LEGAL PRECEDENTS REGARDING USE AND DEFENSIBILITY OF RISK ASSESSMENT IN FEDERAL TRANSPORTATION OF SNF AND HLW

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ABSTRACT

Risk assessment has become an increasingly important and essential tool in support of Federal decision-making regarding the handling, storage, disposal, and transportation of spent nuclear fuel (SNF) and high-level radioactive waste (HLW). This paper analyzes the current statutory and regulatory framework and related legal precedents with regard to SNF and HLW transportation. The authors identify key scientific and technical issues regarding the use and defensibility of risk assessment in Federal decision-making regarding anticipated shipments.

STATUTORY/REGULATORY BASES OF FEDERAL SNF AND HLW TRANSPORTATION RISK ASSESSMENT

The statutory basis requiring Federal agencies to undertake risk assessment in decision making with regard to the transportation of SNF and HLW is found in the National Environmental Policy Act (NEPA), codified at 42 U.S.C. §4321 et seq. The cornerstone of NEPA is §102(2)(C), which requires that, to the fullest extent possible, all agencies of the Federal Government include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on: (1) the environmental impact of the proposed action; (2) any adverse environmental effects which cannot be avoided should the proposal be implemented; (3) alternatives to the proposed action; (4) the relationship between the local short-term uses of man's environment and the maintenance and enhancement of the long-term productivity; and (5) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented. An agency is required to prepare an environmental impact statement (EIS) whenever a proposed action qualifies as a "major Federal action significantly affecting the quality of the human environment." ["Major," as used above in NEPA, reinforces but does not have a meaning independent of "significantly" (See 40 CFR §1508.18)].

NEPA also established the Council on Environmental Quality (CEQ), which promulgates regulations to promote compliance with NEPA's "action-enforcing" requirements. These regulations interpret the terms of NEPA and define the responsibilities of Federal agencies with respect thereto. The regulations require an agency proposing a major action that does not have a significant impact on the environment to file an "environmental assessment" (EA) that explains
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how the agency reached its finding of no significant impact (FONSI). An EA is required to set forth sufficient evidence and analysis to support its FONSI (40 CFR §1508.9(a)(1)).

The CEQ regulations further require that in preparing an EIS an agency consider three types of impacts on the environment - direct, indirect, and cumulative. Indirect impacts are defined as those "which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable" (40 CFR §1508.8). A cumulative impact is defined as an "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but, collectively significant actions taking place over a period of time" (40 CFR §1508.7). Cumulative impacts can be of particular concern with regard to the transportation of SNF or HLW, since both the physical rail system and the U.S. Department of Transportation (DOT)'s highway routing regulations for transport of SNF or HLW (commonly referred to as HM-164, and set forth at 49 CFR §177.825) in effect restrict the number of available transportation routes within a geographic area. Hence, successive shipments or campaigns through the same geographic area may tend to result in cumulative risks.

Both NEPA and the CEQ regulations include a significant and independent requirement that agencies always consider and evaluate appropriate alternatives to proposed actions that will have an impact on the environment. Section 102(2)(E) of NEPA provides that all agencies of the Federal Government shall "study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources." The CEQ regulations (40 C.F.R. §1509.9(b) require that an EA "include brief discussions ... of alternatives as required by §102(2)(E)...." These requirements have been construed to be independent of any determination regarding preparation of an EIS, and to be operative even if an agency makes a finding of no significant environmental impact.1

An agency is responsible for determining the appropriate range of alternatives to be considered through the use of what is termed the "rule of reason." Under the rule of reason, an agency is not required to consider all possible alternatives for each aspect of a proposed action. Rather, the agency need consider "only a reasonable number of examples, covering the full spectrum of alternatives."2

What constitutes a reasonable range of alternatives depends on the nature of the proposal and the circumstances of each case. In general, the smaller the impact of the proposed action, the less extensive the search for alternatives an agency may be required to undertake. However, reviewing courts have generally insisted that an agency consider such alternatives as may partially or completely meet the proposal's goal. As a consequence, the scope of alternatives that must be considered by an agency is a function of how narrowly or broadly the objective of its proposed action is viewed.3 An action involving transportation of SNF or HLW would appear to require consideration of a full spectrum of available alternatives (i.e., transportation mode and route alternatives) which would adequately protect the human environment.

