Handbook of Radioactive Waste Transportation

The Council of State Governments Midwestern Office

August 2005
For more than half a century, The Council of State Governments (CSG) has served as a common ground for the states of the nation. CSG is a non-profit, state-supported and -directed service organization that provides research and resources, identifies trends, supplies answers, and creates a network for legislative, executive, and judicial branch representatives.

Through its national office in Lexington, Kentucky, a state-federal office in Washington, D.C., and regional offices in New York, Atlanta, Chicago (Lombard), and Sacramento, CSG is dedicated to preserving the role of the states in America’s federal system. The role of CSG’s Midwestern Office (CSG Midwest) is to foster intergovernmental cooperation through the promotion of regional—as well as individual—state responses to common issues and challenges.

This report was prepared with the support of the U.S. Department of Energy (DOE), Cooperative Agreement No. DE-FC02-97CH10881. Any opinions, findings, conclusions, or recommendations expressed herein, however, are those of the author(s) and do not necessarily reflect the views of DOE.

The purpose of the agreement, and reports issued pursuant to it, is to identify and analyze regional issues pertaining to the transportation of DOE’s radioactive waste and materials. Through the agreement, CSG Midwest provides the Midwestern states with information on the technical, institutional, and regulatory issues related to radioactive materials transportation. The agreement also provides the states with an opportunity to work with DOE to plan and prepare for the department’s shipments that affect the Midwest.

Prepared by:
Lisa R. Sattler, Senior Policy Analyst, and Sarah K. Wochos, Policy Analyst, with assistance from the CSG Midwestern Radioactive Materials Transportation Committee

For more information or to order copies, contact:
Lisa R. Sattler
CSG Midwest
(920) 803-9976
lsattler@csg.org
www.csgmidwest.org/About/MRMTP.htm
# TABLE OF CONTENTS

Acronyms .................................................................................................................. iii
Introduction .................................................................................................................. 1
Section 1. Transportation Planning: The Regional Approach .................................. 4
  Shipment planning information .............................................................................. 4
  Development of a transportation plan ................................................................. 5
    Regulations, rules, and orders ........................................................................... 5
    Selection of mode .............................................................................................. 6
    Route identification ......................................................................................... 7
  Emergency management ...................................................................................... 9
  Communications plan .......................................................................................... 11
  Security plan ...................................................................................................... 12
  Permits and fees ................................................................................................. 13
  Advance notification .......................................................................................... 14
  Inspections .......................................................................................................... 15
  Escorts .................................................................................................................. 16
  Shipment tracking ............................................................................................... 16
  Emergency procedures ....................................................................................... 17
  Safe parking ......................................................................................................... 17
  Contingencies ..................................................................................................... 18
  Lessons learned review ..................................................................................... 18

Section 2. DOE Shipping Campaigns ....................................................................... 19
  Spent nuclear fuel shipments ............................................................................. 19
    Foreign research reactor shipments ............................................................... 19
    West Valley Demonstration Project to Idaho National Laboratory .............. 22
    Oak Ridge National Laboratory to Idaho National Laboratory .................. 24
  Transuranic waste shipments ............................................................................ 25
    Battelle-Columbus to Hanford ....................................................................... 26
    Mound to Savannah River Site ....................................................................... 27
    Argonne National Laboratory-East to WIPP ............................................... 28
    Missouri University Research Reactor to Argonne National Laboratory-East .. 29
  Future shipments ................................................................................................ 30
    Spent nuclear fuel and high-level radioactive waste to Yucca Mountain ..... 30
Section 3. Information on the Midwestern Region ................. 34
  Illinois ......................................................................................... 35
  Indiana .......................................................................................... 38
  Iowa ............................................................................................... 40
  Kansas .......................................................................................... 43
  Michigan ........................................................................................ 45
  Minnesota ...................................................................................... 47
  Missouri ......................................................................................... 50
  Nebraska ......................................................................................... 52
  North Dakota ............................................................................... 55
  Ohio ............................................................................................... 57
  South Dakota ............................................................................... 60
  Wisconsin .................................................................................... 62

Table 1. Midwestern Commercial Nuclear Reactors .................. 64
Table 2. Spent Fuel in Storage at Midwestern Reactors ............... 65
Table 3. Projected Impact of Repository Shipments on
  the Midwestern States ................................................................. 66
Table 4. Midwestern State Shipment Fees ................................... 67
Table 5. Midwestern State Payments into the Nuclear Waste Fund ... 68
References ....................................................................................... 69
Endnotes ......................................................................................... 72
<table>
<thead>
<tr>
<th>ACRONYMS</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSG</td>
<td>The Council of State Governments</td>
</tr>
<tr>
<td>CSG Midwest</td>
<td>The Council of State Governments, Midwestern Office</td>
</tr>
<tr>
<td>CVSA</td>
<td>Commercial Vehicle Safety Alliance</td>
</tr>
<tr>
<td>DHS</td>
<td>U.S. Department of Homeland Security</td>
</tr>
<tr>
<td>DOE</td>
<td>U.S. Department of Energy</td>
</tr>
<tr>
<td>DOT</td>
<td>U.S. Department of Transportation</td>
</tr>
<tr>
<td>FRA</td>
<td>Federal Railroad Administration</td>
</tr>
<tr>
<td>INL</td>
<td>Idaho National Laboratory</td>
</tr>
<tr>
<td>MERRTT</td>
<td>Modular Emergency Radiological Response Transportation Training</td>
</tr>
<tr>
<td>NRC</td>
<td>U.S. Nuclear Regulatory Commission</td>
</tr>
<tr>
<td>OCRWM</td>
<td>DOE Office of Civilian Radioactive Waste Management</td>
</tr>
<tr>
<td>OSHA</td>
<td>Occupational Safety and Health Administration</td>
</tr>
<tr>
<td>SRS</td>
<td>Savannah River Site</td>
</tr>
<tr>
<td>TEC/WG</td>
<td>Transportation External Coordination Working Group</td>
</tr>
<tr>
<td>WIPP</td>
<td>Waste Isolation Pilot Plant</td>
</tr>
</tbody>
</table>
INTRODUCTION

Since 1989, the Council of State Governments’ (CSG) Midwestern Radioactive Materials Transportation Project has served to bring the Midwestern states together to identify and resolve regional issues related to the U.S. Department of Energy’s (DOE) shipments of radioactive waste. In 1998, after years of working with DOE to plan for future shipments, the Midwest had its first experience partnering with the department to plan and prepare for actual shipments of spent nuclear fuel and transuranic waste. In the years since, the Midwestern states have gained a great deal of first-hand experience in working with DOE on shipping campaigns.

The states have witnessed the enormous amount of work that goes into planning even a single shipment: the many steps in the process, the long lead times required, the significant number of legal requirements and extraregulatory agreements, and the contributions of dozens of individuals, all working together to ensure a safe and uneventful shipment. For sustained shipping campaigns, the states’ experience has been that time- and resource-intensive startups settle gradually into a kind of routine—albeit one that requires continued oversight by state personnel.

This experience will be invaluable to the region as the states and DOE gear up for the largest shipping campaign in the department's history—namely, the movement of tens of thousands of tons of spent nuclear fuel and high-level radioactive waste to the permanent repository planned for Yucca Mountain in Nevada. If the department meets its goal for opening the repository, shipments to the facility could begin as early as 2012. By virtue of its reliance on nuclear power and its geography, the Midwest will bear the burden of shipments that originate in the region as well as those coming from the Northeast and the South.

The state personnel who have been involved in planning know from experience how much work is involved in—and how much influence they have over—shipment planning. Those outside the process often do not. Because shipments will have such a heavy impact on the Midwest, it is important for state officials and the public to understand fully the extent of the planning that goes into shipping campaigns, as well as the influence the affected states can have on those campaigns. The purpose of the Handbook of Radioactive Waste Transportation is to give government officials and the public a glimpse of how a shipping campaign unfolds, including the many steps and the many parties that are involved. Although the Handbook
focuses on the region’s experience with past shipping campaigns, it illustrates how DOE might structure its shipping campaign for moving spent nuclear fuel and high-level radioactive waste to the national repository.

The Handbook is divided into three sections. The first section traces the regional approach to planning that the states and DOE have developed over the years to prepare for shipments of transuranic waste and spent nuclear fuel. Through this approach, DOE works cooperatively with the states to help them obtain the three things they need in connection with shipments: information, input into planning decisions, and—in some cases, but not always—financial assistance to aid with planning and training. The Midwest has found the regional planning approach to be highly effective for coordinating shipment planning and preparedness activities. DOE has committed to following this approach for its shipments to Yucca Mountain.

The second section provides information on the shipping campaigns that have impacted the Midwest since 1998. To varying degrees, these campaigns all took a regional approach to shipment planning. This section also includes more detailed information on DOE’s Civilian Radioactive Waste Management System, the centerpiece of which will be the national repository.

The last section is a compendium of information on the Midwestern states. In this section, the reader will find data on state statutes, spent nuclear fuel inventories, fees, and other transportation-related items. The section also includes summary tables on specific topics, along with maps for reference.

The ultimate purpose of the Handbook is to provide the most pertinent information in a non-technical manner, without the jargon and acronyms so frequently encountered in publications on this subject. The result is a document that will help state officials and the public learn about radioactive waste shipments, their potential impact on the Midwestern states, and the role that CSG’s Midwestern Radioactive Materials Transportation Committee plays in ensuring that DOE’s transportation program meets the expectations of the Midwestern states.

The Council of State Governments’ Midwestern Office (CSG Midwest) provides this information to state officials as part of its Midwestern Radioactive Materials Transportation Project, which is supported by a cooperative agreement with DOE. The cornerstone of the cooperative agreement is the Midwestern Radioactive Materials Transportation
Committee, which comprises representatives of the executive and legislative branches of government in the 12 Midwestern states: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. The committee is the primary forum through which the Midwestern states have been and will continue to be involved in planning and preparing for DOE’s shipments.

The committee consists of 22 members. Each of the members of the Midwestern Governors Association appoints one representative of the executive branch. The remaining seats are reserved for Midwestern state legislators, who are appointed by the chair of the Midwestern Legislative Conference. The governors’ appointees include officials from departments of health, emergency management agencies, and other state agencies that have oversight of shipments. The legislators bring to the table the perspective of the public. This unique mix of executive agency and legislative officials makes the committee well suited to speak for the region on issues related to radioactive waste transportation.

Together, the Midwestern Radioactive Materials Transportation Committee and the CSG Midwest staff are working to make sure that DOE’s shipments of radioactive waste pass safely through the Midwest with minimal impact on the state governments and their citizens.
SECTION 1. TRANSPORTATION PLANNING: THE REGIONAL APPROACH

A great deal of time and effort can go into planning even a single shipment of spent nuclear fuel or other radioactive waste. For DOE shipments of transuranic waste and spent nuclear fuel, a significant amount of the activity takes place through interactions with the state regional groups such as the Midwestern Radioactive Materials Transportation Committee. Working with individual states would present a daunting task for DOE; on the other hand, taking a national, “one-size-fits-all” approach would overlook the considerable variations among the states and regions in terms of key issues and expectations. By working primarily at the regional level, DOE and the states are able to strike the necessary balance between operating efficiently and attending to specific regional needs.

This section describes the typical steps leading up to a shipment and those that take place during a shipment. The description draws from the Midwest’s experience with previous DOE shipping campaigns. In fact, the Midwestern states have recommended many of the following practices in the regional Planning Guide for Shipments of Radioactive Materials through the Midwestern States. For shipments to Yucca Mountain, DOE has yet to develop its concept of operations. It is the Midwestern region’s hope that DOE will seek to incorporate into that transportation program both the best practices employed by the department’s own successful shipping campaigns and the states’ recommended practices.

Shipment planning information

Perhaps the most important asset for the affected states is information regarding what material will be shipped, when, what routes will be utilized, and what the specific plans are. The states need this information both to aid their long-term planning (particularly for large shipping campaigns lasting several years) and to allocate and schedule resources, such as inspection and escort teams. DOE representatives attend Midwestern Radioactive Materials Transportation Committee meetings in order to keep the states informed about upcoming shipments, and to obtain state input on shipments that are planned or have already taken place. (For more information on the latter issue, please see the section on “lessons learned review.”) Another way the Midwestern states obtain information useful to their planning is through the Prospective Shipments Module, which DOE’s Office of Environmental
Management distributes. The document shows planned shipments of spent nuclear fuel and other radioactive material that DOE programs have scheduled for the coming year. Although the Prospective Shipments Module does not report actual shipping dates, DOE regards the listing as containing “sensitive” information. As a result, access to the document is restricted to those with a “need to know.”

