POLICY ISSUE
(Notation Vote)

March 2, 2006 SECY-06-0049

FOR: The Commissioners

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SUBJECT: ACTIONS RELATED TO REGULATION OF MAXIMUM CONTAMINATION LEVELS FOR URANIUM IN DRINKING WATER

PURPOSE:

To provide background to the Commission on the U.S. Environmental Protection Agency's (EPA's) implementation of maximum contaminant levels (MCLs) for uranium in drinking water and the potential impacts to the U.S. Nuclear Regulatory Commission (NRC). The staff also requests approval of recommendations for both interim and long-term solutions to create an effective and efficient regulatory framework for these potential new licensees, as well as agreement on processing an existing license application proposing a multi-site service provider license.

SUMMARY:

EPA finalized an MCL for uranium of 30 micrograms per liter (µg/L) in December 2000. Before this time, EPA did not have a limit specific to uranium in drinking water and instead regulated uranium content through gross alpha and gross beta limits. EPA's rule became effective in 2003 and requires an initial monitoring phase to be completed by the water treatment facilities by the end of 2007. If the monitoring reveals uranium exceeding the MCL, the treatment facilities may choose to remove the uranium from the water using technologies that could concentrate the uranium to levels above 0.05 percent by weight; thereby requiring licensing

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by NRC or an Agreement State. EPA's rulemaking estimates approximately 500 facilities could exceed the MCL for uranium, which would require the facilities to take action regarding the uranium content of the drinking water. NRC regulations under 10 CFR Part 40 currently require that a water treatment facility that concentrates the source material to a level of greater than 0.05 percent by weight to apply for a specific license. However, if the facility possesses less than 15 pounds of source material at one time and receives less than 150 pounds of source material in a year, the facility could potentially operate under a general license in 10 CFR 40.22, "Small quantities of source material." If more than a few of these facilities require specific licensing, there could be a large impact on NRC and Agreement State resources. In addition, development and implementation of a specific license application could have a resource impact on the treatment facilities. Because the staff believes that the risk associated with these facilities does not warrant the increased controls associated with a specific license, the staff evaluated potential alternatives to the specific licensing of each water treatment facility in order to reduce the potential burden on the drinking water industry and regulatory agencies. Based on the expectation of relatively low impacts to public health and safety, the staff is recommending a new general license unique to drinking water treatment facilities.

Some treatment facilities may choose, or be required, to begin removing uranium from water immediately after the completion of their initial monitoring phase and prior to implementation of the new general license. In most cases, these facilities will require a specific license to possess the uranium under existing regulations. Therefore, to reduce the impact to these facilities during the rulemaking process, the staff also recommends that enforcement discretion be exercised to not cite those facilities for possession, use, transfer, or disposal of source material without an NRC license, provided that certain provisions are met to ensure public health and safety. These expectations would be described in a generic communication issued to drinking water treatment facilities. In the interim, the staff has received a site specific license application from RMD operations, LLC, to be a multi-site service provider. The staff recommends that the Commission direct staff to process the license application, unless other circumstances prevent license issuance. The staff estimates a total of 1.6 full-time equivalent (FTE) are needed in FY 2006 and FY 2007 for a total of 3.2 FTE. These resources are in the agency's current budget.

BACKGROUND:

In December 2000, EPA finalized new drinking water regulations (65 FR 76708) in which EPA announced new MCLs for radionuclides, including an MCL of 30 µg/L for uranium. Before this change, the drinking water regulations had no specific limits on uranium content, but instead regulated gross alpha and beta in the drinking water. Enclosure 1 provides a more detailed description of EPA's December 2000 drinking water rule, its history, methodology, and implementation. Although NRC commented on the proposed rule, at that time, NRC staff's comments were focused primarily on EPA's development of the technical basis for development of the MCL for uranium as it impacted NRC's decommissioning efforts and high-level waste licensing. During the rulemaking process, neither EPA nor NRC foresaw the potential need to specifically license water treatment facilities. The potential need to specifically license water treatment facilities has been an unintended consequence of the EPA rule, NRC's regulatory framework, and advances in water treatment technology. The most viable technologies during development of EPA's rule were not expected to exceed the exemption threshold of 0.05 percent by weight of source material found in 10 CFR 40.13(a), "Unimportant quantities."

In early 2004, the State of Vermont and a water treatment service company separately contacted NRC staff to request information on the applicability of NRC's jurisdiction over any

processing that may be used to treat uranium in water. After researching the issue, including the increased viability of newer technologies, the staff determined that some of these treatment processes,[1] which are otherwise cost-effective, would likely require the facility operator to obtain a specific license because the process can concentrate uranium above the 0.05 percent by weight exemption level in 10 CFR 40.13(a). The costs of developing and implementing a specific license application would be in addition to the cost of treating the water to comply with the EPA rule. Even modest regulatory costs could have an impact on this class of licensee; EPA estimates that the average affected treatment plant serves a population of about 1200 people and very few affected communities serve more than 10,000 people. Depending on the number of facilities that actually require specific licensing, NRC and Agreement State resources would also be significantly impacted.

In the *Federal Register* notice for the final rule, EPA estimated that approximately 500 drinking water systems may be impacted by the regulation. However, the number of affected facilities is uncertain because uranium concentrations in the drinking water have never been systematically measured – some industry estimates suggest that the regulation may potentially impact upwards of 3000 facilities (although this higher number may include individual wellheads rather than individual water treatment systems). The actual number of water treatment facilities that will be required to take action because of high uranium levels will not be known until the end of the monitoring period at the end of 2007. The number of these facilities that will require specific licensing, under existing regulations, will ultimately depend on the treatment technologies or approaches selected by those affected facilities. EPA is also currently conducting studies of 9 drinking water treatment facilities to evaluate uranium and radium concentrations at various points in each facility's systems. The selected facilities will cover a variety of sizes and technologies. EPA expects to collect most of the samples by late spring 2006 and complete their evaluation by late summer. NRC staff is coordinating closely with EPA on this regulatory issue, and when the study is complete, EPA will share their findings with NRC.

Although, EPA's regulation requires that drinking water treatment facilities complete their initial monitoring by the end of 2007, some facilities may complete their initial monitoring much earlier than this deadline. If these early facilities are in violation of the MCL, they are required to immediately begin treating the uranium or enter into a compliance schedule with the State. As a result, some of these facilities that treat the uranium may require specific licensing before the end of 2007. The staff is currently aware of one pilot facility in Virginia that, because of public concern, began treating for uranium immediately after sampling indicated uranium levels above the MCL.[2] The company providing the technology for this pilot facility, R.M.D. Operations, LLC, submitted a specific license application to NRC, dated September 27, 2005, for a performance-based, multi-site license, which would include the pilot facility.

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[1] Ion exchange is currently considered the most viable technology for removing uranium from drinking water. This technology is likely to concentrate the uranium above 0.05 percent by weight. See Enclosure 2 for a description of various drinking water technologies and their potential to require licensing.

[2]Because this facility is responsible for treating only a relatively small quantity of water at this time and the total quantity of accumulated uranium has remained under 15 pounds, this facility expects to be able to continue to operate under an NRC general license (10 CFR 40.22) until sometime in mid-2006; larger water treatment systems or those with higher levels of contamination are expected to require specific licensing in much shorter periods.

Finally, it is important to recognize that the majority of the impacted facilities are located in Agreement States, with the potential for greater impacts on the western United States where uranium resources are more abundant. The other major area affected by the uranium MCL is the Piedmont region of the eastern United States. Florida, New Hampshire, and Vermont are also believed to have localized drinking water systems with uranium in excess of the MCL.

Regulatory Background

The Atomic Energy Act (AEA) of 1954, as amended, defines source material as: (1) uranium, thorium, or any other material which is determined by the Commission pursuant to the provisions of Section 61 to be source material; or (2) ores containing one or more of the foregoing materials, in such concentration as the Commission may by regulation determine from time to time. It should be noted however, that Section 62 of the AEA only requires licensing of source material after removal from its place of deposit in nature (in this case, after its removal from the primary water stream). NRC's regulations for source material are found in 10 CFR Part 40, "Domestic Licensing of Source Material."

Within the regulations in Part 40, NRC has exempted persons from licensing of certain "unimportant quantities of source material," as listed in § 40.13. Because uranium is ubiquitous in nature, NRC provided an exemption, in § 40.13(a), for the possession and use of source material in concentrations of less than 0.05 percent by weight. The staff expects that at least one technology used to treat drinking water, ion exchange, will result in concentrating uranium to levels that exceed this exemption limit and therefore will require licensing.

A general license for the possession and use of source material is also included in Part 40, as § 40.22, "Small quantities of source material." Under this regulation, a water treatment facility could possess and process uranium at any concentration as long as the water treatment facility did not possess more than 15 pounds of source material at any one time and did not receive more than 150 pounds of source material in a calendar year. Facilities operating under this general license are exempt from the requirements of 10 CFR Parts 19, 20, and 21, and therefore would be minimally impacted; however, facilities operating under this general license are still required to transfer and dispose of the source material consistent with the regulations. This general license may be a feasible, low-impact method of licensing some of the smallest water treatment operations or allowing the processor to delay the acquisition of a specific license.

If neither the exemption in § 40.13(a) nor the general license in § 40.22 is applicable to the water treatment facility's particular situation, the operator of the facility will need a specific license issued by NRC or an Agreement State to remove and possess the uranium concentrated or extracted by the treatment process, unless a regulatory alternative is developed.

DISCUSSION:

Anecdotal evidence from the Virginia pilot study indicates potential dose rates near a uranium-removal ion-exchange column of up to 0.3 millirem per hour at the surface. However, the actual exposures will depend on the design and implementation of the water treatment system being used. For example, in the case of the pilot facility in Virginia, the facility is located in a locked shed near the well head and far removed from the actual water treatment facility. Minimal operator interaction is required, and the facility operator estimates actual exposures to be below

1 millirem per year for the workers. The shed is located off the main road and is easily approachable by members of the public; however, monitoring located on the side of the shed indicates exposures that are indistinguishable from background. Based on the staff's understanding of most drinking water treatment facilities, these minimal exposure rates should be common under normal operating conditions. At this time, accident scenarios are also highly speculative, but uranium inhalation scenarios that result in workers receiving higher doses or impacts from the chemical toxicity of the uranium are conceivable, but unlikely. For example, in the case of the ion-exchange technologies, the uranium's preference to the resin is expected to limit the dispersion of the uranium in any accident. However, because there is the potential that doses in certain situations, such as large quantity storage or additional processing for volume reduction, could exceed the public dose limit, some level of regulatory oversight may be warranted. Additionally, some regulatory control may be warranted to ensure protection of the public, workers, and the environment from the improper transportation and disposal of large quantities of uranium recovered from drinking water treatment operations. The amount of uranium which could be removed from drinking water may be significant, and improper handling and disposal, including use in unregulated activities or locations (e.g., as fill material), could increase the potential for exposures above public dose limits. Disposal considerations are discussed in Enclosure 3.