The "rule of reason" governs not only which alternatives the agency must consider, but also the
extent to which it must discuss them. An agency's requisite consideration of alternatives must adequately articulate the reasons for the agency's choice and its rejection of available alternatives. While an agency is not required to select any particular alternative and the examination of alternatives need not be exhaustive, it must "be sufficient to demonstrate reasoned decision making." Therefore, an agency contemplating transport of SNF or HLW must generally perform an appropriate risk assessment for each alternative (within the full spectrum of available and appropriate transportation alternatives) for the purposes of developing a well-reasoned decision.

An agency may find that information necessary to the evaluation of environmental impacts in an EIS cannot be obtained because the overall costs of doing so are exorbitant or the means to obtain such information are not known. The CEQ regulations (40 CFR §1502.22) specify how an agency is to proceed in such circumstances. When an agency is evaluating "reasonably foreseeable" significant adverse effects on the human environment and there is incomplete or unavailable information, the agency must make clear that such information is lacking. If relevant incomplete information is essential to a reasoned choice between alternatives and the overall costs of obtaining it are not exorbitant, the agency is required to include the information in its analysis. If such information cannot be obtained because the overall costs of obtaining it are exorbitant or the means to obtain it are not known, the agency is required to include within its EIS: (1) a statement that such information is incomplete or unavailable; (2) a statement of the relevance of the incomplete or unavailable information to evaluating the reasonably foreseeable significant adverse impacts on the human environment; (3) a summary of existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable significant impacts on the human environment; and (4) the agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community. For the purposes of 40 CFR §1502.22, the term "reasonably foreseeable" includes impacts which have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason. As discussed below, these regulations can be of particular importance in developing an analysis of accident-related risks associated with the transport of SNF and HLW and consistent with the procedural requirements of NEPA.

Use of an EIS and/or other environmental study previously prepared by any Federal agency to assist an agency in complying with the requirements of NEPA is clearly permissible. In fact, NEPA regulations encourage the use of such reports (See 40 C.F.R. §§1500.4(n) and 1506.4). An agency, however, does have an obligation to independently evaluate any document (including an EIS, EA, or other environmental report) prepared by others, upon which the agency intends to rely in complying with NEPA (40 C.F.R. §1507.2). If such analyses satisfy an agency's obligation to study the potential effects of its own proposed action, then the agency has no obligation to prepare its own study. However, an agency may not substitute compliance with standards or regulations administered by another agency for required NEPA analysis. This is of particular significance in SNF and HLW transportation, since the packaging and transportation of such materials is extensively regulated by the U.S. Nuclear Regulatory Commission (NRC) and the U.S. DOT.

3
The environmental impacts of the transportation of SNF in Type B casks by truck and rail were first analyzed by the Atomic Energy Commission (AEC) in a generic study entitled Environmental Survey of Transportation of Radioactive Materials To and From Nuclear Power Plants (AEC, 1972) (Wash-1238). A subsequent AEC report, Environmental Survey of the Uranium Fuel Cycle (AEC, 1974) (Wash-1248), specifically applied the Wash-1238 transportation environmental impacts data to the shipment of other high-level nuclear wastes. Public hearings were held on both of these documents. As a result of these hearings, the AEC's approach to the evaluation of the accident risks associated with the transportation of SNF or HLW, that is, multiplication of the consequences of potential accidents by the probability of their occurrence; and its conclusion that such risks were extremely low and well within acceptable limits, were approved by the hearing board.