**Development of a transportation plan**

Shippers must prepare a transportation plan outlining what steps the shipper, the carrier, the states, federal agencies, and other involved organizations will take to execute the shipment. In addition to describing the material to be shipped and explaining the need for shipments, the transportation plan defines the roles and responsibilities of all parties involved. The plan covers all aspects of the shipping campaign, such as the applicable regulations, rules, and orders, the selection of the mode and route, and the key steps for conducting the shipment. Components of the overall transportation plan include separate plans for emergency management, communications, and security.

DOE shipping procedures provide for giving states an opportunity to review the draft transportation plan and to submit comments. This opportunity is the key mechanism by which the states have input into shipment planning decisions.

**Regulations, rules, and orders**

The U.S. Department of Transportation (DOT) and the U.S. Nuclear Regulatory Commission (NRC) share the authority for promulgating and enforcing regulations for shipments of radioactive waste and materials. Because of its jurisdiction over radioactive materials, the NRC regulates the design of packaging and the physical protection of shipments while in transit. The DOT oversees operating practices such as driver training, route selection, labeling and placarding, and loading.

DOE’s order on transportation makes it a policy for the department to follow DOT regulations when conducting its shipments. Departmental policy does not require adherence to NRC regulations; however, DOE does follow security measures that, in some cases, are similar to what the NRC requires of private shippers.
The Nuclear Waste Policy Act stipulates that the Office of Civilian Radioactive Waste Management (OCRWM) will follow the NRC’s regulations regarding the provision of advance shipment notification to the affected states when conducting shipments to Yucca Mountain. The Act also requires that OCRWM use NRC-certified packages for shipments to the repository. In DOE’s 2002 “Radioactive Material Transportation Practices Manual,” OCRWM committed to following additional requirements related to security, such as submitting the selected routes to the NRC for approval. OCRWM has indicated its intention to revise the manual in coordination with the Midwestern Radioactive Materials Transportation Committee and the other state regional groups.

**Selection of mode**

Selection of the shipping mode is the responsibility of the shipper. It is one of the first decisions the shipper makes after identifying the need for shipments. Shippers base their decision on the amount of material to be shipped, site access, cost, previous experience, and any special considerations (e.g., the size of the items to be shipped). Normally, DOE does not consult the potentially affected states regarding the selection of the shipping mode.

In 1998, DOT published a report on the “Identification of Factors for Selecting Modes and Routes for Shipping High-Level Radioactive Waste and Spent Nuclear Fuel.” Among the report’s findings, DOT determined that incident-free radiological risk is a more important factor in selecting modes and routes than is the potential risk stemming from accidents. The major factor affecting incident-free risk is shipment duration. DOT noted that, of the available modes, trucks offered the shortest shipment duration, followed by rail and barge.

For shipments to Yucca Mountain, DOE’s environmental impact statement considered two options: transporting most of the spent nuclear fuel and high-level radioactive waste by truck versus transporting it mostly by rail. DOE’s Record of Decision selected the “mostly rail” option. As its name implies, this option involves using trains to move as much waste as possible.

In the Midwestern Planning Guide, the region’s states express their preference for rail shipments to take place via dedicated trains. For those types of shipments, spent nuclear fuel or high-level radioactive waste would be the only cargo on the train. Dedicated trains typically result in higher costs than shipments of general freight. Nevertheless, the Midwestern states
feel the extra cost is worth the benefit of offering the shipper—in this case, DOE—greater control over decisions such as route selection.

In addition, the use of dedicated trains will reduce the likelihood of spent nuclear fuel or high-level radioactive waste being involved in accidents with other hazardous materials. Dedicated trains will also make it easier for states to inspect, escort, and track shipments. Other stakeholders have expressed a preference for dedicated trains, including the Association of American Railroads. DOE announced in July 2005 that it will use dedicated trains for its “usual rail transport” to the repository. The department cited safety, security, cost, and operations as reasons for using dedicated trains.

DOT’s long-awaited “Dedicated Train Study” is also expected to come out in 2005. Required by a provision in the 1992 Hazardous Materials Transportation Uniform Safety Act, the study is expected to address the question of whether dedicated trains do, indeed, enhance the safety and efficiency of rail shipments.

In the case of nuclear power plants that do not have direct access to rails, DOE will have to rely either on barges or heavy-haul trucks to move the shipping casks to rail terminals for the trip to Yucca Mountain. DOE’s Environmental Impact Statement identified three facilities in eastern Wisconsin and western Michigan as candidates for barge shipments (see Figure 1). As a region, the Midwestern states do not favor the use of barge shipments to move waste from these nuclear power plants to rail heads. Instead, the affected states have asked DOE to consider other options, such as heavy-haul trucks, for getting the waste from these facilities to the nearest rail terminal.

**Route identification**

The process used to identify routes depends, to some extent, on the shipping mode. For highway shipments, federal regulations assign the task of selecting routes to the carrier. In addition, the regulations define the highway routes from which carriers can make their selections for shipments of spent nuclear fuel and other radioactive materials. Regulations for route selection fall under DOT’s jurisdiction and are included in 49 CFR Part 397.

The logic behind the DOT requirements for highway shipments is that, by minimizing the time in transit and by avoiding population centers
to the greatest extent possible, the shipper can likewise minimize the exposure to the public. For this reason, DOT regulations call for carriers to use “preferred highway routes,” which include the interstate system with bypasses and alternative routes officially designated by the states.

Selecting rail routes is different from selecting highway routes. First, there are no rail routing regulations comparable to those for highway. Second, because rail lines are privately owned, carriers do not have to consider time in transit or population exposure when selecting routes. Instead, they look at business-related factors, such as other scheduled traffic, when making their routing decisions. In fact, because many urban centers have grown around major rail switchyards, rail routes generally do not avoid population centers but rather pass right through them.

Since 1998, the Midwestern states have worked with DOE to identify routes. For cross-country shipments of foreign research reactor spent nuclear fuel, DOE proposed four truck routes to the potentially affected states. One of the four routes was removed from consideration because of its relatively
rough terrain and large number of affected population centers. Because it was anticipated that this shipping campaign would last over a decade, DOE retained the remaining three routes as a “suite of available routes” that the Department could use for future shipments under the program. In the six years since the shipments began, DOE has used two of the three available routes. (For more information on the foreign research reactor shipments, see page 19.)

In contrast to the foreign research reactor shipments, DOE proposed 28 potential rail routes for the states to consider for the department’s single rail shipment of spent nuclear fuel from a facility in West Valley, New York, to Idaho. The final selection was a compromise that attempted to balance the preferences of the affected states and Indian tribes. (For more information on the West Valley shipment, see page 22.)

Because the Yucca Mountain transportation program is expected to span 24 years and have a significant impact on the Midwest, the region sought permission from DOE to analyze and evaluate possible shipping routes. With DOE’s support, the Midwestern Radioactive Materials Transportation Committee undertook its route identification project in July 2004 with the goal of identifying and proposing to DOE a suite of acceptable routes through the region. This challenging project is the first of its kind and, if successful, could lay the foundation for the selection of routes to the repository.

Emergency management

In addition to a transportation plan, shippers are required to prepare an emergency management plan that describes the response actions necessary in the event of an accident. A key purpose of the plan is to clarify the roles and responsibilities of the local, state, and federal agencies that would respond to accidents. An important component of the plan is a list of the emergency points of contact for all involved parties, including the states on the route. A separate carrier transportation plan catalogs any carrier resources that can be deployed to assist in the response and outlines the carrier’s plans for recovery.

Even if DOE is the shipper, state and local governments have the primary responsibility to protect the health and safety of the public. Under the regulations of the Occupational Safety and Health Administration (OSHA), first responders must have the capability to respond to emergencies
Emergency Response to a Radiological Accident/Incident: An Overview

In case of a radiological emergency, states are prepared to protect public health and safety. In general, responders are trained in the appropriate procedures for responding to all kinds of hazardous materials incidents, including those involving radioactive materials. Often before the beginning of a new shipping campaign—and continuing throughout the course of that campaign—states provide additional and/or refresher training to emergency responders and other public safety officials.

The characteristics of and the appropriate emergency response procedures for a wide variety of hazardous materials, including radioactive materials, are included in the North American Emergency Response Guide. Under OSHA regulations, the responsibility for hazardous materials accident/incident response training falls on state and local governments. The level of training required is determined by the responder’s role. The initial on-scene responders will take actions consistent with their level of training. If they determine that a more advanced response is necessary, they will call for assistance from responders that have received additional training.

At a minimum, the initial response to a radioactive materials accident/incident would normally include: identifying the hazard, performing life-saving measures, securing the scene, and calling the appropriate authorities for expert assistance. In accord with the National Incident Management System, local responders would have incident command over the response, and state and federal personnel would support the local incident commander as necessary.

Involving hazardous materials of all kinds, including radioactive material. Commonly, the role of local first responders is to recognize that an accident involves radioactive or other hazardous materials, isolate the scene, and call for assistance from personnel with more specialized training.

In addition to the states’ own training curricula, general hazardous materials response training for first responders is available through DOE’s Modular Emergency Radiological Response Transportation Training (MERRTT) program, a part of DOE’s larger Transportation Emergency Preparedness
Program. MERRTT provides basic information on radioactive materials as well as more complicated incident response training. While states are not required to use MERRTT for training, the curriculum is available to states impacted by DOE campaigns. The MERRTT modules were recently approved by the Department of Homeland Security (DHS), which means states can use DHS grant money to pay for MERRTT training.

For transuranic waste shipments destined for DOE’s Waste Isolation Pilot Plant (WIPP) and elsewhere, the Carlsbad Field Office provides the affected states with funding and other assistance so that they can train emergency responders as part of the states’ transportation safety programs. Such assistance is a requirement of the WIPP Land Withdrawal Act. DOE’s Office of Environmental Management also provided limited financial assistance to affected states in connection with the department’s various spent nuclear fuel shipping campaigns, as well as a long-term campaign to move depleted uranium hexafluoride by truck.

For shipments to the national repository, Section 180(c) of the Nuclear Waste Policy Act mandates that DOE provide funding and technical assistance to states and tribes along the shipping routes. This assistance is intended to help the states and tribes train local public safety officials in procedures for emergency response, as well as safe, routine transportation. The Midwestern Radioactive Materials Transportation Committee has been working with DOE and the other state regional groups to revise OCRWM’s draft policy and procedures for implementing this federal assistance program. OCRWM’s goal is to complete a pilot program and make final revisions to the policy in time to award the first grants at least three years prior to the start of shipments.6

Communications plan

Communication is the most important aspect of any shipping campaign. Although the transportation plan’s definition of roles and responsibilities addresses communications roles, a separate communications plan is useful for spelling out exactly how the shipper and the affected states will interact with the public and with the media. For previous DOE shipping campaigns, the department has held public meetings in those locations where interest in the shipments is high. DOE has also prepared fact sheets and other public information materials in connection with its shipping campaigns. These materials are useful to the states that receive inquiries from the media, the
public, or elected officials, and/or to those states that choose to disseminate shipment information prior to the onset of shipments. In some instances—such as the West Valley shipment—the states prepared their own public information materials with DOE’s support.

Security plan

A key component of the transportation plan is the security plan. Like the other plans, the security plan defines the roles and responsibilities for all involved parties. The plan also describes the measures each entity will take in the event of any threats to the security of a shipment—whether as a result of a deliberate attack or an unrelated incident that necessitates temporarily moving the shipment to a safe parking area.

In addition to identifying points of contact in law enforcement and other pertinent agencies, the security plan also identifies safe parking areas that the states have designated. Some states prefer to identify safe parking locations only when the need arises. (For more information, see the section on “safe parking.”) The security plan also addresses the plans for escorting shipments. Because the security plan contains information that is either protected by the NRC safeguards regulations or is for “official use only,” the plan is shared only with those who have a need to know.

Even prior to the terrorist attacks of September 11, 2001, the security of radioactive waste shipments was of paramount importance to shippers, carriers, and the government. Recognizing that deliberate attacks on shipments could present a risk to public health and safety, the NRC regulates the physical protection of spent nuclear fuel in transit. These regulations, included in 10 CFR 73.37, require shipments to be accompanied by armed escorts. In addition, the NRC regulations require shippers to submit their proposed routes to the commission for approval. Shippers must also monitor shipments on a 24-hour basis and provide advance notification to the affected states. (For more information, see the section on “advance notification.”) After the September 11 attacks, the NRC augmented its safeguards and security requirements with additional measures. These new measures are considered safeguards information and, therefore, can be discussed only with authorized state personnel and others who have a need to know.

Because it is not an NRC licensee, DOE is not obligated to follow the NRC’s safeguards and security regulations. The department maintains an
“order,” or procedure, that addresses security issues. DOT found DOE’s order to be “equivalent” to the NRC’s regulations. For shipments to the national repository, the Nuclear Waste Policy Act requires DOE to provide the states with advance notification of shipments following NRC regulations.

