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TRANSPORTATION OF SPENT NUCLEAR FUEL: THE NEED FOR A FLEXIBLE REGULATORY SYSTEM

Sheila Bond Giglio*

I. INTRODUCTION

Spent nuclear fuel is a waste product produced in generating nuclear power.1 Approximately 1,500 tons are generated annually by the nuclear power plants in the United States.2 Highly radioactive,3 it must be permanently isolated from people and the environment.4 Although much of this spent fuel is presently stored in on-site water storage facilities,5 the need to transport it to storage facilities away from the reactor sites will increase as new power plants become operative and on-site storage capacity decreases.6

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1 Garey & Kearney, American Federalism and the Management of Radioactive Wastes, 42 PUB. AD. REV. 14, 15 (1982). Spent nuclear fuel consists of the elements which are removed from the reactor core when the build-up of fission by-products interferes with the efficiency of the nuclear reaction. FINAL ENVIRONMENTAL STATEMENT ON THE TRANSPORTATION OF RADIOACTIVE MATERIALS BY AIR AND OTHER MODES, NUREG-0170, ch. 7 (1977)[hereinafter cited as NUREG].


3 See NUREG, supra note 1, at 7.1.

4 See Garey & Kearney, supra note 1, at 15.

5 Approximately 10,000 tons of spent fuel are now in on-site storage facilities. See Walker, supra note 2, at 43.

6 Dougherty, Hazardous Waste at the Crossroads: Federal and State Transit Rules Confront Legal Roadblocks, 12 ENVTL. L. RPTR. 10075 (1982). When nuclear power plants were first built in the United States, spent fuel was stored in on-site water storage facilities for a short period of time and then transported to a reprocessing facility where usable uranium and plutonium were extracted. The high-level radioactive liquid waste, a by-product of the reprocessing stage, was solidified for intended disposition in underground repositories mined out of saltrock. Greenwood, Nuclear Waste Management in the
Although the actual number of annual shipments is difficult to predict, one commentator suggests that shipments may equal 9,000 per year over the next twenty-five years.\textsuperscript{7}

Because of the unique properties of radiation, radioactive substances such as spent fuel are extremely dangerous.\textsuperscript{8} Human exposure to high levels of radiation have been known to cause death, cancer, reproductive failure and genetic defects.\textsuperscript{9} Lower doses of radiation released into the environment may result in similar harm if radiation concentrates in the foods we eat.\textsuperscript{10} In light of the severity of the release of radiation into the environment, federal, state and local authorities\textsuperscript{11} have an interest in taking regulatory action to develop the safest possible method for transporting high-level radioactive materials.\textsuperscript{12}

Federal authority over the transportation of all hazardous materials is granted to the Secretary of Transportation under the Hazardous Materials Transportation Act (HMTA).\textsuperscript{13} This authority includes the regulation of commercial carriers of radioactive materials such as spent fuel.\textsuperscript{14} In enacting HMTA, Congress believed that uniform national regulations were necessary to assure the safe transportation of hazardous materials.\textsuperscript{15} HMTA consoli-

\textit{United States}, in \textit{The Politics of Nuclear Waste} 1, at 5 (E. Colglazier, Jr. ed. 1982). In 1977, however, President Carter placed a moratorium on further reprocessing of commercial spent fuel largely to prevent terrorists from obtaining plutonium; an element necessary to make nuclear bombs. New decisions are now being made regarding the approximately 60 tons of spent fuel being generated and stored at nuclear power sites each year. See Garey & Kearney, \textit{supra} note 1, at 15-16.

\textsuperscript{7} See Dougherty, \textit{supra} note 6, at 10075. Another report predicts 13,000 shipments of spent fuel per year by 1990. \textit{Allied General Nuclear Services, Current States and Future Considerations for a Transportation System for Spent Fuel and Radioactive Waste} 21 (1978) [hereinafter cited as AGNS].

\textsuperscript{8} Radiation can cause severe damage to any biological tissue. See Walker, \textit{supra} note 2, at 53.


\textsuperscript{10} \textit{Id.} at 18-19.

\textsuperscript{11} Throughout this article, reference to state authority includes the political subdivisions of the state.


\textsuperscript{14} See Green & Zell, \textit{supra} note 12, at 126.

dates federal authority in the Secretary of Transportation,\textsuperscript{16} thereby guaranteeing federal control in the area of hazardous materials transportation.\textsuperscript{17}

Federal regulatory power in this area is not exclusive, however.\textsuperscript{18} As provided by HMTA, state and local governments may continue to exercise their traditional "police powers" over matters concerning the health and safety of their citizenry,\textsuperscript{19} provided that such non-federal regulations do not directly conflict with regulations promulgated by the Secretary of Transportation.\textsuperscript{20} This statutory provision of HMTA is consistent with the Supreme Court's interpretation of the permissible scope of federal power under the United States Constitution.\textsuperscript{21}

In exercising their authority, a number of state and local governments have passed regulations regarding the transportation of nuclear waste.\textsuperscript{22} Some regulations completely ban the transportation of such material within the borders of the state or locality,\textsuperscript{23} while others set forth certain procedural requirements that carriers must respect when transporting radioactive materials.\textsuperscript{24} Varying from one jurisdiction to the next, the overall effect of these regulations is a lack of uniformity.

In an attempt to halt this proliferation of non-federal regulations and to clarify the regulatory role of state and local governments, the United States Department of Transportation (DOT), in 1982, promulgated a regulation specifying the routes that should be used in transporting high-level radioactive materials, such as spent fuel, by truck over the highway. (\textit{Routing and Training Requirements for Radioactive Materials}, HM-164).\textsuperscript{25} Under HM-

\textsuperscript{17} 49 U.S.C. § 1811 (1976).
\textsuperscript{18} \textit{Id}.
\textsuperscript{19} For a discussion of the inherent powers of the states to protect the general welfare of their citizens, generally referred to as their "police powers," see infra text and notes at notes 124-26.
\textsuperscript{20} 49 U.S.C. § 1811(a) (1976).
\textsuperscript{21} See infra text and notes at notes 111-28.
\textsuperscript{22} For a complete summary of state and local regulations affecting the transportation of spent nuclear fuel by highway, see, \textit{OAK RIDGE NATIONAL LABORATORY, Transportation of Radioactive and Hazardous Materials: A Summary of State and Local Legislative Requirements} (Draft) (1983).
\textsuperscript{23} \textit{LA. REV. STAT. ANN.} § 1072 (West).
\textsuperscript{24} \textit{OHIO REV. CODE ANN.} § 4163.07 (Baldwin).
any state or local regulation that prescribes the use of a non-highway mode of transportation is deemed invalid as inconsistent with the federal regulation. This curtailment of state and local regulatory authority over commercial carriers of spent nuclear fuel has created tension between the federal government and state and local governments.

Federal and non-federal authorities are presently engaged in a dispute concerning their respective roles in regulating the transportation of spent nuclear fuel. The controversy arises in determining which non-federal regulations are valid and which are preempted pursuant to HMTA and its regulations. The preemptive effect of HM-164 is largely the focus of this dispute.

The first section of this article discusses in detail the risks involved in transporting spent fuel by highway. It explores the potential hazards posed by highway accidents, sabotage, and population exposure to low-level radiation, and considers the difference between federal and non-federal perceptions of these risks. The next section of this article describes the current federal regulatory scheme regarding the transportation of spent nuclear fuel. This section briefly discusses the constitutional mandates affecting the balance of federal and non-federal regulatory powers, and provides a detailed explanation of the provisions of HMTA and HM-164. This article then discusses the present litigation concerning the validity of HM-164. Finally, the possibility of utilizing barging or shipping as a method of trans-

26 49 C.F.R. § 177.825, Appendix A § III (1982). Appendix A § III sets forth the types of non-federal regulations which DOT considers to be inconsistent with, and therefore preempted by, the federal regulation. For a further discussion of preemption generally, see infra text and notes at notes 14-21. For a specific discussion of the preemptive effect of HM-164, see infra text and notes at notes 171-84.

27 This tension is illustrated by present litigation challenging the validity of HM-164. See infra note 186.

28 Id.

29 For a discussion of the preemptive doctrine and the preemption provisions of HMTA, see infra text and notes at notes 116-23 and 133-42.

30 See infra text and notes at notes 171-84.

31 See infra text and notes at notes 64-79.

32 See infra text and notes at notes 80-95.

33 See infra text and notes at notes 96-108.

34 See infra text and notes at notes 76-79, 91-95.

35 See infra text and notes at notes 109-87.

36 See infra text and notes at notes 110-11.

37 See infra text and notes at notes 130-84.

38 See infra text and notes at notes 186-369.
porting spent fuel and other high-level radioactive materials is evaluated as an alternative to resolving the present dispute.39 This article suggests that barging or shipping is a possible means of increasing transportation flexibility, thereby reducing the present controversy between the federal and non-federal governments.40 It is concluded that a flexible regulatory system promotes federal, state and local cooperation, and is necessary in order to maximize safety in transporting spent nuclear fuel.

II. THE SAFETY RISKS OF TRANSPORTING SPENT FUEL BY HIGHWAY

The transportation of spent nuclear fuel involves grave safety risks because of the highly radioactive quality of this nuclear waste material.41 In an effort to assure the safe handling and transportation of all radioactive materials, Congress declared that federal regulations regarding such substances shall be supreme,42 and it granted primary regulatory authority over radioactive materials to the Nuclear Regulatory Commission (NRC) and DOT.43 Under the Atomic Energy Act of 1954, as amended in 1974,44 the NRC has primary responsibility for protecting the public from the safety hazards of radiation.45 HMTA, enacted by Congress in 1974,46 consolidated federal regulatory authority regarding the transportation of all hazardous materials, including high-level radioactive substances, under DOT.47 In 1979, the NRC and DOT issued a Memorandum of Understanding defining their

39 See infra text and notes at notes 370-463.
40 See infra text and notes at notes 457-63.
41 See supra text and notes 3-4, 8-10.
42 The supremacy of federal law is guaranteed under Article VI § 2 of the United States Constitution, which provides in pertinent part: “This Constitution and the laws of the United States . . . shall be the Supreme Law of the Land.”
43 Trosten & Ancarrow, Federal- State-Local Relationships in Transporting Radioactive Materials: Rules of the Nuclear Road, 68 Ky. L.J. 251, 255-64 (1979-80). Other agencies with some control over the transportation of hazardous materials are the Environmental Protection Agency, and the Interstate Commerce Commission. See Dougherty, supra note 6, at 10075.
45 See Trosten & Ancarrow, supra note 43, at 255-64.
47 49 U.S.C. § 1804 (1976). Since 1871 Congress has authorized federal regulations governing the transportation of hazardous materials. In 1966, the authority over the transportation of these materials was consolidated under DOT. However, due to insufficient resources and lack of real power, HMTA was enacted in 1974 to increase DOT’s authority. See Trosten & Ancarrow, supra note 43, at 255-64.
overlapping responsibilities. This agreement states that, in accordance with HMTA, DOT has primary regulatory authority over the transportation of commercially produced spent fuel and other commercial radioactive materials.

HMTA was enacted to assure the safe transportation of all hazardous materials, including spent fuel. In an effort to achieve this safety goal, DOT has promulgated numerous regulations regarding the transportation of radioactive materials. Specifically, in 1982, DOT issued HM-164, which specifies the highway routes to be used in transporting spent nuclear fuel and other high-level radioactive substances.

In addition to HM-164 and other federal regulations promulgated by DOT, many states and localities impose further regulations on the transportation of hazardous materials in an effort to maximize safety within their borders. Typically, these regulations prohibit the transportation of spent fuel through densely populated areas, or require the carrier either to obtain a state permit or give the government prior notification before transporting these hazardous substances through the state.

Some states and localities assert that these additional regulations address the special needs of the particular jurisdiction, thereby maximizing safety. However, DOT adopts the position

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Id.

The safety purpose of HMTA is declared in 49 U.S.C. § 1801: “It is declared to be the policy of Congress in this chapter to improve the regulatory and enforcement authority of the Secretary of Transportation to protect the nation adequately against the risks to life and property which are inherent in the transportation of hazardous materials in commerce.”

Two examples of these safety regulations promulgated by DOT are: (1) 49 C.F.R. § 172.507 (1976) which requires a radioactive warning placard on all vehicles used to transport high-level radioactive materials; and 49 C.F.R. § 173.22(c) (1977) which requires the shipper of high-level radioactive material to file specified information with the Associate Director for Hazardous Materials Regulation.

49 C.F.R. § 177.825 (1982).

See supra notes 51-52.

See A Summary of State and Local Legislative Requirements, supra note 22.

See e.g., New York, N.Y., Health Code § 175.111(1) (1976), which prohibits the transportation of spent fuel and other high-level radioactive waste through New York City.

See e.g., N.J. ADMIN. CODE tit. 7, c.28 § 12 (1980), which provides that a carrier of spent nuclear fuel must obtain a certificate or certificate number from the Department of Environmental Protection prior to transporting spent fuel on state highways.

See e.g., OHIO REV. CODE ANN. § 4163.07 (Baldwin). Discussed infra text and notes at notes 253-56.