In 1977, the NRC, a successor agency to the AEC, prepared its own EIS regarding the environmental impacts of the transportation of radioactive materials. The Final Environmental Statement on the Transportation of Radioactive Material by Air and Other Modes (NRC, 1977) (NUREG-0170), was a generic study primarily performed using conservative engineering assumptions and national average data. The study extensively examined the potential environmental impacts of shipping radioactive materials by various modes of transportation. It has served as a benchmark EIS, upon which most subsequent EAs and EISs relating to SNF and HLW transportation have relied for methodology, data, and/or analysis. NUREG-0170 included an assessment of both the incident-free radiological consequences of such transportation and the likelihood and magnitude of radiological consequences associated with potential accidents. The assessment concluded that the overall radiological risk involved in all shipments of radioactive materials was small.

Soon after publication of NUREG-0170, U.S. Department of Energy (DOE)-prepared programmatic EISs regarding the management and storage of spent reactor fuel and other HLW (e.g. Final EIS, U.S. Spent Fuel Policy, DOE/EIS-0015 (1980); Final EIS, Management of Commercially Generated Radioactive Waste, DOE/EIS-0046F (1980)) began to substantially rely upon NUREG-0170 for generic data and analysis of the environmental impacts associated with transportation. Subsequent DOE review of specific proposed shipments of foreign and domestic SNF invariably concluded that the environmental effects of the shipment and management of SNF had been adequately addressed in previous NEPA documents (e.g. NUREG-0170; DOE/EIS-0015), and that the impacts of the proposed shipments could be expected to be insignificant in comparison to the impacts previously identified and evaluated in the earlier EISs. After several such reviews, in or about 1981, DOE ceased documenting reviews for similar SNF movements, on the basis of a categorical exclusion contained in DOE's internal guidelines for implementing compliance with NEPA. (An EA is not required for actions that an agency determines are categorically excluded under its internal NEPA compliance procedures; actions are categorically excluded if they normally do not require either an EIS or an EA). The DOE implementation guidelines provided a categorical exclusion for actions that were "substantially the same as other actions for which the environmental effects have already been assessed in a NEPA document and determined by DOE to be clearly insignificant and where such assessment
is currently valid" (45 FR 20695, March 28, 1980).

During the early and mid-1980s, DOE made several significant shipments of SNF of both foreign and domestic origin to DOE’s Idaho National Engineering Laboratory (INEL) in Idaho Falls, Idaho and to DOE’s Savannah River Site (SRS) in Aiken, South Carolina. DOE prepared no campaign-specific EAs or EISs for any of these shipments. Instead, the agency continued to rely upon NUREG-0170, certain other environmental analyses giving generic consideration to transportation environmental impacts, and the above-referenced categorical exclusion established by its internal NEPA compliance guidelines.

The March 29, 1979 accident at the General Public Utilities Company (GPUC)-owned Unit 2 power plant at Three Mile Island, Pennsylvania (TMI) proved to be a watershed event with regard to public and official scrutiny of the risks associated with the transportation of radioactive materials and with nuclear power in general. In the aftermath of the accident, the NRC prepared and published the Final Programmatic Environmental Statement Related to Decontamination and Disposal of Radioactive Waste Resulting From March 29, 1979 Accident at Three Mile Island Nuclear Station, Unit 2 (NRC, 1984). The EIS concluded that TMI was not suitable for the long term storage and disposal of the nuclear wastes and that TMI wastes not acceptable for storage at a commercial facility should be sent to a Federal installation for storage and research until they could be repackaged in a waste form acceptable for a commercial or Federal disposal facility. A four-party coordination agreement was negotiated between GPUC, DOE, NRC and the Electric Power Research Institute, under which DOE agreed to accept the core debris and transport it to INEL for research and storage until emplacement in a permanent repository.

The NRC EIS evaluated the environmental impacts of the cleanup and generally addressed the risks involved in transportation of the core debris. Relying primarily on NUREG-0170 and the NRC EIS, DOE concluded that the transportation of the core debris from TMI to INEL again fell within its internal NEPA compliance guidelines’ categorical exclusion. (DOE did request transportation consultants at Oak Ridge National Laboratory and ALK Associates, Inc. to evaluate potential rail routing alternatives as identified by rail carriers). No serious challenge to DOE’s decision not to prepare a transportation EA or EIS was initiated, although interested parties expressed concern over the absence of a campaign-specific EIS, and questioned the applicability of NUREG-0170 to the TMI shipments.

