



**About LLW Forum**

LLW Forum, established to facilitate state and compact implementation of the Low-Level Radioactive Waste Policy Amendments Act of 1985, promotes the objectives of the low-level radioactive waste regional compacts. LLW Forum provides opportunity for state and compact officials to share information with each other and to exchange views with officials of federal agencies and other interested parties.

**LLW notes**, a copyrighted publication of the LLW Forum, is distributed bimonthly to the Board of Directors of the Low-Level Radioactive Waste Forum, an independent non-profit corporation. Anyone--including compacts, states, federal agencies, private associations, companies and others--may support and participate in the LLW Forum by purchasing memberships and/or by contribution grants or gifts. For information on LLWF memberships and/or subscriptions to the **LLW notes**, visit [www.llwforum.org](http://www.llwforum.org) or contact Daniel Shrum, Executive Director, telephone (801) 580-3201, [dshrum@llwforum.org](mailto:dshrum@llwforum.org). For permission to reproduce or share information from **LLW notes**, see the Copyright Policy at the conclusion of this publication.

**Acronyms Used in LLW notes**

CFR	Code of Federal Regulations
CRCPD	Conference of Radiation Control Program Directors
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
EPA	U.S. Environmental Protection Agency
IAEA	International Atomic Energy Agency
ICRP	International Commission on Radiation Protection
LLWF	Low-Level Waste Forum
NARM	Naturally occurring and accelerator produced radioactive material
NCRP	National Council on Radiation Protection and Measurements
NORM	Naturally occurring radioactive material
NRC	U.S. Nuclear Regulatory Commission
OAS	Organization of Agreement States
TENORM	Technologically enhanced naturally occurring radioactive material

**Contents**

A Message from Dan Shrum, Executive Director ..... 1

About LLW Forum ..... 2

LLWF Fall Meeting..... 3

Forum Corner ..... 3

Summary of the May 17 NRC Public Meeting:

    Regulatory Concepts for Integrated Low-Level  
    Radioactive Waste Disposal Rulemaking..... 4

NRC, OAS and CRCPD Meeting: Comments on Source  
    Security ..... 6

GAO Issues Report on “Priority Open Recommendations:  
    Nuclear Regulatory Commission” ..... 7

CRCPD Source Collection and Threat Reduction (SCATR)  
    Program 2023-2024 ..... 10

NRC Issues License to Holtec International for  
    Consolidated Spent Nuclear Fuel Interim Storage  
    Facility in New Mexico ..... 11

Environmental Justice and Socioeconomic Impacts of  
    CIFS ..... 12

DOE Awards \$26 Million to Support Consent-Based  
    Siting for Spent Nuclear Fuel..... 14

DOE Releases First Update to Consent-Based Siting  
    Process for Spent Nuclear Fuel ..... 15

Workforce Development & Recruitment ..... 16

Appalachian Compact..... 17

Atlantic Compact ..... 17

Central Compact ..... 17

Central Midwest Compact ..... 17

Northwest Compact ..... 18

Southeast Compact ..... 18

Texas Compact ..... 18

Low-Level Radioactive Waste Compact Membership ..... 19

Acknowledgment & Disclaimer ..... 20

Information Resources ..... 20

Copyright Policy ..... 20

**Officers**

**Tom Hansen, Chair**  
**Doug Hansen, Chair-Elect**  
**Joe Klinger, Past-Chair**  
**Alyse Peterson, Treasurer**

# Forum Corner

LLW  
FORUM

## LLW Forum Meeting Dates

### Fall 2023 LLW Forum Meeting

See details below.

### Spring 2024 Meeting

Host: Southeast Compact

April 2-3, 2024

DSWG Meeting

April 4, 2024

Orlando, FL

## Executive Director News

Dan Shrum moderated a panel at the RadWaste Summit 2.0. The RadWaste Summit 2.0 combines the Radwaste Summit and the Decommissioning Strategy Forum. The forum focuses on current topics impacting the management, transportation, and disposal of radioactive waste including low-level, high-level, spent nuclear fuel in both federal and commercial environments. Dan moderated the session on June 7, 2023, "Transportation Efficiencies in a Post-COVID Environment." The panel discussed safe and efficient transportation of radioactive materials and waste. The panelists discussed how COVID temporarily impacted transportation and the efficiencies gained in a post COVID world.

Dan also attended the Southeast Compact meeting in Birmingham, AL.

**Sign UP  
NOW!**

## LLWF Fall Meeting

Clive Disposal Facility Tour: October 2, 2023

LLW Forum Meeting: October 3-4, 2023

DSWG Meeting: October 5, 2023

Salt Lake City, Utah

Reserve your room now while the rates are low!

[Click here to book a room.](#)

[Click here to register.](#)

Summary of the May 17 NRC Public Meeting:  
Regulatory Concepts for Integrated Low-Level Radioactive Waste Disposal Rulemaking  
by Dan Shrum, Executive Director, LLWF

Over 120 people attended the May 17, 2023 NRC on-line meeting, including many state and compact representatives. The meeting addressed upcoming rulemaking for Part 61 and GTCC. Many NRC staff presented and will be part of the rulemaking. The project manager is George Tartal (george.tartal@nrc.gov).

As expected, the new rule incorporates GTCC into Part 61 as well as requires a Performance Assessment for long-lived radioisotopes.

### Safety Case

- A high-level summary of the information and analyses that support the demonstration that the land disposal facility will be constructed and operated safely – think executive summary.
- Provides reasonable assurance that the disposal site will be capable of isolating waste and limiting releases to the environment.
- Describes the strength and reliability of the technical analyses.



## Integrating the LLW Rulemakings



NRC is preparing an integrated rulemaking to:

- ❖ Consolidate and integrate criteria for GTCC and 10 CFR Part 61 rulemaking
- ❖ Conduct site-specific analyses for all waste streams including DU and GTCC waste
- ❖ Include graded approach for compliance period
- ❖ Include TRU waste in the definition of LLW
- ❖ Address physical protection and criticality concerns in GTCC waste streams
- ❖ Provide for Agreement State licensing of certain GTCC waste streams

The use of a Safety Case will be required. A Safety Case is generally an administrative level summary document that ties together all of the of the licensing justifications. A Safety Case is commonly required by the IAEA – guidance on how to prepare will be included in the final Guidance Document.

- Facilities will be required to prepare a Performance Assessment to inform the decision making process.
- A Site-Specific Intruder Assessment will be required as part of licensing. The site-specific intruder analysis cannot be graded based on the probability of an event, but a 500 mrem/year standard may be applied.
- A Site Stability Assessment will be required.