Based on the above considerations, the staff has evaluated existing regulations, as well as alternatives, to ensure that adequate protection of health and safety is maintained without overly burdening the drinking water treatment industry, NRC, or the Agreement States with the significant expenditure of unplanned resources disproportionate to the risk presented by removal of uranium from drinking water. The alternatives developed for regulating the removal of uranium from drinking water are evaluated in detail in Enclosure 4. The options include:

1. Licensing the facilities under the current regulatory structure
2. Developing a new general license specific to drinking water treatment facilities
3. Developing a new exemption specific to drinking water treatment facilities
4. Requesting EPA to rescind their rule specifically for uranium in drinking water
5. Implementing the Jurisdictional Working Group recommendations suggested in 2003, to remove uranium and thorium, not purposefully extracted nor concentrated for the use of the uranium or thorium, from NRC jurisdiction (which would include uranium concentrated at drinking water treatment facilities)

As part of the staff's evaluation of the existing regulatory scheme, the staff also evaluated introducing a new licensing strategy under the existing regulations to allow one or more service providers to operate treatment systems at multiple, independent drinking water facilities under a single license. Under this approach, the service provider, operating under a specific license, would operate filtration equipment at multiple drinking water treatment facilities and take responsibility for the disposal of the source material. R.M.D Operations, LLC, has submitted a request for such a license. The benefit of this approach would be to reduce the number of individual specific licenses that would need to be processed by NRC. However, this multi-site license scheme raises significant policy questions, such as whether it is appropriate to permit a service provider to possess source material or whether the water treatment facilities would also be required to obtain a specific license. Also, the staff needs to determine who is responsible for decommissioning, if the service provider contract is terminated or if there is a change of service providers at a site. These, and other considerations, are discussed further in Enclosure 4, Option 1A.

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The staff also evaluated developing a simplified licensing system specific to drinking water treatment facilities. Under this approach, the staff would develop guidance and templates, for license applications and the review of the application, with the intent to minimize the number of resources expended by the drinking water treatment industry, NRC, and the Agreement States required to meet the existing regulatory requirements.

Based on the evaluation of the options, the staff believes that the best alternative is to immediately begin rulemaking to develop a new general license specific to drinking water treatment facilities. The staff believes that this alternative will best maintain public and worker health and safety and ensure proper disposal of accumulated uranium, while minimizing the impact on the drinking water treatment industry, NRC, and the Agreement States. The staff believes that this action could be completed within 30 months, including collection of information necessary to support the technical basis, if it follows the normal rulemaking process. However, the staff believes it would be beneficial to instead develop the rulemaking as an interim final rule, which would allow the rule to be implemented in a much shorter timeframe (approximately 20 months).

During the development of this rule, the staff plans to work with EPA to communicate with the drinking water treatment industry regarding NRC's existing regulations and any possible changes resulting from the proposed rulemaking. It is the staff's understanding that the EPA plans to hold training sessions on the radionuclides rule and their recently released guidance documents; NRC staff will likely participate in such sessions. Additionally, the staff will consider other methods, such as presentations at appropriate conferences, to inform and prepare members of the drinking water treatment industry regarding NRC's oversight. Through such communications, the staff will interact with the stakeholders to develop a clearer understanding of NRC's role, responsibilities, and requirements for regulating the removal of uranium from drinking water.

One common problem for implementing most of the available options is timing. As stated previously, many facilities may opt to treat uranium much earlier than the EPA compliance deadline. As a result, these facilities will require specific licensing if an alternative regulatory strategy cannot be fully implemented before the facility exceeds the exemption limits in § 40.13(a) or the limits for a general license in § 40.22. In Enclosure 5, the staff has evaluated options to temporarily defer specifically licensing these facilities (if necessary) until the chosen option is implemented.

These options include:

1. Enforcing existing regulatory requirements
2. Issuing orders to impose specific requirements within the existing regulatory requirements
3. Exercising enforcement discretion to not cite for possession, use, transfer, or disposal of source material provided certain conditions are met
4. Requesting EPA to defer the compliance date

Based upon the review of these short-term solutions, the staff believes that during the period of rulemaking for this new general license, enforcement discretion should be exercised, so as to not cite those drinking water treatment facilities for possession, use, transfer, or disposal of source material without an NRC license provided that certain conditions are met by the facility to protect public health and safety. Prior to exercising enforcement discretion, the staff would

issue a generic communication (likely in the form of a regulatory issue summary), within 120 days of Commission direction, that would clearly indicate the expectations for operations by the drinking water treatment facilities during the period of enforcement discretion. The generic communication would include information regarding maintaining adequate public and worker health and safety and protection of the environment, proper transportation and disposal, and reporting. A specific license would not be required to operate while rulemaking was ongoing, although a drinking water treatment facility would not be prohibited from applying for a specific license. During the period of enforcement discretion, following publication of the generic communication, NRC or the Agreement States would actively evaluate situations where persons reported concerns impacting worker and public health and safety or improper disposal. If the staff identifies a public health and safety issue that was not envisioned during the development of the enforcement discretion guidance, the staff will revise the guidance to address this new concern, which could result in the need for some water treatment facilities to obtain a specific license for possession and use of the source material.

Additionally, the staff plans to process the R.M.D. Operations, LLC license application, unless the applicant withdraws their license application. Implementation of a new general license does not preclude NRC from issuing a specific license per the applicant's request. If the service provider license is granted, some drinking water treatment facilities may desire to operate under the service provider's specific license, rather than operate under the proposed general license.

Finally, during the development of this paper, NRC staff have met periodically with EPA staff to share information on this issue. NRC staff have kept EPA staff abreast of the issues discussed in this paper and of the staff's planned recommendations. NRC staff will continue to keep their EPA counterparts informed of the status of these issues and plan to continue to meet with EPA on this issue during the development of any rulemaking that may occur.

AGREEMENT STATE ISSUES AND INTERACTIONS:

As most of the impacted facilities appear to be in Agreement States, those regulatory agencies could see the biggest resource impact. At least five of the impacted Agreement States have already contacted NRC about the uranium MCL and asked how NRC plans to regulate drinking water treatment facilities. Although development of a new general license may require modification of Agreement State regulations, the staff believes that costs for adoption of a new general license will be offset by the savings to most Agreement States by not having to conduct reviews and issue numerous specific licenses. The staff plans to coordinate extensively with the Agreement States during the development of any new rule.

ENFORCEMENT CONSIDERATIONS:

Under the recommended approach, the staff would expect to exercise enforcement discretion, to not cite drinking water treatment facilities for possession, use, transfer, or disposal of source material without an NRC license. However, because of the staff's concern regarding the proper disposal of large quantities of source material and the potential negative impact on public perception that could result from using a blanket discretion approach, the staff plans to issue a generic communication. The generic communication would provide information to the drinking water treatment facilities with conditions that must be met and maintained in order for the NRC to exercise enforcement discretion. These provisions would precede the eventual requirements to be developed during the rulemaking for the general license and may forecast the staff's initial views of the future rulemaking activity.

As long as the drinking water facility met the provisions described in the generic communication, the staff would exercise enforcement discretion to not cite the drinking water treatment facility for possession, use, transfer, or disposal of the source material without an NRC license. Should the staff determine, at any time, that the provisions described in the generic communication are not being met, they could find the drinking water treatment facility operator in violation of the regulations and require the operator to apply for a specific license. The period of enforcement discretion would end upon implementation of the new general license.

RESOURCES:

To finalize and implement the recommended rulemaking to create a new general license specific to drinking water treatment facilities, 3.2 full-time equivalent (FTE) positions are estimated to be required to complete this action. The staff has prioritized this action as high and estimates that 1.6 FTE will be used in fiscal year (FY) 2006 and 1.6 FTE in FY 2007 to support this rulemaking. The 1.6 FTE includes 1.3 FTE from NMSS and 0.3 FTE from other offices. NMSS has coordinated with the other offices regarding these resources. Contract support will be used to help support development of this rule. The staff estimates that $30,000 for FY 2006 and $50,000 for FY 2007 will be needed for contract support. These resources are included in the Office of Nuclear Material Safety and Safeguards' (NMSS's) current budget and Agency-wide prioritization of resources. A detailed schedule will be provided to the Commission within 60 days of the staff receiving approval from the Commission to move forward with the recommended action or for any other action directed by the Commission, if appropriate.

The information on resources and schedule reflect the current environment. If a significant amount of time (greater than 30 days) passes or the Commission provides the staff direction that differs from or adds to the staff's recommended action(s), this section of the paper would need to be revisited after issuance of the draft staff requirements memorandum.

COMMITMENTS:

Should the Commission approve the staff's recommendations, the staff will provide the Commission a schedule to publish an interim final rule for a new general license specific to drinking water treatment facilities within 60 days. In addition, the staff will issue a generic communication (likely in the form of a regulatory issue summary), within 120 days of the Commission's direction, providing information to drinking water treatment facilities regarding provisions that they are required to meet in order for enforcement discretion to apply, while the staff develops the new rule.

RECOMMENDATIONS:

The staff recommends that the Commission:

1. Approve the staff's plans to develop a new general license specific to drinking water treatment facilities as an interim final rule;
2. Authorize the use of enforcement discretion to minimize the impact on the drinking water treatment industry, NRC and the Agreement States, until a new general license is implemented;

3. Direct staff to issue a generic communication to describe NRC expectations with regard to water treatment facilities, and;
4. Direct the staff to continue to process the R.M.D. Operations, LLC, license application as a multi-site service provider, unless other circumstances prevent license issuance.

COORDINATION:

The Office of the General Counsel has no legal objection to the recommendations in this paper. The Office of the Chief Financial Officer has reviewed this paper for resource implications and has no objections.

