LLW notes

Volume 30 Number 1 January/February 2015

*Southwestern Compact/State of North Dakota*

# Argonne Report re Landfill Disposal of TENORM in North Dakota

The Environmental Science Division of the Argonne National Laboratory (Argonne) has released a report titled, *"Radiological Dose and Risk Assessment of Landfill Disposal of Technologically Enhanced Naturally Occurring Radioactive Materials (TENORM) in North Dakota."*

The report, which is dated November 2014, documents the results of a radiological dose and risk assessment of the disposal of TENORM wastes in permitted industrial waste and special waste landfills in North Dakota. The North Dakota Department of Health (NDDH), which is considering possible changes to the state's radiologic health and solid waste management rules regarding TENORM, requested that Argonne conduct the assessment to ensure that any possible rule changes regarding the handling and disposal of TENORM are protective of human health and the environment.

The Low-Level Radioactive Waste Forum, Inc. (LLW Forum) has organized various panels for our recent meetings dedicated to regulatory oversight of oil and gas development, with particular focus on the management and disposition of the resultant radiological byproducts. Presentations on Argonne's North Dakota TENORM Report, as well as on a recently released study on TENORM in the Commonwealth of Pennsylvania, are being scheduled for the spring 2015 LLW Forum meeting that will be held in Alexandria, Virginia on April 20-21, 2014.

*For copies of the spring 2014 LLW Forum meeting bulletin and registration form, please visit the LLW Forum's website at www.llwforum.org.*

**Introduction**

Some of the waste streams generated by the oil and gas sector in North Dakota contain TENORM in concentrations above natural background levels of radionuclides. If these wastes are not properly managed, they can potentially present

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In This Issue

## COPYRIGHT POLICY

The Low-Level Radioactive Waste Forum, Inc. is dedicated to the goals of educating policy makers and the public about the management and disposal of low-level radioactive wastes, and fostering information sharing and the exchange of views between state and compact policy makers and other interested parties.

As part of that mission, the LLW Forum publishes a newsletter, news flashes, and other publications on topics of interest and pertinent developments and activities in the states and compacts, federal agencies, the courts and waste management companies. These publications are available to members and to those who pay a subscription fee.

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Low-Level Radioactive Waste Forum, Inc.

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Directors that serve on the Board of the Low-Level Radioactive Waste Forum, Inc. are appointed by governors and compact commissions. The LLW Forum, Inc. was established to facilitate state and compact implementation of the Low-Level Radioactive Waste Policy Amendments Act of 1985 and to promote the objectives of low-level radioactive waste regional compacts. The LLW Forum, Inc. provides an opportunity for state and compact officials to share information with each another and to exchange views with officials of federal agencies and other interested parties.

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**Key to Abbreviations**

U.S. Department of Energy ..... DOE
U.S. Department of Transportation ..... DOT
U.S. Environmental Protection Agency ..... EPA
U.S. Government Accountability Office ..... GAO
U.S. Nuclear Regulatory Commission ..... NRC
Naturally-occurring and accelerator-produced radioactive material ..... NARM
Naturally-occurring radioactive material ..... NORM
Code of Federal Regulations ..... CFR

*Low-Level Radioactive Waste Forum, Inc.*

# Register for Spring 2015 LLW Forum Meeting

*Hilton Alexandria Old Town on April 20-21, 2015*

Interested stakeholders are encouraged to register and make hotel reservations for the Low-Level Radioactive Waste Forum's spring 2015 meeting, which will be held at the Hilton Alexandria Old Town Hotel located in Alexandria, Virginia on April 20-21, 2015.

The meeting is being co-sponsored by the Southeast Compact Commission for Low-Level Radioactive Waste Management and the Central Interstate Low-Level Radioactive Waste Compact Commission.

*The meeting documents—including agenda, bulletin and registration form—have been posted to the LLW Forum's web site at www.llwforum.org.*

**Attendance**

Officials from states, compacts, federal agencies, nuclear utilities, disposal operators, brokers/ processors, industry, and other interested parties are invited and encouraged to attend.

The meeting is an excellent opportunity to stay up -to-date on the most recent and significant developments in the area of low-level radioactive waste management and disposal. It also offers an important opportunity to network with other government and industry officials and to participate in decision-making on future actions and endeavors affecting low-level radioactive waste management and disposal.

**Location and Dates**

The spring 2015 LLW Forum meeting will be held in Alexandria on Monday, April 20, 2015, from 9:00 am - 5:00 pm, and Tuesday, April 21, 2015, from 9:00 am - 1:00 pm.

The meeting will be held at:

Hilton Alexandria Old Town
1767 King Street
Alexandria, VA 80202
(800) 445-8667

Located in the historic, vibrant King Street neighborhood, the Hilton Alexandria Old Town hotel, renovated in April 2014, is one of the most convenient hotels in Alexandria, Virginia for business and leisure travelers visiting Washington, DC. The hotel is just steps away from the King Street Metro station and close to Reagan National Airport. Downtown DC attractions and government buildings are minutes away by metro.

**Registration**

All persons must pre-register for the meeting and pay any associated registration fees in order to be allowed entry. Registration forms are needed in order to ensure that you receive a meeting packet and name badge. Accordingly, interested attendees are asked to please take a moment to complete the registration form at your earliest convenience and return it Linda Walters of the Southeast Compact Commission for Low-Level Radioactive Waste Management at the address, e-mail or fax number listed at the bottom of the form.

The meeting is free for up to two individuals representing members of the LLW Forum. Additional and non-member registration is $500, payable by check only to the "LLW Forum, Inc." (Credit card payments are not accepted.)

**Reservations**

Persons who plan to attend the meeting are strongly encouraged to make their hotel reservations and send in their registration forms as soon as possible, as we have exceeded our block at the last few meetings.

A limited block of hotel rooms has been reserved for Sunday (April 19) and Monday (April 20) for meeting attendees at the special, discounted rate of $199 plus tax per night for the single/double rate ($219 plus tax per night for the triple rate and $239 plus tax per night for the quad rate). The same rates have been extended for three days prior and three days post the meeting dates.

To make a reservation, please call (800) 445-8667. The deadline for reserving a room at the discounted rate is March 20, 2015. *Please ask for the LLW Forum block to get the discount rate.*

*For additional information, please contact Todd D. Lovinger, the LLW Forum's Executive Director, at (754) 779-7551 or go to www.llwforum.org.*

# Mark Your Calendar for the Fall 2015 LLW Forum Meeting

***Embassy Suites Hotel in Downtown Chicago, Illinois***
***October 22-23, 2015***

The Low-Level Radioactive Waste Forum (LLW Forum) is pleased to announce that our fall 2015 meeting will be held at the Embassy Suites Downtown Chicago Hotel on October 22-23, 2015. Please mark your calendars accordingly and save the date!

Officials from states, compacts, federal agencies, nuclear utilities, disposal operators, brokers/ processors, industry, and other interested parties are invited and encouraged to attend.

The meeting is an excellent opportunity to stay up-to-date on the most recent and significant developments in the area of low-level radioactive waste management and disposal. It also offers an important opportunity to network with other government and industry officials and to participate in decision-making on future actions and endeavors affecting low-level radioactive waste management and disposal.

*For additional information, please contact Todd D. Lovinger, the LLW Forum's Executive Director, at (754) 779-7551 or go to www.llwforum.org.*

***LLW Forum / Disused Sources Working Group***

# DSWG Launches New Web Site re Disused Source Management

***www.disusedsources.org***

The Disused Sources Working Group (DSWG) of the Low-Level Radioactive Waste Forum (LLW Forum) is pleased to announce the launching of a new web site dedicated to the need for proper management and disposition of disused sources.

The site—which includes significant information and resources related to the project, as well as a link to the March 2014 report from the DSWG—can be found at www.disusedsources.org.

**Background**

In September 2011, at the request of the U.S. Department of Energy (DOE) National Nuclear Security Administration/Global Threat Reduction Initiative (NNSA/GTRI), the LLW Forum formed the DSWG. The working group, which was

originally comprised of eight Directors of the LLW Forum, solicited input from a broad range of stakeholders at 19 meetings over a 30-month period.

Following the formation of the DSWG, significant advancements occurred regarding the disposal of sealed sources. The Texas Low-Level Radioactive Waste Disposal Compact (Texas Compact) commercial low-level radioactive waste disposal facility began operation in 2012, including the disposal of sealed sources from within and outside the Texas Compact region. With this facility, licensees in all states now have the ability to dispose of most disused sources.

In September 2013, the Clive facility began accepting certain Class A sealed sources under a State of Utah approved limited one-year variance that was subsequently extended through December 2013. The U.S. Nuclear Regulatory Commission's (NRC's) Branch Technical Position on Concentration Averaging and Encapsulation (CA BTP) may also provide an avenue for the acceptance of additional high activity sealed sources at the South Carolina, Texas, and Washington state disposal sites.

While disposal is now possible for most disused sources, however, there has not been a dramatic increase in disposal activity.

**Issues for Consideration**

While society derives many benefits from the use of sealed sources, the current paradigm for the management of sealed sources does not fully reflect the reality of the post-9/11 threat environment. The magnitude of the disused source problem is large. There are approximately two million sealed sources and tens of thousands of disused sources in the United States; however, the exact number and location of the disused sources are unknown. The existing data systems do not inventory all sealed sources or track all disused sources in the U.S. While most licensees manage their disused sources in a responsible manner, there remains a concern because of the potential for malevolent use.

Once used for their original purpose, many sources are stored indefinitely. Contributing to the accumulation of disused sources is the fact that the cost of the eventual shipment and disposal of sources is not included in the purchase price; and in most states, financial assurance is not required. Therefore, some users are unaware of these costs. When considering the purchase of a new sealed source, the buyer is not required to consider the overall life-cycle cost of properly managing the source and most do not budget for its ultimate disposal.

Thus, as currently configured, the economics of sealed source ownership do not motivate owners toward prompt end-of-life disposition, resulting in thousands of sealed sources being stored indefinitely. Since the purchase price of sources does not reflect the full life-cycle costs, users purchase more sources than they would if the total life-cycle costs were internalized.

**Contributing Factors**

The working group identified six major factors contributing to the disused source problem including:

- the life-cycle costs of managing and ultimately disposing of sealed sources are not internalized;
- the practices of federal agencies do not fully reflect a consistent view of what sources pose a concern;
- the regulatory system should be improved to address the post-9/11 threat environment;
- there is a lack of financial incentives for disused sources to be reused, recycled, or disposed in a timely manner;
- the opportunities for recycling and reusing sealed sources are being underutilized; and,

- Type B shipping containers needed to transport certain high activity sealed sources are in short supply and are very expensive.

**Findings and Recommendations**

The DSWG recommends that licensees should be informed about alternative technologies and the actual costs of reusing, recycling, or disposing of sources when they are no longer needed. Research on alternative technologies to replace high-activity sealed sources for which there are limited or no disposal options should be a priority of the federal government and the private sector.

While recognizing that the current regulatory system was developed to primarily protect health and safety, the DSWG advocates that NRC and the Agreement States should enhance the system to fully address all concerns related to disused sources including consideration of broadening the requirements for a Specific License (SL) and improving tracking in the NRC's National Source Tracking System (NSTS). The DSWG also recommends that the regulatory system should be restructured to provide economic incentives for the prompt reuse, recycle, or disposal of disused sources. In its report, the working group states that financial assurance requirements should be broadened and increased to address the actual cost of transportation and disposal. Regulators should consider requiring licensees to pay an annual possession fee for each sealed source in inventory.

In addition, the DSWG recommends that the NRC and the Agreement States should develop a comprehensive regulation to limit the storage of disused sources to two years and authorize regulators to require the disposition of sources in storage for more than two years unless there is a demonstrated future use. The working group also contends that inventories of disused sources at sealed source manufacturers, suppliers, and waste brokers should be reduced. And, the DSWG states that NRC should reconsider its decision to allow foreign sources that may not have a commercial disposal pathway to be imported. The financial needs of the Agreement States should also be addressed.

According to the DSWG, federal and private research funding organizations should require grantees to budget for the disposal of sealed sources when they no longer are needed by the grantee.

In addition, the working group concludes that the reuse and recycling of sealed sources should be promoted. In this regard, they recommend that a study on measures to promote the reuse and recycling of sealed sources should be conducted and a sealed source "exchange" program should be established to facilitate the transfer of sources between those no longer needing sources and those looking to acquire sources.