For the specific allegations made by some states and localities, see the discussion of the litigation challenging the validity of HM-164, infra text and notes at notes 249-56.
that, in light of the federal regulations promulgated by DOT,\textsuperscript{59} the risks involved in transporting high-level radioactive materials by highway are too low to justify the imposition of further state and local restrictions on the highway carrier.\textsuperscript{60} This controversy between the federal and non-federal governments essentially involves the question of determining an acceptable level of risk.

Safety risks resulting from the transportation of spent nuclear fuel by truck fall into three categories: radioactive release caused by highway accidents;\textsuperscript{61} radioactive release caused by sabotage;\textsuperscript{62} and population exposure to low doses of radiation that are inherently released in transporting such material.\textsuperscript{63} The probabilities and possible consequences of each of these three occurrences require close scrutiny.

\textbf{A. The Highway Accident}

The probability of a radioactive release resulting from a highway accident involving a spent fuel carrier is remote.\textsuperscript{64} Spent fuel is transported in casks weighing anywhere from 25 to 100 tons.\textsuperscript{65} These casks undergo rigid testing to guarantee their integrity before use.\textsuperscript{66} Available accident reports indicate that these casks are able to withstand most accident conditions.\textsuperscript{67} According to

\textsuperscript{59} See supra text and notes at notes 51-52.
\textsuperscript{61} See infra text and notes at notes 64-78.
\textsuperscript{62} See infra text and notes at notes 80-95.
\textsuperscript{63} See infra text and notes at notes 96-108.
\textsuperscript{65} See NUREG, supra note 1, at 7.1. The nature of spent fuel necessitates the use of such casks. Spent fuel generates a significant amount of heat. One study estimates that one ton of spent fuel may generate as much as 27,000 watts 90 days after it is removed from the reactor. Heat is not as problematic during on-site storage as it is during transport, because the spent fuel is stored on-site in water-cooled basins. During transportation, adequate shielding is more difficult. One design for a spent fuel transportation cask involves a cooling water system within the cask itself. An empty cask weighs up to 70 tons and is capable of transporting about three tons of spent fuel. See Walker, supra note 2, at 56-67.
\textsuperscript{66} SCIENCE APPLICATION, INC., PALO ALTO, CALIFORNIA, NATIONAL ENVIRONMENTAL STUDIES PROJECT, A Generic Assessment of Barge Transportation of Spent Nuclear Fuel, at 3.4-3.5 (A. Unione, A. Garcia & R. Stuart 1978).
\textsuperscript{67} Brief for Amici Curiae Scientists and Engineers for Secure Energy, Inc. and Mid-Atlantic Legal Foundation, Inc. at 3-4, City of New York v. United States Dept. of Transportation, 715 F.2d 732 (2d Cir. 1983).
such reports, a highway accident involving spent fuel shipments has never resulted in a release of radioactivity since the transportation of spent fuel began in 1964. 68 Spent fuel casks are not, however, absolutely invulnerable. Out of fifteen casks in use in 1980, seven were taken out of use because of structural deficiencies. 69

Although the probability of an accident is remote, the consequences that could result from such an accident are extremely severe. Two independent government-sponsored reports on the transportation of spent fuel, “Sandia” and “NUREG,” 70 analyze the consequences of the worst-possible highway accident involving a carrier of spent fuel. 71 Both studies conclude that the human and economic losses from such an accident would be grave. 72 Based on these studies, the federal government concludes that the economic loss caused by a worst-case release in a large city such as New York would range between $400 million and $2 billion. 73 Regarding human loss, the NUREG report calculates that such an accident would produce 177 to 1800 latent cancer fatalities. 74 While a highway accident in a rural area would also result in severe damage, the Sandia report concludes that both the economic and human loss would be significantly reduced by avoiding the transportation of spent fuel through heavily populated areas. 75

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68 Id.


70 See Sandia, supra note 64, and NUREG, supra note 1. These reports are two of the most comprehensive studies regarding the transportation of spent nuclear fuel.

71 The worst possible accident, however slight the probability of occurring, is referred to as a “worst-case accident.” See NUREG, supra note 1, at 5.38-5.53 and Sandia, supra note 64, at 66 (Table 3.11).

72 Id. A full summary of these reports and their conclusions appears in City of New York v. United States Dept. of Transp., 539 F. Supp. 1237, 1272 (S.D.N.Y. 1982).

73 See Brief for Appellee, The City of New York, at 3, City of New York, 715 F.2d 732. Included in economic costs are the following: “costs to homeowners, businesses and governmental agencies. These costs consist of emergency response costs, security costs, and land-use denial costs as determined by the particular situation.” See Sandia, supra note 64, at 55.

74 See NUREG, supra note 1, at 7.1. A latent cancer fatality is “a death that results from exposure to radiation, that occurs more than a year after exposure, and that would not have occurred in the absence of the exposure.” See City of New York, 715 F.2d at 745 n.13. For a detailed discussion of the physical effects on humans from different levels of radiation exposure, see R. Lipschutz, supra note 9, at 15.

75 See Sandia, supra note 64, at 168.
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The severe consequences that could result from a highway accident involving a spent fuel carrier have led both state and local authorities to assert that, in order to avoid or at least mitigate these consequences, their safety regulations are necessary supplements to the federal regulations promulgated by DOT.\(^76\) In support of state and local attempts to maximize safety, Justice Oakes of the Second Circuit Court of Appeals noted that worst-case accidents have a way of occurring no matter how remote the probability.\(^77\) In its own safety analysis, however, the federal government emphasized probability rather than consequences,\(^78\) and concluded that state and local regulations restricting highway carriers of high-level radioactive materials are unnecessarily burdensome.\(^79\)

B. Sabotage

The controversy between the federal and non-federal governments regarding an acceptable level of safety in transporting spent fuel is enhanced by the possibility of sabotage. As the NUREG report indicates, concern with the possible effects of sabotage has increased with the rise in terrorist activities throughout the world.\(^80\) In addition to the greater frequency of such acts, sabotage attacks are becoming increasingly unpredictable and severe.\(^81\)

The Sandia report concludes that because an act of sabotage involves human motivations and unpredictable variables, the probability of it causing a radioactive release of spent fuel is

\(^{76}\) See infra text and notes at notes 195-215.
\(^{77}\) See City of New York, 715 F.2d at 783 (Oakes, J., dissenting).
\(^{78}\) In promulgating HM-164, DOT rejected the possibility of considering accident consequences regardless of probability. City of New York, 539 F. Supp. at 1251.
\(^{79}\) The Nuclear Regulatory Commission (NRC) has concluded that the possible risks involved in transporting spent nuclear fuel are “sufficiently small to allow continued shipments by all modes.” DOT has relied on this NRC position in determining that additional state and local regulations restricting the use of the highway mode of transportation are unnecessary. See NUREG, supra note 1, at viii.
\(^{80}\) Id. at 7.1.
impossible to predict with any accuracy.\textsuperscript{82} However, both the Sandia and NUREG reports attempt to evaluate the likelihood of a terrorist attack on a highway shipment of spent fuel.\textsuperscript{83} The NUREG report concludes that spent fuel in transit would be an unlikely target for sabotage.\textsuperscript{84} In contrast, because of the public harm that could be inflicted by such an attack, the Sandia report concludes that the sabotage of a shipment of spent fuel is a possibility.\textsuperscript{85}

In addition to discussing the likelihood of an attempt to sabotage a spent fuel shipment, the Sandia report evaluates the possibility and consequences of a successful act of sabotage. The report notes that a number of methods could be utilized to rupture the wall of a spent fuel cask during transport, including the use of explosives.\textsuperscript{86} It further indicates that the large amounts of explosives required to rupture a cask are easily obtainable,\textsuperscript{87} and that the access needed to attach the detonator is available at normal stops.\textsuperscript{88} The Sandia report concludes that a successful act of sabotage is possible.\textsuperscript{89} Regarding consequences, the Sandia report estimates that a successful act of sabotage would result in several immediate fatalities, several hundreds of deaths from direct exposure to high levels of radiation, and tens to hundreds of latent cancer fatalities.\textsuperscript{90}

Although DOT concludes that the possibility of a successful act of sabotage of spent fuel in transit is remote,\textsuperscript{91} it has attempted to reduce this possibility by extending NRC security regulations to more shipments of high-level radioactive materials.\textsuperscript{92} DOT maintains that these federal regulations assure an adequate level of safety.\textsuperscript{93} However, focusing on the possible consequences of a successful act of sabotage, state and local governments maintain

\textsuperscript{82} See Sandia, \textit{supra} note 64, at 85.
\textsuperscript{83} Id. See also NUREG, \textit{supra} note 1, at 7.2.
\textsuperscript{84} See NUREG, \textit{supra} note 1, at 7.2.
\textsuperscript{85} See Sandia, \textit{supra} note 64, at 85.
\textsuperscript{86} Id. at 86-89.
\textsuperscript{87} Id. at 87.
\textsuperscript{88} Id. at 91-92.
\textsuperscript{89} Id. at 87.
\textsuperscript{90} Id. at 110. The number of early fatalities from radioactive exposure is relatively small because individuals close enough to the accident to receive lethal radiation exposure would probably be killed by the explosion itself.
that additional regulations, such as prohibiting transportation of spent fuel through densely populated areas, are necessary in order to minimize the risks involved in the transportation of spent fuel.  

C. Exposure to Low Doses of Radiation

The safety concern regarding population exposure to low doses of radiation does not involve a discussion of the probability of an accident during transport of a spent fuel shipment. Rather, the focus in regard to this safety issue is the unresolved debate concerning what is a non-harmful level of radiation exposure.

Some exposure to low doses of radiation is unavoidable. All humans are exposed to radiation from the sun and the earth’s surface, along with X-rays and other medical tests. Additionally, airplanes, nuclear power plants, and nuclear weapons testing emit radiation into the environment. Because the casks used in transporting spent nuclear fuel do not completely shield radiation emissions, some release of low dose radiation is inherent in transporting such material.

Federal, state and local authorities are concerned with minimizing the low-level radiation that is released during the transportation of spent nuclear fuel. The National Council on Radiation Protection (NCRP), an advisory board to the NRC, recommends that dose rates be maintained at the lowest possible...
levels. In addition, the specific maximum limitations suggested by the NCRP have been adopted by the NRC. Although these permissible levels are very low, a few studies indicate that the slightest emission is harmful to humans and that permissible exposure levels should be reduced significantly.

In an effort to reduce the adverse physical consequences that could result from the emission of low-dose radiation during the transportation of spent fuel, some state legislatures and local governing bodies have enacted regulations banning the transportation of spent fuel through densely populated areas. DOT maintains that the enactment of such regulations in different jurisdictions will cause transportation delays by requiring carriers to use circumferential routes. Because this would result in a longer shipping period, DOT has asserted that such delays might increase public exposure to low doses of radiation.

D. Conclusion on Safety Risks

The controversy between federal, state and local governments regarding their respective roles in regulating the transportation of spent fuel involves disagreement over the actual risks encountered in such transport. Because of the severe consequences of a worst-case accident, the unpredictable nature of sabotage, and the unknown hazards of low-level radiation, the actual risks in transporting spent fuel are impossible to calculate. The following section of this article outlines the legal framework under which this controversy must be resolved. It discusses the constitutional provisions that control the balance of power between federal and
non-federal governments, as well as the provisions of HMTA and the federal routing regulation, HM-164.

III. THE NATIONAL REGULATORY SCHEME FOR THE TRANSPORTATION OF SPENT FUEL

The controversy between federal and state and local authorities regarding the scope of their respective powers in regulating the transportation of spent nuclear fuel must be ultimately resolved by the commerce and supremacy clauses of the United States Constitution. These constitutional provisions control the balance of power between the federal and non-federal governments. It is these provisions that gave Congress the power to enact HMTA, and therefore, an understanding of them is necessary to evaluate the permissible scope of DOT's authority under HMTA.

A. The Constitutional Provisions

In interpreting the commerce and supremacy clauses of the United States Constitution, the Supreme Court has broadly defined the scope of federal power. The commerce clause of the Constitution, which grants Congress the authority to regulate interstate commerce, is a major source of federal power. The Supreme Court has held that the commerce clause enables Congress to regulate both interstate and intrastate activities that affect interstate commerce. Specifically, the Court has held that a state regulation is invalid under the commerce clause when it unduly burdens interstate commerce, or when its primary in-

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109 See infra text and notes at notes 111-29.
110 See infra text and notes at note 129.
111 Article I § 8 cl. 3 of the United States Constitution provides that Congress has the power: "To regulate Commerce with foreign Nations and among the several States, and with the Indian Tribes." (emphasis added).
112 See e.g., the Shreveport Rate Case [Houston & Texas Ry. v. U.S., 234 U.S. 342 (1914)]. In that case the Supreme Court held that the federal government could regulate interstate and intrastate rail rates because such rates economically affect the several states. See also Hodel v. Virginia Surface Mining and Reclamation Associates, Inc., 452 U.S. 264 (1981), where the Supreme Court held that the Surface Mining and Control Act of 1977 was a valid exercise of Congressional power under the commerce clause and upheld the decision of the lower court to suspend surface mining activities in Virginia pending review of alleged violations of environmental regulations. The Court reasoned that Congress could regulate intrastate pollution and environmental hazards because they affect more than one state, thereby affecting interstate commerce.
113 Pike v. Bruce Church, Inc, 397 U.S. 137 (1970). In Pike the Supreme Court, invalidating an Arizona Law requiring the packaging of Arizona cantaloupes within
tent is to provide local protection from economic competition\(^{114}\) or to retain state resources for the exclusive use of the individual state.\(^{115}\)

In addition to granting Congress the power to regulate interstate commerce, the Constitution also provides that federal law is "the supreme Law of the Land."\(^{116}\) This provision of the Constitution, the supremacy clause, is the other major source of federal power. Over the years, the Supreme Court has repeatedly been called upon to determine when the supremacy clause requires nullification of a state or local regulation that conflicts with a federal law.\(^{117}\) This body of decisions has led to the development of

Arizona before distribution, recognized that a state's interest in protecting the health and safety of its citizens must be balanced against the need for a free flow of interstate commerce to determine whether state legislation unduly burdens interstate commerce. Therein, the Court outlined the following balancing test:

Where the statute regulates even-handedly to effectuate a legitimate public interest, and its effects on interstate commerce are only incidental, it will be upheld unless the burden imposed on such commerce is clearly excessive in relation to the putative local benefits. . . . If a legitimate local purpose is found then the question becomes one of degree. And the extent of the burden that will be tolerated will of course depend on the nature of the local interest involved, and on whether it could be promoted as well with a lesser impact on interstate authorities.  