/RA/

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Enclosures:
1. Background on EPA's 2000 Drinking Water Regulations for Radionuclides
2. Technical Background: Methods for Compliance with EPA Regulations
3. Disposal of Uranium Removed from Drinking Water
4. Alternatives to Specific Licensing of Drinking Water Treatment Facilities
5. Options to Defer Specific Licensing of Drinking Water Treatment Facilities

BACKGROUND ON EPA'S 2000 DRINKING WATER REGULATIONS FOR RADIONUCLIDES

EPA's Regulation of Drinking Water Authority

The U.S. Environmental Protection Agency (EPA) sets national health-based standards for drinking water to protect against both naturally occurring and man made contaminants that may be found in drinking water. EPA's authority to set these standards stems from the Safe Drinking Water Act (SDWA) of 1974, as amended. Unlike many other legislative actions, such as the Clean Water Act, the SDWA does not distinguish Atomic Energy Act (AEA) material from other radioactive material.

EPA sets two types of primary drinking water limits for each regulated contaminant: a Maximum Contaminant Level Goal (MCLG) and a Maximum Contaminant Level (MCL). A MCLG is conservatively established at a level where there is no known or expected health effect. Because EPA uses a non-threshold linear risk model for ionizing radiation, all MCLGs for radionuclides are set at zero. MCLs are set as close to the MCLGs as possible, after consideration of cost and technological feasibility. Unlike the MCLG, the MCL is an enforceable standard.

In addition to the contaminant levels, EPA sets monitoring, testing, reporting, and enforcement requirements for each contaminant. Reporting and public notification requirements are tiered in proportion to the severity of the violation, and use standardized language. Most direct implementation and oversight of the SDWA programs is carried out at the State level. State enforcement is authorized through a "primacy agreement" between the EPA and the States, somewhat similar to the NRC's relationship with the Agreement States.

Federal Radionuclide Drinking Water Limits, 1976 - 2000

In 1976, drinking water regulations were first established for radioactivity (gross alpha, beta, and photon) and combined radium (radium-226 and radium-228). Because alpha emitters were regulated as a whole, uranium was not selectively removed from drinking water. Therefore, NRC's regulatory program was not impacted by EPA's drinking water regulations at that time.

Congress required EPA to promulgate standards specifically for uranium through its 1986 re-authorization of the SDWA. Uranium was to be considered separately from the other alpha emitters for the first time, due in part to its chemical toxicity. In 1991, EPA proposed an MCLG and an MCL of 0 micrograms per liter (µg/L) and 20 µg/L, respectively, for uranium (56 FR 33050); however, the 1991 proposed rule was never finalized.

Subsequent to 1996 amendments to the SDWA, EPA was sued for failure to finalize the radionuclides rule. EPA entered into a court stipulated agreement to take final action for uranium within four years. On December 7, 2000, the EPA finalized its National Primary Drinking Water Regulations for Radionuclides (2000 Radionuclides Rule) [65 FR 76708]. The rule established an MCL of 30 µg/L for uranium.

The 2000 Radionuclides Rule: Methodology

The main reason that the 1991 and 2000 uranium MCLs differ is due to a methodology change. In 1991, EPA was required by statute to set the MCL as close to the MCLG as is feasible. The 1996 SDWA amendments provided new discretionary authority for the EPA Administrator to set

an MCL that is less stringent than the feasible level if the benefits of an MCL set at the feasible level would not justify the costs.

In 1991 EPA determined that uranium can be feasibly treated at a level of 20 µg/L, and therefore the MCL was proposed at that concentration. The 2000 Radionuclides Rule reaffirmed that 20 µg/L is the feasible level. However, because the EPA Administrator was allowed to consider cost-benefit analysis, EPA determined that an MCL of 30 µg/L maximizes the health risk reduction benefits at a cost justified by the benefits.

The 2000 Radionuclides Rule: Implementation

Because uranium, as an individual contaminant, had not been widely measured in drinking water systems prior to the 2000 Radionuclides Rule, EPA is phasing in the new requirement. The rule was not made effective until 2003, to allow for the development of effective testing techniques and to build lab capacity. In addition, only community water systems, which are water systems that serve at least 15 service connections or 25 residents regularly year round, are required to meet the final MCL and have monitoring and reporting requirements.

The facilities, as directed by the States, are allowed up to four years to complete four consecutive quarters of initial monitoring. After the initial monitoring phase is complete – by December 31, 2007 – the States and EPA will institute 9-year compliance cycles, during which drinking water systems will treat and periodically monitor for uranium; the monitoring period will depend upon the level of uranium detected in the water.

If the monitoring reveals uranium exceeding the MCL at any time, the facility must notify the public within 30 days and develop a compliance schedule to be approved by the State. The Federally-required public notification for a uranium violation is: “Some people who drink water containing uranium in excess of the MCL over many years may have an increased risk of getting cancer and kidney toxicity.” Methods for compliance include blending the uranium-laden water with an uncontaminated water source, substituting an alternative source of water, or installing a physio-chemical process to remove the uranium from the drinking water.

The 2000 Radionuclides Rule also makes allowance for a facility to extend the time until its compliance by using EPA’s Variance and Exemption Rule (63 FR 19442; April 20, 1998). The Variance and Exemption Rule essentially allows small systems who find the new regulation burdensome to petition the EPA for an extension of the monitoring phase. Extensions are granted in three-year increments, up to a total of nine years at the discretion of the primacy agency and the drinking water system. As of the NRC staff’s last discussion of this provision with EPA’s Office of Water and Groundwater (November 2005), no drinking water systems had requested an extension for uranium. The majority of affected facilities are likely to meet the eligibility requirements to qualify for an extension; however, due to the complicated exemption process and public perception, it is unlikely that a significant number of the affected facilities will use the exemption to delay removing uranium from drinking water. Effectively, this means that impacted facilities will gradually begin addressing their uranium contamination through December 2007.

Technical Background: Methods for Compliance with EPA Regulations

In 2000, the U.S. Environmental Protection Agency (EPA) issued new drinking water standards for certain radionuclides, including uranium. As drinking water treatment facilities comply with EPA's new limits for uranium in drinking water, some methods that may be used for compliance involve installing engineered treatment technologies. The removal of uranium from a diffuse source (i.e., diluted in groundwater) necessarily will concentrate the uranium in another place. The Atomic Energy Act of 1954, as amended, (AEA) provides NRC regulatory authority over uranium as source material (referred to as AEA material) once it is removed from its place in nature (i.e, artificially concentrated within or removed from the water stream). Depending upon the amount of concentration achieved, some of these technologies may require licensing by NRC or the Agreement States.

Under current regulations, there are three regulatory thresholds when considering AEA material: (1) a person is exempted from the regulations when possessing source material that remains under a concentration threshold of 0.05 percent by weight of uranium and thorium [10 CFR 40.13(a)]; (2) a person may operate under a general license if the amount of source material possessed at any one time contains less than 15 pounds of uranium and thorium and that same person receives (or in the case of drinking water facilities, extracts or concentrates) no more than 150 pounds of source material in a year [10 CFR 40.22(a)]; and (3) a person is required to operate under a specific license from NRC (or an Agreement State) for the possession and use of any source materials not covered by the exemption or general license. Due to the large quantities of water treated at even the smallest drinking water treatment plants, removal of even a low concentration of uranium can result in a waste stream containing hundreds of pounds of uranium. Only unusual circumstances will lead to a drinking water treatment plant being eligible for the existing general license, because the facility would have to be large enough to fall under EPA's rule (i.e., serve at least 15 service connections or 25 residents regularly year round), but still small enough to generate less than 150 pounds per year of uranium. In addition, such a facility would have to conduct its operations so as not to possess more than 15 pounds of uranium at any one time. Consequently, when evaluating technical methods for removing uranium from drinking water on a nationwide scale, the important regulatory threshold is considered to be the concentration limit of 0.05 percent by weight of uranium.

Methods for Removing Uranium from Drinking Water

As part of their 2000 rulemaking, EPA set two limits for uranium in drinking water: a maximum contaminant level (MCL) of 30 µg/L, and a maximum contaminant level goal (MCLG) of 0 µg/L. A MCLG is conservatively established at a level where there is no known or expected health effect. Because EPA uses a non-threshold linear risk model for ionizing radiation, all MCLGs for radionuclides are zero. MCLs are set as close to the MCLGs as possible, after consideration of cost and technological feasibility. To determine cost and technical feasibility, EPA evaluated specific treatment technologies. It should be noted that no one technology will be most effective to treat all affected waters, and the choice of technology will be dependent on site specific characteristics and limitations. Additionally, future developments may result in new technologies for removing uranium from drinking water that cannot be evaluated at this time.

Currently, the best available technologies (BATs) are ion exchange (IX), reverse osmosis, lime softening, and coagulation/filtration. A BAT list is published at 40 CFR 141.66, Table B. Small systems are allowed to use some technologies not on the BAT list, as published at 40 CFR

141.66, Table D. Regardless of the technology used, the process of removing uranium from drinking water will generate a waste, also called residuals, containing concentrated uranium. There are many variables that can affect the ultimate concentration of uranium in solid or liquid waste streams. The EPA does not publish a list of approved residual disposal methods or restrictions in the same way that the BAT list is published.

In general, the methods for complying with the uranium MCL can be categorized in light of the 0.05 percent by weight licensing threshold. At one extreme, technologies with a great affinity for uranium, such as ion exchange resins, will require specific licensing under NRC's current regulatory framework. At the other extreme, the drinking water facility operators may choose options that do not require the removal of any uranium from drinking water and, therefore, would not require licensing by NRC or the Agreement States. These options may include blending, modifying well construction, or using alternative water sources. Of the remaining technologies, operational parameters will determine if the 0.05 percent by weight threshold is breached.

Depending on the other considerations of the drinking water treatment plant, further concentration of uranium is also possible from the unit operations and processes used for residuals handling. In accordance with the appropriate permits, liquid residuals are most often disposed of at a sewage treatment plant, although they can sometimes be re-injected underground, or (rarely) discharged to a surface water body. Uranium may concentrate in excess of 0.05 percent by weight if the liquid residuals are not handled properly, such as in a buildup of pipe scale, or if the liquids are allowed to evaporate. Sludge, in general, is dewatered by mechanical means (centrifuge, filter press, or vacuum) or by evaporation (lagoon) before being applied to land or disposed of in an appropriate landfill.