In regard to issues related to Type B shipping containers, the DSWG advocates that the federal government undertake a market analysis of the demand for Type B shipping containers and take additional steps to encourage the private sector to increase the supply of commercially available Type B shipping containers. In addition, the working group recommends that the federal government identify several internationally-certified Type B shipping containers that would have widespread applicability to disused sources in the U.S. and submit applications to have these packages certified for domestic use. And, the DSWG states that the NRC should continue to expeditiously review applications for Type B shipping containers and should aggressively notify licensees and the Agreement States well in advance of the expiration of shipping container certifications.

An outreach program should be established, according to the DSWG, to assist licensees in identifying resources to assist with packaging, transport, and disposal of disused sources.

The working group also suggests that states with disposal facilities licensed to accept Class B and

Class C low-level radioactive waste should examine their waste acceptance criteria and policies, including the alternative approaches provision in the revised CA BTP to facilitate the disposal of certain high activity sealed sources. The DSWG contends that the existing NRC-Conference of Radiation Control Program Directors (CRCPD) program should be adequately funded to address orphaned and abandoned sources and individual states should retain the ability to operate their own orphaned and abandoned source programs.

The DSWG report acknowledges that NNSA needs to maintain the ability to recover orphaned and abandoned sources that present a national security threat for the foreseeable future. It also recognizes that the CRCPD Source Collection and Threat Reduction (SCATR) program has been effective in collecting and disposing of thousands of disused sources over the last seven years. Nonetheless, the DSWG argues that the long-term solution to the disused source problem is to hold the licensees who have purchased and obtained the economic benefit from the sources responsible for the proper reuse, recycling, or disposal of the sources when they become disused.

*For additional information regarding the DSWG report, or to obtain a copy, please contact LLW Forum Executive Director Todd D. Lovinger at (754) 779-7551 or LLWForumInc@aol.com.*

*LLW Forum / Part 61 Working Group*

# LLW Forum's Part 61 Working Group Launches New Web Site

***www.part-61.org***

The Part 61 Working Group (P61WG) of the Low-Level Radioactive Waste Forum (LLW Forum) is pleased to announce the launching of a new web site dedicated to providing feedback from the states and compacts to the U.S. Nuclear Regulatory Commission's (NRC's) proposal to amend Part 61 of Title 10 of the *Code of Federal Regulations* (10 CFR Part 61).

The site—which includes information and resources related to the rulemaking initiative, as well as a link to a briefing paper from the P61WG—can be found at www.part-61.org.

**About This Project**

NRC is proposing to amend 10 CFR Part 61 titled, "Licensing Requirements for Land Disposal of Radioactive Waste," to require new and revised site-specific technical analyses, to permit the development of site-specific criteria for low-level radioactive waste acceptance based on the results of these analyses, and to facilitate implementation and better alignment of those requirements with current health and safety standards. This rule would affect low-level radioactive waste disposal licensees or applicants that are regulated by NRC or Agreement States.

In early 2012, the LLW Forum—an organization that was established to facilitate state and compact implementation of the Low-Level Radioactive Waste Policy Act of 1980 and its 1985 Amendments (LLRWPAA) and to promote the objectives of low-level radioactive waste regional compacts—formed the P61WG to provide input and comment on the NRC's Part 61 rulemaking initiative. The P61WG includes representatives of all four sited states—South Carolina, Texas,

Utah and Washington—plus the Commonwealth of Pennsylvania.

*The P61WG developed a briefing paper on the Part 61 rulemaking initiative that may be downloaded and printed at http://part-61.org/wp-content/uploads/2015/01/Briefing-Paper-FINAL-September-2014.pdf.*

**NRC Commission Direction**

On February 20, 2014, NRC released a Staff Requirements Memorandum (SRM-SECY-13-0075) in which the Commission approves publication of the proposed Part 61 rule and the associated draft guidance for public comment, subject to the following comments and changes:

- The proposed rule should be revised to include a regulatory compliance period of 1,000 years.
- The proposed rule should be published with a compatibility category "B" applied to the most significant provisions of the revised rule, including the Period of Compliance; the Protective Assurance Analysis Period and its analytical threshold, which, as it is approached, requires the applicant to propose remedial changes to the disposal site design, or impose inventory limits, or propose alternative methods of disposal; and the Waste Acceptance Criteria.
- The Commission has approved staff's proposal to require a 10,000 year intruder assessment analysis, built upon the same assumptions as the compliance and protective assurance analyses contained in the rule, which should be detailed in guidance documents.
- The site-specific analysis for protection of the general public within the 1,000-year compliance period should set a specific dose limit of 25 mrem/yr.
- The staff should focus on ensuring a thorough review of the draft guidance by the limited community of disposal operations in the United States. This includes the licensees, Agreement States, and interested public. The staff should also ensure the draft guidance is reviewed by the broader scientific and academic community and other government agencies with disposal experience.
- The proposed rule should clearly indicate that the intruder assessment should be based on intrusion scenarios that are realistic and consistent with expected activities in and around the disposal site at the time of site closure.
- A further protective assurance analysis should be performed for the period from the end of the compliance period through 10,000 years. Given the significant uncertainties inherent in these long timeframes, and to ensure a reasonable analysis, this performance assessment should reflect changes in features, events, and processes of the natural environment such as climatology, geology, and geomorphology only if scientific information compelling such changes from the compliance period is available. In general, this analysis should strive to minimize radiation dose with the goal of keeping doses below a 500 mrem/yr analytical threshold. The radiation doses should be reduced to a level that is reasonably achievable based on technological and economic considerations.
- The Commission has approved the staff's proposal for applicants to provide a qualitative analysis covering a performance period of 10,000 years or more after site closure to evaluate the ability of the disposal system to mitigate long-term risks associated with the disposal of long-lived low-level radioactive waste.
- The proposed rule should include a clear statement that licensing decisions are based on defense in depth (DID) protections, such as siting, waste forms and radionuclide content,

engineered features, natural geologic features of the disposal site, and on performance assessment (PA) goals and insights, as well as scientific judgment. This combination of DID and PA should be identified as the "safety case" for licensing. The staff should clearly describe the attributes of the safety case in the proposed rule, as modified by this SRM, in terms of the types of DID protections and the role of the PA in satisfying performance criteria and establishing a safety case. Confirming changes should be made throughout the rulemaking package.

- The staff should develop a specific question for the *Federal Register* notice that introduces this proposed rule regarding whether the compatibility designations assigned to the various sections of the proposed rule as modified by this SRM are appropriate and solicit comments on whether changes should be considered and for what reason. Although the Commission has assigned Compatibility "B" for the Compliance Period and the Protective Assurance Analysis Period, the staff should specifically solicit comment on that designation. In addition, a question should be added to the *Federal Register* notice regarding whether 500 mrem/yr is an appropriate analytical threshold for the Protective Assurance Analysis period.
- The Advisory Committee on Reactor Safeguards (ACRS) is encouraged to continue to provide their independent review and recommendations on the technical basis supporting this rule, and the accompanying draft guidance, during the rulemaking period.
- The public comment period should be extended to 120 days.
- The revised *Federal Register* Notice arising from the direction in the staff requirements memorandum should be provided to the Commission for its review no later than 10 business days prior to its transmittal for publication.

*A copy of SRM-SECY-13-0075 is available at http://www.nrc.gov/reading-rm/doc-collections/commission/srm/2013/2013-0075srm.pdf.*

*For additional information, please contact Andrew Carrera in the NRC's Office of Nuclear Material Safety and Safeguards at (301) 415-1078 or at Andrew.Carrera@nrc.gov.*

**Background**

On July 18, 2013, NRC staff requested Commission approval to publish a proposed rule in the *Federal Register* that would amend 10 CFR Part 61. (See *LLW Notes*, July/August 2013, pp. 1, 32-38.)

The proposed amendments would revise 10 CFR Part 61 to require low-level radioactive waste disposal licensees and license applicants to conduct updated and new site-specific analyses and to permit the development of criteria for future low-level radioactive waste acceptance based on the results of these analyses. According to NRC staff, these amendments would ensure that low-level radioactive waste streams that are significantly different from those considered during the development of the current regulations will be disposed of safely and meet the performance objectives for land disposal of low-level radioactive waste.

The proposed rule would update the existing technical analysis requirements for protection of the general population (i.e., performance assessment) to include a 10,000-year compliance period; add a new site-specific technical analysis for the protection of inadvertent intruders (i.e., intruder assessment) that would include a 10,000-year compliance period and a dose limit; add a new analysis for certain long-lived low-level radioactive waste (i.e., performance period analysis) that would include a post-10,000 year performance period; and revise the technical analyses required at closure.

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*Appalachian Compact/Commonwealth of Pennsylvania*

# Pennsylvania Releases TENORM Study

On January 15, 2015, the Commonwealth of Pennsylvania's Department of Environmental Protection (DEP) announced the results of its study regarding Technologically Enhanced Naturally Occurring Radioactive Materials (TENORM), which analyzed the naturally occurring levels of radioactivity associated with oil and natural gas development in Pennsylvania. Although the report outlines recommendations for further study, it concluded that there is little potential for harm to workers or the public from radiation exposure due to oil and gas development.

"The study report is the culmination of a multi-year effort and represents what we believe to be the most comprehensive radiological study of the oil and gas industry ever conducted," explained Vince Brisini, DEP Deputy Secretary for Waste, Air, Radiation and Remediation. "While the recommendations for future actions contained in the report call for additional studies and efforts, we now have data to inform the management of natural gas resources and resultant wastes for environmental and health protection."

The Low-Level Radioactive Waste Forum, Inc. (LLW Forum) has organized various panels for our recent meetings dedicated to regulatory oversight of oil and gas development, with particular focus on the management and disposition of the resultant radiological byproducts. Presentations on the Commonwealth of Pennsylvania's TENORM study, as well on a recently released report by the Environmental Science Division of the Argonne National Laboratory (Argonne) on the results of a radiological dose and risk assessment of the disposal of TENORM wastes in permitted industrial waste and special waste landfills in North Dakota, are being scheduled for the spring 2015 LLW Forum meeting that will be held in Alexandria, Virginia on April 20-21, 2014.

*For copies of the spring 2014 LLW Forum meeting bulletin and registration form, please visit the LLW Forum's website at www.llwforum.org.*

**Overview**

During the expansion of the Marcellus Shale Gas industry, DEP staff observed a steady increase in the volume of waste containing TENORM, generated by the oil and gas industry, being disposed in Pennsylvania landfills. TENORM is naturally occurring radioactive material whose radionuclide concentrations or potential for human exposure have been increased above levels encountered in the undisturbed natural environment by human activities.

In 2013, at the direction of Pennsylvania Governor Tom Corbett, DEP initiated a study to collect data relating to TENORM associated with oil and gas operations in Pennsylvania including radioactivity levels in flow-back waters, treatment solids and drill cuttings, as well as transportation, storage and disposal of drilling wastes. This included a study of radon levels in natural gas to ensure that public health and the environment continue to be protected.

The study included the assessment of potential worker and public radiation exposure, evaluation of potential impacts from TENORM waste disposal, and the investigation of possible radiological environmental effects.

It encompassed radiological surveys at well sites, wastewater treatment plants, landfills, gas distribution and end use, and oil and gas brine-treated roads. The media sampled included solids, liquids, natural gas, ambient air, and surface radioactivity.

The survey and sample data will be used to address potential radiological concerns from oil and gas operations, disposal of waste, and product use.

**Conclusions**

The following is a brief summary of the observations and recommendations contained in the peer-reviewed Pennsylvania TENORM study.

- There is little potential for additional radon exposure to the public due to the use of natural gas extracted from geologic formations located in Pennsylvania.
- There is little or limited potential for radiation exposure to the public and workers from the development, completion, production, transmission, processing, storage, and end use of natural gas. There are, however, potential radiological environmental impacts from fluids if spilled. Radium should be added to the Pennsylvania spill protocol to ensure cleanups are adequately characterized. There are also site-specific circumstances and situations where the use of personal protective equipment by workers or other controls should be evaluated.
- There is little potential for radiation exposure to workers and the public at facilities that treat oil and gas wastes. However, there are potential radiological environmental impacts that should be studied at all facilities in Pennsylvania that treat wastes to determine if any areas require remediation. If elevated radiological impacts are found, the development of radiological discharge limitations and spill policies should be considered.
- There is little potential for radiation exposure to the public and workers from landfills receiving waste from the oil and gas industry. However, filter cake from facilities treating wastes could have a radiological environmental impact if spilled, and there is also a potential long-term disposal issue. TENORM disposal protocols should be reviewed to ensure the safety of long-term disposal of waste containing TENORM.
- While limited potential was found for radiation exposure to recreationists using roads treated with brine from conventional natural gas wells, further study of radiological environmental impacts from the use of brine from the oil and gas industry for dust suppression and road stabilization should be conducted.