Summary of the May 17 NRC Public Meeting: Regulatory Concepts for Integrated Low Level Radioactive Waste Disposal Rulemaking - continued

- There is expected to be little change to the Operational Safety Assessment, but management of GTCC for disposal will probably have to be specifically evaluated.
- The Performance Period Analyses will be required for long-lived radioisotopes such as Depleted Uranium. The Performance Period will include general As Low As Reasonably Achievable criteria as the standard.
- The Compliance Period will most likely be 1,000 years for most wastes and 10,000 years for long-lived radioisotopes.
- 10 CFR Part 61.58 will allow for a Waste Acceptance Criteria (WAC) to account for the findings of the Performance Assessment. In response to a specific question I asked on this, yes, the WAC can override the tables found in 10 CFR Part 61.55.
- Critically Protection will need to be evaluated for GTCC waste as part of the licensing submittal.

It is anticipated that the rule will go to the Commission in November 2023; no date can be given for Commission review and approval. Once approved by the Commission (and assuming no significant changes are requested), the rule will go out for public comment during which time additional public meetings will be held.

The limited rulemaking for 10 CFR Part 61 has evolved into the Integrated Low Level Radioactive Waste Disposal Rulemaking. The proposed rule is quite complicated rulemaking and NRC staff are moving forward taking into consideration the numerous comments made to date.

We expect to be involved in future meetings and will comment on the proposed rule once it is approved by the Commission.

Dan Shrum, Executive Director, LLWF

## Challenges to the Current Regulatory Framework in 10 CFR Part 61

1982 Assumption	Current Practice
Waste hazard to inadvertent intruder duration <ul style="list-style-type: none"> <li>❖ Class A and B: 100 years</li> <li>❖ Class C: 500 years</li> </ul>	Some defaulted Class A wastes are being disposed of in greater quantities than assumed and could cause hazards past these periods (e.g., Depleted Uranium (DU))
Only DOE enriches uranium <ul style="list-style-type: none"> <li>❖ DU only commercially available in small quantities</li> </ul>	Private sector enrichment facilities
Average disposed waste concentration expected to be well below Class limit	Blended wastes create wastes much closer to Class limit and may be disposed in large amounts together
Greater-than-Class-C (GTCC) waste disposal in geologic repository or by Commission approval	Considering near-surface disposal (in top 30 m) for certain GTCC waste streams

### Links

ML23130A189 - 05/17/2023 Slides to Support Integrated Low-Level Radioactive Waste Disposal Rulemaking Public Meeting

History of this rulemaking

### Information and Contacts

<https://www.regulations.gov>  
Search for Docket ID NRC-2011-0012

Contacts:  
George Tartal  
[george.tartal@nrc.gov](mailto:george.tartal@nrc.gov)  
301-415-0016

Priya Yadav  
[priya.yadav@nrc.gov](mailto:priya.yadav@nrc.gov)  
301-415-6667

Cardelia Maupin  
[cardelia.maupin@nrc.gov](mailto:cardelia.maupin@nrc.gov)  
301-415-4127



## Source Security

## NRC, OAS and CRCPD Meeting: Comments on Source Security

## NRC, OAS and CRCPD Meeting

On May 18, 2023, the NRC was briefed by representatives of the Organization of Agreement States (OAS) and representatives of the Conference of Radiation Control Program Directors (CRCPD) on radioactive materials policy and regulatory issues of interest to the states. These issues included:

- activities of the National Materials Program
- CRCPD initiatives and accomplishments
- the emerging regulatory framework for fusion devices
- recruitment and retention of the health physics workforce
- rulemaking activities
- future collaborative efforts on such matters as medical devices, the use of medical radioisotopes on household pets, lost/misplaced material tracking, and artificial intelligence in radiation protection.

“I know that, collaboratively, we worked with OAS and with NRC on a number of issues. One of them over the past year, the source security rulemaking and then, right now, we're got a new committee that is addressing materials licensing, so we're looking to get some work done. So the collaborative effort remains strong between all of our organizations.”

Pat Mulligan, Director for Radiation Control in the State of New Jersey and CRCPD Past-Chair.

Complete meeting information is available at <https://www.nrc.gov/reading-rm/doc-collections/commission/tr/2023/>

“...I would like to discuss some major rulemaking developing currently, which is the Category 3 quantity source security rulemaking. In the Government Accountability Office July 2022 document,

*Preventing a Dirty Bomb: Vulnerabilities Persist in NRC's Controls for Purchase of High-Risk Radioactive Materials*, there were two recommendations made to the NRC for executive action by the chairman of the NRC. The first stated that the NRC should immediately require that vendors verify Category 3 licenses with the appropriate regulatory authority. The second recommendation stated the NRC should add security features to its licensing process to improve its integrity and make it less vulnerable to altering or forging licenses. For both these recommendations, NRC agreed with the recommended actions and intend to include steps to eliminate the vulnerability through the rulemaking process.

The proposed rule was sent to the Agreement

States for comment in October of 2022, and OAS sent a comment letter on November 10, 2022. The applicable rule is scheduled to be adopted by October of 2023, and the NRC usually allows three years for Agreement States to adopt and implement new regulations through their respective state rulemaking process. OAS anticipates an abbreviated adoption period for this rulemaking.

In order to facilitate state compatibility with this proposed rulemaking, OAS drafted a license condition to be approved by NRC. The license condition approval was denied by NRC because the final rule has yet to be determined so that compatibility can be determined. OAS would propose that a compatible license condition accompany the final Category 3 rulemaking so that programs can implement changes in an abbreviated manner. OAS and CRCPD are anxiously awaiting the final rule.”

Keisha Cornelius, Oklahoma Department of Environmental Quality, OAS Chair-Elect

## Source Security

## GAO Issues Report on “Priority Open Recommendations: Nuclear Regulatory Commission”

GAO-23-106462

Published: May 10, 2023. Publicly Released: May 17, 2023.

### What GAO Found

In June 2022, GAO identified 5 priority recommendations for the Nuclear Regulatory Commission. Since then, NRC has not implemented any of the 5 open priority recommendations we identified in our June 2022 letter. Five remain on our list of priority open recommendations.

In March 2023, GAO identified 3 additional priority recommendations for NRC, bringing the total number to 8. These recommendations involve the following areas:

- addressing the security of radiological sources;
  - improving the reliability of cost estimates; and
  - ensuring the cybersecurity of the nation.
- NRC's continued attention to these issues could lead to significant improvements in government operations.

### Addressing the security of radiological sources.

Implementing our six priority recommendations in this area will better enable NRC to carry out its responsibility for licensing and regulating the secure use of radioactive materials while ensuring the protection of public health and safety and the environment.