Alternatives to Water Treatment

It is important to note that a drinking water system that is in violation of the EPA MCL for uranium is not compelled to install a treatment system. As part of their cost-benefit analysis, EPA estimates that 33 percent of the affected drinking water systems will not remove uranium from drinking water. EPA's estimate that 67 percent of affected systems will remove uranium is high, and the actual percentage of such systems treating for uranium may be much lower. Retrospective analyses for other drinking water standards (e.g., EPA's Notice of Data Availability (NODA) identifies specifically Illinois' experience with radium, and nationwide experience with nitrate/nitrates) have shown that approximately 25 percent of affected systems choose to treat their water; the other 75 percent use other methods such as using alternative water sources or blending water sources.

Where allowed, a drinking water treatment system may "blend" contaminated water with clean water so that the distributed, diluted, drinking water is in compliance with the EPA limits. Some States prohibit dilution as a compliance method. A more generally applicable option is to develop an alternative, non-contaminated, drinking water source. If a drinking water treatment system chooses to use an alternative water source or the blending option, uranium would not be extracted or concentrated and an NRC or Agreement State license will not be required.

Technologies that have Demonstrated the Generation of AEA Material

Ion exchange demonstrably concentrates uranium in excess of the "unimportant quantity" threshold of 0.05 percent uranium by weight. In an IX process, the uranium is concentrated on a resin as the water passes through the IX columns. Anecdotal evidence suggests that concentrations of up to 9.00 percent uranium by weight (180 times the regulatory threshold) may be retained on the IX resin. Currently, the few installed pilot programs at drinking water facilities throughout the country indicate that IX technology may be effective at removing uranium from many types of groundwater. More importantly from NRC's regulatory perspective, the pilot programs provide evidence that IX technologies can concentrate uranium in excess of the 15 pound limit applicable to the general license in 10 CFR 40.22 within very short periods of time (weeks to months). Additionally, the EPA has noted [Technology Transfer Handbook: Management of Water Treatment Residuals, EPA/625/R-95/005, April 1996] examples where the IX regeneration waste (brine) is further concentrated in excess of AEA material thresholds. In experimental settings, average IX regeneration waste concentrations range from 0.02 percent to 0.20 percent by weight, with peak values of about 1 percent uranium by weight (20 times the regulatory threshold). Therefore, persons using such a technology will likely be required to obtain an NRC or Agreement State license.

Although it may be possible for a facility to use IX and not generate licensable concentrations of AEA material, it is not a very realistic consideration using current technology. Ion exchange resins can be regenerated, in exactly the same way a residential water softener is regenerated with a brine solution. As long as the uranium does not build up on the resin in excess of 0.05 percent by weight at any time, no license would be required; however, the practice of staying below this limit probably will not be cost-effective. To be effective, the IX resin must be regenerated with an efficiency near 100 percent (most likely at least 99.5 percent). Currently, EPA does not recognize a regeneration method whose efficiency exceeds 92 percent. Even hypothesizing the development of a sufficiently efficient method, such a regeneration schedule would only be for the purposes of regulatory compliance and have no relation to the considerable fundamental capacity of the resin for uranium. A higher regeneration frequency would affect operating and maintenance costs, and it would create a very large volume of wastewater. Additionally, more frequent flushes would create a greater opportunity for exposure to workers and increase the potential for incidents (such as localized spill). Because it is not in the best interest of the drinking water treatment facility to regenerate that frequently, it can be expected that any use of IX will very likely require a specific license from the NRC or an Agreement State.

Technologies Unlikely to Generate AEA Material

Technologies which generate a liquid waste stream and do not remove uranium selectively are unlikely to generate AEA material. Reverse osmosis (RO) is a BAT method that is not likely to generate AEA material, although it usually requires greater operator skill than IX and surface waters usually require pre-filtration. Reverse osmosis purifies water by forcing the water through a semi-permeable membrane under pressure. The membrane is designed so that both particles and dissolved ions are removed from the water, and are concentrated in a continuously produced liquid waste stream. Heavy metals such as uranium are removed by RO with very high efficiency. The liquid waste stream flow rate is typically about 1 percent of the incident flow rate, but the liquid waste stream flow rate can be adjusted for operational concerns. Based on the typical flow rate and the very high removal efficiency, the RO process

very likely concentrates uranium about 100x above the untreated groundwater. For regulatory purposes, a mass fraction of 0.05 percent uranium equates to a concentration in a liquid waste stream of 500 milligrams per liter (500 parts per million). Therefore, unless the raw groundwater is in excess of 5,000 micrograms per liter (µg/L) uranium, it is unlikely that RO alone will produce AEA material in its waste stream. EPA has noted (Technology Transfer Handbook: Management of Water Treatment Residuals, EPA/625/R-95/005, April 1996) uranium concentrations of about 0.01 percent by weight (1,000 µg/L or 1/5 of the regulatory threshold) in the RO waste stream.

As with any liquid waste stream, if uranium is allowed to precipitate via pipe scale or excessive evaporation, there is a possibility of concentrating the uranium above the level for exemption. However, the residual waste stream is unlikely to generate AEA material as long as it is disposed of as a liquid, such as a discharge to sewage or underground injection.

Technologies that Could Generate AEA Material

Technologies for removing uranium from drinking water that generate a waste stream with sludge may, but are unlikely to, generate AEA licensable material. Lime softening and coagulation/filtration are two BAT methods that are not likely to generate licensable source material, because the uranium will not likely be concentrated in excess of 0.05 percent by weight. These technologies are unlikely to generate concentrated uranium because they do not remove uranium selectively. Instead, uranium (usually a trace contaminant) will be removed simultaneously with other naturally occurring impurities in the water, and therefore the sludge will likely be sufficiently diluted so that it does not exceed the 0.05 percent by weight threshold.

Unlike IX or RO, lime softening and coagulation/filtration do not remove uranium particularly well. Lime softening and coagulation/filtration are viable technologies because, for most affected waters, their removal efficiency is sufficient to meet the MCL. However, these technologies do not remove uranium as efficiently as RO and IX, which both approach 100 percent removal efficiency. This means that uranium is not retained as well in the residuals from coagulation/filtration and lime softening as in RO or IX. Another factor affecting the concentration of uranium is that lime softening and the coagulation process add non-radioactive chemicals (e.g., Al, Fe, Ca, Mg, polymers) to the process, which further act to dilute the uranium in the waste stream.

The use of lime softening and coagulation/filtration does not preclude the generation of licensable AEA material. Both technologies generate sludge, and depending on how the sludge is handled, the uranium may be concentrated above 0.05 percent by weight. However, only a combination of unusual circumstances would yield such an outcome. For this to occur for coagulation/filtration, the residual solids would have to be dewatered to a very high degree, up to or exceeding 20 percent solids content, roughly 10x the typical solids content of thickened coagulation/filtration residuals. This is because coagulation/filtration residuals are gelatinous, contain copious amounts of bonded water, and are extremely difficult to thicken/dewater. In the case of lime softening, the solids are considerably easier to dewater and may reach up to 70 percent solids with some effort; however, the lime that is added to the process will dilute the uranium. To generate licensable AEA material, the process chemicals such as lime would likely have to be recovered by unit operations. This practice is considered unlikely, but possible, and in any case should not generally exceed a concentration of 0.05 percent by weight uranium.

Other Technologies Requiring Additional Information

Activated alumina is not on the BAT list, but is another technology that has shown promise to remove uranium (40 CFR 141.66, Table D). Not much is known about the performance of activated alumina in treating for uranium at this time. Activated alumina is a technology that has developed over the past 10 years. It is not likely that activated alumina will concentrate uranium to the extent of IX, because uranium is not specifically removed. However, the potential remains that the waste stream from this process could still exceed concentrations that would require NRC licensing. Due to its overall operational restrictions at the current time, it appears unlikely that uranium would be removed from drinking water using activated alumina in the near future.

Disposal of Uranium Removed from Drinking Water

As a result of U.S. Environmental Protection Agency (EPA) regulations for the treatment of radionuclides in drinking water, some water treatment facilities may be required to treat drinking water for uranium. Drinking water facilities that are required to be licensed by the U.S. Nuclear Regulatory Commission (NRC) or the Agreement States, because they concentrate uranium above 0.05 percent by weight of the material, will be required to ensure that their wastes containing uranium are properly disposed.[1] The concentration and quantity of waste material containing uranium, the material's characteristics, and the presence of other contaminants may all play a role in determining the appropriate disposal method. Depending upon the number of drinking water treatment facilities using technologies that will require NRC or Agreement State licensing, the concentration of uranium in the water being treated, and the amount of water being treated, there is the potential for relatively large quantities of uranium that may be removed from drinking water and require proper disposal. The potential issues related to the proper disposal of material from drinking water treatment facilities licensed by NRC or the Agreement States under existing regulations are discussed below.

EPA's 2000 Radionuclides Rule *Federal Register* notice [65 FR 76708] provides limited information for the purposes of determining the amount of uranium recovered nationwide. A more detailed analysis supporting the rule is found in the notice of data availability (NODA). The NODA is an analysis of the effects of a uranium maximum contaminant level (MCL) of 20, 40, and 80 micrograms per liter (µg/L), but not the actual maximum contaminant level (MCL) of 30 µg/L. The following analysis first defers to the data presented in the *Federal Register* notice and, if not otherwise presented, then defers to interpolations of the data provided in the NODA.

Amount of Uranium Recovered Nationwide

EPA estimates that approximately 500 systems will be impacted by this rule, serving approximately 620,000 people. Given that the average person requires approximately 160 gallons of water per day,[2] it is estimated that approximately 36 billion gallons per year could be produced from these drinking water systems. It is estimated that about one-third of systems will not treat for uranium,[3] but will develop/purchase alternative sources of water. Therefore, it is estimated that roughly 24 billion gallons (91 billion L) of water will be treated to remove uranium annually.

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[1]Disposal is used in this paper to indicate a removal of the uranium from the facility's license. This could be through a transfer to a licensed burial facility, transfer to another licensed facility for further processing, or through some other method approved of by the NRC or Agreement State.

[2]Note that the average per capita water produced at a drinking water treatment facility, 160 gallons/d (600 L/d), is considerably more than the average per capita water drinking (ingestion) rate, which is less than 1 gallon/d (1.11 L/d).