Persons interested in a complete list of the study's observations and recommendations are directed to the document itself.

**Background**

The Marcellus Shale formation underlies much of Pennsylvania, with the exception of southeastern Pennsylvania. The type of gas found in most areas of the Marcellus Shale throughout Pennsylvania is geologically mature and consists of mostly methane that requires little processing prior to use. This gas is commonly called "dry gas." Marcellus Shale gas found along the westernmost border of Pennsylvania is less geologically mature; therefore, in addition to methane, the gas contains additional hydrocarbons such as ethane, propane, and butane. This gas is commonly called "wet gas" and can be used to produce plastics and other high-value petroleum-based products.

The Pennsylvania Department of Conservation and Natural Resources (DCNR) has documented that Marcellus Shale can contain from 10 to 100 parts per million (ppm) uranium (U). Typical crustal U concentrations in the United States average 3 ppm.

Marcellus Shale and other geologic formations rich in oil and gas resources may contain naturally occurring radioactive material (NORM), specifically U, U-238 parent and thorium (Th),

Th-232 parent, and their decay progeny, as well as Potassium-40 (K-40). These series occur naturally and are the most prevalent of the three natural decay series, the third being the actinium (Ac), U-235 parent. Surface soil typically contains approximately 1 to 2 picocuries per gram (pCi/g) of both the U and Th series radionuclides with all of the series members at approximately equal activity (i.e., secular equilibrium). The radioactive materials, including TENORM, are brought to the land surface by oil and gas activities.

Each of the natural decay series includes an Rn gas member. Radon and its progeny are the primary issue of concern associated with natural gas distribution and its end uses.

*For additional information from the Commonwealth of Pennsylvania about oil and gas related topics and to download a copy of the TENORM study, please go to http://www.portal.state.pa.us/portal/server.pt/community/oil___gas_related_topics/20349/radiation_protection/986697.*

*For additional information, please contact Dave Allard of the Pennsylvania Department of Environmental Protection at (717) 787-2480 or at* djallard@pa.gov.

## *Atlantic Compact/State of South Carolina*

# Special Inspection at Summer Nuclear Plant Unit 2 Construction Site

On February 23, 2015, the U.S. Nuclear Regulatory Commission began a special inspection of inadvertent damage to the containment vessel during construction at Unit 2 of the Summer nuclear plant.

The Summer site, which is operated by SCANA, has one unit in operation and two others currently under construction. It is located near Jenkinsville, South Carolina—approximately 25 miles northwest of Columbia.

During the week of February 9, 2015, Chicago Bridge & Iron workers cut some safety-related rebar and damaged the containment vessel bottom head while drilling into concrete. On February 16, 2015, CB&I reported the damage to SCANA and the company reported the event to the NRC.

"While the actual damage appears to have been minor, we want to make sure we completely understand its potential impact and the apparent breakdown in controls that might have prevented it," said NRC Region II Administrator Victor McCree. "We are also concerned about the delay in CB&I reporting the issue."

The three-member NRC inspection team will review the events and both the CB&I and SCANA assessments as well as develop its own independent assessment. The inspectors will also evaluate any potential effects on containment vessel integrity, any similar activities and corrective actions.

The NRC inspectors spent about a week on site and an inspection report documenting the team's findings will be publicly available within 45 days of the end of the inspection.

*For additional information, please contact Roger Hannah at (404) 997-4417 or Joey Ledford at (404) 997-4416.*

*Central Midwest Compact/State of Illinois*

# Hearing Opportunity for LaSalle License Renewal

On February 4, 2015, the U.S. Nuclear Regulatory Commission announced the opportunity to request a hearing on an application to renew the operating licenses of the LaSalle County Station nuclear power plant, Units 1 and 2. The LaSalle plant, which is located in Marseilles, Illinois, has two boiling-water reactors operated by Exelon Generation Co.

NRC has also begun work on an environmental impact statement for the license renewal and announced its intention to hold public meetings near the plant on March 10, 2015.

**Background**

On December 9, 2014, Exelon filed an application seeking to renew LaSalle's operating licenses for an additional 20 years. The reactors are currently licensed to operate through April 17, 2022 for Unit 1, and through December 16, 2023 for Unit 2. The NRC staff has determined the application contains sufficient information for the agency to formally docket the application and begin its technical and environmental reviews. Docketing the application does not preclude requesting additional information as the reviews proceed and it does not indicate whether the Commission will renew the licenses.

**Public Meetings**

The NRC staff will conduct two public meetings on March 10 to describe the process of its environmental review and accept comments from members of the public on the potential scope of that review. The meetings will be held from 2:00 - 4:00 p.m. and 7:00 – 9:00 p.m. at the LaSalle County Emergency Operations Center, which is located at 711 East Etna Road in Ottawa, Illinois.

**Hearing Opportunity and Environmental Reviews**

The hearing opportunity and environmental reviews were announced in separate notices published in the *Federal Register* on February 3, 2015. The hearing opportunity notice includes detailed instructions for requesting a hearing through the NRC's E-filing system. The deadline for filing petitions is April 6, 2015. The second notice provides detail about the environmental "scoping" process and the public meetings. April 6 is also the deadline for submitting comments on the scoping process.

The LaSalle license renewal application and information about the license renewal process are available on the NRC website at www.nrc.gov.

*For additional information, please contact Scott Burnell at (301) 415-8200.*

*Northwest Compact/State of Utah*

# Proposed Order re White Mesa Uranium Mill

On January 12, 2015, the Utah Division of Radiation Control (DRC) announced that it was requesting public comment regarding a proposed Stipulation and Consent Order (Docket No. UGW20-01-SCO) to be issued to Energy Fuels Resources (USA) Inc. by the DRC Director.

The proposed Stipulation and Consent Order is being issued to approve a corrective action plan for remediation of ground water contaminated with chloroform at the White Mesa Uranium Mill in accordance with corrective actions outlined in an Energy Fuels Resources (USA) document

dated December 2014. The document is titled *Groundwater Corrective Action Plan (GCAP) For Energy Fuels Resources (USA) Inc. White Mesa Uranium Mill Chloroform Plume Near Blanding, Utah Docket No. UGW20-01-SCO.*

The proposed Stipulation and Consent Order also requires additional actions prescribed to ensure conformance with the requirements of *Utah Administrative Code R317-6-6.15, Corrective Action,* which outlines the requirements for demonstration to the Director that the corrective action plan meets completeness and accuracy requirements, is protective of the public health and environment, meets all corrective action concentration limits specified by Utah Ground Water Quality Standards or alternate Corrective Action Concentration Limits, and that the corrective action produces a permanent effect.

The proposed Stipulation and Consent Order contains timelines and requirements for the Corrective Action Plan, and stipulated daily penalties if Energy Fuels Resources (USA) fails to implement and provide the required information as prescribed.

The Public Comment Period began on January 12, 2015 and comments were invited any time prior to 5:00 p.m. on February 13, 2015. A hearing to receive public comments was held at the Blanding Arts and Events Center on February 11, 2015.

*Additional information is available on the DRC public web site at the following link: http:// www.deq.utah.gov/businesses/E/energyfuels/ plans/EFR_plan.htm.*

*For additional information, please contact Rusty Lundberg, Director of the Division of Radiation Control at the Utah Department of Environmental Quality, at (801) 536-4257 or at rlundberg@utah.gov.*

# Utah Approves Minor License Amendment re Energy*Solutions'* Clive Facility

On January 7, 2015 the Director of the Utah Division of Radiation Control (DRC) approved Amendment 18 to Energy*Solutions'* low-level radioactive waste material license UT2300249. The amendment involves a revised Appendix I *Organization* that was originally submitted on December 10, 2014.

Upon receipt of the original amendment request, DRC notified Energy*Solutions* of an issue regarding the actual revision number. Energy*Solutions* submitted a revised Appendix I on December 30, 2014 (CD14-0291). DRC reviewed the December 30 submission and found the changes adequate and satisfactory to administer sufficient oversight and expertise to meet occupational and public safety requirements.

In approving Amendment 18, which makes changes to License Condition 32.A, DRC determined that the changes mostly involved nomenclature to the position or the addition of a position with basically the same responsibilities and qualifications. Accordingly, the Director determined the changes to be minor and therefore do not require a public comment period as per R313-17-2 Administrative Procedures.

In addition, the DRC acknowledged that Energy*Solutions'* other radioactive material license, UT2300478, does not need to be amended based on the fact that License Condition 9.10 of that license references the currently approved Appendix I *Organization* in RML UT2300249.

*License Amendment 18, along with the approval letter, may be accessed via the Utah DEQ web page at http://www.deq.utah.gov/businesses/E/ EnSolutions/licenses.htm.*

*For additional information, please contact Rusty Lundberg, Director of the Division of Radiation Control at the Utah Department of Environmental Quality, at (801) 536-4257 or at rlundberg@utah.gov.*

# Utah Radiation Control Board Holds January & February 2015 Meetings

The Utah Radiation Control Board held meetings on January 13, 2015 and February 10, 2015.

The meetings, which were open to the public, were held at the Multi Agency State Office Building located at 195 North 1950 West in Salt Lake City, Utah.

**January 2015 Meeting Agenda**

The following items, among others, were on the January 13 regular Board meeting agenda:

I. Welcome

II. Recognition of Commissioner Jerry Hurst

III. Approval of the Minutes from the December 9, 2014 Board Meeting

IV. Indoor Radon—Radon Action Month/Public Outreach and Awareness
   a. 2014 Poster Contest Winners
   b. Outreach Efforts

V. Administrative Rulemaking
   a. Comments Received
      i. Proposed changes to R313-19, *Requirements of General Applicability to Licensing of Radioactive Material* and R313-17, *Physical Protection of Category 1 and Category 2 Quantities of Radioactive Material*
   b. Approve for Rulemaking and Public Comment
      i. Proposed changes to R313-15, *Standards for Protection Against Radiation*, and R313-38-3, *Clarifications or Exceptions*, in Response to NRC Requested Changes

VI. Information Items
   a. Uranium Recovery Sites
      i. Energy Fuels Resources/White Mesa Mill—Ground Water Corrective Action Plan for Chloroform—public comment period—status update
   b. 2014 4th Quarter Activities Report
   c. 2015 Legislature—Update
   d. Online Availability of DRC Documents—Status Updates

VII. Public Comment

VIII. Election of Chair and Vice Chair

IX. Next Scheduled Board Meeting:

Tuesday, February 10, 2015, 1:00 p.m.
Multi Agency State Office Building, Board Conference Room #1015
195 North 1950 West
Salt Lake City, Utah

**February 2015 Meeting Agenda**

On February 10, the Board held both a working lunch meeting and a regular Board meeting.

**Working Lunch Meeting Agenda** The following items, among others, were on the February 10 working lunch meeting agenda:

I. Welcome

II. Administrative Rulemaking

a. Discussion Following Public Comment Period

i. Proposed changes to R313-19, *Requirements of General Applicability to Licensing of Radioactive Material,* and R313-37, *Physical Protection of Category 1 and Category 2 Quantities of Radioactive Material*

ii. Proposed changes to R313-17-4, *Special Procedures for Decisions Associated with Licenses for Uranium Mills and Disposal of Byproduct Material,* regarding public participation procedures for licensing uranium mills and radioactive byproduct material management per 42 U.S.C. §2021(o)(3)

III. Other Items

**Regular Board Meeting Agenda** The following items, among others, were on the February 10 regular Board meeting agenda:

I. Welcome

II. Approval of the Minutes from the January 13, 2015 Board Meeting

III. Administrative Rulemaking

a. Action Following Public Comment Period

i. Proposed changes to R313-19, *Requirements of General Applicability to Licensing of Radioactive Material,* and R313-17, *Physical Protection of Category 1 and Category 2 Quantities of Radioactive Material*

b. Final Adoption Following Public Comment Period

i. Proposed changes to R313-17-4, *Special Procedures for Decisions Associated with Licenses for Uranium Mills and Disposal of Byproduct Material*, regarding public participation procedures for licensing uranium mills and radioactive byproduct material management per 42 U.S.C. §2021(o)(3)

IV. Information Items

a. Nuclear Regulatory Commission (NRC) Update

i. Commission Chair

ii. Utah program performance evaluation

b. Uranium Recovery Sites

i. Energy Fuels Resources/White Mesa Mill—Ground Water Corrective Action Plan for Chloroform—public comment period—status update

c. 2015 Legislature—Update

V. Public Comment

VI. Next Scheduled Board Meeting:

Tuesday, March 10, 2015, 1:00 p.m.
Multi Agency State Office Building, Board Conference Room #1015
195 North 1950 West
Salt Lake City, Utah

**Background**

The Board—which is appointed by the Utah Governor with the consent of the Utah Senate—

guides development of Radiation Control policy and rules in the state.