Id. at 142-143.

\(^{114}\) Baldwin v. G.A.F. Seelig, Inc., 294 U.S. 511 (1935). In that case, the Supreme Court balanced the health interest asserted by the State of New York against the adverse economic effect on the surrounding states and struck down New York's minimum milk price regulations. The Court noted that a major purpose of the commerce clause was to prevent economic discrimination among the states. Id. at 521-22. However, state legislation enacted to protect intrastate business has been upheld if such legislation does not discriminate against other states, and the local interest outweighs the burden on interstate commerce. See e.g., Minnesota v. Clover Leaf Creamery Co., 449 U.S. 456 (1981).

\(^{115}\) Philadelphia v. N.J., 437 U.S. 617 (1978). In that case the Supreme Court struck down a New Jersey statute prohibiting the importation of liquid and solid wastes into New Jersey on the grounds that the state statute discriminated against other states and thus violated the commerce clause. The Court held that conserving landfill for exclusive intrastate use created an undue burden on interstate commerce. See also Hughes v. Oklahoma, 441 U.S. 322 (1979); Pennsylvania v. West Virginia, 262 U.S. 553 (1923).

\(^{116}\) Article VI, § 2 of the United States Constitution provides: "This Constitution, and the Laws of the United States which shall be made in Pursuance thereof, and all Treaties made, or which shall be made, under the Authority of the United States, shall be the supreme Law of the Land; and the Judges in every State shall be bound thereby, anything in the Constitution or Laws of any State to the Contrary notwithstanding." (emphasis added).

the Preemption Doctrine, as summarized by the Court in *Ray v. Atlantic Richfield Co.* In *Ray*, the Court held that a state regulation is not preempted by federal law "unless that was the clear and manifest purpose of Congress when it enacted the federal statute." The Court held, however, that federal law supercedes state law under the supremacy clause if: Congress implicitly or explicitly intended to control the regulation of the disputed area; compliance with both the state and federal law is physically impossible; or the state law impedes the accomplishment of the full purpose intended by Congress in enacting the federal legislation.

As a result of the broad scope of federal power under the commerce and supremacy clauses, state and local power is necessarily limited. The Supreme Court has held that state and local governments possess the inherent power to enact legislation to protect the health, safety, and general welfare of the public. This authority is generally referred to as the "police power" of the respective governments. Particularly in the area of highway safety regulations, reviewing courts have paid great deference to state and local governments in the exercise of their police powers. Despite this deference, a non-federal highway regulation...
that unduly burdens interstate commerce,\textsuperscript{127} or that is preempted by federal law under the standards set forth in \textit{Ray v. Atlantic Richfield Co.},\textsuperscript{128} has been held invalid by the Supreme Court.

The extent to which states and localities may exercise their respective police powers in regulating the transportation of spent nuclear fuel is determined by the scope of federal power under the commerce and supremacy clauses of the U.S. Constitution. An examination of the purpose and provisions of HMTA, a valid federal statute enacted by Congress pursuant to its powers under the commerce clause,\textsuperscript{129} reveals that the Act was not intended to preempt all state and local legislation regulating the transportation of spent nuclear fuel.

\textbf{B. The Hazardous Materials Transportation Act}

In enacting HMTA, Congress felt that uniform national regulations were necessary in order to guarantee the safe transportation of all hazardous materials, including spent nuclear fuel.\textsuperscript{130} To assure uniform regulations at the federal level, Congress granted the Secretary of Transportation broad regulatory power under that Act,\textsuperscript{131} and endorsed the principal of federal preemption "in order to preclude a multiplicity of state and local regulations and the potential for varying as well as conflicting regulations in the area of hazardous materials transportation."\textsuperscript{132}

Specific provisions of HMTA outline the preemptive effect of that Act on state and local legislation regulating the transportation of spent nuclear fuel.\textsuperscript{133} HMTA provides that a state or local regulation that is inconsistent with a federal regulation promul-
gated under that Act is preempted by the federal regulation. HMTA also provides that an inconsistent state regulation should not be preempted if the Secretary determines that the state regulation meets two criteria: first, it must afford an equal or greater level of protection to the public than is afforded by the Act or the regulations promulgated thereunder, and second, it must not unreasonably burden interstate commerce.

These provisions of HMTA for determining when a state regulation is valid incorporate the balancing test set forth by the Supreme Court in *Pike v. Bruce Church, Inc.*, and the preemption criteria outlined by the Court in *Ray v. Atlantic Richfield Co.* Thus, although the scope of federal power under HMTA is broad, states are not absolutely precluded from exercising their respective police powers in regulating the transportation of spent nuclear fuel. As illustrated by the specific provisions of the Act, Congress did not intend to ignore the authority traditionally exercised by state and local governments in the area of highway safety regulations.

Consistent with this policy of enabling states and localities to continue to exercise their regulatory authority in the area of hazardous materials transportation, a 1978 ruling by DOT, that was requested by the Board of Directors of Brookhaven National Laboratories (BNL), held that a New York City Health Regula-

134 49 U.S.C. § 1811(a) (1976). HMTA does not specifically define the term "inconsistent." However, in its regulatory guidelines promulgated under that Act, DOT defines inconsistent non-federal regulations as those which can not operate simultaneously with the federal regulation because compliance with both regulations is impossible, or those which impede the accomplishment of the Act or the regulations issued thereunder. 49 C.F.R. § 107.209 (1976). DOT's definition is consistent with the preemption criteria established by the Supreme Court. See *Ray*, 435 U.S. at 157.


138 397 U.S. at 142-43. See supra note 113.

139 435 U.S. at 157. See supra text and notes at notes 119-23.

140 State regulations have been upheld under the *Pike* balancing test and the preemption criteria outlined in *Ray*, See *e.g.*, Minnesota v. Clover Leaf Creamery Co., 449 U.S. 456 (1981); Exxon Corp. v. Governor of Maryland, 437 U.S. 117 (1978).


142 *Rice*, 434 U.S. at 443. See supra note 126.

143 *City of New York*, 539 F. Supp. at 1244. BNL is a United States Dept. of Energy research institute. Up until 1976, it sent a small number of spent fuel shipments through New York City. Address by Dr. L. Solon to International Conference on Urban Transpor-
tion effectively banning the transportation of high-level radioactive materials through the City was not preempted by HMTA.\textsuperscript{144}

The New York City health regulation was issued by the City in 1976, for safety reasons, upon the recommendation of the scientific staff of New York City’s Department of Health’s Bureau for Radiation Control.\textsuperscript{145} Absent that regulation, shipments of spent fuel through the densely populated City were expected to reach 250 per year by late 1984.\textsuperscript{146}

By ruling that the City’s regulation was not preempted by HMTA, DOT recognized that the Act was intended to accommodate both federal and state interests.\textsuperscript{147} Moreover, the agency noted in its ruling that state and local regulations representing legitimate safety concerns should not be unnecessarily preempted by HMTA.\textsuperscript{148} Applying the preemption criteria of HMTA,\textsuperscript{149} DOT concluded in its ruling that the City’s regulation did not directly conflict with a federal regulation, impede interstate commerce, or interfere with the safety provisions of HMTA.\textsuperscript{150} DOT supported its conclusion on the factual basis that spent fuel from the nuclear power plants on Long Island could be safely transported by barge...
from those plants to the mainland, thereby avoiding transportation of such material by truck through New York City.\textsuperscript{151}

Despite its finding that the New York City regulation was consistent with the safety purpose of HMTA,\textsuperscript{152} when DOT issued its ruling in 1978, the agency also announced its intention to issue a uniform routing regulation for the nation.\textsuperscript{153} Once promulgated, the federal regulation would preempt state and local regulations similar to the one enacted by the City of New York.\textsuperscript{154} DOT concluded that such a federal regulation was needed in order to prevent a multiplicity of state and local regulations that might interfere with the safety purpose of HMTA.\textsuperscript{155}

\textbf{C. The National Routing Regulation: HM-164}

On January 19, 1981, DOT issued a federal regulation entitled "Routing and Training Requirements for Radioactive Materials," commonly referred to as HM-164.\textsuperscript{156} The regulation specifies the highway routes to be used by commercial truck carriers when transporting spent nuclear fuel and other high-level radioactive materials.\textsuperscript{157}

HM-164 requires commercial carriers of high-level radioactive material to utilize an interstate highway or a federally approved alternate route designated by the state.\textsuperscript{158} In addition, the federal routing regulation requires these commercial truck carriers to use interstate bypasses and beltways where available.\textsuperscript{159} In the preamble to HM-164, DOT concluded that the use of such routes would minimize the possibility of a radioactive release resulting

\begin{itemize}
\item \textsuperscript{151} In order to comply with the City's regulation, Brookhaven National Laboratories successfully ferries radioactive waste materials from its nuclear plant on Long Island to Connecticut by barge for transport to the nuclear fuel reprocessing and waste disposal center at Savannah, South Carolina. See Brief for Appellee, City of New York at 8, \textit{City of New York}, 715 F.2d 732.
\item \textsuperscript{152} 43 Fed. Reg. 16,954-59 (1978). The safety purpose of HMTA is stated under 49 U.S.C. § 1801. See supra note 50.
\item \textsuperscript{153} 43 Fed. Reg. 16,959 (1978).
\item \textsuperscript{154} Id.
\item \textsuperscript{155} Id. In enacting HMTA, Congress concluded that numerous state and local regulations might interfere with the safe transportation of hazardous materials. S. REP. NO. 1192, 93d Cong., 2d Sess. 6-9, 37-38 (1974).
\item \textsuperscript{156} 49 C.F.R. § 177.825 (1982).
\item \textsuperscript{158} 49 C.F.R. § 177.825(a) (1982).
\item \textsuperscript{159} 49 C.F.R. § 177.825(b) (1982).
\end{itemize}
from a highway accident involving a high-level radioactive shipment because interstate highways are generally well maintained and safer than other roads.\textsuperscript{160} It also concluded that the use of bypasses and beltways would avoid densely populated areas, thereby reducing the amount of economic and human loss that could result if an accident involving a spent fuel shipment resulted in the release of radioactivity.\textsuperscript{161} As DOT noted in the preamble, avoiding populated areas also reduces public exposure to low-level radiation emitted by such radioactive shipments.\textsuperscript{162}

HM-164 appears to be a permissible exercise of DOT's authority under HMTA.\textsuperscript{163} It was promulgated to accomplish the safety purpose of that Act: the safe transportation of spent fuel and other high-level radioactive materials.\textsuperscript{164} In the preamble to HM-164, DOT declared that the federal regulation was necessary in order to ensure that numerous and varied state and local routing regulations would not adversely affect national safety.\textsuperscript{165} Although the preamble emphasizes the need for a uniform national regulation, HM-164 does encourage state governments to participate in making routing decisions.\textsuperscript{166} Specifically, HM-164 permits states or localities to designate alternative routes to those suggested by DOT.\textsuperscript{167} By allowing state and local governments to take part in the decisionmaking process, HM-164 appears to recognize their traditional authority to enact legislation to promote highway safety.\textsuperscript{168} Permitting such participation is consistent with the intent of Congress in enacting HMTA.\textsuperscript{169}

HM-164 appears to respect the traditionally important role of state and local governments in promoting highway safety. In practice, however, the power of the non-federal governments under that regulation is quite limited. Appendix A to HM-164\textsuperscript{170}

\textsuperscript{161} See Supplement to Docket HM-164, \textit{supra} note 102, at c.1.2. DOT noted that, while the probability of a catastrophic occurrence is low, the additional precaution is reasonable in light of the severe consequences of such an occurrence.
\textsuperscript{163} 49 U.S.C. § 1804 (1976) grants broad power to the Secretary of Transportation to issue regulations "for the safe transportation in commerce of hazardous materials."
\textsuperscript{165} \textit{Id.}
\textsuperscript{166} 49 C.F.R. § 177.825(b)(1)(ii) (1982).
\textsuperscript{167} \textit{Id.} § 177.825(a) (1982).
\textsuperscript{168} See, \textit{e.g.}, Barnwell, 303 U.S. 177; \textit{Rice}, 434 U.S. 420. See also \textit{supra} note 126.
\textsuperscript{169} 49 U.S.C. § 1811(b) (1976). \textit{See supra} text and notes at notes 135-42.
\textsuperscript{170} 49 C.F.R. § 177.825, Appendix A (1982).
lists several types of non-federal regulations that are considered to be inconsistent with, and therefore preempted by, the federal routing regulation. Specifically, Appendix A provides that states may not prohibit the transportation of high-level radioactive materials by highway between any two points without providing an alternative highway route. Under this restrictive provision, any non-federal regulation mandating transportation of spent fuel by water, such as the regulation enacted by the City of New York, is automatically preempted by the federal regulation. As indicated by DOT's comments when it originally issued HM-164 in 1981, DOT's decision to require the availability of a highway route in all jurisdictions was based on its conclusion that highway transportation of high-level radioactive materials is sufficiently safe. Moreover, DOT asserted in those comments that other methods of transportation do not significantly reduce the safety risks involved in transportation by truck. Based on these conclusions, DOT found that state and local regulations precluding transportation of such materials by truck could not be justified as valid safety regulations.

