

## **Transportation of Low-Level Waste from Fernald, Ohio – Missouri's Lessons Learned**

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### **ABSTRACT**

Between June 2005 and May 2006, Missouri experienced over 2,000 truck shipments of low-level radioactive waste from clean-up activities at the Department of Energy's Fernald Closure Project in Ohio. These shipments traveled on Interstates 70 and 44, through the cities of St. Louis, Kansas City, Springfield and Columbia. Near the end of the shipping campaign on Interstate 44, an incident occurred that totaled one truck, and required medical attention for the shipment's driver as well as relocation of the containers of radioactive waste to another truck before continuing. This paper will primarily focus on lessons learned following the incident, and will also address lessons learned during the entire shipping campaign. Lessons learned include: (1) Early coordination needs to be improved – this could have helped avoid the incident that occurred. (2) The route selection process needs improvement, so that DOE can justify the route selected, not their contractor. (3) Improvement is needed in coordination of media contacts, as the media focused on the lack of notification of local emergency responders. (4) During the incident, public health and safety was not compromised, as the incident did not result in any release of radioactive material. (5) While the truck that ran into the shipment was totaled, and it is a wonder no one was killed, the shipment truck appeared to have relatively minor damage. (6) The contractor provided a rapid and appropriate response, as they sent fresh drivers and a new tractor and trailer so the shipment could continue. (7) The off-site transfer of casks was successfully accomplished with equipment readily available near the site of the incident.

Missouri learned quite a lot through the Fernald campaign that may benefit other states, DOE and their contractors in future shipping campaigns. The purpose of this paper is to share the lessons learned by the State of Missouri during a radioactive waste shipping campaign of significant size and duration. The good news is that while an incident did occur, no radioactive material was released and no one was seriously injured. I hope that sharing Missouri's experience will result in improved communication and coordination between the states involved in radioactive waste shipments, the Department of Energy, and their contractors.

### **Why is the Missouri Department of Natural Resources Involved?**

Responsibilities for radioactive materials planning and security in Missouri is divided among several state agencies. The Missouri Department of Natural Resources deals with policy issues related to transportation and disposal of radioactive materials. The department coordinates with our Environmental Emergency Response program; the Missouri Highway Patrol, which provides escorts for high-level and spent nuclear fuel shipments; the State Emergency Management

Agency, which provides training and manages the state's emergency management plans; and the Department of Health and Senior Services, which provides radioactive inspections of escorted shipments.

### **Brief History of Fernald Wastes**

To fully understand Missouri's interest in the shipments from Fernald, Ohio through Missouri, a bit of a history lesson is in order. These wastes began as Belgian Congo ore that was milled by the Mallinkrodt Chemical Co., in St. Louis, Missouri during the 1940s and early 1950s, and shipped to Fernald in the 1950s. The Belgian Congo ore is many times more radioactive than any ore mined in the United States. Therefore, only 15% to 30% of the material contained in each cask was mine tailings – the rest was a concrete grout mixture that helped consolidate the tailings and allowed the shipments to meet the definition of low-level waste. The wastes from Silo #1 and Silo #2 were shipped to Texas, where the receiving facility had a license to provide only temporary storage. This means it is possible that these wastes may some day travel back through Missouri on their way to another temporary storage facility.

### **Over 2,000 shipments traversed Missouri in 2005 – 2006**

From June 2005 to May 2006, the Department of Energy and their contractors shipped over 2,000 trucks of low-level radioactive waste out of Fernald, Ohio. The wastes were mining residues in dry powder form. Wastes from Silo #3 were transported in soft-sided "Supersaks," while wastes from Silos #1 and #2 were mixed with concrete grout and shipped in carbon steel containers.

Shipments from Fernald Silo #3 traveled through Missouri on Interstate 70 on their way to disposal in Utah, while waste from Silos #1 and #2 traveled on Interstate 44 enroute to temporary storage in Texas. Shipments on I-70 traversed St. Louis, Columbia and Kansas City, while the I-44 shipments crossed St. Louis, Springfield and Joplin.

This paper will focus on Lessons Learned during the Fernald shipping campaign, including those lessons related to the incident that occurred on April 28, 2006 on I-44 near Cuba, Missouri.