The Midwestern Radioactive Materials Transportation Committee has asked DOE to consider making it a departmental policy to follow all NRC safeguards and security regulations for its spent nuclear fuel shipments, including both commercial spent nuclear fuel under the OCRWM program and DOE-owned and foreign research reactor spent nuclear fuel. The Midwest made this request because the states have had generally positive experiences with private shipments following NRC safeguards and security regulations. Since these regulations work well for private shipments, the states believe DOE should, at a minimum, follow them for its own shipments. In addition, it would be easier for the states to work with one set of safeguards and security regulations than two different sets of practices—one for private shipments and the other for DOE shipments.

Permits and fees

Prior to a shipment, the shipper or its agent will apply for any permits that are required. Most states require permits for overweight truck shipments—that is, those that weigh more than 80,000 lbs. Because of the weight of a fully loaded cask, shipments of spent nuclear fuel sometimes exceed the legal weight limit. Among other reasons, permits for such shipments are required so that the state can alert the shipper to any possible problems with the route, such as whether the shipment will exceed bridge weights. For DOE shipments, ideally, the state and DOE will have already coordinated on route selection sufficiently to avoid any last-minute problems involving overweight permits.

Five Midwestern states currently charge a fee specifically on shipments of spent nuclear fuel, transuranic waste, and/or high-level radioactive waste (see Table 4 on page 67). In most of these states, the fees are deposited into dedicated funds and are used for performing inspections, providing escorts, tracking shipments, training first responders, and other shipment-related activities. In one state, the fee is specifically intended to recoup the state’s cost of inspecting and escorting the shipment, which is a state requirement. Fees have been an important source of revenue to the states,
offsetting their expenses related to preparing for shipments and carrying out operational activities such as escorting. The assessment of fees in connection with radioactive waste shipments is permitted under the federal Hazardous Materials Transportation Uniform Safety Act.

**Advance notification**

NRC regulations require that shippers of spent nuclear fuel provide notification to the affected states in advance of shipments. The shipper may provide this information either in writing at least seven days in advance or by messenger at least four days in advance. The information to be provided to the states depends on the quantity of spent nuclear fuel being shipped. For spent nuclear fuel shipments from commercial power plants, the notification must include:

1. The name, address, and telephone number of the shipper, carrier, and receiver;
2. A description of the shipment;
3. A list of the routes to be used within the state;
4. The estimated date and time of departure from the point of origin;
5. The estimated date and time of entry into the state; and
6. A statement regarding the requirement to safeguard, or protect, schedule information.

If there are changes of six hours or more to the estimated shipment times, the shipper must notify the affected states by telephone. Some states share their advance notification with local emergency response officials. In addition to the written advance notification, DOE typically provides states with a “courtesy call” a few hours prior to entering the state. The courtesy call is especially important for states that will be meeting the shipment at the border for the purpose of performing an inspection, escorting the shipment, or both.

For the DOE’s own shipping campaigns, such as the West Valley shipment and the foreign research reactor shipments, the Department operates under its own orders. DOE orders call for the Department to provide notification to affected states and tribes that is similar to the NRC’s requirements. The differences are that the DOE notification goes to the tribes, it includes
an estimated time of departure from the state or tribal jurisdiction, and it does not include a statement regarding the need to safeguard the schedule information. As noted earlier, the Nuclear Waste Policy Act requires DOE to follow the NRC’s advance notification requirements for shipments to the national repository.

**Inspections**

Prior to departing, each shipment must be inspected at the point of origin to verify compliance with applicable transportation and packaging regulations. Some states along the route elect to inspect shipments as a matter of policy or because of state laws. For truck shipments, state inspectors follow the procedures of the Commercial Vehicle Safety Alliance (CVSA). CVSA developed enhanced, or “Level VI,” inspection procedures and out-of-service criteria specifically for shipments of spent nuclear fuel, high-level radioactive waste, and transuranic waste. The inspection focuses on making sure the vehicle and the driver meet federal standards for hazardous materials shipments. In addition to inspecting the vehicle and the driver, some states perform a radiological inspection of the package itself.

States have the authority to inspect rail shipments provided they have personnel trained and certified by the Federal Railroad Administration (FRA) for this purpose. The states can perform inspections and provide oversight in six areas: track, operating practices, signal and train control, motive power and equipment, grade crossing, and hazardous materials. Only five of the 12 Midwestern states have inspectors certified under this program (see the table on page 16).

FRA-certified state inspectors ensure that the shipment will follow the guidelines of the FRA’s “Safety Compliance Oversight Plan for Rail Transportation of High-Level Radioactive Waste and Spent Nuclear Fuel.” The guidelines contain specific “safety enhancements” for inspections, including an inspection of all bridges and automated warning devices along the designated route. As with truck inspections, many states also perform a series of inspections at the point of origin or en route.

The states have not encountered difficulties arranging en route inspections for truck shipments. In the case of the West Valley rail shipment, however, several states found themselves having to send their inspectors to another state in order to conduct their inspections of the packages and the train. The states had requested that the inspections take place at sidings near their...
borders, in conjunction with crew changes and other necessary stops. The railroads, however, did not accommodate the states’ requests. One of the challenges facing DOE is to develop an acceptable approach to conducting en route inspections of rail shipments destined for the national repository.

**Escorts**

Some of the Midwestern states escort all shipments of spent nuclear fuel and transuranic waste that cross their borders. State escorts serve the primary purpose of providing security for shipments, but they can also facilitate communications with other state personnel that may be staffing emergency operations centers or other facilities. In some cases, the escorts also include personnel trained to handle accidents involving radioactive materials. For past DOE shipments of spent nuclear fuel, Ohio, Illinois, Iowa, Nebraska, and Missouri have elected to escort the shipments. In some situations, DOE has provided its own escort for the shipment. Even in these cases, however, the Midwestern states chose to provide their own state escorts as well, either because of state law or because of the agencies’ desire to more easily monitor the shipments’ status.

**Shipment tracking**

States find it extremely useful to be able to track shipments in near real-time, using DOE’s TRANSCOM system. TRANSCOM (“Transportation Tracking and Communications”) is a web-based system that provides users with access to shipment information, including maps that depict the position of the truck or train. DOE limits access to the system to only those users with a need to know, and users are able to see only the shipments that

<table>
<thead>
<tr>
<th>State</th>
<th>Grade Crossing</th>
<th>Motive Power &amp; Equipment</th>
<th>Track</th>
<th>Signal &amp; Train Control</th>
<th>Hazmat</th>
<th>Operating Practices</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illinois</td>
<td></td>
<td></td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Iowa</td>
<td></td>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Missouri</td>
<td>2</td>
<td></td>
<td>2</td>
<td></td>
<td>1</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Nebraska</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Ohio</td>
<td>4</td>
<td></td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>14</td>
</tr>
</tbody>
</table>

Source: FRA 2005.
affect their state or tribe. DOE uses TRANSCOM to track its shipments of spent nuclear fuel, transuranic waste, high-level radioactive waste, and other “high-visibility shipments.” Because so many states are familiar with the system, some states have recommended that DOE make the TRANSCOM system available to private shippers for tracking their shipments. Originally located in Oak Ridge, Tennessee, then moved to Albuquerque, the system will move again in 2005 to a new home in Carlsbad, New Mexico, near the WIPP site.

Emergency procedures

In the event of a radiological accident/incident, the initial notification would go to the local emergency response organization, generally through 911. If the driver, crew, or escort is capable of making the notification, he/she will also immediately notify the shipper, who will then notify the applicable state contact. Redundancy is built into the communications process to make sure that all involved parties will be notified of the accident.

With the exception of state escorts who would be present at the time of the accident, local responders are usually the first to arrive on-scene. Incident command normally rests with the local first responder agency, with state or other trained personnel assisting in the response. At the request of the incident commander, federal resources would also be available to assist in any emergencies that warranted their deployment.

Safe parking

While a shipment is in transit, events can occur that warrant diverting the shipment to a designated safe parking area. Those events could include bad weather, road or rail closures, or potential security situations. In such cases, state security escorts have the authority to direct the shipment to a safe parking location. These locations are generally identified in advance and included in the shipper’s security plan.

Occasionally, a state will not pre-identify safe parking locations but instead will rely on the state escort to identify such a location should one be needed. Safe parking areas may not be located near high-population areas; schools, hospitals, or residential areas; or areas of heavy industry where hazardous materials would be present. Suitable locations would include defense facilities, such as army bases, and state-controlled facilities. Many states expressly prohibit the use of public rest areas for safe parking purposes.
Contingencies

Despite extensive planning, unexpected events can interfere with a shipment’s schedule or with the use of a particular route. DOE’s Radioactive Material Transportation Practices Manual states that, prior to allowing a shipment of spent nuclear fuel, high-level radioactive waste, or transuranic waste to depart, the shipper and carrier must agree that conditions are acceptable for doing so. Conditions along the entire route must be considered. If severe weather or bad road conditions exist, the shipment should not be dispatched. States may notify DOE if adverse weather or road-related emergencies occur while a shipment is in transit. In such instances, the states can request that the shipment either use an alternate route or be directed to safe parking.

Adverse weather and road conditions are important considerations, not just for their direct impact on shipments but because of their indirect impact. Bad weather (such as heavy snow) can close a highway; for rail shipments, however, the concern is not so much the potential for route closures but rather the difficulty of getting emergency response personnel to the scene of an accident. The Midwestern states have asked DOE to try to avoid conducting shipments through the region in December and January, which are the most likely months during which severe weather conditions develop. The states have also asked OCRWM to factor seasonal weather conditions into its schedule for shipments to the repository.

For OCRWM shipments, DOE has not developed contingency plans. However, it is likely the department will look to other DOE shipping programs, such as the foreign research reactor shipments, for best practices as it begins to address contingency planning for shipments to the repository.

Lessons learned review

At the end of each shipping campaign, the shipper and involved states usually participate in a review of the lessons learned. This review is a very important step in the shipping process, for it identifies what worked and what did not from the perspective of various organizations. The Midwestern states have been enthusiastic advocates for and participants in DOE’s lessons learned reviews. The region also reviews the lessons from past shipments to assist in revising its own set of recommended best practices for shippers.
SECTION 2. DOE SHIPPING CAMPAIGNS

Section 1 reviewed the many aspects of shipment planning. Section 2 focuses on the DOE shipping campaigns that have impacted the Midwest. In addition, this section looks at the larger, long-term shipping campaign that DOE’s Office of Civilian Radioactive Waste Management (OCRWM) is currently planning.

Spent nuclear fuel shipments

Foreign research reactor shipments

Background: Under President Eisenhower’s Atoms for Peace program, the U.S. provided 41 foreign countries with nuclear fuel containing enriched uranium for use in research reactors. Participant countries conducted nuclear research in areas such as medicine, agriculture, and industry. The purpose of this program was to allow participant countries to benefit from the products of nuclear research while reducing the potential for these countries to produce and use weapons-grade radioactive materials. Once the uranium in the fuel is depleted, DOE accepts the spent nuclear fuel for storage in the U.S. pending its disposal in the national repository. Only U.S.-provided enriched uranium is accepted and the quantities of enriched uranium are closely monitored. The spent nuclear fuel contains both high-enriched uranium and low-enriched uranium.

From the late 1950s until 1992, the U.S. accepted spent nuclear fuel for storage. After a lapse of four years, DOE’s Foreign Research Reactor Spent Nuclear Fuel Acceptance Program once again began accepting spent nuclear fuel in 1996. To date, 27 countries have shipped spent nuclear fuel to the U.S., with the majority of the shipments having come from Europe and Japan. The program was originally set to expire in May 2009, but DOE extended the deadline to May 2019. Under the extended program, the U.S. will accept around 20 metric tons of foreign research reactor spent nuclear fuel containing uranium enriched in the U.S. The majority of the spent nuclear fuel (about 19 tons) will be stored at DOE’s Savannah River Site (SRS) in South Carolina, with the remainder going to the Idaho National Laboratory (INL) near Idaho Falls, Idaho.

As of May 2005, the U.S. had accepted 6,334 spent nuclear fuel assemblies that filled 163 casks. With the exception of truck shipments from Canada, spent nuclear fuel is shipped from foreign countries via ship. DOE
designated two ports to receive foreign research reactor spent nuclear fuel—one on each coast. Only one shipment was accepted at the Concord Naval Weapons Station in California for transport to INL. Most of the shipments have arrived via the port at the Charleston Naval Weapons Station on the coast of South Carolina. The spent nuclear fuel is then transported to SRS either by rail or truck. Cross-country shipments from SRS to INL travel by truck.