[3]NODA, table VII-13.

Of the affected drinking water treatment systems, it is estimated that the average untreated water contains uranium at a concentration of about 40 µg/L.[4] Therefore, for compliance with the 30 µg/L uranium MCL, at least 10 µg/L will be removed from 24 billion gallons, for a total of about 1,000 kg uranium per year. If the drinking water is treated by high-efficiency processes such as ion exchange or reverse osmosis, it is possible that 4,000 kg of uranium will be removed from drinking water treatment plants nationwide per year.

The recovered uranium will not be in a pure form, but will be diluted according to many factors that are unknown at this time. However, if this quantity of uranium is diluted to the minimum licensable concentration (0.05 percent by weight, or a factor of 2,000), the nationwide impact would require the licensed disposal of approximately 2,000 to 8000 metric tons (2 to 8 million kg) of uranium-bearing wastes per year.

Waste Stream Characteristics

Regardless of the technology used to comply with EPA's drinking water MCL, the process of removing uranium from drinking water will generate a waste stream, also called residuals, containing concentrated uranium. There are many site-specific variables that can affect the ultimate concentration of uranium in the residuals, and the resulting health and safety risks they pose. Only certain technologies are approved by EPA for removing uranium from drinking water, and given a few process variables the waste stream characteristics may be calculated with some degree of confidence.

However, some facilities may undertake intermediate processing of the residuals in order to lower the costs of residual disposal. Intermediate processing may also be used to reduce the volume of waste or to increase the disposal options available to a particular facility. The intermediate processing options available to a particular drinking water treatment system vary in complexity from simple processes such as collecting residuals for direct disposal, or may involve complex treatment technologies that involve chemical or physical reactions.

Due to various combinations of water characteristics, treatment technologies, and intermediate processing options that will be present at the various drinking water treatment systems across the country, the residual characteristics are difficult to predict. Generally, however, the residual disposal options are governed by three factors: (1) the solid content of the uranium-bearing waste stream, (2) the concentration of uranium, and (3) the presence of other chemical or radiological contaminants.

Disposal Considerations for Solid and Liquid Residuals

Solid residuals are generated in bulk by adsorption or precipitation, and to a lesser extent as a result of other processes such as reverse osmosis. Liquid residuals can be generated from all of the available treatment technologies. For the most part, uranium in a solid can be changed

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[4]This value is presented in the NODA (pp VI-9), and estimated from the National Inorganics and Radionuclide Survey (NIRS). The NIRS data is the best survey available, however the use of this data for these purposes introduces considerable uncertainty as some early findings indicate that some facilities could treat water containing 20 times (800 Fg/L) or more uranium.

to a liquid, and vice-versa, using intermediate processing. The likelihood and extent of intermediate processing will depend on the residuals disposal methods preferred by the drinking water treatment facility. For example, uranium in a solid form is more stable for land disposal; other disposal pathways such as discharge to sanitary sewer or underground injection require that the uranium be in a liquid form.

The adsorption of uranium to solid media (such as an ion-exchange resin) may be partially reversed through a process called “regeneration.” Regeneration removes some of the adsorbed uranium from the adsorptive media and dissolves it into a highly-concentrated liquid waste stream. After regeneration, the media can be re-used to remove more uranium from the drinking water, however the media cannot be completely regenerated and at some point will become exhausted. Exhausted media will be contaminated with uranium and likely will have to be disposed of by land burial or milled.

Precipitation involves some manipulation of the drinking water, usually by processes such as chemical addition and pH manipulation, in order to convert the dissolved uranium into an insoluble chemical form. The uranium precipitate is then separated from the drinking water via physical means such as filtration or clarification. Specific technologies approved by EPA for removing uranium from drinking water via precipitation are coagulation/filtration and lime softening. The solid residuals created from precipitation are in the form of a sludge. The uranium is not permanently bound by these processes, however, and through intermediate processing, it may be dissolved into a liquid waste stream.

Liquid residuals are created when the uranium remains dissolved in the water, albeit at a higher concentration than before the treatment. Liquid residuals arise from the membrane reject stream from reverse osmosis, the brine regeneration waste stream from ion exchange, and the various rinses and backwashes required for ion exchange and treatment methods utilizing precipitation.

Disposal Considerations due to the Uranium Concentration

The concentration of uranium will vary due to site-specific characteristics, such as the natural concentration of uranium in the drinking water and the ultimate treatment efficiency. From a licensing standpoint, uranium in excess of 0.05 percent by weight will require a license from the NRC. Along with the amount of material handling necessary for disposal, health and safety concerns will generally increase with higher uranium concentrations. A drinking water treatment facility is unlikely to further concentrate uranium in liquid waste streams if the disposal option is underground injection or direct discharge to sanitary sewer. However, if the residuals must be transported, such as for land burial or milling, the treatment facility will have incentive to increase the concentration of uranium in the transported waste.

Disposal Considerations due to Other Chemicals and Radionuclides

Some chemical and radionuclide contaminants may be found in the groundwater along with uranium, such as lead, radium, and arsenic. Their effect on disposal options would be to limit disposition pathways, and in the worst-case scenario, to create a mixed waste. However, their effect would be best dealt with on a case-by-case basis because their removal and concentration from groundwater will vary considerably due to the operations of the water treatment facility. Some processes, particularly absorptive media regeneration and

precipitation, will add process chemicals which could also limit disposition options because of their hazardous or other undesirable nature in and of themselves. For example, without intermediate processing, lime softening will generate residuals with extreme pH values. This may affect certain disposal pathways if a neutral pH is desired, as in discharge to sewer or underground injection; or if stability is desired, as in land burial. The presence of other radiological contaminants may also affect the residual disposal options if the resulting waste is excessively radioactive.

Waste Classification

The disposal of uranium recovered from drinking water by an NRC licensee will be in accordance with the provisions of the license and ultimately the regulations as set forth in 10 CFR Part 61. This discussion of waste classification is only valid if the uranium recovered from drinking water is categorized as "radioactive waste," and can be processed into a stable physical and chemical form. In accordance with 10 CFR 61.55(a)(6), by definition the uranium-bearing wastes will be classified as "Class A," because it will not contain any radionuclide enumerated in Table 1 or Table 2 of 10 CFR 61.55.[5]

Economic Considerations and Milling

Once removed from drinking water, it is conceivable that the uranium could be milled as alternative feed material. The residuals, or tailings, that will result from ion exchange processes used at drinking water treatment facilities, and if milled as alternative feed stocks, are expected to be physically, chemically, and radiologically similar to existing tailings produced from the processing of conventional ores at in-situ leach facilities. As a result, some facilities, if they concentrate enough uranium and have significant volumes of material, may find it economically beneficial to sell the uranium as an alternate feed rather than disposing of it through a burial method.

[5]In CLI-05-20, the Commission directed the staff to consider whether the quantities of depleted uranium at issue in the waste stream from uranium enrichment facilities warrant amending section 61.55(a)(6) or the section 61.55(a) waste classification tables. Because drinking water treatment facilities will not be concentrating depleted uranium (the facilities will concentrate natural uranium), changes as a result of this direction should not impact the waste classification of uranium bearing wastes from drinking water treatment facililities.

OPTIONS ANALYSIS
ALTERNATIVES TO SPECIFIC LICENSING OF DRINKING WATER TREATMENT FACILITIES

ISSUE

In December 2000, the U.S. Environmental Protection Agency (EPA) finalized new drinking water regulations (65 FR 76708), within which EPA announced new maximum contaminant levels (MCLs) for radionuclides, including an MCL of 30 micrograms per liter (Fg/L) for uranium. Depending upon the technology chosen to reduce the amount of uranium in drinking water, concentrations of uranium could exceed 0.05 percent by weight of source material and thereby require licensing under 10 CFR Part 40, "Domestic Licensing of Source Material." Although a small number of the facilities requiring licensing may be able to operate under the general license in 10 CFR 40.22, "Small quantities of source material," it is expected that, under existing regulations, most impacted facilities would be required to obtain a specific license. The EPA estimates that the average affected treatment plant serves a population of about 1,200 people and very few affected treatment plants serve more than 10,000 people, therefore, even modest regulatory costs could have a significant impact on this class of licensees. In addition, because EPA estimates up to 500 facilities (some industry estimates are considerably higher) could be affected, there could be significant impacts on NRC and Agreement State resources to license and regulate these facilities.

Based on the potential significant impact on resources of the drinking water treatment facilities, NRC and the Agreement States, and the disproportionately low risk from uranium removal operations at drinking water treatment facilities, the staff evaluated options that could potentially relieve or diminish the regulatory burden caused by EPA's rule. These options are discussed below.

Much of the benefit for pursuing alternatives to specific licensing is dependent upon the actual number of drinking water treatment facilities that will be required to treat uranium, as well as whether the technology chosen to treat the uranium will result in concentrations of uranium that will require licensing by NRC. Currently, the staff does not have enough data to make an estimate of how many new licensees could result from EPA's rule, as the range could extend from a few new licensees to thousands of new licensees. Nonetheless, the staff believes that even a handful of new licensees could significantly impact resources currently budgeted for other activities.

EXISTING REGULATORY FRAMEWORK

Section 40.13(a), "unimportant quantities of source material," exempts persons from licensing requirements for the possession and use of source material in concentrations less than 0.05 percent by weight of source material.

Section 40.22, “small quantities of source material,” provides a general license authorizing commercial and industrial firms, research, educational and medical institutions, and Federal, State, and local government agencies to use and transfer not more than fifteen (15) pounds of source material at any one time for research, development, educational, commercial or operational purposes. A person authorized to use or transfer source material under this general license, may not receive more than a total of 150 pounds of source material in any one calendar year. Persons using this general license are exempt from Parts 19, 20, and 21, unless such persons are also in possession of source material under a specific license. It should be noted that the transfer and disposal of source material held under this general license are still constrained by other NRC regulatory requirements.

OPTIONS TO LICENSING OF DRINKING WATER TREATMENT FACILITIES

The staff has evaluated five options for regulating the possession of uranium by drinking water treatment facilities that concentrate uranium above 0.05 percent by weight of source material. These options include: (1) licensing the facilities under the current regulatory structure (no action); (2) developing a new general license specific to drinking water treatment facilities; (3) developing a new exemption specific to drinking water treatment facilities; (4) requesting EPA to rescind their rule specifically for uranium in drinking water; and (5) implementing the Jurisdictional Working Group recommendations, suggested in 2003, to remove uranium and thorium not purposefully extracted nor concentrated for the use of the uranium or thorium from NRC jurisdiction (which would include uranium concentrated at drinking water treatment facilities).