### **Seven Lessons Learned During Shipment Campaign**

The lessons learned from this campaign include:

1. Better early coordination is needed between all parties.
2. Improvements are needed in the route selection process.
3. Better coordination of media contacts is needed.
4. In the event of an incident, public health and safety were not compromised.
5. The tractor and trailer received comparatively little damage during the incident.

6. The contractor provided rapid and appropriate response following the incident.
7. The transfer of casks to a new trailer at a remote site was successfully accomplished with readily available equipment.

### **Improved Early Coordination Needed**

It was unclear who had responsibility for notifying the states of the start of the campaign. DOE initially notified the state regional associations, thinking this was sufficient notification to the states. However, the regional groups thought that DOE had also notified the states, and did not forward the information.

Information about the campaign, including appropriate emergency response activities, was not easy for states to obtain prior to the beginning of shipments. During a conference call the week before shipments started, states finally learned that should radioactive material spill during shipment, the appropriate action was to wet the area down with water. This is the type of information states need if they are to provide information to local responders. The Fact Sheets provided prior to initiation of shipments were good, but seemed to be designed more for distribution to the general public, as they did not contain information needed by emergency responders.

Responsibility for notification of local emergency responders was not clearly identified - states later learned this was their responsibility. Local media contacted local fire chiefs, and used the fact that local emergency responders were unaware of the shipments as the primary issue in initial reports. A television report regarding the first shipment on I-44 provided the estimated arrival time and shipment route information. The media provided a photo of a truck with the same type casks as the Fernald shipments, and the approximate time the first shipment would arrive at a particular bridge in the St. Louis area. While no laws may have been violated, this practice does not appear to be good policy for future shipments.

Training for local emergency responders was held in Missouri by DOE on the day the first shipment was to pass through St. Louis and Springfield on I-44, and after shipments were scheduled to begin moving on I-70 through St. Louis, Columbia and Kansas City.

States occasionally learned the status of the campaign's initial progress through the media, as the campaign started slowly. After a few weeks, DOE's contractor began sending a weekly e-mail status report to all parties, which was quite helpful. The status report did not indicate the date of the final shipment, which states learned of through media reports. States would prefer to receive such notices directly from DOE or their contractor.

### **Route Selection Process Needs Improvement**

Route selection has been a contentious issue for Missouri for a number of years. For example, the computer model used by DOE, the Transportation Routing Analysis Geographic Information System (TRAGIS), uses state specific accident data, and does not consider route specific accident data. Missouri believes that any comprehensive comparison of east-west routes on I-70

or I-80 must include accident data, as the number and severity of accidents on I-70 appears to increase regularly.

Any proposed route must meet the objective of 49 CFR 397 Subpart D requiring carriers to “ensure that the motor vehicle is operated on routes that minimize the radiological risk.” DOE and the carrier cannot meet this standard simply by properly packaging the material – the selection of the route itself must consider such factors as accident rates, time in transit, and population density.

In trying to recreate the selected route using TRAGIS, the Council of State Governments Midwest determined that the selected route was not the shortest, quickest, commercial route or highway route controlled quantity route determined by TRAGIS, and that the route chosen had the highest population, the greatest distance, and the fourth longest travel time. The only rationale that Missouri could identify for the selected route was avoidance of Iowa and its fee of \$125 per truck for low-level waste. DOE’s only justification for this route was that it had been used previously for low-level shipments.

DOE allows the contractor to select the route once they have been selected as the carrier for the shipment. Naturally, in attempting to present a financially attractive bid to DOE, the contractors might be tempted to select the route with the lowest state fee per shipment. This practice does not match statements in DOE’s transportation plan for the Fernald shipments that the planned route on I-70 was selected “in consideration of the requirements of 49 CFR 397 Subpart D, Routing of Class 7 (Radioactive) Materials, for minimization of radiological risk.” DOE needs to be able to justify route selection for transportation campaigns, using their own computer models.

Communication between DOE, their contractors, and the states and other interested parties prior to commencement of shipments was somewhat limited, as this was a low-level shipping campaign. Had states been asked for more input before or during the campaign, Missouri would have recommended against any shipments on the I-44 corridor on Friday afternoons when road construction required lane closures. This route is very heavily traveled in the warmer months, when people from St. Louis and Illinois attempt to reach their vacation homes at Lake of the Ozarks, in addition to regular interstate traffic.