In addition to requiring the availability of highway routes, Appendix A provides that a state regulation is preempted by HM-164 if it unnecessarily delays transportation. Because delays might increase population exposure to low-level radiation, DOT concluded that such regulations were inconsistent with the safety purpose of HMTA. Finally, Appendix A provides that all state and local prenotification and reporting regulations are

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171 Id. at III-VI.
172 Id. at III(1).
176 Id. at 5,299.
177 Id. at 5,313.
178 49 C.F.R. § 177.825, Appendix A at VI G (1982). The preamble to HM-164 defines an unnecessary delay as follows: "A delay is unnecessary unless it is required by an exercise of State or local regulatory authority over a motor vehicle that so clearly supports public health and safety to justify the safety detriment and burden on commerce caused by delay." 46 Fed. Reg. 5,298-318 at 5,315 (1981). This criterion is consistent with the balancing test established by the Supreme Court in Pike, 397 U.S. at 142-43. For a full discussion of that test, see supra text and note at note 113.
180 See, e.g., OHIO REV. CODE ANN. § 4163.07 (Baldwin), discussed infra text and notes at notes 253-56.
181 See, e.g., N.J. ADMIN. CODE tit. 7, c.28 § 12 (1983), discussed supra text and note at note 56.
preempted by HM-164. DOT included this restriction on state regulatory authority on the basis that such regulations would interfere with the principle of national uniformity underlying HMTA.

Although HM-164 appears to encourage participation by federal, state and local governments in regulating the transportation of spent nuclear fuel, the provisions outlined in Appendix A severely restrict the actual scope of state and local regulatory power. This effect on their regulatory authority has led some states and localities, including the City of New York, to challenge the legality of the federal routing regulation. City of New York v. United States Dept. of Transportation represents the most comprehensive legal challenge to HM-164. The following section of this article discusses and evaluates the legal arguments raised by the plaintiffs in that case.

IV. THE LEGAL DEBATE SURROUNDING HM-164

On March 25, 1981, the City of New York initiated an action, City of New York v. United States Dept. of Transportation, in the

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184 See supra text and notes at notes 166-69.

In Chemical Nuclear Systems, Inc., the City of Missoula sought an injunction from the district court to enforce a city ordinance banning the transportation of high-level radioactive materials through Missoula. The City abandoned this legal action pending the outcome of the present action brought against DOT by the City of New York in City of New York. (Telephone interview with Sam Warren, City Attorney's Office, City of Missoula, Montana (Oct. 13, 1983)).

In State of Ohio, Ohio challenged the legality of the preemptive effect of Appendix A to HM-164 on all state prenotification statutes. For a discussion of the preemption of Ohio's statute, see infra text and notes at notes 253-56.

The impetus for Ohio's action was the 144 shipments of spent fuel that were returned in the Fall of 1983 from the non-operative reprocessing plant at West Valley, New York, to power companies in Wisconsin, Illinois and New Jersey. The return of the fuel was mandated by Court order. See N.Y. State Energy Research and Development Authority v. Nuclear Service, 561 F. Supp. 954 (W.D.N.Y. 1983). 114 truckloads of this spent fuel traveled through Ohio. (Telephone interview with Karen Kolmacic, Ohio State Office of the Attorney General (Oct. 5, 1983)). See also, The Boston Globe, Sept. 30, 1983, at 3, col. 1, 2.

District Court for the Southern District of New York, seeking to invalidate HM-164 or to prevent the federal routing regulation from overriding the City's health regulation which effectively banned transportation of spent nuclear fuel through the City.\textsuperscript{187} Joined by the State of New York, the Town of Brookhaven, Sullivan County and the Amicus States of Ohio and Minnesota,\textsuperscript{188} the plaintiffs in that litigation argued that HM-164 exceeds the scope of authority granted to the Secretary of Transportation under HMTA.\textsuperscript{189} They also challenged the legality of HM-164 on the grounds that DOT failed to comply with the procedural mandates of the National Environmental Policy Act (NEPA)\textsuperscript{190} in promulgating the federal routing regulation.\textsuperscript{191} The following subsections of this article discuss the validity of HM-164 in light of these two legal arguments as well as the policy arguments made by plaintiffs in \textit{City of New York}.

\textbf{A. HM-164 and the Regulatory Authority of the Secretary of Transportation Under HMTA}

The purpose of HMTA and the extent to which Congress intended that Act to preempt state and local regulations in the area of hazardous materials transportation determine the scope of the regulatory authority of the Secretary of Transportation. In \textit{City of New York}, the litigants interpret both of these factors differently.\textsuperscript{192} Based on these conflicting interpretations, the District Court for the Southern District of New York and the Second Circuit Court of Appeals reached opposite conclusions regarding

\begin{footnotes}
\textsuperscript{187} \textit{City of New York}, 539 F. Supp. 1237.
\textsuperscript{188} Hereinafter cited as plaintiffs.
\textsuperscript{189} \textit{City of New York}, 539 F. Supp. at 1252.
\textsuperscript{190} 42 U.S.C. § 4321-4347 (1976).
\textsuperscript{191} \textit{City of New York}, 539 F. Supp. at 1258. In \textit{City of New York}, plaintiffs brought their action for declaratory and injunctive relief under the Administrative Procedure Act, 5 U.S.C. §§ 551-706 (1976 & Supp. V 1981) (APA). Under the APA, the Courts have the responsibility of reviewing agency action to determine whether the agency followed the procedures required by the APA and complied with the mandates of the controlling statute. Reviewing courts pay great deference to the decisions made by a federal agency when it promulgates a regulation. However, if the court determines that the agency fails to comply with the mandates of the applicable statute, the regulation will be held invalid. Baltimore Gas & Electric Co. v. Natural Resources Defense Council, Inc., 51 U.S.L.W. 4678, 4683 (U.S. June 6, 1983). Plaintiffs in \textit{City of New York} do not contest DOT's compliance with the procedural mandates of the APA. Rather, they argue that, in promulgating HM-164, DOT failed to fulfill its duties under HMTA and NEPA. See \textit{City of New York}, 539 F. Supp. at 1254.
\textsuperscript{192} See infra, text and notes at notes 194-230.
\end{footnotes}
the validity of DOT's federal routing regulation, HM-164.¹⁹³ This subsection discusses and evaluates the positions of the litigants and the conclusions reached by the district and appellate courts.

1. The Positions of the Litigants

Plaintiffs in City of New York argue that the federal routing regulation exceeds the scope of authority granted to the Secretary of Transportation under HMTA¹⁹⁴ because the provisions outlined in Appendix A to HM-164 preempt many state regulations without considering their safety benefits.¹⁹⁵ In particular, plaintiffs object to the preemption of New York City's regulation effectively banning the transportation of high-level radioactive materials through that City.¹⁹⁶ Plaintiffs contend that the restrictive effect of HM-164 on state and local regulatory power is inconsistent with the safety purpose of HMTA¹⁹⁷ and that HM-164 unlawfully preempts non-federal regulations.¹⁹⁸

The purpose of HMTA, as interpreted by plaintiffs in City of New York, is to maximize safety in the area of hazardous materials transportation.¹⁹⁹ Based on this interpretation, plaintiffs argue that DOT cannot lawfully preempt a state or local regulation regarding the transportation of spent fuel and other high-level radioactive materials without first determining that such transport is less safe under the non-federal regulation than under HM-164.²⁰⁰ Because Appendix A to HM-164 categorically preempts various kinds of non-federal regulations without analyzing their individual safety benefits,²⁰¹ plaintiffs contend that the federal routing regulation is inconsistent with the safety purpose of HMTA.²⁰²

Plaintiffs also argue that the advance determination of inconsistency in Appendix A to HM-164 unlawfully preempts state and

¹⁹³ See infra text and notes at notes 231-42.
¹⁹⁴ City of New York, 539 F. Supp. at 1252.
¹⁹⁵ Id. at 1254.
¹⁹⁶ Brief for Appellee, The City of New York at 3-9, City of New York, 715 F.2d 732.
¹⁹⁸ See Brief for Appellee, supra note 196, at 11-17.
¹⁹⁹ City of New York, 539 F. Supp. at 1254.
²⁰⁰ Id. at 1255.
²⁰² City of New York, 539 F. Supp. at 1254.
local regulations under the standards articulated by the Supreme Court in *Ray*. They assert that, in enacting HMTA, Congress did not intend to authorize exclusive federal control in the area of hazardous materials transportation. In support of their position, plaintiffs note that HMTA explicitly preempts only those non-federal regulations that are inconsistent with the Act or its regulations as promulgated by DOT.

To determine which state and local regulations are inconsistent with, and therefore preempted by, HMTA or its accompanying regulations, DOT utilizes its “inconsistency guidelines.” Under these guidelines, a state requirement is inconsistent with a federal requirement unless compliance with both the state and federal requirement is possible, and the state requirement does not interfere with the safety purpose of the federal requirement. These guidelines reiterate the preemption criteria outlined by the Supreme Court in *Ray*. Although Appendix A lists categories of state and local regulations preempted by HM-164, plaintiffs contend that many of these regulations would not be preempted under DOT’s guidelines. Thus, they assert that Appendix A unlawfully restricts state and local regulatory power.

To illustrate their position, plaintiffs apply DOT’s guidelines to New York City’s regulation and conclude that, absent Appendix A, the City’s regulation is consistent with HMTA and HM-164. They argue that a carrier can comply with the local regulation without contradicting the federal routing regulation by barging spent fuel from the power plants on Long Island to points further south. In addition, the amicus states conclude that the City’s regulation is consistent with the safety purpose of HMTA and

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For a discussion of the constitutional scope of federal power, see *supra* text and notes at notes 111-29.

204 See Brief for Appellee, *supra* note 196, at 13.

205 See Brief for Appellee, *supra* note 196, at 11.


211 See Brief for Amicus States, *supra* note 203, at 23.

212 Id. at n. 11-12. See also Brief for Amicus States, *supra* note 203, at 23-27.


214 See Brief for Amicus States, *supra* note 203, at 23-24; Brief for Appellee, *supra* note 196, at n. 11-12.
HM-164\textsuperscript{214} because it eliminates the dangers associated with transporting spent fuel and other high-level radioactive materials through a densely populated area.\textsuperscript{215}

Finally, plaintiffs argue that where a non-federal regulation is consistent with HMTA and HM-164, DOT must justify its preemption on the grounds that the regulation impedes the safe interstate transportation of hazardous materials.\textsuperscript{216} Plaintiffs assert that Congress did not intend to ignore the traditional deference paid to the states and localities in the area of highway safety regulations when it enacted HMTA.\textsuperscript{217} Therefore, they assert that DOT must adhere to this policy of deference by balancing the non-federal regulation's burden on interstate commerce with the local safety interest that regulation seeks to effectuate.\textsuperscript{218} Because Appendix A preempts state and local regulations without this required weighing of their safety benefits, plaintiffs contend that HM-164 exceeds DOT's regulatory authority.\textsuperscript{219}

The defendants in \textit{City of New York}\textsuperscript{220} assert that HM-164 is a valid exercise of DOT's regulatory authority.\textsuperscript{221} They contend that the purpose of HMTA is to achieve adequate safety and national uniformity in transporting hazardous materials, including spent nuclear fuel.\textsuperscript{222} In contrast to plaintiff's interpretation of HMTA,\textsuperscript{223} defendants argue that Congress did not intend to require DOT to maximize safety in transporting hazardous materials when it enacted HMTA.\textsuperscript{224} Defendants argue that such a requirement would necessitate consideration of safety risks in all localities, thereby placing an impossible burden on DOT.\textsuperscript{225} They
assert that Congress included non-preemption procedures in HMTA to enable states and localities to satisfy their specific safety interests.\textsuperscript{226}

Defendants also argue that the categorical preemption in Appendix A to HM-164 is a lawful exercise of DOT's regulatory authority.\textsuperscript{227} They conclude that Congress expressly intended to limit the scope of state and local regulatory authority in the area of hazardous materials transportation when it enacted HMTA.\textsuperscript{228} In support of this conclusion, defendants emphasize the availability of the non-preemption procedures, and assert that these procedures indicate a presumption of federal preemption under HMTA.\textsuperscript{229} In addition, they justify the preemptive effect of Appendix A on the grounds that such preemption is necessary to avoid numerous non-federal regulations interfering with HMTA's purpose of national uniformity.\textsuperscript{230}