OPTION 1: Licensing the Facilities Under the Current Regulatory Structure

Under this option, the staff would not modify existing regulations. The staff currently has two processes to license persons that are not eligible for the exemption in § 40.13(a). These processes include either licensing water treatment facilities under a general license pursuant to § 40.22 or under a specific license pursuant to § 40.32. This option will be the baseline against which all other options are compared.

Section 40.22 allows a person operating under a general license to possess up to 15 pounds of source material at one time and up to 150 pounds per year. Because this general license operates in many ways like an exemption, the impact from using this general license to regulate water treatment facilities would be minimal on most water treatment facilities, NRC, and the Agreement States. A majority of the regulatory costs would be associated with the disposal of uranium. However, the staff believes that this provision will have little applicability to water treatment facilities removing uranium. Due to the large quantities of water treated at even the smallest drinking water treatment systems, removal of even a low concentration of uranium, using certain technologies, described in Enclosure 2, could result in a waste stream containing hundreds of pounds of uranium. Even if site-specific conditions allow the facility to operate within the scope of the § 40.22 general license for a short period of time, many of these facilities will find it more economical to possess greater than 15 pounds of uranium at one time because of processing considerations. Additionally, attempting to stay under this 15 pound limit could result in additional exposures or greater potential for spills because of the more frequent filter media replacements or backwashing that may be required. Therefore, although the

§ 40.22 general license is appealing for both the water treatment facilities and regulatory bodies, most water treatment facilities will find its limitations prohibitive.

Additionally, it should be noted that NRC is still evaluating a 1999 petition submitted by the State of Colorado and the Agreement States requesting modification of this general license. The staff recommended changes, based in part on the 1999 petition, to this general license in SECY-01-0072, dated April 25, 2001. Although the Commission rejected the staff's rulemaking plan, the Commission directed the staff to collect additional data and provide new recommendations at a future date. The staff has since collected and is analyzing data on general license distributions. The staff will report and provide recommendations, regarding the distribution of generally licensed source material, to the Commission in December 2006. Changes to this regulation could impact any water treatment facilities operating under the § 40.22 general license.

The only existing alternative for facilities which cannot or choose not to operate under the existing general license is specific licensing in accordance with § 40.32. Specific licensing would be a significant expense for water treatment facilities, many of which are not aware that they may soon fall under NRC jurisdiction. Because of the potential number of licensees, a significant amount of unbudgeted NRC and Agreement State resources would have to be devoted to specific licensing of these facilities. Furthermore, depending upon the number of specific license applications received, it may be difficult and costly for NRC and the Agreement States to issue licenses in a timely manner to allow these facilities to operate in compliance with the new drinking water standards. Finally, additional resources would likely be needed to support inspection and future license amendments for these facilities.

Advantages

- Ensures protection of public health and safety and the environment by using existing regulations.
- The regulatory structure is immediately available; no resources will be necessary to develop a new rule.
- If § 40.22 is a viable strategy for operators, resource costs to both the operators and NRC and Agreement States would be minimal (if no future changes are made to § 40.22); however, it is expected that few, if any, operators will be able to operate under this provision.

Disadvantages

- Specific licensing could consume significant amounts of currently unbudgeted staff resources in the licensing arena thus impacting other activities.
- Specific licensing is difficult and costly for NRC and the Agreement States, therefore it may be unlikely that licenses will be issued in a timely manner to allow these facilities to operate in compliance with the new drinking water standards (i.e., treatment may not be allowed immediately after detection because of the required licensing process).
- Specific licensing may be prohibitively burdensome for some licensees (could substantially impact small systems or create a significant financial impact to members of the public who depend on the water).

- Persons operating pursuant to the § 40.22 general license will be difficult to identify because of the lack of reporting requirements in this section; therefore it will be difficult to ensure that the minimal requirements (i.e., possession limits and disposal requirements) are being properly met.
- Resources will be required to develop guidance for both applicants and (NRC and Agreement State) license reviewers; however, cost should be significantly less than any rulemaking option.

Under this option, the staff has also considered two potential strategies that could reduce some of the burden resulting from specific licensing. These suboptions include: (a) allowing a single provider to operate processes at numerous, separate drinking water facilities under a single license and (b) developing a simplified licensing system specific to drinking water treatment systems.

OPTION 1A. Multiple Site, Service Provider License

Under this option, a technology provider would hold a single license to operate processes to remove uranium from numerous, separate drinking water treatment facilities. The licensee would not be the local drinking water treatment facility operator, but instead would be the service provider who operates the technology used to remove the uranium from the water. The technology provider would apply for and hold the license, be responsible for maintaining the safety of the operation, possess the uranium during and after its extraction or concentration, and be responsible for properly transferring and disposing of the concentrated uranium. The licensee could add additional facilities to its license by showing that the new facility falls within the scope of its existing license and environmental analysis.

By letter dated September 27, 2005, R.M.D. Operations, LLC (RMD) applied for such a license and the staff is currently reviewing the application, including environmental and safety evaluation reports. Under the approach proposed by RMD, the licensee would have ownership and possession of the uranium during and after its extraction from the water supply. RMD's application suggests that license amendments to add new facilities to its license would not be necessary; rather, RMD would file a letter of intent with the NRC when adding additional facilities. RMD has proposed to satisfy the NRC's financial assurance requirements in two ways: 1) for publicly-owned facilities, the municipality would provide financial assurance for decommissioning and decontamination; and 2) for privately-owned facilities, the owner would provide acceptable financial assurance. RMD's application does not assume that the water treatment facilities being serviced would require licensing. The staff has not yet determined whether this approach would be adequate to protect public health and safety and the environment, and the staff will have to resolve several issues before granting such a license.

<u>Advantages</u>

- Application and review of a single license, covering multiple water treatment facilities, could reduce the regulatory burden of reviewing numerous separate applications.
- Would likely provide a single, more knowledgeable point of contact ensuring consistency in operations at facilities covered by the multi-site license.

<u>Disadvantages</u>

- All drinking water treatment facility operators may not choose the same technology provider, leaving the potential for numerous applications. NRC would remain obligated to consider site-specific applications not covered by the multi-site license(s).
- Would be most effective if all Agreement States and NRC recognized an NRC or another Agreement State license (reciprocity); but there is currently no provision for year-round reciprocity.
- The water treatment facility may still require a license because it owns and is ultimately responsible for the water and uranium at its site. The primary concern revolves around who is responsible for cleanup if the original provider (licensee) contract is terminated and either the water treatment facility takes over or another service provider continues service.

OPTION 1B. Simplified Licensing Applicable to all Water Treatment Facilities

Under this option, the staff would implement a standardized and simplified license application which, presuming the licensee closely followed the format and included all required content, could permit a more efficient application approval, including preparation of the license and supporting environmental reviews and documentation.

Advantages

- A standardized license application would simplify the licensing process for the water treatment facility.
- The review of a license that strictly followed a standardized license application could reduce the number of NRC and Agreement State resources expended and speed up the timeliness of the review, presuming applicants provided an application consistent and complete with the specified information requirements (and the application itself did not allow much variance).

Disadvantages

- The potential number of applications could still overwhelm NRC and Agreement State resources.
- Because not all sites are the same and some may use unexpected technologies, there may be a number of facilities that would not use the simplified application, which would impact the resources necessary to complete the reviews.
- NRC and Agreement State resources would be necessary to develop both a standard license application and review guidance, although the process is likely to be less costly than a rulemaking.
- Separate actions for each license application would still be necessary under the National Environmental Policy Act (NEPA), which will likely limit the resource savings.

OPTION 2: Rulemaking Option – New General License

As the current regulatory structure is potentially burdensome for the societal benefit attained by removing uranium from drinking water, and the costs associated with licensing under NRC's current regulatory structure may be prohibitive to many water treatment facilities, the staff has considered changing NRC's current regulations. Under this option, the staff would develop a

new general license through rulemaking, applicable to drinking water treatment facilities that concentrate uranium in excess of 0.05 percent by weight.

To develop the new general license, the staff would establish a technical basis to determine the level of regulation necessary for processes which concentrate or extract uranium from drinking water to provide adequate protection to worker and public health and safety, property, and the environment. These considerations would also need to include disposal requirements. The general license would address both existing technologies and the development of new technologies. Because of this consideration, limitations may be required on the scope of the general license to specific water treatment technologies or conditions to ensure adequate protection of worker and public health and safety, property, and the environment. These restrictions may limit the applicability of the general license, which would result in the need to specifically license a smaller number of drinking water treatment facilities.

A normal notice and comment rulemaking (development of the technical basis, proposed rule, and final rule) would be expected to take approximately 30 months. Thus, if started in early 2006, the final rule would be published in approximately Summer 2008. Because EPA's deadline for compliance is December 2007, some operators will likely have begun removing uranium before implementation of a new general license, and specific licensing by NRC may still be required.

A possible alternative may be to amend NRC's regulations via an interim final rule which would be expected to take approximately 20 months. Under the criteria of the Administrative Procedures Act (5 U.S.C. 553(b)(B)), the Commission will need to determine that prior notice and public comment on this rule would be impracticable, unnecessary, or contrary to the public interest. The staff believes that there may be sufficient basis for concluding that a normal notice and comment rulemaking is impracticable and contrary to the public interest, and therefore, there is good cause for an interim final rule.