**Impact on the Midwest:** To date, five cross-country shipments have passed through the Midwestern states:

- 2004: 2 trucks, with spent nuclear fuel from Indonesia
- 2003: 1 truck, with spent nuclear fuel from Japan
- 2001: 3 trucks, with spent nuclear fuel from Germany
- 2000: 1 truck, with spent nuclear fuel from the U.K.
- 1999: 5 trucks, with spent nuclear fuel from Romania, Slovenia, Italy, and Germany

For the cross-country shipments from SRS to INL, DOE uses major interstate highways. The department identified three possible routes, although it has only used the Blue and the Black routes (see Figure 2). The potentially affected Midwestern states are Illinois, Iowa, Kansas, Missouri, and Nebraska.

![Figure 2. Map of shipping routes for the cross-country shipments of foreign research reactor spent nuclear fuel.](image-url)
State involvement: The affected states are part of the transportation planning process for foreign research reactor shipments. They have input into decisions regarding route selection, inspections, escorts, and tracking. The states can also request that DOE schedule shipments so as to avoid key dates such as state fairs and major sporting events.

A member of Illinois's inspection and escort team monitors a shipment of foreign research reactor spent nuclear fuel. (Photo courtesy of Illinois Emergency Management Agency.)

Each state can comment on DOE’s proposed routes, although DOE makes the final decision regarding which of the three routes to use. The states also have an opportunity to review and comment on the foreign research reactor transportation plan, which DOE updates each year that shipments are scheduled. Early in the program, DOE provided a small amount of funding to each of the affected states and, when requested, provided training to first responders. In 1999, before the campaign got underway, the states participated in three planning meetings. For subsequent shipments, DOE and the states have participated in conference calls to review the plans for shipping.

State officials have access to all necessary information regarding date and time, route, packaging, and the content of each shipment. State officials also may conduct inspections upon receiving a shipment at their borders, and they also have the ability to track shipments. Lastly, DOE engages states and other affected stakeholders in a lessons learned review, which addresses any problems or concerns in preparation for future shipments.
West Valley Demonstration Project to Idaho National Laboratory

Background: West Valley is a facility that formerly reprocessed commercial spent nuclear fuel. The West Valley Demonstration Project Act of 1980 assigned DOE the responsibility for solidifying liquid high-level radioactive waste, and for disposing of West Valley’s existing inventory of high-level radioactive waste and spent nuclear fuel. DOE is also responsible for decommissioning the facility. The department has removed over 98% of the liquid high-level radioactive waste from underground tanks and solidified it into 275 glass-filled canisters. Those canisters will remain in storage at the site until DOE opens the national repository.

Impact on the Midwest: In 2003, DOE removed all the spent nuclear fuel on site and shipped two casks by rail to INL. The selected route passed through Ohio, Indiana, Illinois, Missouri, Kansas, and Nebraska. Shipments of West Valley’s high-level radioactive waste must await the construction of a national repository at Yucca Mountain.

State personnel inspect the West Valley spent nuclear fuel shipment at a stop in Indiana. (Photo courtesy of Indiana Department of Homeland Security.)

State involvement: Prior to the spent fuel shipment, DOE provided the affected states with funding for training. In addition, the states potentially affected by the route participated in planning meetings and
reviewed several versions of DOE’s plans for transportation, communication, security, and emergency management. During the shipment, the Midwestern states conducted en route inspections, escorted the shipment, and monitored its progress on TRANSCOM.

After the shipment, DOE engaged all the states in a lessons learned review to address state and other stakeholder concerns. The Midwestern states submitted lengthy comments on the shipment process and DOE’s lessons learned document. The Midwestern comments called attention to, among other concerns, the states’ need for sufficient funding and time to conduct training. Because the West Valley campaign consisted of a single shipment, the lessons learned review was mainly to aid DOE and the Midwestern states in planning future campaigns involving rail shipments.

The West Valley shipment rounds a bend in Missouri. (Photo courtesy of Ed Gray, Missouri State Emergency Management Agency.)

After the shipment, DOE engaged all the states in a lessons learned review to address state and other stakeholder concerns. The Midwestern states submitted lengthy comments on the shipment process and DOE’s lessons learned document. The Midwestern comments called attention to, among other concerns, the states’ need for sufficient funding and time to conduct training. Because the West Valley campaign consisted of a single shipment, the lessons learned review was mainly to aid DOE and the Midwestern states in planning future campaigns involving rail shipments.

Figure 3. Map of the route DOE used for its shipment of spent nuclear fuel from West Valley, New York, to Idaho.
**Oak Ridge National Laboratory to Idaho National Laboratory**

**Background:** As part of the consolidation of DOE’s spent nuclear fuel storage activities, Oak Ridge National Laboratories in Oak Ridge, Tennessee, shipped five truckloads of spent nuclear fuel to INL. The shipments took place in 2003.

**Impact on the Midwest:** For these truck shipments, the shipping route matched up with DOE’s “black” route for the foreign research reactor shipments (see page 20). Illinois, Iowa, and Nebraska were the only Midwestern states affected by these shipments. At a certain point in the route, one of the shipments rendezvoused with a foreign research reactor cross-country shipment, and the two shipments proceeded in convoy fashion.

**State involvement:** Prior to shipment, the Midwestern states engaged in a dialogue with DOE about its shipment plans. DOE assisted with conducting training in some jurisdictions along the route. The states did not receive any financial assistance from DOE for this campaign. State officials along the route inspected the shipments, at their discretion. They also provided escorts even though DOE chose to provide its own escorts, as well. The Midwestern states submitted extensive written comments on the transportation plan and held several conference calls with DOE and the other affected states. Lastly, the shipments were tracked on TRANSCOM.

*One of the Oak Ridge spent nuclear fuel shipments stops for an inspection in Illinois. (Photo courtesy of Illinois Emergency Management Agency, Division of Nuclear Safety.)*
Transuranic waste shipments

In 1979, Congress authorized the development of a repository for transuranic waste and construction began on the Waste Isolation Pilot Plant, an underground storage facility located near Carlsbad, New Mexico. Transuranic waste is any debris, material, clothing, building parts, dirt, and other materials that have radiological contamination consisting of isotopes with a higher periodic table value than uranium. This nuclear waste is generated during both civilian and defense-related operations. Though less radioactive than other wastes, transuranic waste isotopes remain radioactive for long periods of time, and thus the waste must be handled separately from other wastes.

In 1999, WIPP began accepting shipments. Eventually, the site will receive transuranic waste from 23 facilities across the United States. Much of the transuranic waste headed to WIPP is “contact-handled” waste, meaning that workers can directly handle the containers. Some of the shipments involve “remote-handled” waste, which requires that the workers be protected via the use of special shielding.

Figure 4  Highway routes for transuranic waste shipments. (DOE WIPP Web site.)
State involvement: DOE’s Carlsbad Field Office provided the impacted states with funding for planning and training along potential routes. State officials were involved in the development of the transportation plan for the shipments, as well as the selection of the routes. In fact, DOE changed the proposed route for the Argonne shipments at the request of the Midwestern states. The new route took advantage of training that had previously been conducted in connection with DOE’s foreign research reactor shipments. For each shipment, state officials have access to shipment tracking information. Several states conduct inspections and provide escorts for the shipments.

Battelle-Columbus to Hanford

Background: Battelle-Columbus is a laboratory that was used to perform various nuclear experiments, develop nuclear technology, and process nuclear fuels. The site has not been active since 1986, and has a target decommission/closure date of 2006. Clean-up procedures have either been completed or are being conducted at 15 buildings and the surrounding grounds at two different Columbus sites. Transuranic waste shipments from Battelle-Columbus involve mostly remote-handled waste. Because WIPP is not yet certified to accept remote-handled waste, and because Battelle-Columbus is on a tight closure schedule, DOE decided to ship the waste to

A shipment of remote-handled transuranic waste awaits its departure from the Battelle-Columbus site. (Photo courtesy of James Eide.)
its Hanford facility in Richland, Washington, for temporary storage pending WIPP’s receipt of the necessary permit.

**Impact on the Midwest:** DOE shipped three casks by truck from Battelle-Columbus between December 2002 and February 2003. The trucks traversed Ohio, Indiana, Illinois, Iowa, and Nebraska via interstate highway. Shipments from Battelle were put on hold in 2003 because of a legal dispute involving the State of Washington and DOE. That dispute was largely resolved in early 2005, therefore DOE intends to resume shipments from Battelle-Columbus. The shipments will be completed by the end of 2005. DOE anticipates shipping 12 more casks of remote-handled waste and three casks of contact-handled waste to Hanford. The department has not identified a receiver site for the small quantity of mixed transuranic waste at Battelle-Columbus.

**Mound to Savannah River Site**

**Background:** Ohio’s Mound facility, officially known as the Miamisburg Closure Project, is a laboratory that was formerly involved in nuclear materials research, weapons research, and land and space research. The site is located outside of Miamisburg, Ohio, and has not been active since 1995. The target decommission/closure date for the facility is 2006, at which time DOE will sell the facility for commercial use. Shipments from Mound involve contact-handled transuranic waste.

Transuranic waste from Mound is transported to the Savannah River Site in South Carolina for repackaging, after which it is shipped to WIPP for disposal. The transuranic waste at Mound—called “legacy” transuranic waste—was too bulky to fit into DOE’s TRUPACT II containers, which are used for shipments of contact-handled waste heading to WIPP. It would have been costly and time consuming for DOE to construct and operate a repackaging facility for such a small quantity of waste. Instead, DOE chose to ship the waste in larger rail containers to the Savannah River Site, which already had the necessary repackaging facilities.

Although DOE preferred to ship the railcars as general freight, the rail carriers chose to use dedicated trains. DOE ships the waste in two special rail cars called “OHOX” cars. Only one car is shipped at a time so that the second car will be available in the event of an emergency.

**Impact on the Midwest:** Nine shipments of legacy transuranic waste took place between September 2001 and September 2003. Demolition and
decommissioning activities at Mound have generated new transuranic waste that is being shipped to the Savannah River Site by rail in 2005. Ohio is the only Midwestern state affected by shipments from Mound.

**Argonne National Laboratory-East to WIPP**

**Background:** Illinois’s Argonne National Laboratory-East facility, located in the western suburbs of Chicago, was originally built as part of the Manhattan Project to conduct research that would help in the development of nuclear weapons during World War II. Since then Argonne has been utilized for peaceful purposes, including developing nuclear reactors and conducting a multitude of nuclear experiments in fields as varied as climate control and engineering. The site is still very active and produces several types of radioactive waste. DOE shipped contact-handled transuranic waste from Argonne to WIPP by truck. In fact, of the four Midwestern sites that have shipped transuranic waste, Argonne is the only one that actually shipped waste directly to WIPP. The site also possesses a small quantity of remote-handled waste that will eventually be shipped to WIPP. Lastly,
Argonne will be generating new contact-handled transuranic waste as a result of its ongoing activities.

**Impact on the Midwest:** DOE made 13 shipments from the Argonne National Laboratory-East facility from May 2003 through July 2004. The Midwestern states affected by Argonne shipments are Illinois, Iowa, and Nebraska.

A shipment of contact-handled transuranic waste is ready to depart DOE’s Argonne National Laboratory-East near Chicago. (Photo courtesy of Illinois Emergency Management Agency, Division of Nuclear Safety.)

**Missouri University Research Reactor to Argonne National Laboratory-East**

**Background:** The University of Missouri’s research reactor, located on the campus in Columbia, is used to improve nuclear medicine and to research nuclear materials and uses. It produced a small quantity of contact-handled transuranic waste during its operations.

**Impact on the Midwest:** A single shipment of transuranic waste from the university went by truck to Argonne National Laboratory-East for characterization and transport to the WIPP site. The shipment took place in May 2003. Illinois and Missouri were the only two affected states.
Future shipments

- Spent nuclear fuel and high-level radioactive waste to Yucca Mountain

Background: There are over 100 reactors in 31 states that generate approximately 20% of the nation’s electricity. Spent nuclear fuel rods from the reactors are stored in pools or dry-casks on-site, but many nuclear generating plants are running out of storage space. Recognizing the “national problem” of spent nuclear fuel and high-level radioactive accumulating at various sites throughout the nation, Congress enacted the Nuclear Waste Policy Act in 1982. The Act created the Office of Civilian Radioactive Waste Management (OCRWM) within DOE for the purpose of developing a national geologic repository for disposing of this waste. DOE researched several sites until 1987, when Congress amended the Nuclear Waste Policy Act and instructed DOE to focus solely on Yucca Mountain, Nevada, as the repository site. Yucca Mountain is located in Nye County, about 100 miles northwest of Las Vegas.

DOE conducted scientific and environmental studies to assess the feasibility of Yucca Mountain as a repository for highly radioactive waste. In 2002, Congress officially accepted Yucca Mountain as the repository site. Construction cannot begin until DOE receives a license from the NRC. Shipments to the repository were scheduled to begin in 2010, however problems with the licensing process have forced a delay of at least two more years. Concurrent with the
licensing process, DOE is working with the state regional groups and other stakeholders to begin planning the transportation program.