**For example, in July 2022, we recommended that NRC add security features, such as multifactor authentication, to its licensing process to improve the process's integrity and make it less vulnerable to altering or forging licenses.**

**Additionally, in April 2019, we made another recommendation that NRC consider socioeconomic consequences and fatalities from evacuations in the criteria for determining required security measures for radioactive materials that could be used in a radiological dispersal device (RDD).**

By implementing these and the four other recommendations, NRC would have greater assurance that bad actors cannot manipulate the system and that it considers the more likely and more significant consequences of a RDD when establishing its security requirements for radioactive material.

### Priority Open Recommendations to the Nuclear Regulatory Commission

#### Addressing the Security of Radiological Sources: NRC Has Enhanced the Controls of Dangerous Radioactive Materials, but Vulnerabilities Remain.

From GAO-16-330. Washington, D.C.: July 1, 2016.

Year Recommendation Made:  
2016

**RECOMMENDATION:** Because some quantities of radioactive materials are potentially dangerous to human health if not properly handled, the Nuclear Regulatory Commission (NRC) should take action to better track and secure

these materials and verify the legitimacy of the licenses for those who seek to possess them. Specifically, NRC should take the steps needed to include category 3 sources in the National Source Tracking System and add agreement state category 3 licenses to the Web-based Licensing System as

quickly as reasonably possible.

**ACTIONS NEEDED:** NRC neither explicitly agreed nor disagreed with this recommendation but stated that it would consider our recommendation as part of an existing working group.

## Priority Open Recommendations to the Nuclear Regulatory Commission Addressing the Security of Radiological Sources: NRC Has Enhanced the Controls of Dangerous Radioactive Materials, but Vulnerabilities Remain. - continued

In August 2017, the working group provided a staff analysis on these issues to the Commission and recommended against including category 3 sources in the National Source Tracking System or adding information on agreement state category 3 licenses to the Web-based Licensing System. As of February 2023, NRC had no plans to put category 3 quantities into the National Source Tracking System, according to agency officials. We continue to believe that by implementing our recommendation, NRC would have greater assurance that bad actors could not manipulate the system, such as by altering a paper license to acquire radioactive materials in aggregate greater than what they are authorized to possess.

**RECOMMENDATION:** Because some quantities of radioactive materials are potentially dangerous to human health if not properly handled, NRC should take action to better track and secure these materials and verify the legitimacy of the licenses for those who seek to possess them.

Specifically, NRC should, at least until such time that category 3 licenses can be verified using the License Verification System, require that transferors of category 3 quantities of radioactive materials confirm the validity

of a would-be purchaser's radioactive materials license with the appropriate regulatory authority before transferring any category 3 quantities of licensed materials.

**ACTIONS NEEDED:** NRC neither explicitly agreed nor disagreed with this recommendation. As of February 2023, NRC was considering a rulemaking that would require that licensees transferring category 3 quantities of radioactive material verify licenses in NRC's License Verification System or by directly contacting NRC or the agreement state. As a part of the same rulemaking process, NRC is also considering establishing a requirement that safety and security equipment be in place before licenses are granted to such entities. This would address concerns over the potential for unknown entities to obtain valid licenses using false information.

However, NRC has not yet proposed this rule. By implementing this recommendation as soon as possible, NRC would be better able to prevent bad actors from manipulating the system and obtaining dangerous quantities of radioactive material.

**Combating Nuclear Terrorism: NRC Needs to Take Additional Actions to Ensure the Security of High-Risk Radioactive Material. GAO-19-468. Washington, D.C.: April 4, 2019.**

Year Recommendation Made: 2019

**RECOMMENDATION:** The Chairman of NRC should require additional security measures for high-risk quantities of certain category 3 radioactive material and assess whether other category 3 materials should also be safeguarded with additional security measures.

**ACTIONS NEEDED:** NRC neither explicitly agreed nor disagreed with this recommendation but stated that it would consider the recommendation as part of an existing working group. In August 2017, the working group provided a staff analysis on these issues to the Commission that concluded that category 3 materials did not require additional security measures. In our April 2019 report, we provided new information such as expert views and studies on the risks of category 3 materials in a radiological dispersal device (RDD)—also known as a dirty bomb.

However, as of February 2023, NRC had not updated this analysis to take into account this new information. We continue to believe that by implementing



## Priority Open Recommendations to the Nuclear Regulatory Commission Addressing the Security of Radiological Sources: NRC Has Enhanced the Controls of Dangerous Radioactive Materials, but Vulnerabilities Remain. - continued

our recommendation, NRC would have greater assurance that its requirements are sufficient to help prevent any high-risk radioactive materials from being stolen and used in a RDD.

**RECOMMENDATION:** The Chairman of NRC should direct NRC staff to consider socioeconomic consequences and fatalities from evacuations in the criteria for determining what security measures should be required for radioactive materials that could be used in a RDD.

**ACTIONS NEEDED:** NRC disagreed with this recommendation, maintaining that the current regulatory requirements provide for the safe and secure use of all radioactive materials, regardless of category. We disagree with NRC's assessment. About a month after we published our April 2019 report, a small amount of radioactive material was accidentally released at the University of Washington in Seattle. Although the release was not a RDD, it resulted in at least \$156 million in cleanup and remediation costs, closure of the medical facility for 2 years, and negative impacts on researchers and medical professionals. This accident illustrates the risk posed by security failures involving similar quantities of material. We continue to

believe that by implementing our recommendation, NRC would have better assurance that it considers more likely and more significant consequences of a RDD when establishing its security requirements for radioactive material.

### **Preventing a Dirty Bomb: Vulnerabilities Persist in NRC's Controls for Purchases of High-Risk Radioactive Materials. GAO-22-103441. Washington, D.C.: July 14, 2022.**

Year Recommendation Made: 2022

**RECOMMENDATION:** The Chairman of NRC should immediately require that vendors verify category 3 licenses with the appropriate regulatory authority.

**ACTIONS NEEDED:** NRC partially agreed with this recommendation, and committed to take action to require that vendors verify category 3 licensees with the appropriate regulatory agency, but it did not agree to address these vulnerabilities immediately. As of February 2023, NRC was considering a rulemaking that would require specific measures for licensees to verify licenses for category 3 quantities of radioactive material. However, these vulnerabilities will remain while the rulemaking is under consideration, and we

continue to believe NRC should immediately address these issues.

**RECOMMENDATION:** The Chairman of NRC should add security features to its licensing process to improve its integrity and make it less vulnerable to altering or forging licenses. These security features could include multifactor authentication or moving away from paper licenses to electronic-based licensing.