**Judicial Review of DOE Compliance with NEPA in the Transport of SNF and HLW**

NEPA does not mandate any particular substantive agency decision or outcome; its requirements are purely procedural. Therefore, the only proper role of courts in reviewing agency compliance is to ensure that an agency has adequately considered and disclosed the environmental impact of its actions, and that the agency’s decision is not arbitrary, capricious, or an abuse of discretion. Under this standard, a court’s only task is to determine whether the agency has considered all the relevant factors and has articulated a rational connection between the facts found and the choice made.6
Following the TMI shipments, DOE's policies regarding NEPA compliance in the transport of SNF and HLW were challenged in an atmosphere of increasing public concern and scrutiny. The most important challenges arose out of a series of lawsuits involving DOE proposals to ship research SNF from Taiwan to the U.S. pursuant to non-proliferation policies. The initial case involved a DOE proposal to ship 474 natural uranium SNF rods to a West Coast port, unload the SNF rods, and transport them overland by truck to DOE's reprocessing facility at the SRS in South Carolina. Prior to commencement of the shipments, the Northwest Inland Waters Coalition (the "Coalition"), an environmental organization, filed suit in Federal district court in the State of Washington to enjoin the shipments on the ground that DOE had failed to prepare an EIS for the proposed action.

DOE contended that the shipments were categorically excluded from NEPA's environmental analysis requirements under the agency's internal NEPA compliance guidelines. The Coalition argued that the studies relied on were outdated, generic, or programmatic EISs which did not fully analyze all of the risks posed by the proposed shipments. The Coalition specifically noted that the studies contained no analysis of the risks of ocean transport of radioactive materials and, as generic studies, did not include any route-specific information or route-selection analysis.

The district court ruled that DOE had unreasonably relied on NUREG-0170 and the early DOE studies without conducting an analysis to determine whether the conditions under which the shipments would be implemented were accounted for, and further, ruled that the proposed shipments were a major Federal action that could significantly effect the human environment, requiring preparation of an EIS.

On appeal, DOE conceded that its reliance on the categorical exclusion and generic and programmatic studies was unreasonable, arguing only that it should be permitted to prepare an EA to determine if an EIS was required, rather than being required to prepare an EIS. The U.S. Court of Appeals for the Ninth Circuit agreed, reversing the district court in part. However, the court specifically concurred with the district court's finding that DOE's failure to prepare an EA or EIS was unreasonable, noting that DOE had failed to conduct its own analysis specific to the conditions under which the shipments would be implemented.

On December 11, 1986, while the appeal in the Northwest Inland Waters Coalition case was still pending, DOE published an EA finding no significant environmental impact from shipment of the 474 SNF rods from Taiwan by sea to Portsmouth, Virginia, and then overland by truck to the SRS. These shipments were completed without legal challenge on July 6, 1988.

During the final stages of the shipment of the 474 SNF rods, another subsequent arrangement was negotiated under which DOE agreed to accept an additional 1,100 SNF rods from Taiwan. Subsequently, DOE prepared and published a new EA analyzing the environmental impacts of transporting these additional SNF rods by the same route (the Phase II EA). The Phase II EA considered a no-action alternative and the alternative use of a generic West or Gulf Coast port. However, the Phase II EA did not consider the use of any East Coast alternative ports to Hampton Roads. DOE prepared risk assessment calculations for the Phase II EA with the RADTRAN III computer code, using conservative estimates to account for population densities,
and using very little site and/or route-specific information or criteria.

On December 12, 1988, the Sierra Club filed suit in the U.S. District Court for the District of Columbia to enjoin the shipments until DOE complied with the requirements of NEPA. The Sierra Club claimed that NEPA required DOE to prepare an EIS, rather than an EA, for the proposed Phase II shipments or, in the alternative, that the Phase II EA prepared by DOE was legally insufficient. The Court declined to issue a preliminary injunction to halt the Phase II shipments and the transportation and delivery of the Phase II SNF rods was subsequently completed without incident.

