
Transportation of Radioactive Materials in Colorado

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INTRODUCTION

In October, 1988, the Governor of Idaho refused to allow Rocky Flats to ship any more rail cars of nuclear waste to Idaho because DOE and Congress have failed to open a permanent disposal site in New Mexico. DOE's Waste Isolation Pilot Plant (WIPP) which is located 26 miles southeast of Carlsbad, N.M., is where radioactive waste will be buried 2,150 feet underground in salt beds. However, the WIPP won't meet EPA standards for a permanent disposal site until 1993. Is this situation similar to the garbage barge from New York, or is the situation more under control?

In 1984 Denver made national headlines when a truck spilled torpedoes in the infamous mousetrap or interchange between Interstates 70 and 25. This situation was frightening because ... "Getting a response from the appropriate personnel took three hours" (McGraw, Den. Post, 1988). Could this incident occur today? What are the laws concerning the transport of radioactive and hazardous materials? and How much is being transported across Colorado on a daily or yearly basis?

This paper will answer these questions about transportation of radioactive waste. The main issues include: regulations, liability, safety, highway and rail routing.

1. REGULATIONS

The legal and political issues regarding the transportation of radioactive wastes have paralleled those associated with fixed nuclear facilities. The Nuclear Waste Policy Act of 1982 (NWPA) governs the disposal of the nation's radioactive wastes. The act authorizes the development and operation of a repository for the disposal of spent nuclear fuel, and a transportation system to move the waste to the repository. The goal of DOE is to transport waste safely and economically. The principal responsibility for regulating the transportation of hazardous materials rests with the federal government through the Commerce Clause of section 8 of the U.S. Constitution (Transportation of Hazardous Materials, 1983). Both interstate and intrastate movements are included in this regulation.

The Transportation Safety Act (also referred to as HMTA) authorizes the Secretary of Transportation to regulate the safe shipment of hazardous materials. The basic regulations are found in 49 CFR 100-199. Major highways are the preferred routes because they allow for the fastest transport.

The HMTA establishes policies and procedures for shipping spent fuel, DOT regulations implement the HMTA, and DOE shipments (including NWPA spent fuel shipments) comply with DOT requirements. DOT controls routing, as the HMTA allows DOT to preempt any state or local requirements if they are inconsistent with federal statutes. The requirement that state and local regulations be

consistent with federal laws could seriously curtail the ability of local jurisdictions to control nuclear waste shipments within their borders (FitzSimmons, 1987).

Currently the burden of policing, and inspecting vehicles carrying radioactive waste, as well as funding of emergency responders falls upon local jurisdictions, while routing is controlled by the federal government. Colorado can join in the Pacific States Agreement (PSA) on transportation of radioactive material. Washington, Idaho, and Oregon are states that have adopted the PSA to urge the DOE and Congress to assist in funding local police, fire, and other emergency responders to the demands of transporting radioactive materials.

The DOT HM-164 objectives for highway routing of radioactive materials are: (1) uniform and consistent route selection rules, and (2) route selection based on a valid measure of reduced public risk. The overall risk of a route is dependent upon: accident rates, duration of travel, traffic patterns, population density, road conditions, driver training, and time of travel. The goal for transporting high level nuclear wastes is to reduce risk by reducing the amount of time the radioactive material is in transit (FitzSimmons, 1987). Interstate highways are the federal government routing choice to provide the quickest means for crossing the country. This requires trucks generally to follow the most direct interstate route and to avoid large cities when an interstate bypass or beltway is available. Also, state governors must receive timely notification before spent fuel is transported into their state.

The requirements for packaging and labeling hazardous wastes are outlined in DOT regulations (49 CFR-172). A hazardous wastes manifest is required so that shipments can be tracked from their point of generation to their final destination--the so called "cradle-to-grave" system. Federal regulations require EPA transporter identification number as well as compliance with DOT regulations. The Federal Motor Carrier Act requires trucks with hazardous cargoes to not go through cities or near heavily populated areas, tunnels, narrow streets, or alleys.

