurred, but exposures to workers and members of the public have been below regulatory limits. These types of low-risk events have the potential to occur regardless of license term. In the NRC staff's view, NRC inspections, enforcement, licensing actions, licensee corrective actions, industry lessons-learned and best practices, and NRC generic communications have been sufficient to address these events and minimize their frequency. There have been no generic safety issues (e.g., aging management of safety-significant components) at UR facilities for which the license renewal process is relied upon to impose additional safety requirements.

NUREG/CR-6733, "A Baseline Risk-Informed, Performance-Based Approach for In Situ Leach Uranium Extraction Licensees," September 2001, discussed risk at ISR's and stated, "Participation in licensing activities, information gained from site visits, and discussions with NRC staff members supported a broad assumption that uranium ISL [in situ leach] facilities pose inherently low risk. These facilities contain no operating reactors, no fission products, and no high radiation areas requiring extensive shielding; and they have operating records that confirm low exposures to workers and the public." Increasing the license term to 20 years will not increase the level of risk or types of incidents expected at these facilities.

6) Facility Lifespan and Recent Licensing History

Uranium recovery licenses have been issued for 10-year terms since the late 1990s. There have been no new conventional mills or heap leach facilities licensed by the NRC staff since that time. The NRC staff has reviewed new ISR licenses and major ISR expansion license amendments issued from 2010 to present. These applications include information on facility operating schedules. Enclosure 3 lists the ISR facilities and major expansions licensed since 2010 and their expected lifespan. The NRC staff notes that ISRs are often initially scheduled for a 10- to 20-year lifespan, with the average being about 15 years. Because these projects may encounter delays, a 20-year maximum license term is more closely aligned with the typical predicted lifespan during initial licensing. The increase in license term will not impact the

lifespan of UR facilities but would reduce the number of license renewals incurred by a licensee during the lifespan of the facility.

ISR sites usually obtain an initial license, operate for several years, and then apply for license amendments to add wellfields and satellite facilities as the initial ore body becomes depleted. As such, at least one major license amendment is evaluated during the licensing term for many ISR licenses. ISR projects, originally licensed during 1970s and 1980s, are still licensed and currently operating. An example is the Smith Ranch Highland Project that began ISR licensed activities in 1972 and now contains five project areas that have been added over the years. Current projections for the Smith Ranch Highland Project have ISR activities occurring into the 2030s, which would be at least 60 years of operations since initial licensing.

7) Resource Implications

As discussed above, in the case of a facility that was licensed, expanded and operated over a 60-year period, the number of renewals would be reduced from five (year 10, 20, 30, 40 and 50) to two (year 20 and 40). Cost savings for three less renewals would be approximately 3.5 million dollars, in 2017 dollars, in NRC Part 170 fees paid by the licensee, and approximately nine NRC full-time equivalent (FTE) directly related to licensing activities over the 60-year lifespan of a licensed facility. Additional FTE savings may be achieved in the Office of the General Counsel and the Atomic Safety and Licensing Board since a reduced number of renewals may also decrease the number of contested hearings. These cost reductions do not include potential savings to licensees for the preparation of the three renewal applications and contractor fees.

PROPOSAL:

Based on the information discussed above, the NRC staff recommends increasing the maximum license term from 10 to 20 years for all new UR licenses and license renewals at the next renewal cycle for each licensee. The NRC staff would reserve the option to issue licenses with reduced license terms for new processes or technology. The NRC staff would not consider past licensee performance in determination of the length of the license term.

Advantages

Issuing licenses for up to 20 years will better align with the approximately 15-year average lifespan of newly-licensed ISR facilities and major expansion projects. It will reduce the number of renewals over the lifespan of a facility that will lead to cost savings for the licensee and the NRC while maintaining public health and safety and protecting the environment.

Disadvantages

A longer license term would not afford the NRC staff or the licensee the opportunity to apply new or updated guidance to license applications and license conditions as often. A longer license term would not allow for NRC staff to review as frequently the conditions surrounding the facility and evaluate environmental impacts on historical resources, cultural resources, and threatened and endangered species, for example. The opportunity for public involvement would not occur as frequently during longer renewal periods. The identified advantages would not be realized for licensees using new technology that may receive an initial license term less than 20 years.

RECOMMENDATION:

The NRC staff recommends approval of the proposal to increase the UR maximum license term to 20 years. Extending the license term for UR facilities to a maximum of 20 years would not change the health and safety requirements currently in licenses. Thus, given the relatively low level of risk involved in the current operations of these facilities, the effectiveness of the oversight program, the mature regulatory framework, and their historical performance, the staff has determined that extending the maximum license term from 10 to 20 years will not adversely impact the protection of public health and safety and protection of the environment. Reserving the option to reduce the license term to less than 20 years for new processes and technology is in concert with past Commission decisions and is deemed prudent by the NRC staff for use on a case-by-case basis.