According to DOE’s Environmental Impact Statement for Yucca Mountain, to fill the repository to its current statutory capacity of 70,000 metric tons will require approximately 52,786 truck shipments or 9,646 rail shipments over a 24-year period. Spent nuclear fuel will be shipped either by truck or by rail, depending on each individual facility’s capabilities. In 2003, DOE selected “mostly rail” as its preferred mode for shipping to Yucca Mountain. Because there is currently no rail access to Yucca Mountain, OCRWM is pursuing the construction of a 320-mile rail line to the site. Sites that do not have direct rail access will either ship by truck or will use heavy-haul trucks or barges to move spent nuclear fuel casks to the nearest rail terminal.

**Impact on the Midwest:** DOE has not identified the routes it will use for shipments to the national repository. In 2004, CSG Midwest began a route identification project with assistance from the Midwestern Radioactive Materials Transportation Committee. The staff and the states are analyzing potential highway and rail routes from Midwestern reactors to Yucca Mountain. Available routes will be narrowed using comparison factors selected by the committee. By the end of 2005, the Midwest will present its suite of proposed routes to DOE for the department’s consideration. The states that will likely be affected by shipments of spent nuclear fuel and high-level radioactive waste are Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, Ohio, and Wisconsin (see Table 3 on page 66).

**State involvement:** Members of the Midwestern Radioactive Materials Transportation Committee are involved in helping OCRWM plan shipments under a cooperative agreement between DOE and CSG Midwest. Tasks assigned to the committee in the agreement include the following:

- As mentioned previously, under Section 180(c) of the Nuclear Waste Policy Act, DOE must provide each affected state with funding to enable it to adequately plan and train for the impending shipping campaign. Committee members, along with other stakeholders who are members of a DOE working group, are currently negotiating the details of the funding process, distribution method, allowable activities, and level of training. In addition, the committee will help develop the funding application form and accompanying guidance documents.
Figure 5. Locations of commercial and DOE sites. (Source: DOE 2002d.)
Lastly, the committee will assist in the design of a pilot program that will evaluate the proposed 180(c) funding process.

- While DOE will make the final selection of routes, the Midwestern states will analyze the potential highway and rail routes from all Midwestern plants, as well as routes from points of entry that may be used for shipments coming from Northeastern and Southern U.S. plants. The committee has agreed to a list of route comparison factors that will determine the routes with the least radiological risk to the general public. The committee will present a regional suite of acceptable shipping routes to DOE for consideration. Once DOE has determined the final suite of routes to Yucca Mountain, the Midwest will have an opportunity to review and comment on those routes.

- In addition to route identification, the committee is involved in developing a concept of operations that will provide detail for DOE’s overall transportation plan. Among other issues, the transportation plan will cover route selection, training, escorting, inspections, and tracking.

- Members of the committee are working with other stakeholders, DOE, the NRC, and other government agencies to develop a security plan that will ensure that pertinent shipping information is disseminated to those who need it. In addition, the Midwest is involved in the development of public awareness materials and will be involved in outreach activities to inform the public and address any potential concerns.

- Committee members participate in DOE’s Transportation External Coordination Working Group (TEC/WG), which is comprised of state and other stakeholder representatives. Topic groups of the TEC/WG address such issues as security, rail transport, routing, and Section 180(c) assistance. These topic groups meet both in person and on regularly-scheduled conference calls. Through the topic groups, the Midwestern states express their views on a multitude of issues and are intimately involved in the shipping campaign planning process.

Once shipments to Yucca Mountain begin, the Midwestern states will be active participants in the shipping process. It is the committee’s intention to contribute to the development and execution of a shipping campaign that safely and securely transports spent nuclear fuel and high-level radioactive waste to the national repository.
SECTION 3. INFORMATION ON THE MIDWESTERN REGION

While every Midwestern state is affected by radioactive materials transportation, generally in the form of medical or research materials, not every state is affected by shipments of high-level radioactive waste, transuranic waste, or spent nuclear fuel. The following section outlines the effect of such shipments on each Midwestern state, as well as nuclear industry information, pertinent emergency response and regulatory information, and the past, current, and future shipping campaigns that will affect each state.

Reactor location, power, and operating dates were obtained from the NRC. For each reactor, the ‘Year Opened’ date is the year the reactor started operating, and the ‘Operating Until’ date is the year the reactor’s license from the NRC will expire. Reactors may cease operations any time prior to the license expiration date or may apply for a license renewal from the NRC to continue operations beyond that date. Those reactors with a date that has passed in the ‘Operating Until’ column are no longer operating.

The amounts of spent nuclear fuel in storage and the projected shipment numbers were obtained from DOE’s Environmental Impact Statement for Yucca Mountain. All other state information was taken from CSG Midwest’s Planning Guide for Shipments of Radioactive Materials through the Midwestern States. There are several summary tables at the end of this section, including a table of state contributions to the Nuclear Waste Fund. Information on these contributions was provided by Ron Howe at the Michigan Public Service Commission.

In the map for each state, rail routes used before 1995 are represented in blue, rail routes used since 1995 are represented in purple, highway routes used before 1995 are represented in green, and highway routes used since 1995 are represented in yellow. All underlying state maps are courtesy of the Federal Highway Administration.
ILLINOIS

Commercial spent nuclear fuel in storage:

<table>
<thead>
<tr>
<th>Reactor (City)</th>
<th>Power (MW)</th>
<th>Year Opened</th>
<th>Operating Until</th>
<th>MTU to be shipped</th>
<th>Projected Shipments (Truck/Rail)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Braidwood 1 (Braidwood)</td>
<td>1161</td>
<td>1987</td>
<td>2026</td>
<td></td>
<td>1,029</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>565/94</td>
</tr>
<tr>
<td>Braidwood 2 (Braidwood)</td>
<td>1154</td>
<td>1988</td>
<td>2027</td>
<td></td>
<td>1,068</td>
</tr>
<tr>
<td>Byron 1 (Byron)</td>
<td>1163</td>
<td>1985</td>
<td>2024</td>
<td></td>
<td>617/101</td>
</tr>
<tr>
<td>Byron 2 (Byron)</td>
<td>1131</td>
<td>1987</td>
<td>2026</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinton 1 (Clinton)</td>
<td>1022</td>
<td>1987</td>
<td>2026</td>
<td>477</td>
<td>363/59</td>
</tr>
<tr>
<td>Dresden 1 (Morris)</td>
<td>700</td>
<td>1960</td>
<td>1978</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dresden 2 (Morris)</td>
<td>850</td>
<td>1991</td>
<td>2009</td>
<td>2,146</td>
<td>1,456/241</td>
</tr>
<tr>
<td>Dresden 3 (Morris)</td>
<td>850</td>
<td>1971</td>
<td>2011</td>
<td></td>
<td></td>
</tr>
<tr>
<td>La Salle 1 (Seneca)</td>
<td>1111</td>
<td>1982</td>
<td>2022</td>
<td>952</td>
<td>769/101</td>
</tr>
<tr>
<td>La Salle 2 (Seneca)</td>
<td>1111</td>
<td>1983</td>
<td>2023</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quad Cities 1 (Cordova)</td>
<td>855</td>
<td>1972</td>
<td>2012</td>
<td>1,277</td>
<td>979/172</td>
</tr>
<tr>
<td>Quad Cities 2 (Cordova)</td>
<td>855</td>
<td>1972</td>
<td>2012</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zion 1 (Zion)</td>
<td>3250</td>
<td>1973</td>
<td>1998</td>
<td>1,052</td>
<td>557/93</td>
</tr>
<tr>
<td>Zion 2 (Zion)</td>
<td>3250</td>
<td>1974</td>
<td>1998</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Statutes:
Commercial Transportation Law (Illinois Revised Statutes, chapter 625, para. 5/18c et seq.)
Hazardous Materials Emergency Act (Illinois Revised Statutes, chapter 430, para. 50/.01 et seq.)
Hazardous Materials Transportation Act (Illinois Revised Statutes, chapter 430, para. 30/1 et seq.)
Illinois Nuclear Safety Preparedness Act (Illinois Revised Statutes, chapter 420, para. 5/1 - 5/11)
Nuclear Facility Safety Act (Illinois Administrative Code, title 32, part 341)
Radiation Protection Act (Illinois Revised Statutes, chapter 420, para. 40/1 - 40/45)

Governor’s designee for advance notification (10 CFR Parts 71 and 73):  
Gary N. Wright, Assistant Director  
Illinois Emergency Management Agency  
Division of Nuclear Safety  
(217) 785-9868

24-hour emergency contact: Illinois Emergency Management Agency (Radiological Duty Officer) – (217) 782-7860

Agency responsible for emergency response: Illinois Emergency Management Agency, Division of Nuclear Safety

Agency with authority to inspect shipments: Illinois Emergency Management Agency, Division of Nuclear Safety

FRA-certified state inspectors: Hazardous materials, operating practices, signal and train control, track

Inspections: Required for all shipments of spent nuclear fuel, high-level radioactive waste, and transuranic waste (covered by fee). Inspections are also required for certain highway route-controlled quantity shipments of radioactive materials. [420 ILCS 5/8 subparagraph (a)9]

Escorts: Required for all shipments of spent nuclear fuel, high-level radioactive waste, and transuranic waste (covered by fee). Escorts are also required for certain highway route-controlled quantity shipments of radioactive materials. [420 ILCS 5/8 subparagraph (a)9]

Shipment fee: Required for all spent nuclear fuel, high-level radioactive waste, transuranic waste, and highway route-controlled quantity shipments. $4,500 for the initial rail cask, $3,000 for each additional; $2,500 for each truck shipment plus $25 for each mile over 250 miles. Fees go into the Nuclear Safety Emergency Preparedness Fund and are used to cover state expenses for inspecting and escorting shipments. [(420 ILCS 5/8) (from Ch. 111 1/2, par. 4308)]

Designated alternative highway routes: None

DOE shipping campaigns already completed/in progress:  
Spent nuclear fuel: foreign research reactor acceptance program, West Valley Demonstration Project, Oak Ridge National Laboratory, OCRWM (future shipments anticipated)  
Transuranic waste: Argonne National Laboratory-East, Battelle-Columbus, Missouri University Research Reactor
INDIANA

Commercial spent nuclear fuel in storage: None

Statutes:
Indiana Motor Carrier Act (Indiana Code Ann. Sections 8-2.1-18-36 et seq.)
Indiana Radiation Control Act (Indiana Code Ann. Sections 16-41-35-1 et seq.)
Transportation of High-Level Radioactive Waste (Indiana Code Ann. Section 10-8-8-3)

Emergency response plan:
Indiana Emergency Response Plan for the Transportation of High-Level Radioactive Materials (Indiana Code 10-14-8-4)
Memorandum of Agreement Between the Indiana State Board of Health and Indiana Department of Homeland Security
Radiological Protection Systems Management Plan, Radiological Emergency Plan Annex C

Governor’s designee for advance notification (10 CFR Parts 71 and 73):
Paul Whitesell, Superintendent
Indiana State Police
(317) 232-8248 (24 hours)

24-hour emergency contact: Indiana Department of Homeland Security, (800) 669-7362

Agency responsible for emergency response: State Emergency Management Agency

FRA-certified state inspectors: None

Inspections: None required by state

Escorts: None required by state

Shipment fee: Spent nuclear fuel and high-level radioactive waste: $1,000 per cask; Low-level waste: $100 per truck or train [IC 10-14-8-3]. Funds are deposited in the Nuclear Response Fund, which is used “to provide appropriate education, training, and equipment to emergency responders in counties that will be affected....” [IN 10-14-8-6]

Designated alternative highway routes: None

DOE shipping campaigns already completed/in progress:
Spent nuclear fuel: West Valley Demonstration Project, OCRWM (future shipments anticipated)
Transuranic waste: Battelle-Columbus
IOWA

Commercial spent nuclear fuel in storage:

<table>
<thead>
<tr>
<th>Reactor (City)</th>
<th>Power (MW)</th>
<th>Year Opened</th>
<th>Operating Until</th>
<th>MTU to be shipped</th>
<th>Projected Shipments (Truck/Rail)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duane Arnold (Palo)</td>
<td>565</td>
<td>1974</td>
<td>2014</td>
<td>467</td>
<td>324/57</td>
</tr>
</tbody>
</table>

**Statutes:**
Department of Transportation Law (Iowa Code 307.26-307.27)
Iowa Code Chapter 136C
Iowa Administrative Code 641—38.8(11)
Motor Carrier Safety Law (Iowa Code 321.449-321.450)
Nuclear Transportation Regulations (Iowa Environmental Protection Commission)
Radioactive Waste Management Law (Iowa Code 455B.331-455B.340)
Railroad Safety Regulations (Iowa Administrative Code chapters 800-830)
Transportation Law (Iowa Code 321.266)

**Emergency response plan:** Iowa Emergency Response Plan Part IV: The Iowa Radiological Emergency Response Plan (Section A: Non-Power Reactor Incidents)

**Governor’s designee for advance notification (10 CFR Parts 71 and 73):**
David L. Miller, Administrator
Homeland Security and Emergency Management Division
(515) 281-3231

**24-hour emergency contact:** Iowa State Radio (Request EMD Duty Officer), (515) 323-4360

**FRA-certified state inspectors:** Track

**Agency responsible for emergency response:** Homeland Security and Emergency Management

**Agency with authority to inspect shipments:** Department of Transportation, Office of Motor Vehicle Enforcement

**Inspections:** As needed

**Escorts:** Required for spent nuclear fuel, transuranic waste, and high-level radioactive waste shipments.

**Shipment fee:** Spent nuclear fuel, high-level radioactive waste, and transuranic waste: Truck - $1,800 per cask for each shipment, with a surcharge of $20 per mile for every mile over 250 miles traveled for the first truck of every single-cask truck
shipment; Rail - $1,300 for the first cask and $125 for each additional cask; Low-level waste: $125 per truck or train. [Iowa Administrative Code 641—38.8(11)]

The rule states that the fee must be paid unless necessary activities are covered by an alternate source of funding. Funds “shall be used for purposes related to transporting hazardous material, including enforcement and planning, developing, and maintaining a capability for emergency response.”