In 1907 the railroad industry set up the Association of American Railroads (AAR) to advise and assist in railroad operations. The AAR acts as an outside entity to inform and inspect railroad compliance with the hazardous materials regulations CFR-40. These are the same regulations that the Federal Railroad Association (FRA) requires for compliance in transporting hazardous materials. However, only the FRA can enforce the regulations by issuing fines or restrictions against a railroad company. Both the AAR and the FRA inspect the tank cars for securement, markings, and shipping records.

2. LIABILITY

The Nuclear Waste Policy Act defines the indemnity on the part of DOE in the event of a high-level radioactive material accident. A court would have to determine if DOE were liable in the event of an accident.

The Atomic Energy Act of 1954 addresses liability in relation to nuclear energy matters in the section known as the Price-Anderson Act. Price-Anderson establishes a system for paying for damages by directing the NRC to require its licensee to be able to pay damages (FitzSimmons, 1987).

The Price-Anderson Act does not provide a universal remedy to financially recover the actual out of pocket expenses.

In the event of a radioactive material accident the Motor Carrier Act designates the generator to have the financial responsibility for an accident during transport.

3. HIGHWAY ROUTING

Interstate 25 and Interstate 70 from the Kansas border to Denver are federally approved routes for the shipment of nuclear wastes. All trucks carrying radioactive cargo are prohibited from Denver's central business district during peak commuting hours of 6:30-8:30 AM and 4:00-6:00 PM. Also, they are prohibited from using the elevated portion of I-70, a populated area north of Denver between Colorado Boulevard and Washington Street.

Interstate 70 (I-70) west of Denver, winds through some of the most dramatic and difficult-to-navigate mountains in the Nation. Steep grades, sharp turns, and unpredictable mountain weather which can reduce visibility to zero. During 1984, I-70 was closed for more than twelve days, and the runaway truck ramps (located between Denver and Silverthorne) were used 34 times (FitzSimmons, 1987). DOE's assessment of I-70 failed to take into account the occurrence of snowstorms and associated rock, mud and snowslides.

Trucks hauling radioactive cargo must use Loveland Pass because they are banned from the Eisenhower Tunnel a 1.7 mile tunnel under the Continental Divide. Loveland Pass rises in elevation to nearly 12,000 feet, and is very narrow, windy, and twisting. "U.S. 6 over Loveland Pass was closed 16 times during the winter of 1984-85, once for nine days" (FitzSimmons, 1987). Traffic is extremely heavy during the winter ski season on both Loveland and Vail Pass. West of Vail, Dowd Junction is a site of many accidents due to the peculiar combinations of weather, road/bridge configuration and river confluence.

Nuclear shipments from Rocky Flats will use State Highways 93 and 128 and U.S. 36 (Boulder Turnpike) to reach I-25. Truckers coming into Denver from the east on I-70 will use I-270 and I-76 to reach I-25 northbound or use I-225 to get to I-25 heading south. Therefore, they will avoid "the mousetrap" of the I-70 and I-25 interchange.

3A. TRUCK SHIPMENTS

DOT estimates that 5-15 percent of all trucks on the road at any given time carry hazardous materials (National Transportation Safety Board, 1981). The American Automobile Association estimates that 2 billion tons of hazardous materials are transported by highway vehicles annually. The radioactive shipments in Colorado are generally low level--clothing, equipment, and soil.

In 1987, Colorado shipped 3,570 cubic feet of radioactive refuse to a facility in Nevada. The waste comes from research facilities, hospitals, industry, and nuclear power plants. The full extent of shipments is still unknown because the military will not tell local emergency agencies when to be on alert and what kind of hazardous materials are being shipped. To justify the secrecy of transport, the military alludes to the potential threats by terrorists.

3B. TRUCK SAFETY

The Bureau of Motor Carrier Safety is understaffed and underfunded and tends to allow companies to continue to ship even if they do not comply with safety rules (FitzSimmons, 1987). There is a disappropriation of the federal funds between monitoring aviation... \$4 billion for 2,600 aircrafts and monitoring trucking... \$14 million for 210,000 trucks (1985 data). Fewer inspections are made and the investigations are made at random rather than by singling out potentially dangerous vehicles. Among the problems is that the vast majority of interstate truck accidents happen to trucks from other states. Also, there is no national license or registration, or required safety training for drivers.