The Board holds open meetings ten times per year at locations throughout the state. A public comment session is held at the end of each meeting.

*Copies of the Utah Radiation Control Board meeting agendas can be found at http://www.radiationcontrol.utah.gov/Board/minagd/agenda.pdf.*

*For additional information, please contact Rusty Lundberg, Director of the Division of Radiation Control at the Utah Department of Environmental Quality, at (801) 536-4257 or at rlundberg@utah.gov.*

### *Southwestern Compact/State of California*

# White Finding Issued to Diablo Canyon Nuclear Power Plant

On February 12, 2015, the U.S. Nuclear Regulatory Commission announced that the agency has determined that an inspection finding involving emergency plan evacuations for areas over the ocean at Diablo Canyon is of low to moderate safety significance. A severity level III violation was also issued. The plant, which is operated by Pacific Gas & Electric Co. (PG&E), is located near San Luis Obispo, California.

"Changes were made to the emergency plan implementing procedures that reduced the plan's effectiveness," said NRC Region IV Administrator Marc Dapas. "The requirement to provide protective action recommendations for the 10-mile emergency planning zone, regardless of whether that zone includes areas of water, is clear. PG&E should have recognized that the changes were not in compliance with those standards and required prior NRC approval."

The licensee has taken action to fully resolve this issue. Licensees recommend protective actions to local and state officials, who then make the actual decision about what protective actions the public should take. In this case, the county had procedures in place that included evaluating the ocean for evacuation. So, despite the gap in PG&E's emergency plan implementing procedures, at no time was the public going to be allowed to stay in an area that had the potential for radioactivity if an event had occurred.

The NRC uses color-coded inspection findings and performance indicators to assess nuclear plant performance. The colors start with green and then increase to white, yellow, or red, commensurate with the safety significance of the issues involved. The agency's enforcement system uses four severity levels, with level I being the most serious. NRC held a regulatory conference with PG&E officials on January 14, 2015. After thoroughly considering the information provided by the licensee, as well as NRC's inspection results, the agency determined that the finding has low to moderate safety significance, or is "white."

NRC inspectors identified that the licensee's emergency plan did not include a measure to recommend evacuation of the public for areas over the ocean within the 10-mile emergency planning zone. Upon further review, the inspectors determined that the licensee had changed its procedure without prior NRC approval as is required if a change decreases the effectiveness of those plans. In this case, PG&E did not identify the change as a decrease in effectiveness and therefore did not request NRC approval.

The NRC will determine the appropriate level of agency oversight and notify PG&E officials of that decision in a separate letter.

*For additional information, please contact Victor Dricks at (817) 200-1128 or Lara Uselding at (817) 200-1519.*

*(Continued from page 1)*
unacceptably high human health risks. The international petroleum industry uses a variety of methods to ensure the safe management and disposal of these wastes.

The North Dakota TENORM report presents the results of Argonne's radiological dose and risk assessment. Specifically, it presents results associated with the following:

- worker exposures to TENORM wastes associated with well site operations;
- accidental public exposures associated with improperly managed well site operation wastes (e.g., filter socks) and materials (e.g., proppants);
- worker and public exposures associated with the transportation of TENORM wastes to landfills; and,
- worker and public exposures associated with TENORM disposal in industrial and special waste landfills permitted in North Dakota.

In addition, the report presents information supporting these dose and risk assessments.

**Outline**

The North Dakota TENORM report is organized as follows:

- Section 2 presents information describing the TENORM waste streams generated by the petroleum industry in North Dakota;
- Section 3 presents information about landfill disposal, including design criteria for permitted industrial waste and special waste landfills in North Dakota and assumptions used to define the well site and landfill exposure scenarios;
- Section 4 presents the models and methods used to assess the fate and transport of TENORM (including modeling of the subsurface hydrologic regime) and radiological dose and risk;
- Section 5 presents the results of the hydrologic modeling;
- Section 6 presents the results of the radiological dose and risk assessments;
- Section 7 presents conclusions and recommendations;
- Appendix A presents the radionuclide analysis data for TENORM waste samples collected in North Dakota;
- Appendix B presents parameter values used in the dose and risk assessment models; and,
- Appendices C through E present various groundwater-related data and results.

**Overview**

Some of the waste streams generated by the oil and gas sector in North Dakota contain naturally occurring radioactive materials (NORM) in concentrations above background. In North Dakota, these materials are referred to as TENORM. If these wastes are not properly managed, they can potentially present unacceptably high human health risks.

**Methodology** The assessment conducted by Argonne evaluated the radiological doses associated with a number of scenarios concerning oil and gas well site operations, improperly managed wastes, transportation of TENORM, and disposal of TENORM in industrial waste and special waste landfills permitted in North Dakota.

Limited characterization data are available for most of the TENORM waste streams generated in North Dakota by oil and gas operations. The study was designed to minimize its reliance upon specific waste characterization data. For the well site worker and public accidental exposure scenarios, potential doses were calculated on the basis of both the average and maximum radionuclide concentrations for specific waste types relevant to the scenario, the latter providing conservatively high dose estimates. For the landfill worker and future use-scenarios, the study was designed to calculate the maximum allowable radionuclide concentrations that could be present in landfilled wastes such that potential doses would not exceed the 100-mrem/yr dose limit recommended for members of the general public by the International Commission on Radiological Protection (ICRP).

**Waste Streams** The primary TENORM waste streams of concern from oil and gas wells in North Dakota include scale accumulated within pipe and other oilfield equipment, sludge accumulated in produced water storage tanks and vessels, filter cake from filtration of water, disposable filter socks, and some synthetic fracturing proppants that have been found to contain low levels of TENORM. These wastes were found to contain elevated levels of the radionuclides radium-226 (Ra-226), radium-228 (Ra-228), lead-210 (Pb-210), and thorium-232 (Th-232). A total of 119 waste samples were analyzed by the NDDH, although not all radionuclides were measured for all samples (more details on the waste characterization can be found in Section 2 and Appendix A of the report). Many previous TENORM risk assessment studies did not include thorium because of the lack of data. In addition, state regulations for TENORM and NORM disposal typically impose limits based upon total radium (Ra-226 plus Ra-228) activity concentrations. The North Dakota TENORM study recommends similar limits, taking into consideration the presence of Th-232 and the relative concentrations of Th-232 and total radium in the waste samples measured.

**Exposure Scenarios** Pathway analysis computer codes were used to estimate doses for both workers and members of the general public. These codes included the RESRAD-BUILD, RADTRAN, TSD-DOSE, and RESRAD. A wide range of exposure scenarios were evaluated. The risks associated with a number of specific well site operations were estimated, including mixing hydraulic fracturing fluid, produced water filtration, pipe cleaning, storage tank cleaning, equipment cleaning at a gas processing plant, and sludge treatment. In all scenarios except the produced water filtration scenario, it was assumed that workers were equipped with personal protective equipment (PPE) (e.g., respirators, eye protection, and gloves). The maximum dose calculated, assuming average waste activity concentrations, was 20 mrem/yr for the worker involved in mixing hydraulic fracturing fluid. However, when maximum radionuclide concentrations were assumed, the dose for workers engaged in pipe cleaning was 130 mrem/yr, and the dose for storage tank cleaners was 70 mrem/yr. When the sensitivity analyses were run, assuming workers were not equipped with PPE, the estimated dose for a number of the scenarios approached or exceeded the 100 mrem/yr level. These results suggest that it may be important to monitor and limit the duration of exposure for workers involved in pipe and storage tank cleaning activities and that the use of proper PPE is important to protect workers with regular exposure to TENORM.

**Improper Waste Disposal Scenarios** Risk to the public from improper waste disposal was estimated for three scenarios. The first involved a child playing with a used filter sock, the second involved a load of filter socks being disposed of in an urban dumpster, and the third involved a child playing in a pile of spilled synthetic proppants. The maximum dose calculated, assuming maximum radionuclide concentrations, was 4.9 mrem/yr for the individual exposed to the filter socks disposed of in an urban dumpster. When average concentrations were assumed, the estimated dose dropped below 1 mrem/yr.

Assuming maximum concentrations, the dose for a child playing with a used filter sock was less than 1 mrem/yr, while the dose for a child playing in a field where proppants were illegally dumped was less than 2 mrem/yr. While these few scenarios seem to indicate that the risks to the public are likely relatively low from short-term exposure to waste that is improperly disposed of, they are not representative of all possible exposures. Extra care should be taken to ensure that such exposures do not occur.

**Transportation Risks** The routine cargo-related doses and risks from transportation were estimated for a truck driver and an individual living near the landfill. The maximum doses to drivers and to any member of the public were found to be about 20 mrem/yr and 3.2 × 10-6 mrem/yr, respectively. Since these doses are quite small compared with the 100-mrem/yr recommended dose limit, the transportation of TENORM does not appear to be a major consideration in possible rule changes regarding TENORM disposal. Moreover, the maximum collective doses to persons living along and sharing the transportation corridor for routine and accident conditions were 1.3 × 10-4 person-rem/yr and 7.2 person-rem/yr, respectively. It should be noted that the risk of getting involved in a fatal transportation accident is at least 100 times greater than that of the driver contracting a latent fatal cancer associated with the TENORM shipment.

**Landfill Disposal Scenarios** Landfill disposal scenarios considered both worker and public exposures during operation of the landfill, as well as possible exposures to future users of the land post-closure. Exposure to landfill workers involved with receiving and handling waste, transporting waste within the landfill, and waste placement were all analyzed. Five future-use scenarios were also evaluated including:

- a residential-use scenario, in which a resident is assumed to construct a house on top of the landfill, use the surrounding area for growing crops, and obtain drinking and irrigation water from an on-site well;
- an industrial-use scenario, in which the land encompassing the landfill is used for industrial purposes;
- a recreational-use scenario, in which the landfill is turned into a recreational area;
- an intruder scenario, in which a resident on the landfill site accidentally uncovers the buried wastes and disperses the material around his or her property; and,
- an off-site groundwater-use scenario, in which an off-site resident obtains water from a well drilled down-gradient of the landfill.

For the groundwater-use scenario, infiltration and percolation rates were modeled using the Hydrologic Evaluation of Landfill Performance (HELP) model. Groundwater flow and contaminant transport were modeled using the Modular Three-Dimensional Finite-Difference Groundwater Flow Model (MODFLOW) and the Modular 3-D Multi-Species Transport Model (MT3DMS).

**Conclusions**

The North Dakota TENORM report concludes that NDDH can use the results of this study to make decisions about the disposal of TENORM wastes in North Dakota special waste and industrial waste landfills, even though waste characterization data are limited, and specific landfill locations have not been evaluated. The report acknowledges that, throughout the analyses, conservative assumptions have been made in the absence of definitive information. Although this approach could overestimate potential doses to receptors, the report states that it is a commonly used and prudent approach to ensure public health protection. Sensitivity analyses have been conducted on many parameters that might have a substantial bearing on the dose calculations in order to further support decisions about TENORM waste management at

the well site, as well as TENORM landfill disposal.