**ACTIONS NEEDED:** NRC agreed with this recommendation. As of February 2023, NRC stated that as part of its ongoing rulemaking process, it would develop additional guidance to regulators and licensees to reduce the potential that altered or counterfeit licenses could be used to purchase category 3 material. This includes exploring the specific methods listed in our recommendation. In addition, we made another recommendation in an Official Use Only version of this report that, if implemented, would reduce the risk of a dirty bomb.

Director: Allison Bawden,  
Natural Resources and  
Environment - BawdenA@gao.  
gov, (202) 512-3841

**Source:** GAO  
<https://www.gao.gov/assets/>

## CRCPD Source Collection and Threat Reduction (SCATR) Program 2023-2024

## Source Security

The Conference Radiation Control Program Directors (CRCPD) Source Collection and Threat Reduction (SCATR) Program has begun its 2023-24 unwanted radioactive sealed source collection and disposal effort. CRCPD/SCATR provides cost-shared support for the packaging, transport, and commercial disposal of Class A, B, and C sources. SCATR receives funding through a grant provided by the Department of Energy (DOE) National Nuclear Security Administration (NNSA).

SCATR is targeting a 40% cost-share amount for 2023-24 program participants. Licensees in all 50 States and U.S. territories are eligible for program participation. The SCATR program is now accepting larger sources. If your shipment requires a Type B cask you will be offered a 50% cost-share amount.

To qualify for SCATR participation, licensees must register their disused and unwanted sources with the Los Alamos National Laboratory (LANL) Off-Site Source Recovery Program (OSRP) at:

<http://osrp.lanl.gov/PickUpSources.aspx>

Interested licensees are encouraged to complete source registration as soon as possible. Source registration does not imply a commitment by either the generator or CRCPD with regard to program participation. CRCPD selects participants, in part, based on the number of sources the generator has registered with OSRP/LANL. However, any previously registered party is encouraged to contact the person listed in this article to request to participate.

All registered parties are encouraged to request a copy of information about their facilities and source inventory to determine if the information in the SCATR database is accurate and up to date.

For more information on CRCPD/SCATR or the 2023-24 national SCATR collection, please contact Russ Meyer at 512-761-3822, [rmeyer@crcpd.org](mailto:rmeyer@crcpd.org)

#### Cost-Share Targets

Note: Cost-share targets are set on an annual basis. However, the cost-share amount is expected to remain constant each year going forward. While the program makes every effort to assist as many eligible generators as possible each year at the targeted cost-share amount, the cost-share support available, as well as the number and location of sources collected, are subject to funding, logistic, and other considerations.

## Consolidated Interim Storage Facilities

**NRC Issues License to Holtec International for Consolidated Spent Nuclear Fuel Interim Storage Facility in New Mexico**

The Nuclear Regulatory Commission has issued a license to Holtec International to construct and operate a consolidated interim storage facility for spent nuclear fuel in Lea County, New Mexico.

The license, issued May 9, authorizes the company to receive, possess, transfer and store 500 canisters holding approximately 8,680 metric tons of commercial spent nuclear fuel for 40 years. The company said it plans to eventually store up to 10,000 canisters in an additional 19 phases. Each expansion phase would require a license amendment with additional NRC safety and environmental reviews.

The spent fuel must be stored in canisters and cask systems certified by the NRC as meeting standards for protection against leakage, radiation dose rates, and criticality under normal and accident conditions. The canisters are required to be sealed prior to arrival at the facility. They will be inspected upon arrival and will remain sealed during onsite handling and storage activities.

The NRC's review of the license application included a technical safety and security review, an environmental impact review and adjudication before an Atomic Safety and Licensing Board. A safety evaluation report, documenting the technical review, is being issued along with the license. A final environmental impact statement was published last July and supplemented in October.

The environmental study included extensive public input during its development and during the comment phase. The adjudication resolved contentions filed by several local and national petitioners.

Information about the Holtec application and the NRC's review is available on the NRC website. Licensing documents will also be posted on this site.

The NRC has previously issued similar licenses for away-from-reactor storage installations. Private Fuel Storage received a license in 2006, but was never constructed. The NRC issued a license in September 2021 to Interim Storage Partners LLC for a proposed storage site in Andrews, Texas. ISP has not yet initiated construction.

Source: NRC News Release No: 23-031  
May 9, 2023

Contact: David McIntyre, 301-415-8200

<https://www.nrc.gov/cdn/doc-collection-news/2023/23-031.pdf>

Also see Holtec press release at <https://holtecinternational.com/wp-content/uploads/2023/05/38.09.pdf>

## Environmental Justice and Socioeconomic Impacts of CIFS Lea County, NM

### Location

Southeast New Mexico at a site located approximately halfway between the cities of Carlsbad and Hobbs, New Mexico

NRC analyses based on the environmental report submitted by Holtec and:

- NRC staff's consultation with Federal, State, Tribal, and local government agencies
- NRC staff's independent environmental review
- NRC staff's consideration of public comments received during the scoping process
- NRC staff's consideration of public comments on the draft Environmental Impact Statement (EIS)

### Project Scope

The proposed action is the issuance of an NRC license authorizing the initial phase (Phase 1) of the project to store up to 8,680 metric tons of uranium (MTUs) [9,568 short tons] in 500 canisters for a license period of 40 years. Holtec plans to subsequently request amendments to the license to store an additional 500 canisters for each of 19 expansion phases of the proposed CIFS (a total of 20 phases), to be completed over the course of 20 years, and to expand the proposed facility to eventually store up to 10,000 canisters of SNF.

### Licensed Authorizations

Spent nuclear fuel elements and associated radioactive materials, in the form of fuel assemblies and fuel debris, with a maximum limit of 8680 metric tons of uranium (500 loaded canisters)  
Source: License at: <https://www.nrc.gov/docs/ML2307/ML23075A181.pdf>

### Region of Influence

The region of influence (ROI) for socioeconomics is the 4-county area of Andrews and Gaines in Texas, and Lea and Eddy in New Mexico. The timeframe for this analysis is from 2017 to 2060. Census tract data from 2010.

### Project Area

The proposed CIFS project would be built and operated on approximately 421 hectares (ha) [1,040 (acres) ac] of land in Lea County, New Mexico (EIS Figure 2.2-1). The storage and operations area, which is a smaller land area within the full property boundary, would include 134 ha [330 ac] of disturbed land. The proposed project area is approximately 51 kilometers (km) [32 miles (mi)] east of Carlsbad, New Mexico, and 54 km [34 mi] west of Hobbs, New Mexico.