There are several reasons why the typical notice and comment rulemaking procedure may not be practicable for publishing such a general license. While EPA was developing its rule, the EPA staff thought that drinking water residuals would legally be considered technologically enhanced naturally occurring radioactive material (TENORM), and therefore not subject to the licensing requirements of the Atomic Energy Act of 1954, as amended. The possible presence of licensable source material was not identified by the NRC during EPA's rule development because the most viable technology at the time was not expected to concentrate uranium more than 0.05 percent by weight of the source material. The technology most likely to concentrate uranium such that licensing is required, ion exchange, had not been applied to full-scale potable water systems and therefore was not closely evaluated at that time. Ion exchange technology has more recently been successfully applied to the treatment of potable water at research facilities and in a commercial setting in some small pilot facilities, operating under a general license pursuant to § 40.22. As noted, the staff still needs to establish a technical basis to determine the level of regulation necessary for a general license, such that it provides adequate protection. Considering the recent technological developments in uranium removal technology, the staff has not yet developed a technical basis. The combination of EPA's compliance deadline of December 2007, with this recent development in technology, has left the NRC with a very narrow window of opportunity to develop an appropriate technological basis and license for these facilities so they do not violate the NRC's licensing requirements. It is impracticable

for the NRC to proceed with the typical notice and comment rulemaking because it would necessitate either publication of the general license prior to proper development of the technological basis or would result in water treatment facilities complying with EPA's rule, while violating NRC licensing requirements.

Potential impacts on drinking water availability could also provide a basis for an interim final rule. If the NRC undertakes a normal notice and comment rulemaking, an appropriate general license may not be in place before the EPA's compliance deadline of December 2007; therefore, in order to comply with NRC regulations, water treatment facilities will be forced to undergo specific licensing. As the typical community affected by EPA's uranium rule is roughly 1,200 people, the resources and staffing required to comply with a specific license may be prohibitively burdensome for the community serviced by the water treatment facility, not to mention the NRC or Agreement State resources needed to process hundreds of license applications. Although a specific license would adequately protect the public health and safety, the staff believes that this protection can be ensured for drinking water treatment facilities with considerably less regulatory burden through a new general license. This approach would not require the intensive resource requirements of a specific license that could force a water treatment facility to cut costs in other ways or charge costs that are too expensive for the local population.

Advantages

- Would minimize regulatory burden for persons operating under the general license, while still maintaining adequate regulatory controls for worker and public health and safety and protection of property and the environment.
- NRC and Agreement State resource expenditures for the monitoring of general licensees would be significantly reduced compared to specifically licensing each operator (e.g., only annual reports, registrations, financial assurance, may be necessary, as determined through the rulemaking process).
- Offers a consistent nationwide approach that can be used in both NRC, and Agreement State, regulated States.
- Service providers, such as RMD, can still provide hardware and technology to drinking water treatment facilities. Additionally, service providers could provide administrative support to meet any general license requirements (e.g., registration and reporting). This approach, however, will place regulatory responsibility with the on-site drinking water treatment facility operator.

Disadvantages

- Some facilities may decide or be required to begin processing uranium prior to completion of rulemaking; therefore, specific licensing of those facilities may be necessary regardless of the relative quickness of an interim final rule (unless such licensing is allowed to be deferred during development of the new rule).
- Significant resources would be expended by NRC and Agreement States to develop rulemaking. If only a few facilities require specific licensing, these resources could be better applied processing the specific license applications.
- There could still be significant costs associated with disposal of the concentrated uranium, which is unusual for a general licensee.

- May not be able to apply to all technologies and still ensure adequate health and safety (particularly those facilities with large quantities of highly concentrated uranium) and thus some specific licensing may still be necessary.

OPTION 3: Rulemaking Option – New Exemption

Under this option, rulemaking would be used to amend the regulations to exempt water treatment facilities that remove uranium in excess of 0.05 percent by weight from licensing requirements, including disposal. Using an exemption could eliminate the need for licensing, thus requiring no resource expenditures by the operators, NRC, or the Agreement States to license the facilities. However, it appears extremely unlikely that an exemption for this class of potential licensees could be justified on a health and safety basis. Depending upon the technologies, concentrations, and quantities involved, it is possible that NRC's 100 millirem per year (mrem/yr) limit could be exceeded in a relatively short period dependent upon the time and frequency of worker exposure. Review of data from a pilot facility in Virginia indicates that the exposure rate on contact from an ion exchange column could be as much as 0.3 millirem per hour, although it is expected that normal operations will result in exposures less than 1 mrem/yr. An exemption from licensing is not typically issued unless it can be shown that "it is unlikely that individuals in the population will receive more than a small fraction, less than a few hundredths, of individual dose limits..." [30 FR 3462]. In addition, an exemption could allow disposal or transfer of large quantities of concentrated uranium to sites at which there could be unnecessary impacts to workers and members of the public.

<u>Advantages</u>

- Would require no expenditure of resources to meet NRC requirements by operators
- NRC and Agreement States would not be required to expend resources on licensing or inspection

<u>Disadvantages</u>

- May not adequately ensure protection of health and safety, protection of property, or the environment during operation or transportation and disposal of material, depending upon the conditions of the exemption.
- Some facilities may decide or be required to begin processing uranium prior to completion of rulemaking and therefore specific licensing of those facilities may be necessary (unless such licensing is allowed to be deferred during development of the new rule).
- Significant resources would be expended by NRC and Agreement States to implement rulemaking.
- May not be able to apply to all technologies and still ensure adequate health and safety (particularly those facilities with large quantities of highly concentrated uranium) and thus some specific licensing may still be necessary.

OPTION 4: Administrative Option - Request EPA to Rescind Rule

Under this option, NRC would formally request EPA to rescind its radionuclide rule in respect to uranium. However, rescinding the rule may be in conflict with the Safe Drinking Water Act of

1974, as amended. Additionally, even if the rule were rescinded, any facilities which had already identified high uranium levels could face public pressure to treat the water for uranium.

Advantages

- If EPA agreed to this option, there would be no resource costs to operators, NRC, and Agreement States resulting from this rule (except for facilities that decided to treat for uranium anyway).
- Would reduce the potential impact to workers (from lack of need to concentrate, store, or dispose of uranium).
- Would remove concerns regarding disposal of concentrated uranium.

Disadvantages

- Unlikely that EPA will agree to rescind the 2000 Radionuclides rule for uranium.
- Would potentially cause members of the public to consume water with uranium at higher levels than implementation of EPA's 2000 radionuclide rule would allow.
- EPA would be required to expend resources rescinding rule as related to uranium.
- May confuse public as to why the rule is considered no longer necessary.

OPTION 5: Implement the 2003 Jurisdictional Working Group Recommendations

In 2003, as part of the recommendations from an Interagency Jurisdictional Working Group evaluating the regulation of low-level source material or materials containing less than 0.05 percent by weight concentration of uranium and/or thorium, the staff recommended that uranium and thorium not purposefully extracted or concentrated for the use of the uranium or thorium be removed from NRC jurisdiction (see SECY-03-0068). Because the primary purpose of extracting uranium from drinking water is not for the use of the uranium, implementation of the approach suggested in SECY-03-0068 would remove such uranium from NRC jurisdiction and allow the States and EPA to regulate the uranium removed from drinking water as naturally occurring radioactive material. Although the staff requirements memorandum indicated agreement with this approach, the Commission believed that the legislative approach, which the staff believed would be necessary to implement this strategy, was not feasible at that time.

Advantages

- Removes regulatory costs for operators and NRC and Agreement States for licensing, although individual states could implement some resource costs on operators.
- Provides a more consistent national policy for treatment of uranium in drinking water.

Disadvantages

- Unlikely to be acted upon, given the current environment requiring the regulation of radionuclides and Congress's recent action on similar legislation.
- Legislative change is often a lengthy process.
- Facilities may decide or be required to begin processing prior to completion of the legislative change and therefore specific licensing of those facilities may be necessary

anyway (unless such licensing is allowed to be deferred during development of a new rule).
- Significant resource costs to NRC, States and EPA, to develop appropriate legislation and amend existing regulations or promulgate new regulations.
- May create some confusion to operators in the short-term as to who is the appropriate regulatory authority.

RECOMMENDED APPROACH

OPTION 2: The staff believes that development of a new general license would be the most efficient approach to provide an adequate level of protection to workers and public health and safety and the environment, while minimizing the resource expenditures for both drinking water treatment facility operators, NRC, and the Agreement States. The staff recommends implementing this approach through an interim final rule, which would be expected to completed in approximately 20 months; however, if the requirements for an interim final rule cannot be justified, the staff believes the final rule could still be implemented within a period of 30 months.

The staff believes that resources that might be expended to specifically license even a small number of these facilities could quickly exceed the resources necessary to develop this new general license. In addition, the costs under the general license approach would be relatively small for drinking water treatment facilities compared to costs associated with specific licensing. The most significant caveat is that the staff cannot clearly identify the number of potential licensees at this time, because many facilities are in the initial stages of monitoring the uranium content of their drinking water. Additionally, many of these facilities could select approaches that do not require specific licensing.

The staff does not have enough information at this time to determine whether it may be more efficient and less costly for facilities to use technologies that may be more expensive or difficult to implement, but have no regulatory costs associated with NRC jurisdiction. It should be noted that technologies that do not significantly concentrate uranium in their water will likely lose a higher percentage of their product (i.e, the water) in order to stay under the 0.05 percent limit; this may not be a viable option for areas with limited water resources.

At this time, based upon available data, the staff believes that there will be a significant number of facilities that will be required to treat drinking water for uranium and choose technologies that require specific licensing, such that moving forward with this rule is recommended.

Despite these significant unknowns, based upon the data available, the staff believes that Option 2 is the most appropriate choice to continue to adequately protect worker and public health and safety while significantly reducing the costs to the public and the drinking water treatment industry, and potentially reducing long-term regulatory costs to the NRC and the Agreement States.

OPTIONS ANALYSIS

OPTIONS TO DEFER SPECIFIC LICENSING OF DRINKING WATER TREATMENT FACILITIES

ISSUE

In December 2000, the U.S. Environmental Protection Agency (EPA) finalized new drinking water regulations (65 FR 76708) in which they announced new maximum contaminant levels (MCLs) for radionuclides, including an MCL of 30 micrograms per liter (Fg/L) for uranium. Depending upon the technology chosen to treat the drinking water, concentrations of uranium could exceed 0.05 percent by weight of source material and thereby require licensing under 10 CFR Part 40, "Domestic Licensing of Source Material." Although a small number of the facilities requiring licensing could operate under the general license in 10 CFR 40.22, "Small quantities of source material," it is expected that, under existing regulations, most impacted facilities would be required to obtain a specific license. As EPA estimates the average affected treatment plant to serve a population of about 1,200 people, and very few affected communities serve more than 10,000 people, even modest regulatory costs could have a significant impact on this class of licensees. In addition, because EPA estimates up to 500 facilities (other estimates indicate more) could be impacted, there could be significant impacts to NRC resources for processing these unexpected license requests.