On June 19, 1991, during pendency of the litigation over the Phase II shipments, DOE filed a new EA with the district court covering shipment of an additional 118 spent fuel rods from Taiwan to the SRS (the Phase III EA). The Phase III EA responded to some of the inadequacies alleged by the Sierra Club with regard to the Phase II EA. Specifically, two East Coast ports, Charleston, South Carolina and Wilmington, North Carolina, were considered as East Coast alternatives to the use of the port at Hampton Roads; and the Phase III risk calculation program (RADTRAN IV) used actual population densities (instead of conservative estimates) for all areas located along the overland routes.

The RADTRAN IV accident-risk calculations considered a broad range of possible accidents involving different types and degrees of stress that could be placed on a shipping cask and the consequences such accidents would have on the integrity of the cask and the amount of radiation released. However, the RADTRAN IV accident-risk calculations did not include accidents that would generate sufficient force to create more than a one-inch diameter breach in a cask. The Phase III EA deemed a larger breach "not credible," effectively assuming that such an accident could not occur.

The Phase III EA mooted the Sierra Club’s claims against the Phase II EA, and the Sierra Club amended its complaint to reflect its belief that DOE had still failed to comply with the requirements of NEPA, despite the improvements made in the Phase III EA. The Sierra Club challenged the legal sufficiency of the Phase III EA on several grounds. Principally, it contended that DOE should have considered the alternative use of several additional East Coast military and civilian ports with lower population densities and/or closer proximity to the SRS; and that DOE had skewed the results of its RADTRAN IV risk calculations by failing to include all low probability/high consequence accidents in the overall risk calculations.

On December 9, 1991, the district court ruled that the Phase III EA was legally insufficient because DOE: (1) had not adequately considered an appropriate range of alternatives to the proposed action; and (2) had failed to include in its risk calculations the entire set of probabilities and consequences that might occur from an accident.

The court found that DOE’s consideration of Charleston, South Carolina and Wilmington, North Carolina as alternative East Coast ports to Hampton Roads did not cover the full spectrum of possible routing alternatives, and that the agency’s action was, therefore, not reasonable and an abuse of discretion. The court noted that of the eleven East Coast ports identified by the Sierra
Club for possible routing of shipments, the EA analyzed only the second, third, and fourth most densely-populated ports (selecting the port with the highest risk factor of the three), and that the EA did not consider other commercial ports with lower population densities or military ports in rural areas. Furthermore, the court observed that DOE never explained why such alternative ports were inappropriate for consideration; the court also noted that the EA provided no explanation of why the shipments were to be routed through Hampton Roads.

Another case with important repercussions on Federal agency compliance with the requirements of NEPA in the transportation of SNF and HLW is City of New York v. U.S. Dept. of Transp., 715 F.2d 732 (2nd Cir. 1983), cert. denied 465 U.S. 1055 (1984). This case concerned the validity of the DOT's HM-164 regulations governing the highway routing of highway route controlled quantity shipments of radioactive materials. The City of New York filed suit challenging the regulations on several grounds, including: (1) the EA prepared by DOT did not comply with the requirements of NEPA; and (2) DOT's determination that the adoption of HM-164 would not have a significant effect on the environment was arbitrary and capricious. The United States District Court for the Southern District of New York found DOT's EA to be deficient on several grounds and invalidated HM-164 in part. The United States Circuit Court of Appeals for the Second Circuit reversed the decision of the district court and remanded the case to the district court for entry of an order upholding HM-164.

While City of New York did not involve litigation over compliance with NEPA in the transportation of an actual shipment or campaign of shipments of SNF or HLW by an agency, the written opinions of the Federal District Court and the Second Circuit are valuable for the depth of their examination of both risk assessment methodology and scientific/technical issues relating to compliance with NEPA in SNF and HLW transportation.