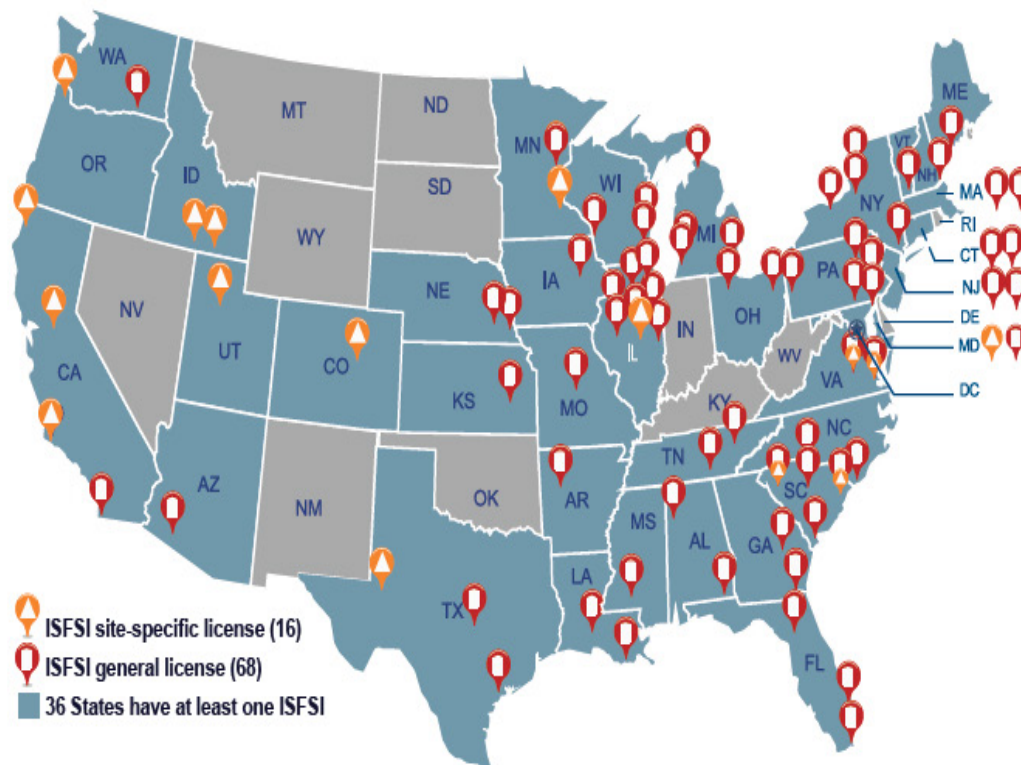
### Source

NUREG-2237, Final Report (PDF – 46.60 MB)

### Environmental Justice

In summary, the environmental justice cumulative impact analysis assesses the potential for disproportionately high and adverse human health and environmental effects on minority and low-income populations that could result from past, present, and reasonably foreseeable future actions, including construction, operation, and decommissioning of the proposed CIFS at full build-out. The NRC staff finds that the impacts from the proposed CIFS on the resources evaluated in this EIS would be SMALL for most resources, SMALL to MODERATE for ecological resources and socioeconomics. Furthermore, the NRC staff did not identify any high and adverse human health or environmental impacts from the past, present, or reasonably foreseeable future actions in the geographic region of analysis {80 km [50 mi]} on minority and low-income populations, and concludes in EIS Section 4.12 that there would be no disproportionately high and adverse impacts on any environmental justice populations as a result of the proposed CIFS. Therefore, the NRC staff finds that cumulative impacts would not be considered disproportionately high and adverse on low-income or minority populations.

Figure 35. Licensed and Operating Independent Spent Fuel Storage Installations by State



<p><b>ALABAMA</b></p> <ul style="list-style-type: none"> <li>○ Browns Ferry</li> <li>○ Farley</li> </ul> <p><b>ARIZONA</b></p> <ul style="list-style-type: none"> <li>○ Palo Verde</li> </ul> <p><b>ARKANSAS</b></p> <ul style="list-style-type: none"> <li>○ Arkansas Nuclear</li> </ul> <p><b>CALIFORNIA</b></p> <ul style="list-style-type: none"> <li>▲ Diablo Canyon</li> <li>▲ Humboldt Bay</li> <li>▲ Rancho Seco</li> <li>○ San Onofre</li> </ul> <p><b>COLORADO</b></p> <ul style="list-style-type: none"> <li>▲ Fort St. Vrain</li> </ul> <p><b>CONNECTICUT</b></p> <ul style="list-style-type: none"> <li>○ Haddam Neck</li> <li>○ Millstone</li> </ul> <p><b>FLORIDA</b></p> <ul style="list-style-type: none"> <li>○ Crystal River</li> <li>○ River Bend</li> <li>○ St. Lucie</li> <li>○ Turkey Point</li> </ul> <p><b>GEORGIA</b></p> <ul style="list-style-type: none"> <li>○ Hatch</li> <li>○ Vogtle</li> </ul>	<p><b>IDAHO</b></p> <ul style="list-style-type: none"> <li>▲ DOE: Three Mile Island 2 (Fuel Debris)</li> <li>▲ DOE: Idaho Spent Fuel Facility *</li> </ul> <p><b>ILLINOIS</b></p> <ul style="list-style-type: none"> <li>○ Braidwood</li> <li>○ Byron</li> <li>○ Clinton</li> <li>○ Dresden</li> <li>▲ GEH Morris (Wet)</li> <li>○ LaSalle</li> <li>○ Quad Cities</li> <li>○ Zion</li> </ul> <p><b>IOWA</b></p> <ul style="list-style-type: none"> <li>○ Duane Arnold</li> </ul> <p><b>KANSAS</b></p> <ul style="list-style-type: none"> <li>○ Wolf Creek</li> </ul> <p><b>LOUISIANA</b></p> <ul style="list-style-type: none"> <li>○ River Bend</li> <li>○ Waterford</li> </ul> <p><b>MAINE</b></p> <ul style="list-style-type: none"> <li>○ Maine Yankee</li> </ul> <p><b>MARYLAND</b></p> <ul style="list-style-type: none"> <li>▲ Calvert Cliffs</li> </ul>	<p><b>MASSACHUSETTS</b></p> <ul style="list-style-type: none"> <li>○ Pilgrim</li> <li>○ Yankee Rowe</li> </ul> <p><b>MICHIGAN</b></p> <ul style="list-style-type: none"> <li>○ Big Rock Point</li> <li>○ Cook</li> <li>○ Fermi 2</li> <li>○ Palisades</li> </ul> <p><b>MINNESOTA</b></p> <ul style="list-style-type: none"> <li>○ Monticello</li> <li>▲ Prairie Island</li> </ul> <p><b>MISSISSIPPI</b></p> <ul style="list-style-type: none"> <li>○ Grand Gulf</li> </ul> <p><b>MISSOURI</b></p> <ul style="list-style-type: none"> <li>○ Callaway</li> </ul> <p><b>NEBRASKA</b></p> <ul style="list-style-type: none"> <li>○ Cooper</li> <li>○ Ft. Calhoun</li> </ul> <p><b>NEW HAMPSHIRE</b></p> <ul style="list-style-type: none"> <li>○ Seabrook</li> </ul>	<p><b>NEW JERSEY</b></p> <ul style="list-style-type: none"> <li>○ Hope Creek</li> <li>○ Oyster Creek</li> <li>○ Salem</li> </ul> <p><b>NEW YORK</b></p> <ul style="list-style-type: none"> <li>○ FitzPatrick</li> <li>○ Ginna</li> <li>○ Indian Point</li> <li>○ Nine Mile Point</li> </ul> <p><b>NORTH CAROLINA</b></p> <ul style="list-style-type: none"> <li>○ Brunswick</li> <li>○ McGuire</li> </ul> <p><b>OHIO</b></p> <ul style="list-style-type: none"> <li>○ Davis-Besse</li> <li>○ Perry</li> </ul> <p><b>OREGON</b></p> <ul style="list-style-type: none"> <li>▲ Trojan</li> </ul> <p><b>PENNSYLVANIA</b></p> <ul style="list-style-type: none"> <li>○ Beaver Valley</li> <li>○ Limerick</li> <li>○ Peach Bottom</li> <li>○ Susquehanna</li> <li>○ Three Mile Island</li> </ul>	<p><b>SOUTH CAROLINA</b></p> <ul style="list-style-type: none"> <li>○ Catawba</li> <li>▲ Oconee</li> <li>▲ Robinson</li> <li>○ Summer</li> </ul> <p><b>TENNESSEE</b></p> <ul style="list-style-type: none"> <li>○ Sequoyah</li> <li>○ Watts Bar</li> </ul> <p><b>TEXAS</b></p> <ul style="list-style-type: none"> <li>▲ WCS Consolidated Interim Storage Facility (CISF)*</li> <li>○ Comanche Peak</li> <li>○ South Texas Project</li> </ul> <p><b>UTAH</b></p> <ul style="list-style-type: none"> <li>▲ Private Fuel Storage*</li> </ul> <p><b>VERMONT</b></p> <ul style="list-style-type: none"> <li>○ Vermont Yankee</li> </ul> <p><b>VIRGINIA</b></p> <ul style="list-style-type: none"> <li>○ North Anna</li> <li>○ Surry</li> </ul> <p><b>WASHINGTON</b></p> <ul style="list-style-type: none"> <li>○ Columbia</li> </ul> <p><b>WISCONSIN</b></p> <ul style="list-style-type: none"> <li>○ Kewaunee</li> <li>○ La Crosse</li> <li>○ Point Beach</li> </ul>
---	---	--	--	--