In a separate analysis, staff evaluated numerous options that could potentially relieve or diminish the regulatory burden associated with this issue. However, several of these alternatives to specific licensing, including the staff's preferred option, cannot be implemented before many drinking water treatment facilities could require licensing. As a result, the staff is also reviewing options for interim measures to defer the need for specifically licensing those facilities if an alternative to specific licensing is pursued by NRC.

EXISTING REGULATORY FRAMEWORK

Section 40.13(a), "unimportant quantities of source material," exempts persons from licensing requirements for the possession and use of source material in concentrations less than 0.05 percent by weight of source material.

Section 40.22, "small quantities of source material," provides a general license authorizing commercial and industrial firms, research, educational and medical institutions, and Federal, State, and local government agencies to use and transfer not more than fifteen (15) pounds of source material at any one time for research, development, educational, commercial or operational purposes. A person authorized to use or transfer source material under this general license, may not receive more than a total of 150 pounds of source material in any one calendar year. Persons using this general license are exempt from Parts 19, 20, and 21, unless such persons are also in possession of source material under a specific license. It should be noted that the transfer and disposal of source material held under this general license are still constrained by other NRC regulatory requirements.

OPTIONS FOR DEFERRING THE SPECIFIC LICENSING OF DRINKING WATER TREATMENT FACILITIES

OPTION 1: Enforce Existing Regulatory Requirements

Under this option, the staff would require any persons treating drinking water to apply for and obtain a specific license if they exceeded the threshold for a specific license, even while the staff pursues other actions to eventually relieve such a burden. This option would not relieve any burden for early adopters or NRC and the Agreement States and could result in the expenditure of additional resources to amend or terminate specific licenses if NRC modified how these facilities were regulated. Drinking water treatment facilities are required to meet EPA standards by the end of 2007. Without an alternative to specific licensing, significant resources would be required to develop and review the initial applications, as well as potentially develop guidance for licensing reviews, inspections, and enforcement. Furthermore, the diversion of resources for reviewing these new applications may further delay implementation of the alternative strategies to specific licensing.

Advantages

- Ensures protection of public health and safety and the environment under current regulations while alternative to specific licensing is developed and implemented
- No legal, perception, or enforcement concerns

Disadvantages

- Would require substantial expenditure of resources by drinking water treatment facilities, and NRC and Agreement State regulators to specifically license impacted facilities prior to implementation of an alternative approach.
- Would be necessary to expend resources on developing guidance for both applicants and NRC and Agreement State license reviewers
- May impact schedule of implementing an alternative to specific licensing

OPTION 2: Issue Orders to Impose Specific Requirements Within the Existing Regulatory Requirements

The Commission could issue orders to each drinking water treatment facility that would require a license. The order would issue a license and impose certain aspects of the regulations that these facilities should meet in order to ensure worker and public health and safety, and would likely be similar to many of the requirements expected for the alternative to specific licensing chosen by the Commission. However, the facilities would still be required to meet the existing regulatory requirements, unless some enforcement discretion was also exercised. The order would impose conditions specific to drinking water treatment facilities, in lieu of each facility applying for a license.

Advantages

- Would limit resource costs to industry only to those items deemed important at this time to maintain worker and public health and safety.

- No resources would be necessary for developing or reviewing specific license applications.

Disadvantages

- Orders would be on a facility by facility basis rather than to industries as a whole and therefore the resources necessary to issue orders to each separate facility could be significant.
- Would be extremely difficult to identify who would require an order.
- Could be challenged as an improper rulemaking.
- Unless the order remained within the scope of the existing regulations, the facilities could be in violation of the regulations and would require enforcement discretion until the regulations were revised.
- Less than optimal way to license these facilities and would not endear public confidence.

OPTION 3: Exercise Enforcement Discretion to Not Cite for Possession, Use, Transfer, or Disposal of Source Material Provided Certain Conditions Are Met

Under this option, NRC would not actively enforce the existing regulations requiring a specific license, for the possession, use, transfer and disposal of source material, for the treatment of drinking water to remove uranium, while developing a regulatory alternative to specific licensing of drinking water treatment facilities. The period of enforcement discretion would only be until such time that a regulatory alternative was enacted. However, drinking water treatment facilities would be expected to maintain adequate worker and public health and safety, manage the source material, and properly dispose of the source material. If the staff identifies a public health and safety issue that was not envisioned during the development of the enforcement discretion guidance, the staff will revise the guidance to address this new concern, which could result in the need for some water treatment facilities to still obtain a specific license for possession and use of the source material.

The staff would issue a generic communication that would describe the use of enforcement discretion for these facilities and provide information to the drinking water treatment facilities with conditions that must be met and maintained in order for the NRC to exercise enforcement discretion. The generic communication would include information regarding maintaining adequate public and worker health and safety and protection of the environment; proper handling, storage, and disposal; and reporting. The exact content of the generic communication would be dependent upon which regulatory approach (if any) the Commission chose to pursue to modify the existing regulations for the drinking water treatment facilities (i.e., the information included in a generic communication during the development of a new general license may be different than that for development of an exemption). The generic communication would describe operational limits (e.g., concentration levels, types of processes, or amounts of source material that may be stored on site) that the facility would have to meet and maintain in order to be considered for enforcement discretion. The enforcement discretion criteria may forecast the staff's initial views of the future rulemaking activity.

As long as the drinking water facility met the provisions described in the generic communication, the staff would exercise enforcement discretion to not cite the facility for possession, use, transfer, or disposal of source material without an NRC license. Should the

staff determine, at any time, that the provisions described in the generic communication are not being met, they could find the drinking water treatment facility operator in violation of the regulations and require the operator to apply for a specific license, and/or take other action, as appropriate.

The staff would expect to issue a generic communication within 120 days of Commission direction. The staff requires this time to develop the basic provisions to be described in the generic communication because it must be sufficiently robust to ensure adequate protection of the public health and safety while the rule is being developed. Additionally, a minimum of 30 days is necessary to allow for Agreement State comment.

Advantages

- Would require no expenditure of resources by operators, NRC, or Agreement States to support specific licensing of these facilities except for unusual cases.
- The potential resource savings for not having a specific license would be incentive for maintaining proper worker and public health and safety and ensuring proper disposal (i.e., performance-based regulation).
- Allows time for NRC and Agreement States to implement any chosen alternative to specific licensing.
- The limits established for enforcement discretion would be sufficient to protect worker and public health and safety and would provide the staff's current thinking on the future rulemaking.

Disadvantages

- Public may be concerned that NRC is not actively enforcing its own regulations.
- Some resources would be expended on developing and issuing a generic communication; however, it is expected much of the information provided in the generic communication would be based upon the chosen regulatory action and incorporated in the basis of any rulemaking. Therefore, the direct cost would be relatively low.
- Cost to implement and maintain the discretion policy.

OPTION 4: Request EPA to Defer Implementation of Rule for Uranium

Under this option, NRC would formally request EPA to defer implementation of their rule in respect to uranium until NRC enacts an alternative to specific licensing. Such a deferral could postpone the actual concentration of uranium until NRC has a new regulatory structure in place saving resources for both industry, NRC, and the Agreement States. However, based upon informal discussions with EPA, it is likely that EPA would reject such a request. Furthermore, because most facilities are likely in the process of self-identifying levels of uranium in their drinking water that warrant action under the EPA rule, even if implementation of the rule were deferred, those facilities which already identified high uranium levels would likely face public pressure to treat the water for uranium immediately.

Advantages

- If EPA agreed to this option, there would be minimal resource costs to operators, NRC, and Agreement States while NRC implemented an alternative to specific licensing
- Would reduce impact to workers (from lack of need to concentrate, store, or dispose of uranium) at this time
- Would postpone concerns regarding disposal of concentrated uranium

Disadvantages

- Would potentially cause members of the public to consume water with uranium at higher levels than the EPA rule currently allows
- EPA would be required to expend resources notifying treatment facilities of the deferral of the rule implementation date
- May cause public concern that their water is not safe and not being treated

RECOMMENDED APPROACH

OPTION 3: Should the Commission decide to pursue an alternative to specific licensing for persons treating drinking water for uranium, the staff recommends that the NRC apply enforcement discretion to those persons treating drinking water for uranium while the staff is developing the alternative to specific licensing. Because the intent of pursuing an alternative strategy is to provide an adequate level of protection to workers and public health and safety and the environment while limiting the resources expended by the drinking water treatment industry, NRC, and the Agreement States, the staff believes this approach will provide the most efficient use of resources. Under this recommended option, minimal resources could be expended by the regulatory agencies in notifying drinking water treatment facilities (e.g., through industry contacts) through a new generic communication of the provisions for enforcement discretion to apply, and that specific licensing will not be required at this time, except for circumstances that fall beyond the provisions described in the generic communication. NRC and the Agreement States will still maintain the authority to specifically license those facilities which either (1) request a specific license or (2) do not meet the provisions of the enforcement discretion guidance and as a result do not maintain adequate worker and public health and safety or do not properly dispose of wastes containing concentrations of uranium that would normally require specific licensing. The staff believes that the significant costs estimated to be associated with specifically licensing a drinking water treatment facility will be a strong deterrent such that the operator will adequately maintain worker and public health and safety and properly dispose of any wastes, making this option performance-based. This policy of enforcement discretion will expire upon the implementation date of a selected alternative to specific licensing, although NRC has the option of enforcing the existing regulations, if determined to be necessary, at any time.

It should be noted that although NRC may opt to exercise enforcement discretion regarding specifically licensing drinking water treatment facilities, some Agreement States may decide not to implement a policy of enforcement discretion and may instead specifically license those facilities. Although the NRC staff believes that many Agreement States will take the same or similar regulatory positions as NRC because of the resource implications, those Agreement States that do not exercise enforcement discretion would reduce the resource savings to those

facilities located therein and for the Agreement State itself. Because many of the alternatives to specific licensing may require Agreement State compatibility, it is expected that the Agreement States would exercise enforcement discretion to limit the possibility of expending resources to specifically license a facility that may later need to be terminated in order to implement and be compatible with the alternative to specific licensing. Finally, Agreement States' enforcement programs are not required to be compatible with NRC's enforcement program, so the extent that any State would need or choose to exercise enforcement discretion, while an alternative regulatory approach is being developed, depends on the specifics of that State's own enforcement program.