OTHER STAFF CONSIDERATIONS:

The NRC staff considered longer license terms and did not identify any inherent barriers to a licensing term greater than 20 years, such as 40 years. Much of the rationale to support a license term of 20 years is relevant to longer periods and the resource savings would be proportionately greater. However, such a substantial change would warrant significant outreach with industry, Agreement States, and other stakeholders. Additionally, staff would need to consider possible modification to reporting or oversight requirements in conjunction with longer license terms, for example, a 5-year licensing basis update may be appropriate. Consideration was also given to possibly issuing indefinite term licenses. In addition to the considerations associated with a 40-year term, this approach has additional challenges such as potentially creating an incentive for licensees to delay restoration and decommissioning and may require rulemaking. Therefore, the NRC staff recommends increasing the maximum license term to 20 years at this time. However, after experience is gained with 20-year license terms and greater stakeholder outreach, consideration of terms greater than 20 years may be appropriate.

STAKEHOLDER OUTREACH:

The NRC staff has informed industry representatives of the UR licensing term review at the June 2017 National Mining Association Workshop in Denver, Colorado. The NRC staff has also informed and discussed this proposal with UR Agreement State representatives.

COORDINATION:

The Office of the General Counsel has reviewed this paper and has no legal objection.

/RA/
Victor M. McCree
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for Operations

Enclosures:

1. Material License Term History
2. Uranium Recovery Technology
3. Recent New Licenses and Major
Expansions Issued and Expected Lifespan

INCREASING LICENSING TERMS FOR URANIUM RECOVERY FUEL CYCLE FACILITIES
 DATED August 31, 2017

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Material License Term History

In a *Federal Register* notice (32 FR 7172) dated May 12, 1967, the Atomic Energy Commission (AEC) amended Title 10 of the *Code of Federal Regulations* (10 CFR) Part 40, "Domestic Licensing of Source Material," to eliminate a 3-year restriction on the term of source material licenses (there were no restrictions on the term of byproduct (10 CFR Part 30, "Rules of General Applicability to Domestic Licensing of Byproduct Material) and special nuclear material licenses (10 CFR Part 70, "Domestic Licensing of Special Nuclear Material")). The AEC indicated in the notice of proposed rulemaking, dated December 22, 1966, that if the proposed amendment to eliminate the 3-year restriction were adopted, licenses would be issued for 5-year terms, except in cases where the nature of the applicant's proposed activities indicates a need for a shorter license period. The AEC identified, at that time, that there was little justification for granting Parts 30, 40, and 70 licenses for terms of less than 5 years in view of: (a) cumulative experience up to that time; and (b) means available to the AEC to suspend, revoke, or modify such licenses if public health and safety or environment so required.

On June 19, 1990 (55 FR 24948), the U.S. Nuclear Regulatory Commission (Commission or NRC) gave notice that the license term for major operating fuel cycle licensees (i.e., licenses issued pursuant to 10 CFR Parts 40 or 70) would be increased from a 5-year term to a 10-year term, beginning on the next renewal of the affected licenses. This change was implemented to enable NRC resources to be used to make improvements in the licensing and inspection programs. The bases for this change was that major operating fuel cycle facilities had become stable in terms of significant changes to their licenses and operations, and that licensees would be required to update the safety demonstration sections of their licenses every 2 years.

On July 2, 1996, in SRM-SECY-96-112, "Ten-Year License Terms for Uranium Recovery Licensees", the Commission approved the NRC staff's proposal to extend the license term for uranium recovery (UR) facilities from the current 5-year period to a 10-year period for qualified licensees. Qualified licensees consisted of those that had performed well, had successful inspections with no violations more serious than Severity Level IV, and had no serious operational problems or reports during the previous 2 years. Extending the license terms for UR facilities would reduce the administrative burden associated with the license renewal process for both the NRC staff and the UR licensees; reduce licensee fees; and align the license term for these facilities with regulatory schedules that are commensurate with their level of risk. Licensees were informed by letter of the new policy in July 1996. The NRC staff granted extended license terms to qualified licensees by amendment.

In SECY-96-252, "Extension of License Term for Material Licensees," dated December 17, 1996, the NRC staff requested that the Commission approve a 10-year license term for materials licensees. In SRM-SECY-96-252, dated January 24, 1997, the Commission approved a 10-year license term for materials licensees, with the provision that the use of license terms shorter than 10 years is appropriate, on a case-by-case basis, and for situations where the industry or NRC has not had extensive experience in using or regulating the proposed use of the material.

In a *Federal Register* notice (62 FR 5656) dated February 6, 1997, the Commission gave notice that the license term for materials licenses issued pursuant to 10 CFR Part 30, Part 40, and Part 70, would be extended from the current 5-year period to a 10-year period on the next renewal of the affected licenses with the exception of licenses issued pursuant to Part 35.