\* Facility licensed only, never built or operated.

Note: Alaska and Hawaii are not pictured and have no sites. NRC-abbreviated reactor names are listed. Data are current as of September 30, 2022. For the most recent information, go to the NRC facility locator page at <https://www.nrc.gov/info-finder.html>.

### Spent Nuclear Fuel Disposal

The current U.S. policy governing permanent disposal of high-level radioactive waste is defined by the Nuclear Waste Policy Act of 1982, as amended, and the Energy Policy Act of 1992. These acts specify that high-level radioactive waste will be disposed of underground in a deep geologic repository licensed by the NRC. Because the timing of repository availability is uncertain, the NRC looked at potential environmental impacts of storing spent fuel over three possible timeframes: the short term, which includes 60 years of continued storage after a reactor’s operating license has expired; the medium term, or 160 years after license expiration; and indefinite, which assumes a repository never becomes available. The NRC’s findings—that any environmental impacts can be managed—appear in the 2014 report NUREG-2157, “Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel.”

Source:  
*Information Digest, 2022–2023 (NUREG-1350, Volume 34)*

## DOE Awards \$26 Million to Support Consent-Based Siting for Spent Nuclear Fuel

Funding Provides Engagement and Training Resources for Communities Interested in Learning More About Interim Storage

WASHINGTON, D.C. — June 9, 2023

The U.S. Department of Energy (DOE) today announced \$26 million in funding for groups of university, nonprofit, and private-sector partners that will work with communities interested in DOE's community-centered approach to storing and disposing of spent nuclear fuel, a process known as consent-based siting. DOE, along with these consortia, will continue working with communities to ensure transparency and local support.

...Consent-based siting is an approach to siting facilities that focuses on the needs and concerns of people and communities and centers equity and environmental justice. Communities participate in the process by working through a series of phases and steps with the Department, helping them determine whether and how hosting a facility to manage spent nuclear fuel is aligned to their goals. The process consists of three stages: planning and capacity building, site screening and assessment, and negotiation and implementation.

...DOE competitively selected 13 geographically and institutionally diverse awardees—representing 12 states and the District of Columbia—who will engage with additional partners and communities, expanding the impact of these awards and furthering the conversation around consolidated interim storage of spent nuclear fuel.

Awardees will represent a consent-based siting consortium, and they will collectively help the Department facilitate engagement activities and dialogue. They will each lead inclusive community and stakeholder engagement efforts, elicit public feedback to refine the Department's consent-based siting process, and develop strategies that support mutual learning. Throughout this process, DOE and the consent-based siting consortia will work together to build equity and environmental justice principles into the engagement processes.

The project teams will each receive about \$2 million and represent diverse organizations, a makeup that DOE hopes will enable a broad spectrum of perspectives and approaches. The project teams that will receive awards are shown and listed.

### Consent-Based Siting Consortia



### Teams

- American Nuclear Society (IL) as the lead, with South Carolina Universities Research and Education Foundation (SC), Northern Arizona University (AZ), University of New Mexico (NM), and South Carolina State University (SC) as partners.
- Arizona State University (AZ)
- Boise State University (ID) as the lead, with the National Tribal Energy Association, Arizona State (AZ), Colorado State (CO), Idaho State (ID), Montana State (MT), University of Idaho (ID), University of Wyoming (WY), and University of Michigan (MI) as partners.
- Clemson University (SC) as the lead, with South Carolina Universities Research and Education Foundation (SC) as partner.
- Energy Communities Alliance (DC) as the lead, with Environmental Council of the States (DC), DOE's State and Tribal Government Working Group, National Association of Attorneys General (DC), National Conference of State Legislatures (DC), and National Governors Association (DC) as partners.
- Good Energy Collective (CA) as the lead, with the University of Notre Dame (IN) as partner.
- Holtec International (NJ) as the lead, with University of Florida (FL), McMahan Communications (MA), Agenda Global (DC), American Nuclear Society (IL), and Nuclear Energy Institute (DC) as partners.
- Keystone Policy Center (CO) as the lead, with Social and Environmental Research Institute, GDFWatch (UK), and the National Association of Regional Councils (DC) as partners.
- Missouri University of Science & Technology (MO) as the lead, with University of Missouri - Columbia (MO), University of Illinois (IL), Massachusetts Institute of Technology (MA), University of Nevada (NV), Taylor Geospatial Institute (MO), and St. Louis University (MO) as partners.
- North Carolina State University (NC) as the lead, with Northern Chumash Tribe of San Luis Obispo County and Region (CA), Mothers for Nuclear (CA), and the Tribal Consent Based Coalition - Diablo Canyon Nuclear Power Plant (CA) as partners.
- Rensselaer Polytechnic Institute (NY) as the lead, with Schenectady Foundation (NY) and Stockbridge-Munsee Community Band of Indians (WI) as partners.
- Southwest Research Institute (TX) as the lead, with Deep Isolation (CA), Westra Consulting (NE), Community Transition Planning (MI), and Prairie Island Indian Community Tribal Nation (MN) as partners.
- Vanderbilt University (TN) as the lead, with Rutgers University (NJ) and Oregon State University (OR) as partners.