The report states that the following general conclusions about well site operations, landfill disposal, and potential exposures to specific receptors are supported by the analyses and results presented in Sections 5 and 6:

- Potential doses to well site workers appear to be acceptable based upon average activity concentrations and the appropriate use of PPE. However, these doses can increase significantly and potentially even exceed recommended doses if concentrations approach the maximum of the range of the evaluated activities. The use of appropriate PPE is important to help minimize exposure, especially for workers performing cleaning tasks that may involve encountering scale.
- For well site operational scenarios, the pipe cleaning and storage tank cleaning workers received the highest doses. If maximum radionuclide concentrations are assumed, their doses are of potential concern (i.e., exceeding or approaching the ICRP's recommended public exposure limit of 100 mrem/yr). These doses may be reduced to acceptable levels by limiting the workers' duration of exposure.
- The estimated doses from accidental public exposure to improperly managed filter socks and proppant were a small fraction of the public dose limit of 100 mrem/yr under all scenarios modeled. However, the scenarios evaluated in the study are not representative of all possible exposures related to improperly managed filter socks and proppants.
- The estimated annual dose to the driver involved in transporting TENORM waste to the landfill was a small fraction of the public dose limit of 100 mrem/yr. The transportation of the TENORM waste should not be a major component in deciding on the possible changes to the rules regarding TENORM disposal.
- Potential exposures to landfill workers are more restrictive than potential exposures related to future use of the landfill, in terms of the maximum TENORM concentrations that can be disposed of in the landfill safely. The workers involved in receiving and handling or waste placement activities received the highest dose.
- Increasing the depth of the TENORM wastes in the landfill can effectively reduce doses to future-use scenarios. Decreasing the volume of TENORM wastes that can be disposed of per year in a single landfill could effectively reduce doses to both landfill workers and future-use scenarios. Alternatively, potential doses could be reduced by limiting the number of hours that workers are exposed to the TENORM wastes.
- On the basis of the hydrologic modeling and the dose assessment results, disposal of TENORM wastes in both industrial and special wastes landfills is appropriate, provided certain restrictions are met. From a groundwater contamination perspective, TENORM wastes may therefore be appropriately disposed of in either landfill type. The thicker cover required for industrial waste landfills (2 m [6 feet] as opposed to 1 m [3 feet]) results in lower potential doses to the receptors in all of the future-use scenarios modeled, except the off-site resident whose potential dose is independent of the landfill depth to TENORM.
- Further refinement of data parameters for the hydrologic modeling (e.g., site-specific Kd values, site-specific hydrogeological data) is not warranted given that the groundwater exposure pathway is not a significant contributor to dose, except for scenarios assuming the thickest landfill cover (which limits other pathways) and very high concentrations of Pb-210 and Th-232.
- Initial waste characterization data for TENORM waste streams generated by oil and gas production in North Dakota indicate that

thorium may be present in the wastes in addition to radium. Establishing a total radium limit that takes into account the levels of thorium that may be present is a conservative approach that ensures potential exposures to workers and the general public are maintained below the recommended annual dose limit.

**Recommendations**

The report states that the following recommendations are supported by the analyses and results:

- For the maximum TENORM concentrations evaluated, in order to keep exposures to acceptable levels, it may be necessary for workers to wear PPE (particularly respirators). This could be appropriate for all workers with inhalation exposure risks, including workers involved in pipe cleaning, storage tank cleaning, equipment cleaning at gas processing facilities, and sludge treatment.
- For the pipe cleaning and storage tank cleaning workers, additional analyses may be warranted to ensure that their exposures do not exceed or approach the ICRP's recommended public exposure limit of 100 mrem/yr. It may be appropriate to limit the workers' duration of exposure.
- North Dakota solid waste regulations may be safely modified so that the maximum exposure to any landfill worker does not exceed 100 mrem/yr, to allow TENORM wastes containing an average concentration of less than or equal to 50 pCi/g of total radium (independent of background radium levels) to be disposed of in either special waste or industrial waste landfills, based on the following conditions:
  - No more than 25,000 tons of TENORM wastes are disposed of in a single landfill per year.
  - The average thorium activity concentration in the waste does not exceed 24 pCi/g. (This concentration assumes a thorium to radium ratio of 49% at 50 pCi/g total radium, based on the conservative assumption that the ratios of Th-232 to total radium and of Ra-226 to total radium are both average, plus one SD greater than those in all samples observed for the report.)
  - TENORM wastes must be covered by at least 2 m (6 feet) of a combination of the landfill cover materials and clean wastes that do not contain radionuclides.

**Background**

Argonne is a U.S. Department of Energy laboratory managed by UChicago Argonne, LLC under Contract DE-AC02-06CH11357. The Laboratory's main facility is located outside Chicago.

The North Dakota TENORM Report was prepared by Christopher Harto, Karen Smith, Sunita Komboj and John Quinn of the Environmental Science Division, Argonne National Laboratory.

*For additional information about Argonne and its science and technology programs, please go to www.anl.gov.*

*Copies of the North Dakota TENORM and other DOE reports produced after 1991, as well as some pre-1991 documents, may be obtained via DOE's SciTech Connect online at http://www.osti.gov/scitech/.*

*Texas Compact*

# Texas Compact Commission Holds January 2015 Meeting

On January 6, 2015, the Texas Low-Level Radioactive Waste Disposal Compact Commission (Texas Compact Commission) held a regularly scheduled meeting.

The meeting, which began at 9:30 a.m. CDT, was held in Room E1.028 at the Texas State Capitol located at 1100 Congress Avenue in Austin, Texas.

**Meeting Agenda**

The following is an abbreviated overview of the agenda for the Texas Compact Commission meeting. Persons interested in additional detail are directed to the formal agenda themselves.

- call to order;
- roll call and determination of quorum;
- introduction of commissioners, elected officials and press;
- public comment;
- discussion on revisions to 31 Texas Administrative Code §675.20, §675.21, §675.22 and §675.23 related to exportation and importation of waste;
- consideration of and possible action on requests for amendments to agreements for importation of low-level radioactive waste from Bionomics, Inc.; NSSI; RAM Services, Inc.; Tennessee Valley Authority; and, Thomas Gray & Associates;
- consideration of and possible action on applications and proposed agreements for importation of low-level radioactive waste from Alaron-Veolia; Arizona Public Service Co. - Palo Verde; and, PerkinElmer, Inc.;
- receive reports from Waste Control Specialists LLC (WCS) about recent site operations and any other matter WCS wishes to bring to the attention of the Texas Compact Commission;
- Chairman's report on Texas Compact Commission activities including reporting on fiscal matters and on other actions to be taken by the compact;
- report from Leigh Ing, Consulting Supervisory Director of the Texas Compact Commission, on her activities and questions related to Commission operations;
- discussion and possible changes of dates and locations of future Texas Compact Commission meetings in 2015; and,
- adjourn.

**Background**

**Texas Compact Commission Meetings** The Texas Compact Commission may meet in closed session as authorized by the Texas Open Meetings Act, Chapter 551, Texas Government Code. Texas Compact Commission meetings are open to the public.

*Texas Compact Commission meeting agendas may be found on the Commission's website at http://www.tllrwdcc.org/.*

**Draft Import/Export Rules** On July 18, 2014, the Texas Compact Commission announced the availability for public review and comment of working drafts of proposed revisions to 31 Texas Administrative Code (TAC) §675.21, §675.22 and §675.23 related to exportation and importation of waste. (See *LLW Notes*, July/August 2014, p. 12.) Comments received will be reviewed in order to develop rules for proposal in the *Texas Register*.

*The working draft rules for comment include redline/strikeout versions in PDF format and clean versions in PDF format. Links are provided to the current rules in the TAC, and clean versions of the revised working drafts are also provided in Word to assist reviewers in developing comments. The working draft rules and associated links can be found at http://www.tllrwdcc.org/rules/.*

*For additional information, please contact Leigh Ing, Consulting Supervisory Director of the Texas Compact Commission, at (512) 217-8045 or at ing.leigh@gmail.com.*

*Commonwealth of Massachusetts*

# Special Inspection at Pilgrim Nuclear Power Plant

## *NRC Reviews Issues re Storm-Induced Unplanned Shutdown*

On February 2, 2015, the U.S. Nuclear Regulatory Commission began a Special Inspection at the Pilgrim Nuclear Power Plant to review issues surrounding a storm-induced unplanned shutdown on January 27, 2015. The single-unit boiling-water reactor is located in Plymouth, Massachusetts. It is owned and operated by Entergy Nuclear.

The six-member NRC team was tasked with reviewing equipment issues that occurred during the shutdown—including the partial loss of off-site power; the failure of a condensate pump motor associated with the plant's High-Pressure Coolant Injection (HPCI) system; and, the malfunctioning of one of the plant's four safety relief valves.

Pilgrim, like other nuclear power plants, transmits power to the grid but also receives power back for operational purposes. During a major winter storm, one of two 345-kilovolt lines that provide off-site power to the plant tripped. In response, plant operators began reducing power. At about 50-percent power, the second 345-kilovolt line also tripped, resulting in a reactor shutdown (or scram) at about 4:00 a.m. A third off-site power line, a 23-kilovolt line, remained available.

Operators started the plant's two emergency diesel generators and transferred electrical loads for safety systems to those on-site power supplies due to concerns with off-site power. The transfer was performed by the operators prior to the loss of the off-site power lines.

"The Pilgrim reactor was safely shut down following the loss of two off-site power lines," said NRC Region I Administrator Dan Dorman. "Nevertheless, we want to examine more closely the challenges that surfaced during the event, including safety system and equipment problems and the loss of the two off-site power lines."

An inspection report documenting the team's findings will be issued within 45 days after the completion of the review.

*For additional information, please contact Diane Screnci at (610) 337-5330 or Neil Sheehan at (610) 337-5331.*

*(Continued from page 10)*

NRC would also add a new requirement to develop criteria for the acceptance of low-level radioactive waste for disposal based on either the results of these technical analyses or on the existing low-level radioactive waste classification requirements. This would facilitate consideration of whether a particular disposal site is suitable for future disposal of depleted uranium (DU), blended low-level radioactive waste, or any other previously unanalyzed low-level radioactive waste stream. Additionally, the NRC is proposing amendments to facilitate implementation and better align the requirements with current health and safety standards. This rule would affect low-level radioactive waste disposal licensees and license applicants that are regulated by the NRC or the Agreement States.

*For additional information regarding the P61WG, please contact LLW Forum Executive Director Todd D. Lovinger at (754) 779-7551 or LLWForumInc@aol.com.*

*U.S. Department of Energy/ National Nuclear Security Administration*

# DOE/NNSA Recovers One Millionth Curie of Radioactive Material

By press release dated December 22, 2014, the U.S. Department of Energy's National Nuclear Security Administration (DOE/NNSA) announced that it had recovered its one millionth curie (Ci) of disused and unwanted radioactive sources from domestic sites through its Off-Site Source Recovery Project (OSRP). According to the release, "[t[hese removals were part of DOE/ NNSA's global campaign to prevent terrorists from acquiring nuclear and radiological material."

**Source Recovery**

The radioactive source that achieved the millionth curie milestone was a small stainless steel capsule, about the size of a pencil, containing 100 Ci of the radioactive isotope Cobalt-60 (Co-60). This source was recovered from an industrial facility in Maryland. Technical experts from both Los Alamos and Idaho National Laboratories provided expertise in implementing this mission.

"The State of Maryland greatly appreciates the assistance of DOE/NNSA's OSRP for the safe removal and disposal of large quantities of unwanted and hazardous radioactive material from the State," said Robert Summers, Secretary of the Environment for the State of Maryland. "Proper disposal of this radioactive material significantly reduces the potential for illicit use of the material."

"This recovery shipment of the one-millionth curie is the latest on the list of major accomplishments the OSRP team has achieved over the years," said Anne Harrington, Deputy Administrator for Defense Nuclear Nonproliferation at DOE/NNSA. "These recovery efforts help keep all of us safe from the malicious use of unwanted radioactive sources."

**Background**

Since 1999, OSRP's mission to remove excess, unwanted, abandoned or orphaned radioactive sealed sources that pose a potential risk to health, safety, and national security has resulted in the successful recovery of more than 38,000 radioactive sources from more than 1,100 domestic locations. Collectively, this amount of radioactive material is enough to produce 100,000 radiological dispersal devices (i.e., "dirty bombs").

Established by Congress in 2000, NNSA is a semi -autonomous agency within the U.S. Department of Energy responsible for enhancing national security through the military application of nuclear science. NNSA maintains and enhances the safety, security, reliability and performance of the U.S. nuclear weapons stockpile without nuclear testing; works to reduce global danger from weapons of mass destruction; provides the U.S. Navy with safe and effective nuclear propulsion; and, responds to nuclear and radiological emergencies in the United States and abroad.