Lt. Allan M. Turner of the Colorado State Patrol said "trucks transporting gasoline are a problem because there are so many of them, and their containers are not as safe as those used to transport nuclear materials." A rupture of a truck transporting anhydrous ammonia, a common fertilizer used by farmers, could be potentially deadly.

3C. HIGHWAY IMPROVEMENTS

Last year a board of 43 Denver-area cities and counties approved a \$11.5 billion road-building plan which includes adding 3,600 miles of highway lanes. The Denver Regional Council of Governments transportation committee has recommended a \$242 million improvement package for metro area highways. The highway improvements include reducing the congestion at the "mousetrap", the interchange for I-25 and I-70, widening of interstates and a starting a beltway around Denver.

4. RAIL

A rail car can ship three to five times as much as a truck. This increase in capacity decreases the number of shipments, thereby reducing the risk of transportation. The problem with rail transport is that there are few alternative routes for the cargo to travel in the event of an emergency.

Rocky Flats, located 16 miles northwest of Denver ships about 55 boxcars (2 million pounds) each year by the Denver and Rio Grande railroad to Idaho National Laboratories near Idaho Falls, Idaho. The tracks cross the north-south highway between Golden and Boulder. The Denver and Rio Grande ships nitric acid to Utah for arms manufacturing.

Rocky Flats rail shipments are made on the Denver and Rio Grande east-west tracks that cross Colorado 93, the north-south highway between Boulder and Golden. The governor of Idaho refused the boxcars of waste in October 1988 to force the Energy Department to open the Waste Isolation Plant in New Mexico. This plant will be the nation's first permanent repository for low-level nuclear waste. Rocky Flats waste will account for more than 70 percent of the debris to be buried in salt deposits 2,150 feet underground.

4B. TRAIN CAR SAFETY

The AAR and the FRA inspect the tank cars for securement, markings, and shipping records. Accidents generally are only a few minor leaks around valves, which the railroad personnel are equipped to handle. The problems the railroads had in the late 70's and early 80's with drug use have been alleviated for the most part with "Operation Red Box," which is a program where peers can turn in co-workers without fear of loss of job or position.

4C. RAIL CONDITIONS

The rail lines in Colorado are in the process of being upgraded. The rail conditions are considered to be good by AAR standards.

5. INCREASE IN SHIPMENTS

It is estimated that the number of hazardous materials shipments will increase from 250,000/day to 500,000/day during the 1980's (National Transportation Safety Board, 1981). New hazardous materials are being added daily to the thousands already in transport. The Occupational Safety and Health Administration (OSHA) estimates that 1 million compounds are manufactured yearly with 500 new compounds a year. (Transportation of Hazardous Materials, 1983)

The proposed low-level radioactive waste disposal Uravan site located 50 miles south of Grand Junction, Colorado, would handle the 140,000 tons of tailings from Denver's old radium mills. The Uravan site mill tailings produce more than 100 times the radiation that would be generated by the waste from the 44 Denver sites. The waste will be shipped from Denver to a site southwest of Salt Lake City, Utah until the Uravan site is approved and open. Plans are to ship the waste by rail to Utah starting in July 1989 and finish in September 1992.

The Energy Department has been forced to delay the scheduled September opening of the Waste Isolation Plant (WIPP) in New Mexico. The \$800 million underground repository would be the nation's first permanent dump for plutonium-contaminated wastes generated by the Energy Department's nuclear weapons production complex. The Energy Department wants to open the dump for a five-year experimental period before the department could meet EPA radioactive disposal standards. Legislation withdrawing the 10,250 acre site from public domain must pass before the facility can open. Idaho Gov. Cecil Andrus will reimpose the embargo of Rocky Flats shipments on Sept. 1, 1989 if the WIPP facility is not accepting radioactive waste.

More than 1,000 truckloads of radioactive waste will be transported through Colorado from the U.S. Nuclear Waste and treatment facilities to the WIPP facility. Most of the waste will be mid to low level waste from Rocky Flats and the Idaho research and storage facility. Some of the waste transported through Colorado to WIPP will be mid-level waste shipments from the Hanford Reservation in Washington. Eighty percent of the nuclear wastes in DOE's proposed program (WIPP) will be transported right along the Front Range where nearly 3 million people live.