Contacts: Phone: (202) 586-4940 or [DOENews@hq.doe.gov](mailto:DOENews@hq.doe.gov)

## DOE Releases First Update to Consent-Based Siting Process for Spent Nuclear Fuel

Reducing Storage Sites and Incorporating Broader Community Input Will Advance DOE's Goal to Achieve an Equitable Process to Collect and Store Spent Nuclear Fuel

WASHINGTON, D.C.— The U.S. Department of Energy (DOE) released an updated version of its consent-based siting process that takes immediate action to engage with willing communities to host federal consolidated interim storage facilities, reducing the number of locations where commercial spent nuclear fuel is stored and easing the burden on U.S. taxpayers. This community-centered approach will help reduce health and safety impacts on disadvantaged and overburdened communities in line with President Biden's environmental justice goals.

...While DOE expects to continue to update the consent-based siting process as more information is gathered from community and stakeholder engagement, this latest iteration details several guiding principles and values, including a commitment to protecting public health and safety, and the environment.

Four noteworthy updates to the consent-based siting process from the 2017 version include:

- Focusing specifically on siting one or more federal consolidated interim storage facilities
- Placing greater emphasis on equity and environmental justice
- Creating a larger role for host communities in developing site-specific assessment criteria
- Expanding consideration of funding opportunities, subject to availability of appropriations, to support community participation

### DOE Approach

DOE's approach to consent-based siting is in accordance with key presidential directives on environmental justice and equity, including Executive Order 12898 on "Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations," Executive Order 13985 on "Advancing Racial Equity and Support for Underserved Communities Through the Federal Government," and Executive Order 14008 on "Tackling the Climate Crisis at Home and Abroad."

### Community Develops Terms and Conditions

The community drafts and proposes the terms and conditions of an agreement with DOE to host the facility. Terms and conditions will vary from community to community, but may include items such as finalizing the types and amounts of spent nuclear fuel that can be accepted at the storage site(s), and may include additional information such as emergency response protocols, additional regulatory requirements, terms for governance and oversight, modes of facility operation, conditions and performance metrics, economic development commitments, access to information, communication and reporting commitments, non-federal co-oversight options, and terms for continued engagement and dialogue.

The community and DOE discuss, collaborate, and negotiate to achieve a workable, durable consent-based agreement. Any potential terms and conditions that are inconsistent with the requirements in the NWPAs concerning a benefits agreement would require congressional authorization.<sup>13</sup> DOE and the community determine whether to enter into a formal consent-based agreement.

The community determines the method to be used to ratify the consent-based agreement that the community considers suitable. If the agreement is ratified, DOE and the community accept its terms, and all required parties sign. Agreement is approved by the necessary parties and finalized. If an agreement is reached and these steps occur, then the parties will proceed to the next phase.

Source: DOE Consent-Based Siting  
<https://www.energy.gov/sites/default/files/2023-05/Consent-Based%20Siting%20Process%20Report-0424%203.pdf>

## Workforce Development &amp; Recruitment

### Oak Ridge Partners With University to Grow Cleanup Workforce

OAK RIDGE, Tenn. – Nearly 85 miles west of Oak Ridge, 10,000 students attend Tennessee Technical University. About 30% of the student body is enrolled in engineering programs, and most of those students are seeking jobs that keep them in the state. ...That's welcome news to the Oak Ridge Office of Environmental Management (OREM) and its contractor, UCOR, as a significant percentage of their workforce is eligible to retire in the next 10 years. The need for the next generation workforce to continue environmental cleanup in Oak Ridge is leading to new and exciting partnerships to advance workforce development initiatives. -Contributor: Chris Caldwell, DOE Update, Vol. 15, Issue 22 | June 6, 2023

### Clafin University Students Find Potential Careers at Savannah River Site

AIKEN, S.C. – Students from Clafin University in Orangeburg, South Carolina, recently toured EM's Savannah River Site (SRS) to learn about the array of occupations and operations across the 310-square-mile environmental reservation. ...“It benefits our students to see exactly where they could apply their future degrees and the job opportunities available in those areas,”

said Koenemann. ...A historically Black university founded in 1869, Clafin is committed to providing students with access to exemplary educational opportunities in its undergraduate, graduate and continuing education programs.

...“We have several ways to populate our employee pipeline with job candidates, including tours, job fairs and education outreach programs,” Ortner said.

-Contributor: DT Townsend  
EM Update | Vol. 15, Issue 20 | May 23, 2023

### NRC Briefing on Human Capital and Equal Employment Opportunity (Public Meeting)

Tuesday, June 13, 2023

10:00 a.m. (Contact: Angie Randall: 301-415-6806)

### Hanford Site Contractor Training Next Generation of Radiation Protection Workers

RICHLAND, Wash. – A comprehensive health physics training program is not only reinforcing radiation safety but also building the next-generation workforce at the Hanford Site.

EM Richland Operations Office contractor Central Plateau Cleanup Company (CPCCo) began a 17-week health physics course earlier this year to provide robust training supporting the site's ongoing environmental cleanup mission. Once certified, the health physics technicians, or HPTs, are the radiation safety “police,” ensuring that any potential radiological hazards are identified and properly managed to protect

workers, the public and the environment.

...Students in the HPT training course learn how to calculate radiation doses, estimate the potential risk of exposure and interpret data from radiation detection instruments. Coursework also includes site-specific information such as Hanford's safety culture, documentation and emergency response. ...HPT students learn about the job from the ground up; everything from isotopes to safety culture to federal regulations to the history and evolution of radiological control.”