*For additional information on NNSA's work to reduce and protect vulnerable nuclear and radiological material, go to www.nnsa.energy.gov.*

*U.S. Environmental Protection Agency*

# EPA Publishes Proposed Revisions to 40 CFR Part 192

## *Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings*

On January 26, 2015, the U.S. Environmental Protection Agency published a proposed rule (80 *Federal Register* 4,145) that seeks to add new health and environmental protection standards to regulations promulgated under the Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA) as found at 40 CFR Part 192.

The proposed standards will regulate byproduct materials produced by uranium in-situ recovery (ISR), including both surface and subsurface standards, with a primary focus on groundwater protection, restoration and stability. ISR has a greater potential to directly affect groundwater than does conventional milling. Therefore, by explicitly addressing the most significant hazards represented by ISR activities, these proposed standards are intended to address the shift toward ISR as the dominant form of uranium recovery that has occurred since the standards for uranium and thorium mill tailings were initially promulgated in 1983. Once finalized, the general standards will be implemented by the U.S. Nuclear Regulatory Commission (NRC).

EPA is also proposing to amend specific provisions in the current Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings rule to address a ruling of the Tenth Circuit Court of Appeals, to update a cross-reference to another environmental standard and to correct certain technical and typographical errors that have been identified since the 1983 promulgation.

Information on public hearings will be announced as soon as it becomes available. The public comment period ends on April 27, 2015.

*EPA's proposed rule, as published in the Federal Register, can be found at http://www.gpo.gov/fdsys/pkg/FR-2015-01-26/pdf/2015-00276.pdf.*

**Proposed Rule**

The major provisions of EPA's proposal to add new health and environmental protection standards to regulations promulgated under the UMTRCA include the following:

- EPA is proposing to add an additional subpart within 40 CFR Part 192 to explicitly address groundwater protection at uranium ISR operations. A new subpart F is being proposed that would set standards that would apply to uranium ISR facilities only. The overall purpose of this subpart is to address the most significant hazards represented by ISR activities. This subpart adds the following:

  1. A section on applicability—§ 192.50 Applicability—that specifies the subpart will apply to the management of uranium byproduct materials during and following the processing of uranium ores using ISR methods.
  2. A section containing definitions—§ 192.51 Definitions and Cross References.
  3. A section—§ 192.52 Standards—in which EPA proposes to specify the minimum 13 constituents for which groundwater protection standards must be met. The list includes the following: arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, nitrate (as N), molybdenum, combined radium-226 and radium-228, uranium (total), and gross alpha-particle activity (excluding radon and uranium).

4. A section discussing monitoring requirements—§ 192.53 Monitoring Programs—that details the specific requirements of monitoring programs to be conducted during the preoperational, operational, restoration, stability and long-term stability phases.
5. A section establishing requirements for corrective actions—§ 192.54 Corrective Action Program.
6. A section detailing the effective date of the new subpart—§ 192.55—Effective Date.

- EPA is also proposing to amend certain provisions within the existing 40 CFR Part 192 to address a ruling of the Tenth Circuit Court of Appeals, delete reference to an outdated standard and correct minor technical and typographical errors.

The proposed rule requires affected facilities to monitor groundwater for a longer period of time compared to current practice—estimated to be 9.5 additional years if geochemical modeling indicates that conditions will remain stable, and estimated to be 32.5 additional years if long-term stability monitoring continues for 30 years.

EPA conducted a qualitative assessment of the benefits of the proposed rule. EPA recognizes that groundwater is a valuable resource, and is becoming more valuable as groundwater use increases. While the aquifers in the vicinity of ISR operations are currently providing little extractive value—because of their locations and, for some areas, the fact that groundwater quality is low—in future years these resources may have increased value. For this reason, EPA believes it is necessary to take a longer view of groundwater protection than taken in the past.

Currently, monitoring groundwater conditions after restoration is typically conducted for a short period of time—EPA assumes 6 months for cost estimate purposes—which may not be long enough to detect instability in groundwater conditions. EPA's proposed rule requires a 30 year long-term stability monitoring period, which may be shortened if geochemical modeling demonstrates that conditions in the restored well field will remain stable over time.

According to EPA, the proposed rule will reduce the risk of undetected excursions of pollutants into adjacent aquifers. This in turn will reduce the human health risks that could result from exposures to radionuclides in well water used for drinking or agriculture in areas located down-gradient from an ISR. Because radionuclides are human carcinogens, the main health risk averted would be cancer.

In addition to avoiding human health impacts, EPA states that the proposed rule has the potential to detect excursions sooner and thus enable a faster remedial response. Because plumes detected during long-term stability monitoring would be smaller, costs of remediation would be potentially much lower.

**Submitting Comments**

Comments on EPA's proposed rule that seeks to add new health and environmental protection standards to regulations promulgated under UMTRCA must be received on or before April 27, 2015.

When submitting comments, stakeholders should identify them by Docket ID No. EPA–HQ–OAR–2012–0788.

Comments may be submitted via any of the following methods:

- Federal rulemaking web site: Submit comments to the federal rulemaking web site at www.regulations.gov. Follow the on-line instructions for submitting comments.
- Email: Submit comments to

a-and-r-docket@epa.gov.

- Facsimile: Fax comments to (202) 566–9744.
- Mail: Mail comments to Air and Radiation Docket, U.S. Environmental Protection Agency, Mail Code: 2822T, 1200 Pennsylvania Ave. NW., Washington, DC 20460.
- Hand Delivery: Hand deliver comments to EPA West Building, Room 3334, 1301 Constitution Avenue NW., Washington, DC 20004.

**Background**

The current regulations, Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings (40 CFR 192), set standards to protect public health, safety and the environment from radiological and non-radiological hazards associated with uranium and thorium ore processing and its wastes. EPA issued the standards, which were originally issued in 1983 and last revised in 1995, under the legal authority of UMTRCA.

**Why is EPA Proposing Changes?** In the years since the rule was originally issued, ISR has become the prominent method of uranium extraction in the United States. The current regulations do not explicitly address the alteration of groundwater that occurs during the ISR process. EPA is proposing to add a new Subpart to 40 CFR 192 that will establish groundwater restoration and monitoring requirements at ISR facilities. EPA is also proposing to correct a few outdated references and make minor changes to correct typographical errors.

**ISR and Groundwater** In the ISR process, fluids are injected into an ore-bearing aquifer to mobilize uranium. Extraction wells then collect the groundwater, which is processed at the surface to obtain the uranium. The fluids injected to mobilize uranium also mobilize minerals and metals like arsenic and lead, and change the chemistry of the aquifer from its original state. Groundwater from the altered aquifers could migrate (an "excursion") over time and contaminate nearby groundwater.

**What is Proposed for ISR Facilities?** The proposed new subpart of 40 CFR Part 192 would establish groundwater restoration goals and monitoring requirements at ISR facilities. Specific provisions of the new subpart include:

- Requirements to characterize background groundwater chemistry: The proposed rule describes how ISR facilities are to characterize groundwater chemistry before beginning uranium recovery operations.
- Requirements to meet restoration goals for 13 constituents: The proposed rule would require compliance with whichever standard is most protective from the Safe Drinking Water Act (SDWA), the Resource Conservation and Recovery Act (RCRA), or UMTCRA for each of 13 groundwater constituents. The 13 groundwater constituents include: arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, nitrate (as nitrogen), molybdenum, radium, total uranium and gross alpha-particle activity. If the water in the aquifer meets the groundwater standards before ISR operations begin, it would have to be restored to meet them again after operations have stopped. If the constituent concentrations already exceed standards before operations begin, the operator would have to restore the groundwater chemistry to original, pre-operational concentrations. If background concentrations or groundwater protection standards cannot be achieved, ISR operators can request an Alternate Concentration Limit (ACL), provided that they meet certain criteria and conditions.
- Requirements for long-term stability monitoring: The proposed rule would require ISR operators to monitor groundwater for 30 years after demonstrating that the groundwater chemistry has been restored and is stable.

Under this proposal, the 30-year monitoring period could be shortened if monitoring data and geochemical modeling show that the groundwater chemistry has been restored, has remained stable for at least three consecutive years, and is likely to remain stable into the future. Statistical analyses would have to demonstrate groundwater stability at a confidence level of 95 percent.

*Additional information on the proposed rule can be found on the EPA website at http://www.epa.gov/radiation/tenorm/40CFR192.html.*

*For additional information, please contact Ingrid Rosencrantz of the EPA at (202) 343-9286 or*

## *U.S. Nuclear Regulatory Commission*

# Reporting of H-3, C-14, Tc-99 and I-129 on the Uniform Waste Manifest

### *NRC Issues RIS 2015-02*

On February 18, 2015, the U.S. Nuclear Regulatory Commission issued Regulatory Issue Summary (RIS) 2015-02, *Reporting of H-3, C-14, Tc-99 and I-129 on the Uniform Manifest,* to inform addressees of the option to use indirect methods to determine the activity of tritium (H-3), carbon-14 (C-14), technetium-99 (Tc-99), and iodine-129 (I-129) reported on the uniform waste manifest when the radionuclide is present at a concentration less than the lower limit of detection (LLD).

"The reason for noting this option is because accurately reporting the activities of these radionuclides is important for better decision-making regarding the disposal of low-level radioactive waste," according to RIS 2015-02. "Overestimation of disposal site inventory could lead to premature loss of disposal system capacity, whereas underestimation of inventory could lead to public health and safety concerns."

The RIS advises that licensees may voluntarily begin using the methods described in RIS 2015-02 and that neither a specific action nor any written response is required. NRC provided RIS 2015-02 to the Agreement States for their information and for distribution to their licensees, as appropriate.

*RIS 2015-02 can be found at http://www.nrc.gov/reading-rm/doc-collections/gen-comm/reg-issues/2015/.*

**Summary**

According to NRC, licensees may be able to generate and report more accurate uniform manifest numbers for wastes that have radionuclide concentrations less than the LLD by using indirect methods. NRC expects that the use of indirect methods will be most appropriate for licensees with well-characterized and consistent waste streams (e.g., nuclear power plants). Regulations in 10 CFR 61.55(a)(8) allow for the use of indirect methods to determine the concentrations of radionuclides in waste for the purpose of waste classification *if there is reasonable assurance that the indirect methods can be correlated with actual measurements*. However, the instructions for completing the uniform manifest (NUREG/BR-0204) do not include this option for reporting the inventory of H-3, C-14, Tc-99, and I-129.

RIS 2015-02 states that the basis for any indirect methods used should be justified by the licensee. As part of this basis (and as indicated by the guidance provided in the references found in Enclosure 2 of RIS 2015-02), the licensee should determine the range of conditions under which the indirect method is appropriate and the situations that could lead to a change in the correlation or cause the indirect method to no longer be

appropriate. This is particularly important, according to NRC, when the indirect method is based on an empirical relationship that does not have a physical basis. As an example, RIS 2015-02 states that indirect methods involving the correlation of radionuclides with different production mechanisms (e.g., activation products versus fission products) or different transport properties (e.g., H-3 and C-14 versus cobalt-60 (Co-60) or cesium-137 (Cs-137)) would not be expected to correlate well over a range of conditions.

One type of indirect method is the use of scaling factors, which are used to calculate the activity of a difficult-to-measure radionuclide from that of an easy-to-measure radionuclide that has been shown to be correlated. The NRC previously published guidance on the use of scaling factors to determine radionuclide concentrations in waste for the purpose of waste classification in the 1983 Branch Technical Position (BTP) on Waste Classification, as well as in Information Notice 86-20, "Low Level Radioactive Waste Scaling Factors, 10 CFR Part 61." The NRC staff believes that the use of scaling factors as described in these guidance documents for waste classification purposes is also suitable for the purpose of reporting of difficult-to-measure radionuclides on the uniform manifest. This guidance is summarized and clarified in Enclosure 1 to RIS 2015-02, which states that a reasonable target for determining inferred radionuclide concentrations is that the concentrations are accurate to within a factor of 10.