2. The Conclusions Reached by the District and Appellate Courts

The District Court for the Southern District of New York in \textit{City of New York} rejected many of plaintiffs' arguments\textsuperscript{231} and held that the federal routing regulation, HM-164, was within the scope of DOT's regulatory authority.\textsuperscript{232} That court found that the advance determination of preemption in Appendix A to HM-164 was a permissible method of avoiding unnecessary state and local interference with the safety purpose of HMTA.\textsuperscript{233} The district court emphasized the fact that state and local governments could continue to satisfy their specific safety needs by applying to DOT for a determination of non-preemption.\textsuperscript{234}

Although the district court held that HM-164 was procedurally within the scope of DOT's authority, it also held that the federal routing regulation was not valid in its entirety.\textsuperscript{235} That court

\textsuperscript{226} See Brief for Appellants, \textit{supra} note 221, at 27.
\textsuperscript{227} Id. at 34.
\textsuperscript{228} Id.
\textsuperscript{229} Id. at 21, 34.
\textsuperscript{230} Id. at 21-24.
\textsuperscript{231} \textit{City of New York}, 539 F. Supp. at 1253-57.
\textsuperscript{232} Id. at 1257.
\textsuperscript{233} Id.
\textsuperscript{234} Id. at 1255-57.
\textsuperscript{235} Id. at 1293. That court held that HM-164 was invalid "insofar as it overrides nonfederal bans on truck transportation of spent fuel and other large-quantity radioactive materials through densely populated areas such as New York." Id.
concluded that HMTA mandates DOT to "adopt reasonable measures to maximize safety in hazardous materials transportation." (emphasis added). Finding that DOT failed to adequately consider the risks of transporting spent fuel and other high-level radioactive materials through densely populated areas such as New York, the district court concluded that DOT did not fulfill this substantive mandate of HMTA. Therefore, it held that HM-164 was invalid as applied to such densely populated areas.

The Second Circuit Court of Appeals reversed the district court and held that HM-164 was a valid exercise of DOT's regulatory authority under HMTA. That court disagreed with the lower court's conclusions that HMTA requires DOT to maximize safety in the area of hazardous materials transportation. Agreeing with defendants' interpretation of HMTA, the circuit court held that HMTA authorizes DOT "to set acceptable levels of safety for each mode of transportation" (emphasis added). In support of its holding, the circuit court concluded that Congress would not have included non-preemption procedures under HMTA if it intended DOT to evaluate risks on a jurisdiction-by-jurisdiction basis in an effort to maximize safety.

The decision of the Second Circuit Court of Appeals conclusively decided the specific controversy between New York City and DOT. The plaintiffs in *City of New York* appealed the circuit court's decision to the Supreme Court, but the Supreme Court dismissed the appeal for want of jurisdiction.

3. Evaluating DOT's Regulatory Authority Under HMTA

Although the specific litigation between New York City and DOT has been concluded, the district court's and the appellate court's conflicting interpretations regarding the purpose of

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236 Id. at 1288. In its concluding remarks, the district court explained this reasonableness standard: "The HMTA does not require DOT to maximize safety at any cost or to choose safety over all other policies. But HMTA forbids DOT to choose the less safe of two alternatives without any legitimate reason for doing so." *Id.* at 1293.

237 Id. at 1288. The district court held that DOT's failure to adhere to the substantive mandate of HMTA was "arbitrary, capricious, and an abuse of discretion under the APA. 5 U.S.C. § 706(2)(A) (1976)." *Id.*

238 Id. at 1293.

239 *City of New York*, 715 F.2d at 741.

240 Id. at 739.

241 *Id.*

242 Id. at 740.

HMTA and the extent of DOT’s regulatory authority leave in doubt the validity of HM-164 in restricting the regulatory power of state and local governments over spent fuel transportation. The criteria for balancing federal and non-federal power, established by the Supreme Court in interpreting the United States Constitution, seems to indicate that HM-164, and in particular Appendix A thereto, unlawfully restricts the regulatory authority of state and local governments. Thus, it appears that HM-164 exceeds DOT’s regulatory authority under HMTA.

Under the preemption provisions outlined in Ray, the categorical preemption of state and local regulations by Appendix A to HM-164 is impermissible. Congress did not intend to exclusively occupy the area of hazardous materials transportation when it enacted HMTA. That Act provides that only inconsistent non-federal regulations are preempted by HMTA or its regulations. Therefore, states and localities may continue to regulate the transportation of hazardous materials, including spent nuclear fuel, provided that their regulations do not violate the preemption criteria outlined in Ray.

DOT incorporates these preemption provisions in its inconsistency guidelines. In 1978, prior to promulgating HM-164, DOT applied these guidelines and found New York City’s regulation consistent with the safety purpose of HMTA. In upholding the City’s regulation, DOT also concluded that the regulation did not impede interstate commerce because a barging alternative was available for transporting spent fuel from the nuclear power plants on Long Island. Yet, Appendix A to HM-164 now preempts that same regulation.

It would appear that Appendix A also preempts other state and local regulations not preempted under the Ray criteria. The Amicus States in City of New York note the preemption of Ohio’s prenotification statute under the terms of Appendix A. Ohio’s

244 See supra text and notes at notes 111-29.
245 Ray, 435 U.S. at 157. See supra text and notes at notes 119-23.
247 For the Ray criteria, see supra text and notes at notes 119-23.
252 Id. at III-VI.
253 See Brief for Amicus States, supra note 203, at 27. Ohio initiated separate litigation
statute requires a carrier of high-level radioactive material to notify state authorities, at least 48 hours prior to entering the state, of the size and quality of the cargo and of the carrier’s specific transportation route.\(^{254}\) The federal routing regulation unconstitutionally preempts the Ohio statute in two important ways: first, the Ohio statute promotes the safety purpose of HMTA by assuring emergency preparedness along the transportation route\(^{255}\) without contradicting HM-164; and second, Ohio’s prenotification provision, which is present in many states, is valid because it does not unreasonably burden interstate commerce.\(^{256}\)

DOT attempts to justify the categorical preemption under Appendix A as necessary to achieve national uniformity.\(^{257}\) It can be argued that varying regulations from jurisdiction to jurisdiction might impede safety by creating transportation delays.\(^{258}\) In addition, an absolute ban on the transportation of spent fuel by all modes within a given jurisdiction unduly burdens interstate commerce.\(^{259}\) In effectuating the purpose of HMTA, however, DOT should not speak of uniformity as an end in itself. When Congress enacted HMTA, it emphasized uniformity as a method of assuring safety.\(^{260}\) As the district court in City of New York recognized, Congress did not authorize DOT to preempt state regulations in the name of uniformity absent a full safety analysis justifying such preemption.\(^{261}\)


\(^{254}\) OHIO REV. CODE ANN. § 4163.07 (Baldwin).

\(^{255}\) In promulgating HM-164, DOT specifically acknowledged the importance of prior notification from carriers of spent fuel regarding routing plans. See Supplement to Docket HM-164, supra note 102, at D.4. However, DOT decided to preempt non-federal prenotification requirements under the final routing regulation on the grounds that such requirements interfere with national uniformity. See Brief for Amicus States, supra note 203, at n. 27.

\(^{256}\) This conclusion is based on the balancing test outlined by the Supreme Court in Pike. See supra note 113.

\(^{257}\) See Brief for Appellants, supra note 221, at 21-24.

\(^{258}\) See supra text and notes at notes 178-79.

\(^{259}\) A State regulation violates the commerce clause of the United States Constitution if it discriminates against other States. Such absolute protectionist legislation is, therefore, invalid. See supra text and notes at notes 113-115.

\(^{260}\) The stated policy of HMTA is “to protect the Nation adequately against the risk to life and property…” 49 U.S.C. § 1801 (1976). Uniformity, absent safety benefits is, therefore, not the focus of HMTA.

\(^{261}\) City of New York, 539 F. Supp. at 1288.
in *City of New York*, the non-preemption provisions of HMTA do not justify the preemptive effect of Appendix A to HM-164. Requiring states to apply for non-preemption determinations regarding safety regulations that do not contradict HMTA or HM-164, absent Appendix A, disregards the deference paid to the states in the area of highway safety regulations. By providing for the preemption of only inconsistent state regulations under HMTA, Congress intended DOT to adhere to this policy of deference.

Furthermore, as demonstrated by New York City's experience, the actual availability of non-preemption rulings from DOT is questionable. When the City of New York applied to DOT for a non-preemption determination regarding the regulation at issue in *City of New York*, DOT refused to rule on the City's application until the City produced extensive studies regarding the safety benefits of its regulation. Specifically, DOT required the City to prepare a detailed analysis: comparing the costs and safety benefits of its regulation with HM-164; identifying all sectors of the public affected by the City's regulation; and evaluating the safety risks associated with barging spent nuclear fuel. The plaintiffs in *City of New York* contend that the required studies are so burdensome that a state or locality is effectively precluded from obtaining an exemption from the preemptive effect of Appendix A to HM-164. If the plaintiffs are correct, such an absolute denial of non-preemption is inconsistent with both the intent

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262 See *supra* text and notes at notes 239-42.
264 *Rice*, 434 U.S. at 443. See *supra* notes 126, 217.
265 See *supra* text and note at note 217.
266 In accordance with the provisions of HMTA, 49 U.S.C. § 1811(b) (1976), on March 20, 1981, the City of New York filed an application with DOT asking that agency to declare § 175.111(1) (1976) of the City's Health Code valid despite its apparent preemption by HM-164. See *City of New York*, 539 F. Supp. at 1251.
267 *City of New York*, 539 F. Supp. at 1251. DOT did not inform the City of this refusal until 15 days before HM-164 went into effect. Therefore, the City was effectively precluded from preparing the requested reports in time to obtain a ruling before its regulation was rendered unenforceable by HM-164. The district court concluded that the letter illustrates DOT's "hostility toward the City's application." 539 F. Supp. at 1251-52. In addition, leaving the City in a position of no ruling is an effective denial of non-preemption. 539 F. Supp. at 1252. Because a ruling has not been issued however, the City is unable to challenge this denial in the courts. Therefore, the question whether DOT retains absolute discretion to deny a non-preemption ruling, even if the state or local legislation increases safety, remains unanswered. *City of New York*, 715 F.2d at 752.
268 Id.
269 See *Brief for Appellee, supra* note 196, at 15.
of Congress in enacting HMTA, and the constitutional scope of federal power.\textsuperscript{270} 

As stated by the district court in City of New York, in enacting HMTA "Congress intended that DOT respect the traditional and legitimate interests of state and local jurisdictions in promoting public safety..."\textsuperscript{272} By ignoring congressional intent in promulgating HM-164, DOT exceeded its statutory authority. The validity of the federal routing regulation is also questionable based on the mandates of NEPA.

\textbf{B. HM-164 and the Mandates of NEPA}

In addition to challenging HM-164 as an unlawful exercise of DOT's authority under HMTA, plaintiffs also challenge its legality on procedural grounds. They assert that DOT failed to comply with the procedural mandates of NEPA in promulgating the federal routing regulation, and that this failure invalidates HM-164.\textsuperscript{273} NEPA was enacted to "promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man..."\textsuperscript{274} Its primary purpose is to reduce the environmental impact of actions by federal agencies.\textsuperscript{275} Although NEPA emphasizes the preservation of our environment, it does not directly affect the substantive decisionmaking process of federal agencies.\textsuperscript{276} Rather, NEPA requires all federal agencies to fulfill certain procedural duties before reaching their substantive conclusions.\textsuperscript{277} Failure to comply with NEPA's procedural requirements invalidates the federal action.\textsuperscript{278}

Specifically, NEPA requires all federal agencies to prepare an

\textsuperscript{270} See supra text and notes at notes 141-142.
\textsuperscript{271} See supra text and notes at notes 111-28.
\textsuperscript{272} City of New York, 539 F. Supp. at 1258.
\textsuperscript{273} Id.
\textsuperscript{275} 40 C.F.R. § 1500.2(e) (1978).
\textsuperscript{276} City of New York, 539 F. Supp. at 1260 (citing Stryker's Bay Neighborhood Council, Inc. v. Karlen, 444 U.S. 223 (1980)). NEPA requires federal agencies to take a "hard look" at environmental consequences, but it does not interfere with the agencies' discretion to evaluate the necessary information in arriving at their substantive decisions. Kleppe v. Sierra Club, 427 U.S. 390, 410 n. 21 (1976).
Environmental Impact Statement (EIS)\textsuperscript{279} prior to implementing any federal action that "significantly affects the quality of the human environment."\textsuperscript{280} While an EIS is not required when the federal action results in only some impact on the environment,\textsuperscript{281} the federal agency is still required to consider alternatives to the action proposed by the agency in its "Environmental Assessment."\textsuperscript{282}