**Designated alternative highway routes:** I-80 and I-680 in lieu of I-29 in all directions through the Council Bluffs area; I-80 and I-35 in lieu of I-235 through the Des Moines area.

**DOE shipping campaigns already completed/in progress:**
Spent nuclear fuel: Foreign research reactor acceptance program, Oak Ridge National Laboratory, OCRWM (future shipments anticipated)
Transuranic waste: Argonne National Laboratory-East, Battelle-Columbus
KANSAS

Commercial spent nuclear fuel in storage:

<table>
<thead>
<tr>
<th>Reactor (City)</th>
<th>Power (MW)</th>
<th>Year Opened</th>
<th>Operating Until</th>
<th>MTU to be shipped</th>
<th>Projected Shipments (Truck/Rail)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wolf Creek (Burlington)</td>
<td>1165</td>
<td>1985</td>
<td>2025</td>
<td>630</td>
<td>396/63</td>
</tr>
</tbody>
</table>

Statutes:
Motor Carrier Regulations (Kansas Corporation Commission, Kansas Statutes Ann. 66-1129)
Nuclear Energy Development and Radiation Control Act (Kansas Statutes Ann. 48-1601 et seq.)
Radioactive Waste Transportation Prenotification Law
Transportation Law (Kansas Statutes Ann. Section 8-1746)
Transportation of Radioactive Materials (Kansas Administrative Rules Section 28-35-189a et seq.)

Emergency response plan: Kansas Emergency Operations Plan

Governor’s designee for advance notification (10 CFR Parts 71 and 73):
Frank Moussa, Ph.D.
Administrator, Technological Hazards
Adjutant General’s Department
Division of Emergency Management
(785) 274-1408
(785) 296-8013 (24 hours)

24-hour emergency contact: Kansas Division of Emergency Preparedness,
(Operator on Duty), (800) 275-0297

FRA-certified state inspectors: None

Agency responsible for emergency response: Adjutant General’s Department,
Division of Emergency Management

Inspections: None required by state

Escorts: None required by state

Shipment fee: None

Designated alternative highway routes: None
DOE shipping campaigns already completed/in progress:
Spent nuclear fuel: West Valley Demonstration Project, OCRWM (future shipments anticipated)
MICHIGAN

Commercial spent nuclear fuel in storage:

<table>
<thead>
<tr>
<th>Reactor (City)</th>
<th>Power (MW)</th>
<th>Year Opened</th>
<th>Operating Until</th>
<th>MTU to be shipped 2010-2033</th>
<th>Projected Shipments (Truck/Rail)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Big Rock Point (Charlevoix)</td>
<td>67</td>
<td>1963</td>
<td>1997</td>
<td>58</td>
<td>110/7</td>
</tr>
<tr>
<td>Cook 1 (Bridgman)</td>
<td>1000</td>
<td>1974</td>
<td>2014</td>
<td>1,433</td>
<td>832/149</td>
</tr>
<tr>
<td>Cook 2 (Bridgman)</td>
<td>1060</td>
<td>1977</td>
<td>2017</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fermi 1 (Newport)</td>
<td>200</td>
<td>1966</td>
<td>1972</td>
<td>523</td>
<td>377/61</td>
</tr>
<tr>
<td>Fermi 2 (Newport)</td>
<td>1089</td>
<td>1985</td>
<td>2025</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Palisades (Covert)</td>
<td>730</td>
<td>1971</td>
<td>2011</td>
<td>585</td>
<td>409/70</td>
</tr>
</tbody>
</table>

Statutes:
Department of Environmental Quality Radiation Protection Regulations (R325.5001 et seq.)
Radiation Control Act (Michigan Comp. Laws Ann. Sections 333.13501 et seq.)

Emergency response plan: Michigan Emergency Management Plan

Governor’s designee for advance notification (10 CFR Parts 71 and 73):
Captain Dan Atkinson, Commander
Special Operations Division
Michigan State Police
(517) 336-6187
(517) 336-6100 (24 hours)

24-hour emergency contact: Special Operations Division, Michigan State Police, (517) 336-6100

FRA-certified state inspectors: None

Agency responsible for emergency response: Michigan State Police, Emergency Management Division

Agency with authority to inspect shipments: Michigan State Police and Michigan Department of Environmental Quality

Inspections: En route inspections not required.

Escorts: Considered on a case-by-case basis.

Shipment fee: None

DOE shipping campaigns already completed/in progress: None
MINNESOTA

Commercial spent nuclear fuel in storage:

<table>
<thead>
<tr>
<th>Reactor (City)</th>
<th>Power (MW)</th>
<th>Year Opened</th>
<th>Operating Until</th>
<th>MTU to be shipped</th>
<th>Projected Shipments (Truck/Rail)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monticello (Monticello)</td>
<td>578</td>
<td>1981</td>
<td>2010</td>
<td>426</td>
<td>257/40</td>
</tr>
<tr>
<td>Prairie Island 1 (Red Wing)</td>
<td>522</td>
<td>1974</td>
<td>2013</td>
<td>866</td>
<td>665/103</td>
</tr>
<tr>
<td>Prairie Island 2 (Red Wing)</td>
<td>522</td>
<td>1974</td>
<td>2014</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Statutes:
Motor Carrier Law (Minnesota Statutes, Sections 221.033-221.035)
Radioactive Waste Management Law (Minnesota Statutes, Section 116C.73)
State Board of Health Law (Minnesota Statutes, Section 144.12(15))

Emergency response plan: Minnesota Emergency Operations Plan

Governor’s designee for advance notification (10 CFR Parts 71 and 73):
John Kerr, Assistant Director
Administration and Recovery
Department of Public Safety
Division of Homeland Security and Emergency Management
(651) 296–0481
(651) 649–5451 (24 hours)

24-hour emergency contact: Minnesota Duty Officer, (800) 422-0798 (Greater Minnesota only), (651) 649-5451 (Minneapolis-St. Paul Metro Area and outside the State of Minnesota), TDD: (651) 297-5353 (Minneapolis-St. Paul Metro Area), (800) 627-3529 (Greater Minnesota).

NOTE: Minnesota statutes, sections 115E.09 and 299K.07 require that the Minnesota Duty Officer be called to request state assistance and to report a petroleum or hazardous materials spill (including high-level radiological waste).

FRA-certified state inspectors: None

Agency responsible for emergency response: Minnesota Department of Public Safety, Division of Homeland Security and Emergency Management

Agency with authority to inspect shipments: Minnesota State Patrol and Minnesota Department of Health
Inspections: The state of Minnesota does not routinely inspect hazardous materials (including high-level radioactive waste) shipments. However, in the event of a major shipment campaign, the state may choose to inspect certain/all shipments.

Escorts: Depending upon the nature of the shipment, the state may choose to provide an escort.

Shipment fee: $1,000 per each vehicle carrying high-level radioactive waste in each shipment. [Minnesota Statutes Section 116C.731]

Designated alternative highway routes: None

DOE shipping campaigns already completed/in progress: None
MISSOURI

Commercial spent nuclear fuel in storage:

<table>
<thead>
<tr>
<th>Reactor (City)</th>
<th>Power (MW)</th>
<th>Year Opened</th>
<th>Operating Until</th>
<th>MTU to be shipped</th>
<th>Projected Shipments (Truck/Rail)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Callaway (Fulton)</td>
<td>1125</td>
<td>1984</td>
<td>2024</td>
<td>702</td>
<td>435/71</td>
</tr>
</tbody>
</table>

Statutes: Radiation Control Law (Missouri Revised Statutes sections 192.400 et seq.)

Emergency response plan: Missouri Nuclear Emergency Accident Plan

Governor’s designee for advance notification (10 CFR Parts 71 and 73): Ronald M. Reynolds, Director
State Emergency Management Agency
(573) 526-9101
(573) 751-2748 (24 hours)

24-hour emergency contact: Missouri Emergency Management Agency (Duty Officer), (573) 751-2748

FRA-certified state inspectors: Grade crossing, operating practices, track

Agency responsible for emergency response: State Emergency Management Agency

Agency with authority to inspect shipments: Missouri Highway Patrol

Inspections: Required for all shipments of spent nuclear fuel, high-level radioactive waste, and transuranic waste.

Escorts: Required for all highway shipments of spent nuclear fuel, high-level radioactive waste, and transuranic waste.

Shipment fee: None

Designated alternative highway routes: None

DOE shipping campaigns already completed/in progress:
Spent nuclear fuel: Foreign research reactor acceptance program, West Valley Demonstration Project, OCRWM (future shipments anticipated)
Transuranic waste: Missouri University Research Reactor
NEBRASKA

Commercial spent nuclear fuel in storage:

<table>
<thead>
<tr>
<th>Reactor (City)</th>
<th>Power (MW)</th>
<th>Year Opened</th>
<th>Operating Until</th>
<th>MTU to be shipped</th>
<th>Projected Shipments (Truck/Rail)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooper (Brownville)</td>
<td>764</td>
<td>1974</td>
<td>2014</td>
<td>452</td>
<td>272/42</td>
</tr>
<tr>
<td>Fort Calhoun (Fort Calhoun)</td>
<td>478</td>
<td>1973</td>
<td>2013</td>
<td>379</td>
<td>260/61</td>
</tr>
</tbody>
</table>

Statutes:
Motor Carrier Act (Nebraska Revised Statutes sections 75-363 et seq.)
Radiation Control Act (Nebraska Revised Statutes sections 71-3501 et seq.)

Emergency response plan: Nebraska State Emergency Operations Plan, Radiological Materials; Transportation Accident Emergency Action Plan

Governor’s designee for advance notification (10 CFR Parts 71 and 73):
Captain Julie Maaske
Nebraska State Patrol
(402) 479-4950
(402) 471-4545 (24 hours)

24-hour emergency contact: Nebraska State Patrol HQ Troop Area Communications Center, (402) 479-4921, (402) 471-4545 (alternate)

FRA-certified state inspectors: Track

Agency responsible for emergency response: Nebraska Emergency Management Agency

Agency with authority to inspect shipments: Nebraska State Patrol

Inspections: Carriers may be subject to the CVSA Level VI inspection process applicable to shipments of nuclear material. These inspections will be completed by officers of the Nebraska State Patrol Carrier Enforcement Division.

Escorts: Escorts in general are not required, unless specific federal regulations require an escort by a qualified law enforcement authority.

Shipment fee: $2,000 per cask of high-level radioactive waste (including spent nuclear fuel) or transuranic waste. [Neb. Rev. Stat. Sections 71-3523 to 71-3528]

The fees are used for “1) shipping of high-level radioactive waste and transuranic waste, including, but not limited to, inspections, escorts, and security for waste
shipment, planning, and maintenance, (2) coordination of emergency response capability, (3) education and training, (4) purchase of necessary equipment, and (5) administrative costs attributable to the state agencies which are incurred as related to the shipping of high-level radioactive waste and transuranic waste.” Fees go into the Radiation Transportation Emergency Response Cash Fund.

**Designated alternative highway routes:** Interstate 680 from Interstate 80 to Iowa (use in lieu of I-80 in the Omaha area). Temporary route due to construction on I-80 in the Omaha and Lincoln area: Highway 2 (Nebraska City to Lincoln); I-80 in the remainder of the state.