In SRM-SECY-06-0186 “Increasing Licensing Terms for Certain Fuel Cycle Facilities,” dated September 26, 2006, the Commission approved the issuance of up to a 40-year license for facilities which implement an integrated safety analysis, consistent with the requirements in 10 CFR Part 70, “Domestic Licensing of Special Nuclear Materials,” Subpart H, “Additional Requirements for Certain Licensees Authorized To Possess a Critical Mass of Special Nuclear Material.” The Commission also approved license terms of less than 40 years on a case-by-case basis where the NRC staff had concerns with safety risk to the facility or where a licensee introduces a new process or technology. The NRC staff notes UR facilities are not required to prepare, and do not implement, integrated safety analyses.

On April 13, 2016, the Commission issued SRM-SECY-16-0009, “Recommendations Resulting from the Integrated Prioritization and Re-Baselining of Agency Activities,” which approved the NRC staff recommendations associated with two process changes that would reduce resource expenditures in the regions. The first is to move to a standardized 15-year license term for Regional materials licenses in lieu of the 10-year term. The second is to centralize bankruptcy reviews in headquarters. The NRC staff has formed a Joint NRC/Agreement State Working Group to carry out the Commission’s directive for Regional materials licenses. Because this effort was directed at regional materials licensing, the move to a standardized 15-year license term in lieu of the 10-year term was not applicable to UR facilities, which are licensed at the NRC Headquarters.

On March 2, 2017, the Nuclear Energy Innovation and Modernization Act (S. 512) was introduced in the U.S. Senate. If passed, the bill would require the NRC to submit a report to the appropriate Congressional committees describing the safety and feasibility of extending the duration of uranium recovery licenses from 10 to 20 years, including any potential benefits of the extension.

Uranium Recovery Technology

Conventional uranium milling involves the crushing and grinding of uranium ore to sand-sized particles, extracting the uranium via chemical processes, and disposing of the waste rock in mill tailings impoundments. In most cases, sulfuric acid is the leaching agent, but alkaline solutions can also be used to leach the uranium from the ore. The mill then concentrates the extracted uranium. The uranium extract is then further purified, and dried to produce a material, which is called yellowcake. Mill tailings are the fine-grained, sandy waste byproduct material that remains after the milling process has extracted and concentrated the uranium from the ore. They are typically created in slurry form during processing, and are then deposited in an impoundment or "mill tailings pile," which must be carefully regulated, monitored, and controlled. Mill tailings impoundments contain a large majority of the mass of processed ore.

Historically, heap leaching of uranium ore has been a lesser used technology in the U.S, which involves percolating chemicals over uranium ore. Small pieces of uncrushed ore are placed in a "heap" on an impervious pad of plastic, clay, or asphalt, with perforated pipes under the heap. An acidic solution is then sprayed over the ore to dissolve the uranium it contains. The uranium-rich solution drains into the perforated pipes, where it is collected and transferred to an ion-exchange system. The ion-exchange system extracts and concentrates the uranium. The uranium extract is then further purified and dried to produce yellowcake. Heap leaching results in a large tailings impoundment similar to a conventional mill.

In situ recovery (ISR) involves injecting chemicals into a host rock formation, dissolving the uranium in place, and recovering uranium once the uranium-laden solution is pumped back to the surface. A solution called lixiviant (typically containing water mixed with oxygen and/or hydrogen peroxide, as well as sodium carbonate or carbon dioxide) is injected through a series of wells into the ore body to dissolve the uranium. The lixiviant is then collected in a series of recovery wells, from which it is pumped to a processing plant, where the uranium is extracted from the solution through an ion-exchange process. The ion-exchange system extracts and concentrates the uranium. The uranium extract is then further purified and dried to produce yellowcake. Surface disturbances are relatively minor and there are no tailings or waste rock generated at ISR facilities.

Not all uranium ore bodies are amenable to the ISR method. For the ISR process to work, water must be present in the geologic unit hosting the uranium ore, and the geologic unit must have hydraulic properties that allow water movement through the ore zone. The targeted ore zone must be hydraulically confined both above and below to control the movement of injected chemicals and dissolved uranium. Currently, ISR is the primary method of U.S. uranium yellowcake production regulated by the U.S. Nuclear Regulatory Commission and Agreement States and is widely used throughout the world.

Recent New Licenses and Major Expansions Issued and Expected Lifespan¹

- Moore Ranch (new license, issued September 30, 2010) 12 years
- Nichols Ranch (new license, issued July 19, 2011) 17 years
- Lost Creek (new license, issued August 31, 2011) 12 years
- Dewey Burdock (new license, April 8, 2014) 20 years
- Ross ISR (new license, issued April 30, 2014) 9 years
- Reno Creek (new license, issued February 28, 2017) 16 years
- Jane Dough (major expansion, issued March 22, 2017) 20 years

The average expected lifespan is 15.1 years for facilities licensed since 2010.

¹ Expected lifespan based on proposed schedule in the license application.