### **Coordination of Media Contacts Needs Improvement**

While federal regulations may not require extensive coordination with the states and tribes for low-level waste shipments, more regular, routine communication on large shipping campaigns could allow a freer exchange of information between the parties.

Early attention by the media focused on the fact that local emergency responders were not notified of the shipment campaign prior to initiation of shipments. In fact, DOE’s contractor informed the media that the states are responsible for notification of local emergency responders.

However, after a couple of thousand trucks had traveled through the state without incident, the media was less focused on this issue, as no media outlets reported the incident on I-44 when it occurred. When reporting on the end of the shipment campaign a few weeks after the incident, the St. Louis Post-Dispatch briefly mentioned that an accident had occurred without release of radioactive material.

### **Public Health and Safety Not Compromised During Incident**

An accident involving a Fernald shipment occurred on April 28, 2006 on I-44 near Cuba, Missouri. The driver of the shipment was taken to a local hospital by ambulance. Missouri Highway Patrol officers responded to the incident, and following a Level VI Commercial Vehicle Safety Alliance (CVSA) inspection, determined there was no leakage of radioactivity from the casks. The Department of Health and Senior Services and the State Emergency Management Agency were notified of the incident by the shipment contractor.

As you can see from these photos (below), the tractor trailer that collided with the shipment received considerable damage. The shipment was stopped on the interstate, as construction activities resulted in a lane closure and traffic delays, and this truck did not stop in time. Fortunately, no-one was in the sleeper compartment at the time of the collision, as the truck's load of steel moved forward into the driver's compartment.



**Figure 1. Damage to tractor that rear-ended Fernald shipment.**



**Figure 2. Steel from the trailer shifted into the driver's compartment.**

### **Integrity of Tractor and Trailer Post-Incident**

From the photos below, you can see that the damage to the shipment trailer was not nearly as extensive as damage to the truck that rear-ended the shipment. The trailers are built to withstand more force than an ordinary trailer, which proved effective in this case.



**Figure 3. Damage to Fernald trailer.**

The driver of the shipment was treated for a head wound at a local hospital, and received 7 stitches. No other injuries were reported. The damaged shipment trailer was stored inside a warehouse at the local wrecker yard, to reduce any potential alarm by the public.

### **Rapid and Appropriate Contractor Response**

The contractor notified the Department of Health and Senior Services and the State Emergency Management Agency. The Department of Health sent staff to observe relocation of the casks from the damaged trailer to the new trailer provided by the contractor. Visionary Solutions provided a replacement tractor rig and fresh drivers, so that the shipment could continue.

### **Off-Route Transfer of Casks Successfully Accomplished Without Further Incident**

When these casks are loaded initially, and when they reach their destination, the contractors have equipment in place that can lift such heavy weights. The containers are approximately 6 1/2 feet tall, just over 6 feet across, and when filled have a maximum weight of 21,950 pounds. Using two tow trucks, the contractors were able to successfully relocate the casks without use of a crane. The move required about 2 1/2 hours to complete.

Once the casks were relocated, staff from the Department of Health conducted a radiological inspection, and verified that no radiation leakage occurred and the shipment was in compliance with all federal regulations. Within 30 minutes from relocating the casks, the shipment was on its way south to Texas.



**Figure 4. Transfer of casks to new trailer using 2 tow trucks.**

### **Summary of Lessons Learned During Campaign**

- Coordination and communication between all parties involved needs to be improved.
- Route selection should be justified by DOE, not by the contractor.
- Coordination of media contacts needs improvement, as confusion resulted from lack of coordination early in the campaign. While media attention was a concern early in the campaign, media coverage was not a concern regarding the incident.
- During this low speed accident, no release of radioactive material occurred, and public health and safety were not compromised.
- Damage to the shipment's tractor and trailer was minimized, due to extra heavy duty construction.
- The contractor promptly addressed the need for new equipment and drivers, as well as the transfer of the casks, following the incident.

Thank you to Keith Henke, Division of Community and Public Health, Missouri Department of Health and Senior Services, for use of the photographs contained in this paper.