An EIS is a detailed written evaluation of the effects that a proposed action will have on the environment.\textsuperscript{283} Regulations promulgated by the Council on Environmental Quality (CEQ), the agency responsible for implementing NEPA,\textsuperscript{284} specify the purpose behind filing an EIS and the information required in such a statement.\textsuperscript{285} An EIS is intended to allow the full consideration of an agency's proposed action by all interested parties\textsuperscript{286} in order to assure compliance with NEPA's environmental policies.\textsuperscript{287} It is a lengthy document\textsuperscript{288} which must contain an analysis of the environment to be affected by the proposed action,\textsuperscript{289} the possible environmental consequences of the action,\textsuperscript{290} and alternative means of accomplishing the proposed goal.\textsuperscript{291}

The CEQ regulations state that evaluating alternatives to the proposed action is the most important element of the Environmental Impact Statement.\textsuperscript{292} Alternatives must be presented in comparative form, thus clearly presenting all choices to concerned

\textsuperscript{280} Id.
\textsuperscript{281} Id. See also City of New York, 539 F. Supp. at 1262.
\textsuperscript{283} 40 C.F.R. § 1502 (1978).
\textsuperscript{284} CEQ regulations are not binding on other agencies, but they are entitled to "substantial deference." City of New York, 539 F. Supp. at 1263 (citing Andrus v. Sierra Club, 442 U.S. 347, 356-61 (1979)). However, they are binding on DOT since that agency expressly adopted them. See DOT Order 5610.1c, pt. 1 appearing in 40 C.F.R. § 1502 (1978).
\textsuperscript{286} 40 C.F.R. § 1502.1 (1978) provides, in part, that an EIS "shall provide full and fair discussion of significant environmental impacts and shall inform decisionmakers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment."
\textsuperscript{287} 40 C.F.R. § 1502.1 (1978).
\textsuperscript{288} 40 C.F.R. § 1502.7 (1978) requires that the text of an EIS should, generally, be no less than 150 pages.
\textsuperscript{289} 40 C.F.R. § 1502.15 (1978).
\textsuperscript{290} 40 C.F.R. § 1502.16 (1978).
\textsuperscript{292} Id.
regulatory bodies and the public. All reasonable alternatives must be "rigourously explored" and the agency must briefly explain its reasons for eliminating consideration of any suggested alternatives. A clear and thorough presentation of alternatives is required in order to assure an understanding of all the issues presented by the proposed action and to choose the best means to achieve the federal goal.

When it is unclear whether a proposed federal action will significantly affect the environment, NEPA requires the federal agency to prepare a shorter and less comprehensive report referred to as an Environmental Assessment. Based on this report, the agency must determine whether an EIS is necessary. An Environmental Assessment must include a brief discussion of the need for the proposal, alternative methods of accomplishing the stated goal, and the environmental impacts of both the proposed action and the alternatives.

In City of New York, plaintiffs assert that HM-164 is invalid because DOT failed to comply with the procedural mandates of NEPA in promulgating the regulation. They assert that DOT failed to prepare an EIS and consider alternatives to the federal routing regulation as mandated by NEPA. Defending the regulation, DOT maintains that the promulgation of HM-164 did not require an EIS. Defendants contend that an EIS was not required because HM-164 does not significantly affect the environment since highly radioactive materials can be transported over interstate highways with adequate safety. They also assert that an EIS was not mandated by NEPA because the probability of a worst-case accident is too remote to warrant the preparation of such a statement. Regarding the consideration of alternatives to HM-164, DOT maintains that it satisfied this NEPA require-

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390 Id.
393 40 C.F.R. §§ 1501.4(b), 1508.9 (1978).
394 40 C.F.R. § 1501.4(c) (1978).
395 40 C.F.R. § 1508.9(b) (1978).
396 City of New York, 539 F. Supp. at 1242.
397 See Brief for Appellee, supra note 196, at 16.
398 City of New York, 539 F. Supp. at 1242.
399 City of New York, 539 F. Supp. at 1258. See also Supplement to Docket HM-164, supra note 102, at 14.
400 City of New York, 539 F. Supp. at 1265.
ment in considering nine highway alternatives to the federal routing regulation.304

The District Court for the Southern District of New York, in City of New York, agreed with plaintiffs and held that DOT failed to comply with NEPA in promulgating HM-164.305 Without actually concluding that DOT was bound to prepare an EIS, the district court concluded that DOT's finding of no significant impact was inadequate because it was not supported by a consideration of all necessary factors such as human error306 and sabotage.307 As a result, the court held that DOT had not complied with this mandate of NEPA.308

In addition, the district court held that DOT's consideration of nine highway alternatives did not satisfy NEPA's requirement to “study, develop and describe appropriate alternatives” to its proposed action.309 The district court focused on the alternative of barging spent fuel suggested by the City of New York when DOT solicited comments to the proposed federal routing regulation.310 It held that DOT's failure to consider the barging alternative violated NEPA's mandate to consider all reasonable alternatives.311 Based on possible safety and cost benefits that might result from barging spent fuel rather than transporting it by highway,312 the district court concluded that the barging alternative was reasonable and that DOT was therefore required to evaluate this mode of transport.313

On appeal, the Second Circuit Court of Appeals overruled the district court's decision314 and concluded that DOT was not required to file an EIS.315 The circuit court held that DOT's determination that the risks presented by HM-164 were not of the magnitude to require the preparation of an EIS was reasonable and within that agency's discretion.316

304 Id. at 1278.
305 Id. at 1276.
306 Id. at 1269.
307 Id. at 1275.
308 Id. at 1276.
309 Id. at 1276-77. The nine alternatives are listed id., at 1278 n. 12.
310 Id. at 1250.
311 Id. at 1282, citing 40 C.F.R. § 1500.2(e) (1978).
312 Id. at 1281, 1284-87.
313 Id. at 1282.
314 City of New York, 715 F. 2d at 752.
315 Id. at 752.
316 Id. at 748.
The circuit court also concluded that DOT complied with NEPA's requirement to consider alternatives to HM-164.\textsuperscript{317} It agreed with plaintiffs that HM-164 does have some impact on the environment\textsuperscript{318} and that DOT was bound to comply with this requirement of NEPA.\textsuperscript{319} In promulgating HM-164, DOT considered nine alternatives to that regulation,\textsuperscript{320} including the alternative of taking no action at all.\textsuperscript{321} Each of these alternatives concerned different methods of regulating the highway transportation of spent fuel and other high-level radioactive materials.\textsuperscript{322} Non-highway alternatives, such as barging, were not considered by DOT.\textsuperscript{323} The circuit court held that it was within the permissible scope of DOT's discretion to limit its consideration to various highway routing alternatives since HM-164 was specifically a highway routing regulation.\textsuperscript{324} Therefore, the court found that the considered alternatives satisfied DOT's NEPA compliance.\textsuperscript{325}

The conclusions reached by the circuit court are based on the well-established principle that a reviewing court must show great deference to the decisions of federal agencies.\textsuperscript{326} The scope of an agency's discretion is especially broad when reviewing scientific data, as with the risk analysis at issue in \textit{City of New York}.\textsuperscript{327} DOT's discretion, however, cannot be extended to the point of circumventing the primary purpose of NEPA: to assure the protection of our environment.\textsuperscript{328}

Despite the decision of the circuit court, DOT's failure to file an EIS and consider alternative modes of transporting spent fuel

\begin{itemize}
  \item \textsuperscript{317} Id. at 743.
  \item \textsuperscript{318} Id. at 742. The circuit court held that HM-164 does have some impact on the environment because of the possibility of an accident resulting in the release of radioactivity, and the contribution by the permitted transportation to the amount of low-level radiation on the interstate highways. \textit{Id}.
  \item \textsuperscript{319} Id.
  \item \textsuperscript{320} \textit{See City of New York}, 539 F. Supp. at 1278 n. 12, for a list of these alternatives.
  \item \textsuperscript{321} Id. Consideration of the no-action alternative is required by 40 C.F.R. § 1502.14(d) (1978).
  \item \textsuperscript{322} \textit{City of New York}, 539 F. Supp. at 1278 n. 12.
  \item \textsuperscript{323} \textit{Id}.
  \item \textsuperscript{324} \textit{City of New York}, 715 F.2d at 743.
  \item \textsuperscript{325} \textit{Id}.
  \item \textsuperscript{327} \textit{Baltimore Gas & Electric Co. v. Natural Resources Defense Council, Inc.}, 51 U.S.L.W. 4678, 4682 (U.S. June 6, 1983).
  \item \textsuperscript{328} 42 U.S.C. § 4331(a) (1976).
\end{itemize}
appear to violate the mandates of NEPA. That Act requires DOT to file an EIS because HM-164 significantly affects the environment. The district court and Justice Oakes, dissenting from the circuit court’s opinion, agree that the mere possibility of a highway accident involving a shipment of spent fuel that results in the release of radioactivity makes HM-164’s impact on the environment significant because of the grave consequences of such an accident. In addition, as Justice Oakes pointed out in his dissent, population exposure to greater doses of low-level radiation when transporting spent fuel through densely populated areas qualifies as a significant environmental effect.

The CEQ regulation establishing the criteria for a federal agency to determine if its proposed action has a significant environmental effect, supports this conclusion that DOT was required to file an EIS in promulgating HM-164. Under the CEQ regulation, when deciding if an EIS is required, decision-makers should consider whether the effect of the federal action is “likely to be highly controversial” or “highly uncertain involving unique or unknown risks.” If a proposal satisfies these conditions, an EIS should be filed. In his dissent in City of New York, Justice Oakes indicated that HM-164 fulfills both of these considerations. Justice Oakes concluded that the federal routing regulation is controversial because a substantial dispute exists between DOT and state and local governments regarding its effect on the environment. Emphasizing the uncertainties of sabotage and human error in transporting spent fuel, Justice Oakes also found that

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329 See supra text and notes at notes 274-82.
330 City of New York, 715 F.2d at 753 (Oakes, J., dissenting).
331 Id.; City of New York, 539 F. Supp. at 1264.
332 Id.
333 40 C.F.R. § 1508.27 (1978).
334 40 C.F.R. § 1508.27(b)(4) (1978).
335 40 C.F.R. § 1508.27(b)(5) (1978).
336 40 C.F.R. § 1508.27 (1978). This regulation lists factors that should, rather than must, be considered by a federal agency when deciding if the proposed action significantly affects the environment.
337 City of New York, 715 F.2d at 754 (Oakes, J., dissenting).
338 Id. Justice Oakes notes that controversial within the meaning of the regulation means more than the fact the “people are highly agitated and willing to go to court. Instead, a project is controversial if a substantial dispute exists as to the size, nature or effect of the major federal action.” (citing North American Wild Sheep v. U.S. Dept. of Agriculture, 681 F.2d 1172, 1182 (9th Cir. 1982) (quoting Rucher v. Willis, 484 F.2d 158, 162 (4th Cir. 1973)).
HM-164 involves unique and unknown risks. Because the likelihood of the successful sabotage of a spent fuel shipment cannot be predicted with any accuracy, Justice Oakes’ conclusions are well-founded.

Even if the circuit court is correct in asserting that deference should be given to DOT’s decision regarding the preparation of an EIS, it is difficult to agree with that court’s conclusion that DOT satisfied its NEPA duty to consider alternatives to HM-164. The circuit court’s narrow interpretation of the scope of NEPA is questionable in light of previous cases that have interpreted the provisions of that Act. Generally, these cases indicate that NEPA must be interpreted broadly in order to fulfill its legislative purpose. Although the district court also acknowledged that an agency must be permitted to limit the scope of the alternatives it considers, that court concluded that DOT could not limit its review to exclude alternatives that might reduce HM-164’s impact on the environment.

The conclusions reached by the district court seem to be correct in light of the CEQ regulations that require consideration of all reasonable alternatives. Prior to the enactment of HM-164, DOT itself concluded that barging, at least in the case of New York City, was a reasonable alternative to transportation by truck. Although New York City suggested the consideration of barging as an alternative or supplemental mode of transporting spent fuel when DOT solicited comments to the proposed federal routing regulation, DOT did not consider that alternative. Arguably,

339 City of New York, 715 F.2d at 754 (Oakes, J., dissenting).
340 See supra text and note at note 82.
341 See supra text and notes at notes 314-25.
342 The district court in City of New York, 539 F. Supp. 1280, concluded that NEPA’s mandate to consider alternatives “has been expansively construed” and it cited the following cases as authority: National Resources Defense Council, Inc. v. Callaway, 524 F.2d 79, 93 (2d Cir. 1975); Trinity Episcopal School Corp. v. Romney, 523 F.2d 88, 93 (2d Cir. 1975). See also Hanly v. Kleindienst, 471 F.2d 823, 834-36 (2d Cir. 1972), cert. denied, 412 U.S. 908 (1973) (NEPA requires federal agencies to study alternatives to any actions that have an impact on the environment); Natural Resources Defense Council v. Morton, 458 F.2d 827, 834 (D.C. Cir. 1972) (all reasonable alternatives must be considered).
343 Id. See supra text and notes at notes 274-75.
344 City of New York, 539 F. Supp. at 1278.
347 City of New York, 539 F. Supp. at 1250.
348 Id. at 1278 n. 12.
transporting spent fuel by barge creates less impact on the environment than transportation by truck because, by avoiding densely populated areas, it reduces the consequences which might result from an accident involving a spent fuel carrier.\textsuperscript{349} Therefore, because NEPA's purpose is to minimize the impact of federal action on the environment,\textsuperscript{350} DOT's failure to evaluate transporting spent fuel by barge violates the mandates of that Act.