**DOE shipping campaigns already completed/in progress:**
Spent nuclear fuel: Foreign research reactor acceptance program, West Valley Demonstration Project, Oak Ridge National Laboratory, OCRWM (future shipments anticipated)
Transuranic waste: Battelle-Columbus, Argonne National Laboratory-East
NORTH DAKOTA

Commercial spent nuclear fuel in storage: None

Statutes:
Disclosure of Information Concerning Toxic or Hazardous Substances (North Dakota Cent. Code 18-01-34)
Materials Licensing Law (North Dakota Cent. Code sections 23-20.1-01 et seq.)
Transportation of Radioactive Materials Regulations (North Dakota Administrative Code article 33-10-13)

Emergency response plan:
North Dakota State Emergency Operations Plan
State of North Dakota Procedures for Coordination of Emergency Response and Recovery in Hazardous Material Incidents

Governor’s designee for advance notification (10 CFR Parts 71 and 73):
Terry O’Clair, Director
Division of Air Quality
North Dakota Department of Health
(701) 328-5188
(701) 328-9921 (after hours)

24-hour emergency contact: North Dakota Division of Emergency Management, State Radio Communications, (800) 472-2121 (in-state), (701) 328-9921 (out-of-state). Ask State Radio to page the Emergency Management REACT Officer

FRA-certified state inspectors: None

Agency responsible for emergency response: North Dakota Division of Emergency Management

Inspections: None required by state

Escorts: None required by state

Shipment fee: None

Designated alternative highway routes: None

DOE shipping campaigns already completed/in progress: None
**OHIO**

**Commercial spent nuclear fuel in storage:**

<table>
<thead>
<tr>
<th>Reactor (City)</th>
<th>Power (MW)</th>
<th>Year Opened</th>
<th>Operating Until</th>
<th>MTU to be shipped</th>
<th>Projected Shipments (Truck/Rail)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Davis-Besse (Oak Harbor)</td>
<td>882</td>
<td>1977</td>
<td>2017</td>
<td>505</td>
<td>343/64</td>
</tr>
<tr>
<td>Perry (North Perry)</td>
<td>1235</td>
<td>1986</td>
<td>2026</td>
<td>452</td>
<td>293/42</td>
</tr>
</tbody>
</table>

**Statutes:**
Hazardous Materials Transportation Act (Ohio Revised Code Ann. sections 4905 et seq.)
Radiation Control Act (Ohio Revised Code Ann. sec. 3748)
Radiation Protection Regulations (Ohio Administrative Code sections 3701:1-38, 40, 44, 46, 48, 49, 50, 52, 54, 56, 58)

**Emergency response plan:** State of Ohio’s Memorandum of Understanding for Response to Hazardous Materials Incidents; Ohio Emergency Radiation Response Plan for Transportation Accidents

**Governor’s designee for advance notification (10 CFR Parts 71 and 73):**
Carol O’Claire
Radiological Branch Chief
Ohio Emergency Management Agency
(614) 799-3915
(614) 889-7150 (24 hours)

**24-hour emergency contact:** Bureau of Radiation Protection, Ohio Department of Health, (614) 644-2727 (24-hr number)

**FRA-certified state inspectors:** Grade crossing, hazardous materials, motive power and equipment, operating practices, track

**Agency responsible for emergency response:** Ohio Department of Health and Ohio Emergency Management Agency

**Agency with authority to inspect shipments:** Public Utilities Commission of Ohio (PUCO) and Ohio Department of Health

**Inspections:** PUCO maintains a policy to inspect all shipments of highway route-controlled quantities of radioactive materials, spent nuclear fuel, high-level radioactive waste, and transuranic waste shipments. Package and vehicle/equipment inspection performed by PUCO.
Handbook of Radioactive Waste Transportation

Escorts: Considered on a case-by-case basis.

Shipment fee: Uniform State: $50 processing fee plus an apportioned fee based on hazardous materials activities. Registration required.

Designated alternative highway routes: None

DOE shipping campaigns already completed/in progress:
Spent nuclear fuel: West Valley Demonstration Project, OCRWM (future shipments anticipated)
Transuranic waste: Battelle-Columbus, Mound
SOUTH DAKOTA

Commercial spent nuclear fuel in storage: None

Statutes:
Radiation Resources and Uranium Resources Exposure Control Act (South Dakota Codif. Laws Ann. sections 34-21-1 et seq.)

Emergency response plan: State of South Dakota Emergency Operations Plan

Governor’s designee for advance notification (10 CFR Parts 71 and 73):
Kristi Turman, Director of Operations
Emergency Management Agency
(605) 773-3231

24-hour emergency contact: Division of Emergency Management, (605) 773-3231
(Duty Officer)

FRA-certified state inspectors: None

Agency responsible for emergency response: South Dakota Division of Emergency Management

Inspections: None

Escorts: None

Shipment fee: None

Designated alternative highway routes: None

DOE shipping campaigns already completed/in progress: None
WISCONSIN

Commercial spent nuclear fuel in storage:

<table>
<thead>
<tr>
<th>Reactor (City)</th>
<th>Power (MW)</th>
<th>Year Opened</th>
<th>Operating Until</th>
<th>MTU to be shipped</th>
<th>Projected Shipments (Truck/Rail)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kewaunee (Carlton)</td>
<td>511</td>
<td>1973</td>
<td>2013</td>
<td>451</td>
<td>306/51</td>
</tr>
<tr>
<td>La Crosse (La Crosse)</td>
<td>165</td>
<td>1969</td>
<td>1987</td>
<td>38</td>
<td>37/5</td>
</tr>
<tr>
<td>Point Beach 1 (Two Rivers)</td>
<td>510</td>
<td>1970</td>
<td>2010</td>
<td>876</td>
<td>653/130</td>
</tr>
<tr>
<td>Point Beach 2 (Two Rivers)</td>
<td>512</td>
<td>1973</td>
<td>2013</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Statutes:
Emergency Planning Law (Wisconsin Statutes Ann. Sections 166.01 et seq.)
Motor Vehicle Code (Wisconsin Statutes Ann. section 346.45)
Radiation Protection Act (Wisconsin Statutes Ann. sections 254.31-.45)
WI Administrative Code HFS 157.92-.94 regarding transportation of radioactive material

Emergency response plan: Wisconsin Emergency Operations Plan

Governor's designee for advance notification (10 CFR Parts 71 and 73):
Johnnie Smith, Administrator
Wisconsin Division of Emergency Management
(608) 242-3232
(800) 943-0003 (24 hour emergency no.)
24-hour emergency contact: (800) 943-0003

FRA-certified state inspectors: None

Agency responsible for emergency response: Wisconsin Emergency Management

Inspections: None

Escorts: None

Shipment fee: None

Designated alternative highway routes: None

DOE shipping campaigns already completed/in progress: None
TABLE 1.
MIDWESTERN COMMERCIAL NUCLEAR REACTORS

<table>
<thead>
<tr>
<th>State</th>
<th>Reactor</th>
<th>City</th>
<th>Type</th>
<th>Power (MW)</th>
<th>Year Opened</th>
<th>Open Until</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iowa</td>
<td>Duane Arnold 1</td>
<td>Palo</td>
<td>BWR</td>
<td>565</td>
<td>1974</td>
<td>2014</td>
</tr>
<tr>
<td>Illinois</td>
<td>Braidwood 1</td>
<td>Braidwood</td>
<td>PWR</td>
<td>1161</td>
<td>1987</td>
<td>2026</td>
</tr>
<tr>
<td></td>
<td>Braidwood 2</td>
<td>Braidwood</td>
<td>PWR</td>
<td>1154</td>
<td>1988</td>
<td>2027</td>
</tr>
<tr>
<td></td>
<td>Byron 1</td>
<td>Byron</td>
<td>PWR</td>
<td>1163</td>
<td>1985</td>
<td>2024</td>
</tr>
<tr>
<td></td>
<td>Byron 2</td>
<td>Byron</td>
<td>PWR</td>
<td>1131</td>
<td>1987</td>
<td>2026</td>
</tr>
<tr>
<td></td>
<td>Clinton 1</td>
<td>Clinton</td>
<td>BWR</td>
<td>1022</td>
<td>1987</td>
<td>2026</td>
</tr>
<tr>
<td></td>
<td>Dresden 1</td>
<td>Morris</td>
<td>BWR</td>
<td>700</td>
<td>1960</td>
<td>1978</td>
</tr>
<tr>
<td></td>
<td>Dresden 2</td>
<td>Morris</td>
<td>BWR</td>
<td>850</td>
<td>1991</td>
<td>2009</td>
</tr>
<tr>
<td></td>
<td>Dresden 3</td>
<td>Morris</td>
<td>BWR</td>
<td>850</td>
<td>1971</td>
<td>2011</td>
</tr>
<tr>
<td></td>
<td>La Salle 1</td>
<td>Seneca</td>
<td>BWR</td>
<td>1111</td>
<td>1982</td>
<td>2022</td>
</tr>
<tr>
<td></td>
<td>La Salle 2</td>
<td>Seneca</td>
<td>BWR</td>
<td>1111</td>
<td>1983</td>
<td>2023</td>
</tr>
<tr>
<td></td>
<td>Quad Cities 1</td>
<td>Cordova</td>
<td>BWR</td>
<td>855</td>
<td>1972</td>
<td>2012</td>
</tr>
<tr>
<td></td>
<td>Quad Cities 2</td>
<td>Cordova</td>
<td>BWR</td>
<td>855</td>
<td>1972</td>
<td>2012</td>
</tr>
<tr>
<td></td>
<td>Zion 1</td>
<td>Zion</td>
<td>PWR</td>
<td>3250</td>
<td>1973</td>
<td>1998</td>
</tr>
<tr>
<td></td>
<td>Zion 2</td>
<td>Zion</td>
<td>PWR</td>
<td>3250</td>
<td>1974</td>
<td>1998</td>
</tr>
<tr>
<td>Kansas</td>
<td>Wolf Creek 1</td>
<td>Burlington</td>
<td>PWR</td>
<td>1165</td>
<td>1985</td>
<td>2025</td>
</tr>
<tr>
<td>Michigan</td>
<td>Big Rock Point 1</td>
<td>Charlevoix</td>
<td>BWR</td>
<td>67</td>
<td>1963</td>
<td>1997</td>
</tr>
<tr>
<td></td>
<td>Cook 1</td>
<td>Bridgeman</td>
<td>PWR</td>
<td>1000</td>
<td>1974</td>
<td>2014</td>
</tr>
<tr>
<td></td>
<td>Cook 2</td>
<td>Bridgeman</td>
<td>PWR</td>
<td>1060</td>
<td>1977</td>
<td>2017</td>
</tr>
<tr>
<td></td>
<td>Enrico Fermi 2</td>
<td>Newport</td>
<td>BWR</td>
<td>1089</td>
<td>1985</td>
<td>2025</td>
</tr>
<tr>
<td></td>
<td>Palisades 1</td>
<td>Covert</td>
<td>PWR</td>
<td>730</td>
<td>1971</td>
<td>2011</td>
</tr>
<tr>
<td>Minnesota</td>
<td>Monticello 1</td>
<td>Monticello</td>
<td>BWR</td>
<td>578</td>
<td>1981</td>
<td>2010</td>
</tr>
<tr>
<td></td>
<td>Prairie Island 1</td>
<td>Red Wing</td>
<td>PWR</td>
<td>522</td>
<td>1974</td>
<td>2013</td>
</tr>
<tr>
<td></td>
<td>Prairie Island 2</td>
<td>Red Wing</td>
<td>PWR</td>
<td>522</td>
<td>1974</td>
<td>2014</td>
</tr>
<tr>
<td>Missouri</td>
<td>Callaway 1</td>
<td>Fulton</td>
<td>PWR</td>
<td>1125</td>
<td>1984</td>
<td>2024</td>
</tr>
<tr>
<td>Nebraska</td>
<td>Cooper 1</td>
<td>Brownville</td>
<td>BWR</td>
<td>764</td>
<td>1974</td>
<td>2014</td>
</tr>
<tr>
<td></td>
<td>Fort Calhoun 1</td>
<td>Fort Calhoun</td>
<td>PWR</td>
<td>478</td>
<td>1973</td>
<td>2013</td>
</tr>
<tr>
<td>Ohio</td>
<td>Davis-Besse 1</td>
<td>Oak Harbor</td>
<td>PWR</td>
<td>882</td>
<td>1977</td>
<td>2017</td>
</tr>
<tr>
<td></td>
<td>Perry 1</td>
<td>North Perry</td>
<td>BWR</td>
<td>1235</td>
<td>1986</td>
<td>2026</td>
</tr>
<tr>
<td>Wisconsin</td>
<td>Kewaunee 1</td>
<td>Carlton</td>
<td>PWR</td>
<td>511</td>
<td>1973</td>
<td>2013</td>
</tr>
<tr>
<td></td>
<td>La Crosse 1</td>
<td>La Crosse</td>
<td>BWR</td>
<td>165</td>
<td>1969</td>
<td>1987</td>
</tr>
<tr>
<td></td>
<td>Point Beach 1</td>
<td>Two Rivers</td>
<td>PWR</td>
<td>510</td>
<td>1970</td>
<td>2010</td>
</tr>
<tr>
<td></td>
<td>Point Beach 2</td>
<td>Two Rivers</td>
<td>PWR</td>
<td>512</td>
<td>1973</td>
<td>2013</td>
</tr>
</tbody>
</table>