According to NRC, the scaling factors should be periodically assessed to confirm that the values used remain appropriate. NRC further states that direct analytical measurement of samples that are representative of the waste stream using techniques that are sensitive enough to quantify these radionuclides is the best method to confirm that the scaling factors remain appropriate. However, if enough data has previously been collected to demonstrate that the scaling factors are relatively constant in a particular system or waste stream, then NRC states that an evaluation of whether the current conditions remain comparable to the conditions under which the scaling factors were determined would be sufficient. According to RIS 2015-02, this assessment should include an evaluation of which parameters could affect the relative ratios of radionuclides and confirmation that these parameters have not significantly changed. NRC writes that a confirmatory assessment should also be performed whenever there is reason to believe that facility or process changes may have significantly altered the previously determined correlations. Additionally, NRC advises that the waste stream should continue to be periodically sampled to confirm that the concentrations of the radionuclides remain below the LLD. If the concentrations are above the LLD, the measured concentrations should be used to derive the radionuclide activities on the manifest.

RIS 2015-02 advises that other indirect methods, such as the use of material accountability or computer codes that predict the activity of radionuclides, can also be used to determine the reported activity of H-3, C-14, Tc-99, and I-129 on the uniform manifest if there is reasonable assurance that the results obtained using these methods are correlated with actual measurements. As with the use of scaling factors, however, NRC advises that periodic assessment should be performed to confirm that the method remains appropriate and that it is accurately determining the concentrations to within a factor of 10.

Although licensees may report conservative values for radionuclides on the uniform manifest, NRC believes that there may be benefits for disposal facilities if more accurate and less conservative numbers are used. The 1983 BTP on Waste Classification states that the lower limit of detection of a measurement technique for direct measurement of a particular radionuclide should be no more than 0.01 times the concentration for that radionuclide listed in Table 1 of Section 61.55, and 0.01 times the smallest concentration

for that radionuclide listed in Table 2 of Section 61.55. Although not required, licensees can take additional steps, such as using improved analytical techniques (e.g., mass spectrometry, increased count times), to achieve a lower detection limit.

RIS 2015-02 does not require licensees to make any changes to how they report the activity of H-3, C-14, Tc-99, and I-129 on the uniform manifest. Licensees continue to have the option to report LLD-based activity values. As described in NUREG/BR-0204, LLD-based values reported on the uniform manifest should continue to be put in parentheses. NRC staff plans to update NUREG/BR-0204 in the near future to reflect the permissible use of indirect methods (e.g., scaling factors) for the purpose of reporting of difficult-to-measure radionuclides on the uniform manifest as described in RIS 2015-02.

**Background**

Appendix G of 10 CFR Part 20, "Requirements for Transfers of Low-Level Radioactive Waste Intended for Disposal at Licensed Land Disposal Facilities and Manifests," requires that an NRC uniform manifest (i.e., NRC Forms 540, 541, and, if necessary, 542) be prepared for waste intended for ultimate disposal at a licensed low-level radioactive waste land disposal facility, and states that the activity of each of the radionuclides H-3, C-14, Tc-99, and I-129 contained in the shipment must be reported on the uniform manifest. These radionuclides were identified as being of particular concern for the groundwater pathway dose in the analysis performed for NUREG-0782, "Draft Environmental Impact Statement on 10 CFR Part 61 Licensing Requirements for Land Disposal of Radioactive Waste," published in September 1981. The concentration values provided in the 10 CFR Part 61 waste classification tables are based on intruder protection, and the potential groundwater pathway dose was not considered in the development of these tables. Instead, the NRC staff decided that the groundwater pathway for each disposal facility should be analyzed on a case-by-case basis because the groundwater pathway impacts are site-specific and are a function of the total inventory of radionuclides at a disposal site. The quantities of the four radionuclides believed to be especially important to the groundwater pathway (i.e., H-3, C-14, Tc-99, and I-129) were required to be reported on the uniform manifest. According to NUREG/BR-0204, Revision 2, "Instructions for Completing NRC's Uniform Low-Level Radioactive Waste Manifest," if these four radionuclides are present in the waste in quantities less than the LLD, they must be reported as being present at the LLD value on the uniform manifest. Because these radionuclides are difficult to measure, the LLD values are potentially much higher than the actual concentrations in the waste. According to RIS 2015-02, however, research indicates that the use of the LLD values may result in a significant over-estimation of the inventory of these four radionuclides in disposal facilities. (*See NUREG/CR-6567, "Low-Level Radioactive Waste Classification, Characterization, and Assessment: Waste Streams and Neutron-Activated Metals.")*

The uniform manifests are often the best source of inventory information for performance assessments, though the disposal sites are not required to use the uniform manifest information. Because the inventory of radionuclides is a key parameter in the determination of the projected dose from the groundwater pathway in a performance assessment, NRC believes that the reporting of more accurate information for risk-significant radionuclides on the uniform manifests may result in a more reliable performance assessment and lead to better decision-making regarding the disposal of low-level radioactive waste. According to NRC, overestimation of inventory could lead to premature loss of disposal system capacity (e.g., closure of disposal sites), whereas underestimation of inventory could lead to public health and safety concerns.

A notice of opportunity for public comment on RIS 2015-02 was published in the *Federal*

*Register* (79 FR 31348) on June 2, 2014. Comments were received from the American Society of Mechanical Engineers; WMG, Inc.; and, from two individuals. NRC staff considered all comments that were received. The staff's evaluation of the comments is publicly available through NRC's Agency-wide Documents Access and Management System (ADAMS), under Accession No. ML14289A361.

*For additional information, please contact Don Lowman of the NRC's Office of Nuclear Material Safety and Safeguards (NMSS) at (301) 415-5452 or at Donald.Lowman@nrc.gov or Karen Pinkston of NMSS at (301) 415-3650 or at Karen.Pinkston@nrc.gov.*

# Registration Open for NRC's 2015 Regulatory Information Conference

By press release dated January 6, 2015, the U.S. Nuclear Regulatory Commission announced that registration is now open for the agency's 27th annual Regulatory Information Conference (RIC). The RIC is being held at the Bethesda North Marriott Hotel from on March 10-12, 2015.

**Program Highlights**

The NRC's Offices of Nuclear Reactor Regulation and Nuclear Regulatory Research jointly host the RIC. The conference program features NRC Chair Stephen Burns as the keynote speaker.

Additional program highlights include plenary sessions with Commissioners Kristine Svinicki, William Ostendorff and Jeff Baran. NRC's Executive Director for Operations, Mark Satorius, will give remarks. Bill Dean, NRC's Director of the Office of Nuclear Reactor Regulation, will give welcome and introductory remarks.

This year's RIC includes two sessions that are expected to be particularly highly attended—Implementation of Lessons Learned from the Fukushima Dai-ichi Accident and Regulatory Agility in the New Millennium. Other technical sessions will address significant domestic and international issues like nuclear safety and security, reactor decommissioning, public participation, spent fuel storage and new reactor licensing.

**Agenda and Registration**

The conference is free and open to the public, but registration is required.

The agenda and online registration are now available on the NRC website at www.nrc.gov. The deadline for online registration was February 24, 2015.

Early registration is encouraged; however, onsite registration will also be available during the conference.

**Background**

Nearly 3,000 people are expected to attend the RIC, including industry executives, representatives from state governments, non-governmental organizations, individual community members, and representatives from dozens of foreign countries. The conference is an opportunity for attendees to discuss issues related to the safety and security of commercial nuclear facilities and current regulatory activities.

*For additional information, please contact Stephanie West of the NRC at (301) 415-8200.*

# NRC Publishes Final Volumes of Yucca Mountain Safety Evaluation Report

On January 29, 2015, the U.S. Nuclear Regulatory Commission (NRC) published Volumes Two and Five of its Safety Evaluation Report on the proposed geologic high-level nuclear waste repository at Yucca Mountain, Nevada. Volume 2 covers repository safety before permanent closure. Volume 5 covers proposed conditions on the construction authorization, probable subjects of license specifications, and the NRC staff's overall conclusions.

Publication of Volumes Two and Five complete the technical safety review of the U.S. Department of Energy's (DOE's) Yucca Mountain application. The Safety Evaluation Report includes the staff's recommendation that the Commission should not authorize construction of the repository because DOE has not met certain land and water rights requirements identified in Volume 4, which was published in December 2014, and a supplement to DOE's Environmental Impact Statement has not yet been completed.

Completion of the Safety Evaluation Report does not does not represent an agency decision on whether to authorize construction of the repository. A final licensing decision, should funds beyond those currently available be appropriated, could come only after completion of the supplement to DOE's Environmental Impact Statement, hearings on contentions in the adjudication, and Commission review.

*Additional information on the Yucca Mountain licensing process is available on the NRC website at www.nrc.gov.*

**Publication of Volumes 3 and 4**

NRC published Volume 3 of its Safety Evaluation Report on the proposed underground geologic nuclear waste repository at Yucca Mountain, Nevada on October 16, 2014. (See *LLW Notes*, September/October 2014, pp. 29-30.) The agency then published Volume 4 on December 18, 2014. (See *LLW Notes*, November/December 2014, pp. 23-24.)

**Volume 4 re Administrative and Programmatic Requirements** Volume 4 covers administrative and programmatic requirements for the repository. It documents the staff's evaluation of whether DOE's research and development and performance confirmation programs, as well as other administrative controls and systems, meet applicable NRC requirements. It contains the staff's finding that most administrative and programmatic requirements in NRC regulations are met, except for certain requirements relating to ownership of land and water rights.

Specifically, DOE has not acquired ownership or jurisdiction over the land where the geologic repository operations area would be located, and the land is not free of significant encumbrances such as mining rights, deeds, rights-of-way or other legal rights. DOE also has not acquired water rights it determined are needed to accomplish the purpose of the geologic repository operations area.

*NUREG-1949, Safety Evaluation Report Related to Disposal of High-Level Radioactive Wastes in a Geologic Repository at Yucca Mountain, Nevada, Volume 4, and additional information on the Yucca Mountain licensing process are available on the NRC website at http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1949/.*

**Volume 3 re Post-Closure Requirements** Volume 3 covers the period after a repository at Yucca Mountain would be permanently closed should NRC authorize construction following

completion of the remaining steps in the licensing process. Volume 3 contains the staff's finding that the U.S. Department of Energy's repository design meets the requirements that apply after the repository is permanently closed, including but not limited to the post-closure performance objectives in NRC's regulations contained in 10 CFR Part 63, Subpart E. These performance objectives include the requirement that the repository be composed of multiple barriers to isolate radioactivity from the environment. The staff also found the proposed repository design meets the NRC's limits or standards as found in 10 CFR Part 63, Subpart L for individual protection, human intrusion and groundwater protection.

*NUREG 1949, Safety Evaluation Report Related to Disposal of High-Level Radioactive Wastes in a Geologic Repository at Yucca Mountain, Nevada, Volume 3, is now publicly available in the NRC's ADAMS online database as ML14288A121.*

**Background**

DOE submitted its Yucca Mountain application in June 2008. The NRC staff published Volume 1 (General Information) of the Safety Evaluation Report in August 2010. After DOE moved to withdraw the application and Congress stopped appropriating funds for the NRC's review, the agency closed out its application review and published three technical evaluation reports containing the staff's technical analyses to that point but no regulatory conclusions. The adjudication of nearly 300 contentions filed by various parties contesting the application was also suspended in September 2011.

The U.S. Court of Appeals for the District of Columbia Circuit ordered the NRC in August 2013 to resume the licensing process using currently available funding appropriated from the Nuclear Waste Fund. The NRC subsequently published Volume 3 (Repository Safety after Permanent Closure) on October 16, 2014. NRC published Volume 4 (Administrative and Programmatic Requirements) on December 18, 2014.

*For additional information, please contact David McIntyre of the NRC at (301) 415-8200.*

# NRC Proposes FY 2016 Budget to Congress

## *NRC Spending, Staffing Declining*

By press release dated February 2, 2015, the U.S. Nuclear Regulatory Commission announced that the agency has requested $1,032.2 million (including the Office of the Inspector General) in its Fiscal Year 2016 budget proposal to Congress. The request is down $27.3 million from the FY 2015 submission. Requested staffing is down as well for the agency that regulates nuclear power plants and users of nuclear materials to protect public health and safety, promote the common defense and security and protect the environment.

"This budget reflects today's realities and ushers in a new era in enhancing accountability within the NRC for the prudent use of resources," said NRC Chair Stephen Burns.

Since the NRC recovers approximately 90 percent of its budget from licensee fees, which are sent directly to the Treasury, the resulting net appropriation request is $122.2 million—down $2 million from last year's submission. The continuing resolution adopted by Congress on December 16, 2014 cut the NRC request by $44.2 million to account for fee-based unobligated carryover and authorized the agency to reallocate its unobligated carryover to supplement its FY 2015 appropriations.