\textit{C. Policy Considerations Regarding the Propriety of HM-164}

Despite the conclusions reached by the District Court for the Southern District of New York and the Second Circuit Court of Appeals regarding DOT's compliance with NEPA and HMTA in promulgating HM-164, the propriety of the federal routing regulation is also subject to criticism. DOT's failure to consider alternative methods of transportation, such as barging,\textsuperscript{351} and its failure to evaluate the safety benefits of those types of non-federal regulations preempted by HM-164,\textsuperscript{352} results in an absence of any legitimate justification for the restrictive effect that the federal routing regulation has on state and local authority. DOT should, and perhaps must, justify this effect in light of the deference traditionally paid to state and local governing bodies in the area of highway safety regulations.\textsuperscript{353}

In failing to carefully explain the necessity for categorical preemption under HM-164, DOT invites additional criticism of its regulatory role. In \textit{City of New York}, the amicus states of Ohio and Minnesota discuss in detail what they perceive to be an almost complete lack of concern on DOT's part for the safety interests of states and localities.\textsuperscript{354} These states criticize DOT for being more concerned with the needs of the nuclear power industry\textsuperscript{355} than local safety interests.\textsuperscript{356} They assert that Congress, in

\textsuperscript{349} See supra text and note at note 75.
\textsuperscript{350} 42 U.S.C. § 4331(a) (1976).
\textsuperscript{351} \textit{City of New York}, 539 F. Supp. at 1278 n.12.
\textsuperscript{352} See supra text and notes at notes 170-82.
\textsuperscript{353} \textit{Rice}, 434 U.S. at 443. See supra notes 126, 217.
\textsuperscript{354} See Brief for Amicus States, supra note 203, at 4.
\textsuperscript{355} As used here, the term "nuclear industry" includes utility companies, reactor manufacturers, uranium suppliers, the companies that build the shipping casks, and consultant engineering firms. See Woodhouse, \textit{The Politics of Nuclear Waste Management}, in \textit{Too HOT TO HANDLE?} 159 (1983).
\textsuperscript{356} Id.
enacting HMTA, stressed the need for uniformity as a means of achieving safety.\footnote{357} These states emphasize that the goal of uniformity was not specifically intended to accommodate the needs of the nuclear power industry.\footnote{358} As the amicus states point out, HMTA does not prohibit DOT from promulgating regulations that interfere with the nuclear industry’s preferred method of transporting spent fuel.\footnote{359}

Although this criticism of DOT may be justified, some degree of cooperation between industry and government is necessary in order to achieve the safe transportation of spent fuel.\footnote{360} To a large extent, industry controls the technology required to assure that radioactivity is not released during the transportation of spent fuel.\footnote{361} It also has the availability of funds for researching such things as the design and reliability of transportation casks.\footnote{362} The financial strength of the nuclear power industry, however, has also been used in attempts to influence federal action in favor of that industry.\footnote{363} The nuclear power industry supports permanent lobbying organizations such as the Atomic Industrial Forum and Americans for Energy Independence.\footnote{364} These groups have lobbied the government in several well-financed campaigns.\footnote{365} It is difficult to conclude to what extent DOT actually acquiesces to the pressure of these special interest groups absent a thorough safety analysis of their specific demands. However, because HM-164 requires the use of the nuclear power industry’s preferred mode of

\footnotesize\textsuperscript{357} Id.
\footnotesize\textsuperscript{358} Id.
\footnotesize\textsuperscript{359} Id.
\footnotesize\textsuperscript{360} See generally TOO HOT TO HANDLE? (1983). The authors note that power companies have traditionally played an important role in managing nuclear waste matters. Because the nuclear industry physically controls the disposal of spent nuclear fuel, the authors conclude that cooperation with the industry is essential to assure safety in transport.
\footnotesize\textsuperscript{361} See Woodhouse, supra note 355, at 159-60 (1983).
\footnotesize\textsuperscript{362} Id.
\footnotesize\textsuperscript{363} Id. at 159
\footnotesize\textsuperscript{364} Id. See also Lipschutz, supra note 9, at 22 n.7.
\footnotesize\textsuperscript{365} See Woodhouse, supra note 355, at 159. The author notes that: in 1976 the Atomic Industrial forum spent $1.5 million on a number of electoral conflicts regarding nuclear issues; in that same year Bethlehem Steel and Exxon Nuclear contributed $2 million to defeat an anti-nuclear proposition in California; and in 1980, various nuclear facilities contributed approximately $800,000 to lobbying organizations in a campaign to defeat a referendum in Maine which might have resulted in shutting down the only nuclear reactor in that state.
transporting spent fuel,\(^{366}\) in promulgating that regulation DOT appears to be unduly oriented in favor of that industry.

The criticism that DOT is servicing the needs of the nuclear power industry highlights the intensity of the present controversy between the federal and non-federal governments over regulating the transportation of spent fuel. The restrictions placed on state and local regulatory authority by Appendix A to HM-164\(^{367}\) create an adversarial atmosphere between the federal government and industry on one side, and state and local governments on the other. A regulatory system that lacks cooperation from all of its components cannot produce the safest method for transporting spent nuclear fuel.\(^{368}\)

Many commentators suggest that a flexible system that encourages participation at all levels of government is necessary to assure the safe transportation of spent fuel and other high-level radioactive wastes.\(^{369}\) The following section discusses the use of shipping and barging as an alternative method of transporting spent nuclear fuel by highway. Barging and shipping spent nuclear fuel is technically feasible. More importantly, the use of this mode of transporting spent fuel may help to reduce the tension that presently exists between the federal and state and local governments.

V. TRANSPORTATION OVER WATER: A SAFE AND FEASIBLE ALTERNATIVE

The provisions for categorical preemption set forth in Appendix A to HM-164 unnecessarily limit the scope of state regulatory power.\(^{370}\) Although the Second Circuit Court of Appeals concluded in City of New York that HM-164 is a valid exercise of DOT's regulatory authority,\(^{371}\) DOT should permit greater flexibility for state legislators and local governing bodies to participate in reg-

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\(^{367}\) See supra text and notes at notes 170-83.

\(^{368}\) Lipschutz suggests that a flexible system will minimize the consequences of an accident. This author implies that such flexibility will be achieved only with cooperation in the management of nuclear waste. Lipschutz also stresses the need for public participation. See Lipschutz, supra note 9, at 171. See also Green & Zell, supra note 12, at 110-11.

\(^{370}\) Id.

\(^{371}\) 49 C.F.R. § 177.825, Appendix A (1982). See supra text and notes at notes 171-84.

ulating the transportation of spent nuclear fuel. A policy of flexibility is more acceptable to the states and localities because it offers them a better opportunity to satisfy their local safety interests. If DOT permits state and local governments to pursue various routing alternatives, they can attempt to regulate the transportation of spent fuel in a manner that satisfies their local safety interests without impeding interstate commerce or interfering with the purpose of HMTA. A policy of flexibility would therefore maximize safety and promote cooperation at all levels of government.

DOT could achieve this goal of increased flexibility by amending HM-164 to permit state and local governments to mandate the transportation of spent fuel and other high-level radioactive material by water when such transportation is appropriate. By permitting states and localities to designate water routes as an alternative to highway routes, DOT would increase the presently restricted scope of state and local authority in regulating the transportation of spent nuclear fuel. State and local authorities would, therefore, have more opportunities to express their individual safety concerns, and DOT’s policy would more closely reflect the traditional deference paid to state and local governing bodies in the area of highway safety regulation. In addition, a federal policy that demonstrates concern for local interests should be more acceptable to the general public. NEPA and several commentators stress the importance of public acceptance of fed-

372 One commentator emphasizes that the resolution of the legal issues does not answer the question of whether state and local authorities should exercise control in the area of nuclear waste transport. See Green & Zell, supra note 12, at 110-11. See also supra note 368.

373 The purpose of HMTA is to assure the safe transportation of hazardous materials. 49 U.S.C. § 1801 (1976).

374 HM-164 presently requires the use of highway routes for transporting spent nuclear fuel. 49 C.F.R. § 177.825, Appendix A at III(1) (1982).

375 See supra text and notes at notes 170-83.

376 The majority of state legislation regarding spent fuel transportation is concerned with protecting the public from the safety risks associated with a radioactive release. See A Summary of State and Local Legislative Requirements, supra note 22. By permitting an alternative to highway routing, DOT would enable states to designate water routes that avoid population centers. Such an alternative, therefore, provides a greater opportunity for tailoring transportation routes to satisfy the safety concerns of various localities.

377 Rice, 434 U.S. at 443. See also supra text and note at note 126.

eral action that affects the environment. Because of public influence on legislators, public acceptance is necessary to reduce the present controversy between the federal and non-federal governments.\textsuperscript{380}

Reports suggest that transportation of spent fuel by waterways is as safe or safer than transportation by highway.\textsuperscript{381} Furthermore, available data indicates that such a method of transporting spent fuel is technically feasible.\textsuperscript{382} The following subsections of this article evaluate the safety advantages and technical feasibility of using waterways as an alternative to highways for transporting spent nuclear fuel. This discussion concludes that DOT may permit states to mandate the transportation of spent fuel by waterway. Transport by waterway is consistent with the safety purpose of HMTA\textsuperscript{383} and does not constitute an undue burden on interstate commerce.\textsuperscript{384}

A. The Safety Advantages of Transportation Over Water

Available data indicates that transportation of spent fuel by barge or ship over the water is as safe or safer than transportation by truck over the highway for several reasons. First, reports calculate that the probability of a release of radioactivity resulting from a serious accident involving a spent fuel carrier is more remote when such transportion is by waterway rather than highway.\textsuperscript{385} Additionally, both the distant proximity of most water routes to major population centers and the radioactive shielding properties of water make the consequences of a worst-case accident less severe when radioactive material is transported by waterway.\textsuperscript{386} Finally, transportation by water reduces public exposure to low-level radiation.\textsuperscript{387}

\textsuperscript{379} These commentators conclude that public acceptance is necessary for a successful nuclear waste disposal policy. See Lipschutz, supra note 9, at 171; Green & Zell, supra note 12, at 110-11.
\textsuperscript{380} Id.
\textsuperscript{381} See infra text and notes at notes 385-416.
\textsuperscript{382} See infra text and notes at notes 420-60.
\textsuperscript{384} For a discussion of impermissible burdens on interstate commerce, see supra text and notes at notes 111-15.
\textsuperscript{385} See infra text and notes at notes 390-400.
\textsuperscript{386} See infra text and notes at notes 401-11.
\textsuperscript{387} See infra text and notes at notes 412-16.
1. Lesser Probability

In evaluating the probability of a barge accident resulting in the release of radioactivity, the NUREG report concludes that a severe accident is less likely to occur when transporting spent fuel by barge than by truck. That report states that a barge does not move fast enough to cause a rupture of a spent fuel cask in the event of a collision. The NUREG report also estimates that if a barge were to catch fire, it would not burn long enough to melt the spent fuel cask. Another report indicates that casks transported by ship would remain intact following a collision between ships or between a ship and a fixed structure.

Furthermore, if a spent fuel cask inadvertently fell into the water during transport, it is highly unlikely that the cask would rupture underwater. Despite the increased water weight, such casks are designed to withstand tremendous external pressure. None of the waterways used for transporting goods in the United States are sufficiently deep to create the water pressure necessary to cause a spent fuel cask rupture. Finally, transportation of spent fuel by waterway reduces the probability of a radioactive release resulting from sabotage. Because such transport avoids densely populated areas, sabotage by a terrorist intent on inflicting great economic damage and human loss is unlikely. Based on available probability data alone, therefore, transportation of spent fuel by waterway is safer than by highway.