-Contributor: Karisa Saywers

EM Update | Vol. 15, Issue 21 | May 30, 2023



**Appalachian Compact**

Delaware • Maryland •  
Pennsylvania • West Virginia

### Meetings October 2023

The next meeting of the Appalachian Compact will be held October 27, 2023. Details to follow at a later date on <https://www.dep.pa.gov/Business/RadiationProtection/Appalachian/Pages/Meetings-and-Bylaws.aspx>

**Atlantic Compact**

Connecticut • New Jersey • South Carolina

### Meetings September 2023

The next Atlantic Compact Commission will be held in Columbia on Wednesday, September 20. More details including agenda will be available in July. For additional information contact [max@atlanticcompact.org](mailto:max@atlanticcompact.org)

**Central Compact**

Arkansas • Kansas • Louisiana • Oklahoma

**Meeting**

**Annual Meeting  
Thursday June 15, 2023 at 10:00 a.m.**

The purpose of the meeting is to take necessary action on meeting minutes, review and recommend action on the draft FY24 Budget, review and recommend action on engagement letter for the accounting firm to perform the FY 23 audit, review and recommend action on renewal of the Professional Services Agreement for the Commission Administrator, and all other business to come before the Commission.

The agenda and other documents that will be discussed will be posted on the Commission website at least 7 days prior to the meeting: [www.cillrrcc.org](http://www.cillrrcc.org). For more information call 405.702.5151, by email: [cillrwcc@gmail.com](mailto:cillrwcc@gmail.com).

Materials available at <https://cillrwcc.org/> include:  
June 15 Agenda  
Proposed 2024 Budget  
Draft Minutes from November 17 2022 Meeting  
PSA June 2023  
2023 Hood Engagement Letter

**Central Midwest Compact**

Illinois • Kentucky

### Meetings September 12, 2023

The Central Midwest Compact Commission (CMCC) will hold its Annual Meeting September 12, 2023 in Frankfort, KY. For information, please contact [loribeagles@gmail.com](mailto:loribeagles@gmail.com)

### Northwest Compact

Alaska • Hawaii • Idaho •  
Montana • Oregon • Utah • Washington • Wyoming

#### Meetings

Northwest Compact will hold its annual meeting in late September in the great state of Wyoming.

The Utah Waste Management and Radiation Control Board held Board Meetings on May 11 and June 8, 2023. For more information, please [click here](#).

### Rocky Mountain Compact

Colorado • Nevada • New Mexico

#### Meeting

The Rocky Mountain Low-Level Radioactive Waste Board will hold an Annual Meeting at 9:30 MDT on Thursday, June 22, 2023. The meeting will be held virtually via Microsoft Teams. The Annual Meeting will begin immediately following the Regular Meeting. See the agenda [here](#).

For further information, contact Leonard Slosky, Executive Director of the Board, at [lslosky@rmlwb.us](mailto:lslosky@rmlwb.us) or (303) 825-1912.

Consolidated Interim Fuel Storage (CIFS) has been authorized for Lea County, NM. See articles in this issue for details on CIFS.

### Southeast Compact

Alabama • Florida • Georgia •  
Mississippi • Tennessee • Virginia

#### Meeting

June 15, 2023,

9 am to 12 pm CDT

Residence Inn, Birmingham Downtown at 821 20th Street South, Birmingham, Alabama 35205.

The meeting is open to the public.

### Texas Compact

Texas • Vermont

#### Meetings

Thursday, June 29, 2023

via Zoom webinar and in person in Austin, Texas at 10 am.

Thursday, August 24, 2023

via Zoom Meeting webinar and in person in Andrews, Texas at 9 am.

Thursday, October 12, 2023

To check for agendas, [click here](#).

The June 29th Meeting agenda includes:

Rules Committee Report

a. Proposed Rule 31 TAC § 675.24, including possible withdrawal and related action

Discussion and Update on Current Capacity and Needs of In Compact Generators and Potential Methods to Address Related Issues - Contingency Plan Committee Report

a. Discussion on contingency planning for capacity issues

Low-Level Radioactive Waste Disposal Compact Membership

Northwest Compact

- Alaska
- Hawaii
- Idaho
- Montana
- Oregon
- Utah
- Washington
- Wyoming

Midwest Compact

- Indiana
- Iowa
- Minnesota
- Missouri
- Ohio
- Wisconsin

Appalachian Compact

- Delaware
- Maryland
- Pennsylvania
- West Virginia

Rocky Mountain Compact

- Colorado
- Nevada
- New Mexico

Northwest accepts Rocky Mountain waste as agreed between Compacts

Central Midwest Compact

- Illinois
- Kentucky

Atlantic Compact

- Connecticut
- New Jersey
- South Carolina

Southwestern Compact

- Arizona
- California
- South Dakota
- North Dakota

Texas Compact

- Texas
- Vermont

Central Compact

- Arkansas
- Kansas
- Louisiana
- Oklahoma

Southeast Compact

- Alabama
- Florida
- Georgia
- Mississippi
- Tennessee
- Virginia

Unaffiliated States

- District of Columbia
- Maine
- Massachusetts
- Michigan
- Nebraska
- New Hampshire

- New York
- North Carolina
- Puerto Rico
- Rhode Island

Membership details available at [llwforum.org/membership/](http://llwforum.org/membership/)

### Information Resources

- DOE Public Affairs/Press Office - 202/586-5806
- DOE Distribution Center - 202/586-9642
- EPA (for program information, publications, laws and regulations) [www.epa.gov](http://www.epa.gov)
- EPA Information Resources Center - 202/260-5922
- 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) [listserv@unixmail.rtpnc.epa.gov](mailto:listserv@unixmail.rtpnc.epa.gov)
- Government Accounting Office (GAO) Document Room - 202/512-6000
- Government Printing Office (to order entire *Federal Register* notices) - 202/ 512-1800
- Legislative Resource Center (to order U.S. House of Representatives documents)- 202/226-5200
- NRC Public Document Room - 202/ 634-3273
- NRC Reference Library (NRC regulations, technical reports, information digests, and regulatory guides) [www.nrc.gov](http://www.nrc.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) <http://www.access.gpo.gov>
- U.S. Senate Document Room - 202/224-7860
- Variety of documents through numerous links at LLW Forum, Inc. at [www.llwforum.org](http://www.llwforum.org)

### Acknowledgment & Disclaimer

Acknowledgment: This material is based upon work supported in part by the U.S. Department of Energy under Award Numbers DE-EM0001364 and DE-em0003153.

Disclaimer: Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.



### Copyright Policy

All LLWF materials are copyrighted and for permission to use or reproduce, please send your request to the Daniel B. Shrum Executive Director, [dshrum@llwforum.org](mailto:dshrum@llwforum.org)