6. SAFETY (packaging, inspections, etc.)

"Safety questions concerning the transportation of nuclear waste cover a range of issues and are complicated by waste transport accidents being low probability, high consequence events for which no historical accident data exists" (FitzSimmons, 1987). NRC estimates the probability of a serious radiation release from a nuclear transportation accident would occur only once in every 25 billion years. Accidents of HLNW during shipment account for less than 3% of approximately 180 million hazardous waste shipments per annum in the United States. It is difficult to evaluate the implications of accidents involving radioactive materials for the secure packaging has kept the accidents under control.

The federal government relies on the secure packaging of nuclear waste shipments to insure the safety of those shipments and to permit their traveling in general commerce. The key to safe transport of nuclear waste is effective package design or cask that provides all of the protection needed to assure public safety.

By relying on package design, the problems of having specially trained handling personnel, and special drivers, vehicles, and highways are eliminated. If an accident occurs, the carrier must notify the shipper and DOT, isolate the spilled material from people, wait for qualified personnel to arrive, give disposal instructions, and then evacuate and clean the affected areas. (FitzSimmons, 1987)

To test the durability of the casks to transport radioactive material DOE deliberately placed a cask in the path of a 120-ton locomotive traveling about 80 miles per hour. Also, a cask aboard a truck moving at about 80 miles an hour was deliberately crashed into a concrete wall. The results of the tests confirmed that there would not be a release of spent fuel from the casks.

8. CONCLUSION

There needs to be stronger state enforcement programs to produce safer trucking. Trucking safety could benefit from a national license or registration, and required safety training. Truck safety and inspections are expensive but when considering that what is being transported can be deadly like anhydrous ammonia, the risk is too great to ignore.

Rail shipments of radioactive waste would be the most efficient method of transport because one rail car can ship three to five times as much as a truck.

Radioactive shipments are safe for transport since the "cask" prevents the waste from escaping. Yet approximately 80 million people--nearly one-third of the population of the U.S.--would regard themselves as being at risk from HLNW transportation accidents (FitzSimmons, 1987). However, the possibility of a HLNW accident is unlikely. The laws have required stringent conditions to be met

as well as emergency plans to be made to handle this situation...the problems Denver experienced with the torpedoes in the mousetrap would not occur today.

The public concern over the shipments of radioactive waste is aggravated by the problems of the regulations which do insure safety but do not promote the process of what to do with the wastes. It has been eight months since Idaho Gov. Cecil Andrus refused the Rocky Flats radioactive waste shipments. Since that time he has relented and agreed to allow only two boxcars a month to be shipped until Sept. 1, 1989. Rocky Flats has been on the brink of shutdown because it can't handle its own waste. The Energy Department hopes to open WIPP in August. However, the opening may be delayed because of questions on whether the design is adequate and whether the repository was built as designed. Also, the facility can not open until legislation passes to remove the WIPP site from public domain status. Three months is not enough time to have either the WIPP facility in experimental operation and/or Idaho accepting more waste. Unfortunately, the analogy of the garbage barge from New York may be used again to describe the problems Colorado is facing concerning the shipment of radioactive materials.

The old adage "you can't put the cart before the horse" can be expanded to include "you have to have a place for the horse to pull the cart or what is the point of having the horse pull the cart." First radioactive waste was shipped to Idaho for "temporary" storage. Will the radioactive waste be in transport until a time when it can be stored permanently? Will the waste be shipped to New Mexico for "experimental" storage until it can be determined if it can be "permanently" stored at WIPP?

Two insights on these questions are the following; (1) there is no such thing as permanent, change is inevitable and (2) see the problem as solved and solve the problem by engineering applications and legislation.

INFORMATIONAL INTERVIEWS

Alber, Ron, Inspector, Association of American Railroads.

Low, Don, Accident Specialist, Union Pacific Railroad.

Marshall, John H., Captain, Hazardous Materials, City and County of Denver Fire Department.

Pratt, Roger, Emergency Preparedness Ass't, Office of Emergency Preparedness for City and County of Denver.