The budget reflects a decrease of 140.8 full-time equivalent (FTE) employees from the FY 2015 budget. The FY 2016 budget funds 3,741 FTEs, including the Office of the Inspector General. The decrease is due to reduction in New Reactors and Fuel Facilities staffing due to decreasing workload, and efficiencies realized in the merger of two program offices.

The FY 2016 budget breakout includes $793.4 million for nuclear reactor safety and $226.7 million for nuclear materials and waste. The budget also includes resources to continue lessons-learned activities related to the Fukushima nuclear accident, including seismic and flooding reevaluations.

The budget request for the Inspector General is $12.1 million. That office independently and objectively conducts audits and investigations to ensure the efficiency and integrity of NRC programs and promote cost-effective management. The OIG's budget also includes funding to provide Inspector General services for the Defense Nuclear Facilities Safety Board.

*The budget briefing slides and the Congressional Budget Justification are available on the NRC website at http://nrcweb.nrc.gov:400/reading-rm/doc-collections/nuregs/staff/sr1100/v31/.*
*A limited number of hard copies of the report will be available from opa.resource@nrc.gov.*

*For additional information, please contact Holly Harrington of the NRC at (301) 415-8200.*

# NRC Report Focuses on Agency's Future

On February 18, 2015, the U.S. Nuclear Regulatory Commission released its Project Aim 2020 report detailing a staff-developed look at the agency's future. The report is designed to improve the agency's agility, effectiveness and efficiency while ensuring its ability to protect the public health and safety.

Commissioners and NRC senior staff publicly discussed the report during a briefing on February 18, 2015. NRC Chair Stephen Burns welcomed the report, but emphasized its recommendations are merely the beginning of the NRC's effort to position itself for the future.

"This study gives us a starting point for our Commission discussions about how to position the agency for a different environment and different challenges," Burns said. "We will start that dialogue, but I want to be clear about one thing – in determining the size of this agency in the future we will not take any step that would compromise our mission of protecting the American people and our environment."

**Overview**

The Project Aim report identifies 17 recommended strategies under the themes of people, planning, and process to prepare the NRC for the future. The staff's report concludes that the NRC needs to function more efficiently by:

- right-sizing the agency to retain appropriate skill sets needed to accomplish its mission;
- streamlining agency processes to use resources more wisely;
- improving timeliness in regulatory decision making and responding quickly to changing conditions; and,
- promoting unity of purpose with clearer agency-wide priorities.

The report proposes implementing the strategies during the next couple of years. The report projects that the NRC could be about 10 percent smaller in 2020 with a suggested workforce of about 3,400 employees ("full-time equivalents"), compared to 3,677 projected for fiscal year 2015 and 3,976 employees at the height of the agency's expansion in FY 2010.

**Next Steps**

Following release of the report, the Commission plans to consider the recommendations of Project Aim and give direction to the staff on its implementation.

Further evaluation of the report by NAPA is expected in March 2015. The Commission will provide a report to Congress in May 2015.

**Background**

With Commission support, Project Aim was established last June to develop proposals for repositioning the NRC in a dynamic environment. The effort was supported by Mark Satorius, NRC's Executive Director for Operations, and Maureen Wylie, the agency's Chief Financial Officer. The NRC expanded over the past decade, anticipating a wave of new reactor license and other applications. Changing economic conditions, especially reduced prices for natural gas, led to declining interest in constructing new nuclear plants.

The Project Aim report was developed by a small team of experienced staff experts working with a "guiding coalition" of senior staff and management.

The Project Aim team conducted outreach to external parties, other federal agencies, the National Academy of Public Administration (NAPA), and Chapter 208 of the National Treasury Employees Union. The team performed an analysis comparing the current state of the agency and the challenges and trends the agency may need to face between now and 2020. The analysis included interviews with senior NRC managers and 23 focus groups of staff members. It yielded more than 2,000 suggestions, strategies and observations the team used to formulate its report.

*For additional information, please contact Scott Burnell of the NRC at (301) 415-8200.*

# NRC Holds Public Meeting to Discuss Mixed Oxide Fuel Project

On January 15, 2015, the U.S. Nuclear Regulatory Commission held a public meeting to provide information regarding the construction of the Mixed Oxide Fuel Fabrication Facility that is being built near Aiken, South Carolina and changes to the NRC inspection procedures for the facility.

The MOX facility is being constructed at the U.S. Department of Energy's Savannah River site near Aiken, South Carolina. The facility will be owned by the DOE's National Nuclear Security Administration and will convert supplies of surplus weapons-grade plutonium into more proliferation-resistant forms by blending it with natural or depleted uranium. Converting the plutonium into MOX fuel will enable it to be used in commercial reactors to generate electricity.

The NRC issued a construction authorization for the facility in March 2005 and extended the project's construction deadline by an additional 10 years in November 2014. The deadline is now March 30, 2025. The NRC also changed the licensee name on the construction authorization to CB&I AREVA MOX Services to reflect

Chicago Bridge & Iron's acquisition of the Shaw Group in 2013.

The NRC revised its Inspection Manual Chapter 2630, entitled "Mixed Oxide Fuel Fabrication facility Construction Inspection Program" in its entirety on May 9, 2014.

The public meeting on January 15, 2015 began at 5:00 p.m. at the Hydrogen Research Center at the Savannah River Research Campus which is located at 301 Gateway Drive in New Ellenton, South Carolina. People attending the meeting were not required to go through Savannah River site security.

*For additional information, please contact Roger Hannah at (404) 997-4417 or Joey Ledford at (404) 997-4416.*

# ACRS Member Honored by National Academy of Engineering

Dana Powers, an advisor to the NRC for more than 20 years, was honored in early February 2015 by the National Academy of Engineering, which elected him as a new member. Powers is serving his sixth term on the NRC's Advisory Committee on Reactor Safeguards (ACRS). The Academy said he was elected for contributions to commercial nuclear power plant safety worldwide and to radioactive source-term processes. Election to the Academy is one of the highest professional distinctions in engineering.

Powers is a Senior Scientist in Nuclear Energy and Fuel Cycle Programs at Sandia National Laboratories in Albuquerque. His service on the ACRS began in 1994 and included a two-year term as Chair and a two-year term as Vice-Chair. He is currently the longest-serving member of the ACRS.

A native of Ironton, Missouri, Powers earned his Bachelor's Degree in Chemistry and his Ph.D. in Chemistry, Chemical Engineering and Economics from the California Institute of Technology. He began his career with Sandia in 1974 and was a consultant to President Carter's Commission on the 1979 accident at the Three Mile Island nuclear power plant. In his current role, Powers is responsible for the development of safety research programs at U.S. Department of Energy nuclear facilities. He also serves on a panel advising DOE on the safety of radioactive waste stored in tanks at DOE sites.

The ACRS is an advisory group that provides independent technical review of, and advice on, matters related to the safety of existing and proposed nuclear facilities, and on the adequacy of proposed reactor safety standards. It also advises the Commission on issues in health physics and radiation protection.

The ACRS's primary focus is on safety issues associated with the United States' operation of 99 commercial nuclear power plants, as well as regulatory initiatives including risk-informed and performance-based regulations, license renewal, power uprates, new reactor applications and the use of mixed oxide and high burnup fuels. In addition, the ACRS may be asked to provide advice on radiation protection, radioactive waste management and earth sciences in the agency's licensing reviews for fuel fabrication, enrichment and waste disposal facilities.

*For additional information on the ACRS, please go to the NRC website at www.nrc.gov. For additional information, please contact Maureen Conley of the NRC at (301) 415-8200.*

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- DOE Public Affairs/Press Office ..... (202) 586-5806
- DOE Distribution Center ..... (202) 586-9642
- EPA Information Resources Center ..... (202) 260-5922
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- NRC Public Document Room ..... (202) 634-3273
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### by internet

- NRC Reference Library (NRC regulations, technical reports, information digests, and regulatory guides). ..... **www.nrc.gov**

- EPA Listserve Network • Contact Lockheed Martin EPA Technical Support at (800) 334-2405 or email (leave subject blank and type help in body of message). ..... **listserver@unixmail.rtpnc.epa.gov**

- EPA • (for program information, publications, laws and regulations) ..... **www.epa.gov**

- U.S. Government Printing Office (GPO) (for the Congressional Record, *Federal Register*, congressional bills and other documents, and access to more than 70 government databases). ..... **www.access.gpo.gov**

- GAO homepage (access to reports and testimony) ..... **www.gao.gov**

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# Acknowledgement and Disclaimer

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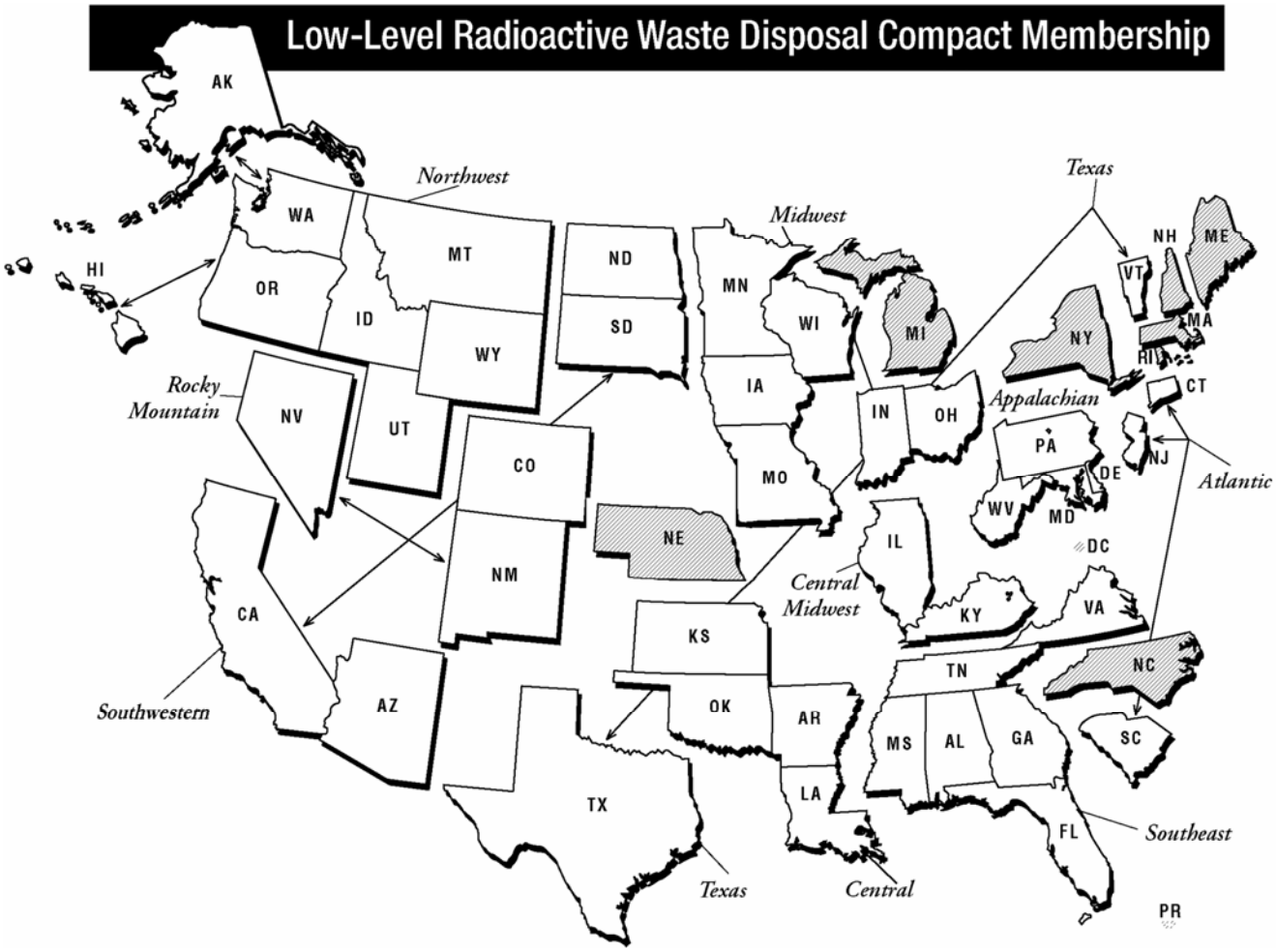


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