Source: NRC.
TABLE 2.
SPENT FUEL IN STORAGE AT MIDWESTERN REACTORS

<table>
<thead>
<tr>
<th>State</th>
<th>Plant</th>
<th>Fuel in Storage by 2011 (MTU)</th>
<th>Projected fuel produced 2012-2033 (MTU)</th>
<th>State Total (MTU)</th>
<th>State Rank (MTU to be shipped, of 33 states)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illinois</td>
<td>Braidwood</td>
<td>1,029</td>
<td>1,258</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Byron</td>
<td>1,068</td>
<td>1,113</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clinton</td>
<td>477</td>
<td>607</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dresden</td>
<td>2,146</td>
<td>395</td>
<td>12,842</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>La Salle</td>
<td>952</td>
<td>911</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quad Cities</td>
<td>1,277</td>
<td>557</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Zion</td>
<td>1,052</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iowa</td>
<td>Duane Arnold</td>
<td>467</td>
<td>225</td>
<td>692</td>
<td>31</td>
</tr>
<tr>
<td>Kansas</td>
<td>Wolf Creek</td>
<td>630</td>
<td>648</td>
<td>1,278</td>
<td>26</td>
</tr>
<tr>
<td>Michigan</td>
<td>Big Rock Point</td>
<td>58</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cook</td>
<td>1,433</td>
<td>722</td>
<td>4,106</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Enrico Fermi</td>
<td>523</td>
<td>637</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Palisades</td>
<td>585</td>
<td>148</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minnesota</td>
<td>Monticello</td>
<td>426</td>
<td>111</td>
<td>1,747</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Prairie Island</td>
<td>866</td>
<td>344</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Missouri</td>
<td>Callaway</td>
<td>702</td>
<td>586</td>
<td>1,288</td>
<td>25</td>
</tr>
<tr>
<td>Nebraska</td>
<td>Cooper</td>
<td>452</td>
<td>310</td>
<td>1,296</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Fort Calhoun</td>
<td>379</td>
<td>155</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ohio</td>
<td>Davis-Besse</td>
<td>505</td>
<td>320</td>
<td>1,735</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Perry</td>
<td>452</td>
<td>458</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wisconsin</td>
<td>Kewaunee</td>
<td>451</td>
<td>161</td>
<td>1,793</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>La Crosse</td>
<td>38</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Point Beach</td>
<td>876</td>
<td>267</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: DOE 2002b, Appendix A.
### TABLE 3.
**PROJECTED IMPACT OF REPOSITORY SHIPMENTS ON THE MIDWESTERN STATES**

<table>
<thead>
<tr>
<th>State</th>
<th>MOSTLY TRUCK</th>
<th>MOSTLY RAIL</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Shipments</td>
<td>State Rank*</td>
<td>Total</td>
<td>Shipments</td>
<td>State Rank**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Shipments</td>
<td>Through</td>
<td></td>
<td>Shipments</td>
<td>Through</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>From State</td>
<td>State from</td>
<td></td>
<td>From State</td>
<td>State from</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iowa</td>
<td>324</td>
<td>40,539</td>
<td>5</td>
<td>57</td>
<td>4,380</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Illinois</td>
<td>5,306</td>
<td>38,549</td>
<td>6</td>
<td>861</td>
<td>8,098</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Indiana</td>
<td>0</td>
<td>17,258</td>
<td>9</td>
<td>0</td>
<td>6,560</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Kansas</td>
<td>396</td>
<td>396</td>
<td>41</td>
<td>63</td>
<td>4,253</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Michigan</td>
<td>1,728</td>
<td>1,728</td>
<td>31</td>
<td>287</td>
<td>287</td>
<td>34</td>
<td></td>
</tr>
<tr>
<td>Minnesota</td>
<td>922</td>
<td>959</td>
<td>37</td>
<td>143</td>
<td>143</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Missouri</td>
<td>435</td>
<td>19,124</td>
<td>7</td>
<td>71</td>
<td>4,560</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>North Dakota</td>
<td>0</td>
<td>0</td>
<td>—</td>
<td>0</td>
<td>0</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Nebraska</td>
<td>532</td>
<td>40,799</td>
<td>4</td>
<td>103</td>
<td>8,736</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Ohio</td>
<td>636</td>
<td>12,121</td>
<td>12</td>
<td>106</td>
<td>2,961</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>South Dakota</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>32</td>
<td>44</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wisconsin</td>
<td>996</td>
<td>996</td>
<td>36</td>
<td>186</td>
<td>186</td>
<td>38</td>
<td></td>
</tr>
</tbody>
</table>

* State rank of number of shipments passing through each state, of the 43 states receiving shipments, not including Nevada which will receive all shipments.

** State rank of number of shipments passing through each state, of the 44 states (and the District of Columbia) receiving shipments, not including Nevada which will receive all shipments.

Source: DOE 2002b, Appendix J.
# TABLE 4.
## MIDWESTERN STATE SHIPMENT FEES

<table>
<thead>
<tr>
<th>State</th>
<th>Per Shipment Fee</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illinois</td>
<td>$4,500 for each initial rail cask, $3,000 for each additional; $2,500 for each truck shipment plus $25 for each mile over 250</td>
<td>420 ILCS 5/8) (from Ch. 111 1/2, par. 4308): Fees go into the Nuclear Safety Emergency Preparedness Fund and are used to cover state expenses for inspecting and escorting all shipments of spent nuclear fuel, high-level radioactive waste, transuranic waste, and highway route controlled quantities of radioactive materials in Illinois</td>
</tr>
<tr>
<td>Indiana</td>
<td>$1,000 per cask</td>
<td>IC 10-14-8: Funds are deposited in the Nuclear Response Fund, which is used “to provide appropriate education, training, and equipment to emergency responders in counties that will be affected….”</td>
</tr>
<tr>
<td>Iowa</td>
<td>$1,300 for each initial rail cask, $125 for each additional; $1,800 for each truck shipment plus $20 for each mile over 250</td>
<td>Iowa Administrative Rule 641-38.8(11): This rule states that the fee must be paid unless necessary activities are covered by an alternate source of funding. Funds “shall be used for purposes related to transporting hazardous material, including enforcement and planning, developing, and maintaining a capability for emergency response.”</td>
</tr>
<tr>
<td>Minnesota</td>
<td>$1,000</td>
<td>Minnesota Statutes Section 116C.731</td>
</tr>
<tr>
<td>Nebraska</td>
<td>$2,000 per cask</td>
<td>Neb. Rev. Stat. Sections 71-3523 - 71-3528: The fees are used for “1) shipping of high-level radioactive waste and transuranic waste, including, but not limited to, inspections, escorts, and security for waste shipment, planning, and maintenance, (2) coordination of emergency response capability, (3) education and training, (4) purchase of necessary equipment, and (5) administrative costs attributable to the state agencies which are incurred as related to the shipping of high-level radioactive waste and transuranic waste.” Fees go into the Radiation Transportation Emergency Response Cash Fund.</td>
</tr>
</tbody>
</table>

Fees charged on spent nuclear fuel, transuranic waste, and high-level radioactive waste shipments.

Source: CSG Midwest. For an updated listing, see CSG Midwest’s Web site: www.csgmidwest.org/fees.htm.
TABLE 5.
MIDWESTERN STATE PAYMENTS INTO THE NUCLEAR WASTE FUND (in millions of dollars)

<table>
<thead>
<tr>
<th>State</th>
<th>Payments</th>
<th>Return on Investments</th>
<th>Total (Pay + Return)</th>
<th>Debt*</th>
<th>Fund Assets** (Total + Debt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illinois</td>
<td>$1,388</td>
<td>$859.2</td>
<td>$2,247.2</td>
<td>$844.3</td>
<td>$3,091.5</td>
</tr>
<tr>
<td>Indiana</td>
<td>$185.9</td>
<td>$115.1</td>
<td>$301</td>
<td>$199.9</td>
<td>$500.9</td>
</tr>
<tr>
<td>Iowa</td>
<td>$196.5</td>
<td>$121.6</td>
<td>$318.1</td>
<td>$39.3</td>
<td>$357.4</td>
</tr>
<tr>
<td>Kansas</td>
<td>$102.5</td>
<td>$63.5</td>
<td>$166</td>
<td>$0</td>
<td>$166</td>
</tr>
<tr>
<td>Michigan</td>
<td>$221</td>
<td>$133.9</td>
<td>$354.9</td>
<td>$170.5</td>
<td>$525.4</td>
</tr>
<tr>
<td>Minnesota</td>
<td>$265.4</td>
<td>$164.3</td>
<td>$429.7</td>
<td>$0</td>
<td>$429.7</td>
</tr>
<tr>
<td>Missouri</td>
<td>$193.8</td>
<td>$120</td>
<td>$313.8</td>
<td>$5.1</td>
<td>$318.9</td>
</tr>
<tr>
<td>North Dakota</td>
<td>$14.4</td>
<td>$8.9</td>
<td>$23.3</td>
<td>$0</td>
<td>$23.3</td>
</tr>
<tr>
<td>Nebraska</td>
<td>$155.8</td>
<td>$96.4</td>
<td>$252.2</td>
<td>$0</td>
<td>$252.2</td>
</tr>
<tr>
<td>Ohio</td>
<td>$344.7</td>
<td>$213.4</td>
<td>$558.1</td>
<td>$28.4</td>
<td>$586.5</td>
</tr>
<tr>
<td>South Dakota</td>
<td>$4.6</td>
<td>$2.8</td>
<td>$7.4</td>
<td>$0</td>
<td>$7.4</td>
</tr>
<tr>
<td>Wisconsin</td>
<td>$355.8</td>
<td>$220.2</td>
<td>$576</td>
<td>$0</td>
<td>$576</td>
</tr>
</tbody>
</table>

* Funds owed for fuel burned before 1983 but not yet paid by utilities (as allowed by DOE contract).
** Assets before withdrawals for expenditures by DOE.

Source: Howe.
REFERENCES


The Nuclear Waste Policy Act (Public Law 97-425, as amended by Public Law 100-203).

Handbook of Radioactive Waste Transportation


———. 2003. Why WIPP?


———. Title 10, Code of Federal Regulations, Chapter 1, Part 71, Packaging and Transportation of Radioactive Material.

———. Title 10, Code of Federal Regulations, Chapter 1, Part 73, Physical Protection of Plants and Materials.
ENDNOTES

1The source of funding notwithstanding, CSG Midwest retains editorial control over all publications produced under the cooperative agreement, including this Handbook. Unless otherwise noted, the opinions expressed herein are those of the authors, not necessarily DOE’s.

2A very preliminary step is an assessment of the potential environmental impacts of shipments. DOE program managers are responsible for conducting such assessments. According to DOE, because shipments are always connected to some other action (e.g., site cleanup), the environmental impacts of transportation should be considered in the assessments of those broader program actions (DOE 1998).

3“it is DOE policy that, notwithstanding the exemptions available through the national security provisions [Title 49, Code of Federal Regulations (CFR), 173.7(b)] shipments under this provision will comply with the requirements of 49 CFR, parts 100-185, except those that infringe on maintenance of classified information” (DOE 2004a, p. 3).

4Association of American Railroads.

5DOE 2005.

6DOE’s decision to award grants three years prior to the start of shipments is, in part, a response to the strong recommendation of the states in the Midwest and the other regions.

7DOE 2004b.

8The term “transuranic” means “waste containing more than 100 Nanocuries of alpha-emitting transuranic isotopes per gram of waste, with half lives greater than 20 years, except for (A) high-level radioactive waste; (B) waste that the Secretary has determined, with the concurrence of the Administrator, does not need the degree of isolation required by the disposal regulations; or (C) waste that the Nuclear Regulatory Commission has approved for disposal on a case-by-case basis in accordance with part 61 of title 10, Code of Federal Regulations” (WIPP Land Withdrawl Act, Sec. 2(18))

9According to the Coalition on Affordable and Reliable Energy (www.careenergy.com) and the Nuclear Energy Institute (www.nei.org), 31 states derive at least part of their energy from nuclear sources, varying from 7.9% in Washington to 74.6% in Vermont. Colorado, Delaware, Hawaii, Idaho, Indiana, Kentucky, Maine, Montana, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, Rhode Island, South Dakota, West Virginia, and Wyoming may inadvertently get part of their energy from nuclear sources by purchasing energy from a neighboring state, but they do not produce any of their own nuclear energy.