2. Less Severe Consequences

In addition to reducing the probability of an accident involving a spent fuel carrier resulting in the release of radioactivity, transportation of spent fuel by waterway would also reduce the

386 See NUREG, supra note 1.
387 Id.
390 See AGNS, supra note 7, at 55.
391 Id.
392 See AGNS, supra note 7, at 55.
393 See NUREG, supra note 1, at 5.18.
394 The three types of waterways used for transporting goods in the U.S. are the rivers, intracoastal waterways, and the Great Lakes. A Generic Assessment, supra note 66, at 1.2.
395 See AGNS, supra note 7, at 55.
396 City of New York, 539 F. Supp. at 1285.
397 See A Generic Assessment, supra note 66, at 1.4-1.6 for illustrations of available water routes.
398 City of New York, 539 F. Supp. at 1285.
severity of the *consequences* resulting from such an accident.\textsuperscript{399} Barring and shipping routes generally avoid major population centers during the majority of the transportation period.\textsuperscript{400} By avoiding densely populated areas such as New York City, the economic damage and loss of life from a "worst-case" release of radioactivity\textsuperscript{401} would be significantly reduced.\textsuperscript{402}

The consequences of a radioactive release would be further mitigated if such a release occurred under water.\textsuperscript{403} Since water serves as an excellent shield from radiation,\textsuperscript{404} it would reduce the amount of radioactivity released into the atmosphere.\textsuperscript{405} Consequently, the population would be protected from the immediate adverse effects of exposure to high-level radiation.\textsuperscript{406} In addition, the radiation effects on the public from the resulting water contamination could be contained by restricting the immediate use of such water for consumption and irrigation.\textsuperscript{407} Although the consequences resulting from the release of radioactivity under water would be extremely severe,\textsuperscript{408} the overall consequences are even more severe when radioactivity is released on the highway.\textsuperscript{409}

3. Less Exposure to Low-Level Radiation

Finally, transportation of spent fuel by waterway is safer than transportation by highway because water transportation would reduce public exposure to low-level radiation.\textsuperscript{410} While the dangers of exposure to low-dose radiation are controversial,\textsuperscript{411} the federal mandate is to maintain low-dose radiation at the lowest possible level.\textsuperscript{412} In contrast to the exposure resulting from the transporta-

\textsuperscript{399} For a complete discussion of such consequences, see supra text and notes at notes 70-75, 90.
\textsuperscript{400} See supra note 397.
\textsuperscript{401} A "worst-case" release of radioactivity is the most radioactivity that could be released, regardless of probability. See supra note 71.
\textsuperscript{402} See Sandia, supra note 64, at 168.
\textsuperscript{403} See NUREG, supra note 1, at 5.18; AGNS, supra note 7, at 55.
\textsuperscript{404} See NUREG, supra note 1, at 5.18.
\textsuperscript{405} Id.
\textsuperscript{406} For a discussion of the effects of high-level radiation on humans, see supra text and note at note 9.
\textsuperscript{407} See A Generic Assessment, supra note 66, at 6.40-42.
\textsuperscript{408} Id. at 6.37-43.
\textsuperscript{409} One study concludes that transporting spent fuel by waterway results in little risk to the environment. See AGNS, supra note 7, at 55.
\textsuperscript{410} See NUREG, supra note 1, at 4.25.
\textsuperscript{411} See supra note 96.
\textsuperscript{412} See supra note 102.
tion of spent fuel through a major city by truck, reports indicate that population exposure from transportation over water is negligible because water routes generally avoid densely populated areas.\textsuperscript{413} In addition, the use of a larger cask when transporting spent fuel by water reduces the amount of low-dose radiation exposure for nuclear transportation workers.\textsuperscript{414} Transportation of spent fuel by waterway is, therefore, consistent with the federal policy of maintaining radiation doses at the lowest possible level.

By reducing low-level radiation, transportation of spent fuel by waterway is safer than transportation by highway. DOT could, therefore, permit state and local regulations requiring transportation of spent fuel by waterway because such regulations would be consistent with the safety purpose of HMTA.\textsuperscript{415} In addition, the use of such a mode is feasible and it, therefore, does not unreasonably burden interstate commerce.\textsuperscript{416}

\textbf{B. The Feasibility of Transporting Spent Fuel By Water}

The United States nuclear power industry has not extensively utilized transportation of spent nuclear fuel by barge or ship.\textsuperscript{417} Thus, it is impossible to evaluate conclusively the actual success of transportation by waterway as an alternative to highway transportation in all appropriate locations.\textsuperscript{418} Despite this absence of full-scale experience, the use of waterways for transporting spent fuel appears to be highly feasible\textsuperscript{419} because it is physically possible,\textsuperscript{420} its use has been successful to date,\textsuperscript{421} it is not unreasonably costly,\textsuperscript{422} and the necessary technology is available.\textsuperscript{423} Transportation of spent fuel by waterway is physically possible because most reactor sites are located within a short distance of

\textsuperscript{413} See NUREG, \textit{supra} note 1, at 4.25.
\textsuperscript{414} The use of a larger cask results in five to six times less radiation exposure. See AGNS, \textit{supra} note 7, at 50.
\textsuperscript{416} For a discussion of impermissible burdens on interstate commerce, see \textit{supra} text and notes at notes 111-15. See also, text and note at note 250.
\textsuperscript{417} See AGNS, \textit{supra} note 7, at 49. This study cites lack of utility commitment as a major obstacle to full-scale use of water as a primary method for transporting spent nuclear fuel.
\textsuperscript{418} See AGNS, \textit{supra} note 7, at 50.
\textsuperscript{419} See \textit{A Generic Assessment}, \textit{supra} note 66, at v-vii.
\textsuperscript{420} See \textit{infra} text and notes at notes 424-32.
\textsuperscript{421} See \textit{infra} text and notes at notes 433-39.
\textsuperscript{422} See \textit{infra} text and notes at notes 440-54.
\textsuperscript{423} See \textit{infra} text and notes at notes 455-60.
the nearest waterway. Although rail or heavy weight truck transport would be necessary to carry the casks between the plant site and the waterway, the majority of nuclear power plants could utilize a transportation route more than 90% of which is comprised of waterways. In addition, cold weather conditions would not impede the transportation of spent fuel over water. The majority of navigable waterways are open for travel at least nine months of the year. The average shipment of spent fuel is completed in less than four months. Since nuclear power plants are designed to store some spent fuel on site, the three month period in which transportation by water would be impossible does not preclude its use as a viable alternative to highway transportation.

The successful, albeit limited, use of spent fuel transportation by waterway in the United States further demonstrates the feasibility of this method of transportation. In addition, the nuclear industry in continental Europe, Great Britain, and Japan utilize water routes in transporting spent fuel. For example, a reprocessing plant in Windsale, British Isles, receives shipments of spent fuel via water from both Europe and Japan. The experience of these countries illustrates that standard barges can be used successfully to transport spent nuclear fuel. Furthermore, special craft designed specifically for transporting such material might be utilized in the future. Based on the limited

424 See A Generic Assessment, supra note 66 at 1.9.
425 Reactor sites serviceable by this method of transportation must have either: direct access to a navigable waterway; a location within a short distance of a waterway which is accessible by heavy-haul trucks (trucks designed to carry large spent fuel casks); or a rail link between the reactor site and such a waterway. Id. at 1.7-1.8.
426 Id. at v.
427 Id. at 1.7.
428 See supra note 394.
429 See A Generic Assessment, supra note 66, at 1.7.
430 Id.
431 Nuclear power plants in operation as of 1980 are designed for four to five years of on-site spent fuel storage. Many of these plants have been redesigned to permit a maximum of nine years storage on-site. See Lipschutz, supra note 9, at 46.
432 For example, barging has been successfully used by BNL on Long Island. See supra text and note at note 152.
433 See AGNS, supra note 7, at 49.
434 Id. at 52.
435 Id.
436 Id. at 54. Great Britain Shipbuilding Co. received an order to build a specially designed ship for transporting spent fuel from Japan to France and the United Kingdom.
experience in this country and the experience abroad, spent fuel can be safely transported by barge or ship over waterways.

Estimates also indicate that the cost of transporting spent fuel by waterway is not prohibitive.437 Although cost estimates vary and depend largely on the location of the power plant,438 reports suggest that there are many cost advantages to transporting spent fuel by water. One advantage is that more spent fuel can be transported by waterway per shipment than by highway since larger casks are used during water transport.439 In addition, one study indicates that reducing the number of shipments increases efficiency by eliminating unloading delays at storage sites.440 Transportation by waterway may also save wage costs; less time is required for loading the larger casks onto rail cars or heavy-haul trucks at the reactor site than for loading smaller casks onto trucks used for highway transportation.441 Finally, some estimates indicate that carrier fees are lower for barging and shipping than for trucking.442 Based on these cost advantages, one report concludes that transporting spent fuel by waterway is the most cost effective mode of transportation.443

These cost advantages of transportation by waterway, while advantageous, must be balanced against the capital expenditures necessary to implement such a method of transportation.444 Before transportation by waterway is possible on a large scale, nuclear power plants may have to invest capital to upgrade their loading facilities, and to purchase or lease barges or special motor vessels.445 In addition, the estimated cost of renting spent fuel casks is high,446 and work crews may be idle between loading and unloading periods.447 One study suggests that these costs could be reduced by several power plants using common equipment, thus sharing these initial capital expenditures.448 Furthermore, as the

437 See NUREG, supra note 1, at 6.25.
438 See supra note 424.
439 See AGNS, supra note 7, at 50.
440 Id.
441 Id. Six to ten moves are required for loading large casks as opposed to 60 or 70 moves when smaller casks, designed for trucks, are loaded.
442 See NUREG, supra note 1, at 6.11.
443 Id. at 6.25.
444 See AGNS, supra note 7, at 93.
445 Id.
446 See A Generic Assessment, supra note 66, at 7.1.
447 See AGNS, supra note 7, at 93.
448 Id. at 96-97.
nuclear industry becomes more experienced with transporting spent fuel by waterway, such costs will probably decline. Therefore, despite these initial capital outlays, transportation of spent fuel by waterway is economically feasible.

Finally, the equipment and technology necessary to transport spent fuel by waterway is readily available. The equipment required for such transportation includes either a ship or tugboat and barge, several large spent fuel casks, and large cranes to transfer the casks on and off the water vessel. Because large casks are used during transportation by rail, both the casks and required cranes are immediately available for use. The number of tugs necessary to service those nuclear power plants that could utilize water as a means of transportation are also immediately available. Finally, the requisite number of ships and barges could be purchased or leased. Should the nuclear industry decide to use specialized vessels, it could obtain the necessary design and construction technology from the British nuclear industry, which has developed vessels specifically used for the transportation of spent nuclear fuel.

Transportation of spent nuclear fuel by waterway is a safe and feasible alternative to transportation by highway. Because it is consistent with the safety purpose of HMTA and does not unreasonably burden interstate commerce, DOT could exercise its regulatory authority under HMTA to permit states and localities to require the use of this alternative to transporting spent fuel by highway.

By revoking the categorical preemption provisions in Appendix A to HM-164, DOT could accomplish this result. Appendix A to HM-164 unnecessarily restricts state regulatory authority because it preempts non-federal regulations without considering

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449 One study concludes that the cost of transportation by waterway might be reduced as experience with such a system increases efficiency. This study also concludes that new procedures and technologies are likely to develop as the utilization of this method of transportation increases. See *A Generic Assessment*, supra note 66, at 7.1.

450 See *AGNS*, supra note 7, at 58.

451 See *A Generic Assessment*, supra note 66, at vi.

452 *Id.* at 1.12.

453 See *AGNS*, supra note 7, at 64.

454 One study estimates that 25 to 30 tugs would be required. See *A Generic Assessment*, supra note 66, at vi.

455 See *AGNS*, supra note 7, at 93.

456 *See supra* note 436.

their safety benefits.\textsuperscript{458} The preemption provisions of HMTA are sufficient to assure that state regulations do not interfere with the safety purpose of that Act.\textsuperscript{459} Those provisions adhere to the constitutionally mandated scope of federal power.\textsuperscript{460} In contrast, based on the preemption standards established by the Supreme Court, Appendix A to HM-164 is an excessive exercise of federal power.\textsuperscript{461}

DOT should, therefore, revoke the provisions of Appendix A to HM-164 in order to permit greater regulatory flexibility at state and local levels. Such increased flexibility would alleviate many of the legal conflicts\textsuperscript{462} and much of the current political tension\textsuperscript{463} between the federal and non-federal governments regarding the regulation of transporting spent nuclear fuel. In addition, as the waterway routing alternative demonstrates, by permitting states and localities to supplement HM-164, DOT would maximize safety in transporting such materials.

\section*{VI. CONCLUSION}

Federal, state and local authorities all have an interest in protecting the public against the grave safety hazards associated with the transportation of spent nuclear fuel. Because the particular safety concerns of the states and localities conflict at times with the need to assure national safety, some tension between federal and non-federal authorities is inevitable. In order to maximize public safety and mitigate this potential conflict, a flexible national regulatory scheme is necessary.

Such flexibility is possible under the preemption provisions of HMTA.\textsuperscript{464} However, the categorical preemption set forth in the federal routing regulation promulgated by DOT, HM-164, undermines this flexibility by severely restricting the scope of state and local regulatory authority.\textsuperscript{465} HM-164 preempts various types of

\begin{footnotes}
\item[460] \textit{See supra} text and notes at notes 111-29.
\item[461] \textit{See supra} note 203.
\item[462] \textit{See supra} note 185.
\item[463] \textit{See supra} text and notes at notes 378-80. One study suggests that transportation of spent fuel over water would reduce political tension by minimizing public fear. Because most water routes do not pass through heavily populated areas, transportation is less visible to the public and related fears are, therefore, reduced. \textit{See AGNS, supra} note 66, at 50.
\end{footnotes}
state and local regulations without regard to their safety benefits. 466

Although such preemption may be a lawful exercise of DOT's regulatory authority and DOT may have complied with the mandates of NEPA in promulgating HM-164, as the Second Circuit Court of Appeals held in City of New York, 467 DOT should consider public policy and revoke the categorical preemption provisions of the federal routing regulation. Such action would increase the flexibility of state and local authority in regulating the transportation of spent nuclear fuel. Where appropriate, states and localities could then require the transportation of spent fuel by waterway rather than highway, as required under HM-164, thereby satisfying many of their local safety interests and assuring the safe interstate transportation of spent nuclear fuel. 468

Increased flexibility at the state and local levels would foster cooperation and political acceptance of the general federal framework for regulating the transportation of spent nuclear fuel. Most importantly, a policy of flexibility would best facilitate DOT's duties under HMTA because it would maximize safety in transporting spent nuclear fuel.

466 Id.
467 City of New York, 715 F.2d 732.
468 See supra note 376.