**JUDICIAL FINDINGS OF SCIENTIFIC, TECHNICAL, AND RISK ASSESSMENT METHODOLOGY ISSUES IN THE TRANSPORT OF SNF AND HLW**

The decisions in both Sierra Club and City of New York involved extensive judicial examination and discussion of several scientific/technical and risk assessment methodology issues raised by Plaintiffs regarding agency compliance with NEPA in the transportation of SNF and HLW. The following is a summary of some of the key rulings or pronouncements from these cases:

**Judicial Review of Scientific/Technical Issues.** A reviewing court must generally defer to the expertise of an agency when assessing difficult issues of scientific and/or technical dispute, so long as the agency’s determination does not appear to be arbitrary and capricious (issues considered in the cases included: transportation cask properties/reliability; dose conversion factors; and both incident-free and accident-related radiation exposure factors). When specialists express conflicting views, an agency is allowed the discretion to rely on the reasonable opinions of its own qualified experts even if, as an original matter, a court might find contrary views more persuasive. Under this standard, an agency determination is merely required to have a rational basis -- i.e., to be within a range of opinion generally accepted by the scientific community, or justifiable in light of current scientific thought.
Risk Assessment Methodology. The use of an overall (probabilistic) risk assessment methodology, and in particular of the RADTRAN IV code, to calculate the risks associated with the transportation of radioactive waste, complies with the requirements of NEPA.

Cumulative Risk. While incident-free dose from SNF or HLW transportation is relatively small, where people along a transportation route have been exposed to this minimal dose of additional radiation repeatedly (from historic shipping campaigns), the cumulative dose must be included in risk calculations, with an explanation regarding the amount of the radiation, the number of people it might involve, and its potential health effects.

Use of Bounding Values. The use of conservative estimates, or "bounding values," for certain variables in risk assessment calculations (i.e., weather conditions, topography, and emergency response times) complies with the requirements of NEPA. However, use of bounding values tends to lessen or eliminate differences among alternatives, making the comparison of alternatives required by NEPA more difficult. Hence, their use should be limited. Specifically, the use of bounding values for population densities does not permit the sort of comparisons between ports and routes that NEPA requires.

Low Probability/High Consequence Accidents. Consideration of the risks and discussion of the potential effects of low-probability accidents may not be avoided by simply deeming them "not credible." The consequences of all possible accidents caused by earthly forces must be included in an overall risk assessment methodology, no matter how slight their probability. The use of RADTRAN IV insures that DOE need not brainstorm for all of the freakish types of accidents which might occur, because RADTRAN IV accident severity categories do not focus on specific types of accidents, but rather on impact forces, fires, and certain-size breaches of casks.

Human Error. Historic accident rates do not account for human error that may have an effect specific to the shipping of spent nuclear fuel (e.g. an error in sealing the casks after the SNF rods have been loaded inside, or human error in the design or manufacture of the casks). To the extent such factors could create forces that could cause the release of radionuclides, they must be considered in a transportation risk assessment.

Sabotage. To the extent that sabotage could create forces that could cause a release of radionuclides, it must be included in a transportation risk assessment.

CONCLUSIONS REGARDING ANTICIPATED FEDERAL SHIPMENTS OF SNF AND HLW

Under DOE’s Record of Decision for the conduct of its Spent Fuel Management Program through the year 2035 (May 30, 1995), approximately 575 shipments of Naval SNF will be made by rail to INEL from 6 sites (Kesselring, Norfolk, Newport News, Pearl Harbor, Portsmouth, and Puget Sound). And, while there is currently inadequate data available regarding specific transport variables to accurately assess the total number and modal mix of other DOE shipments necessary for implementation, the ROD estimates that the number of shipments (to INEL and SRS combined) will be a maximum of 3,655 (this assumes that all
shipments are by truck, with the exception of Naval SNF), including approximately 546 shipments of special case commercial SNF from 11 non-DOE origins; 1,008 shipments of foreign research reactor SNF through 8 potential ports of entry; 519 shipments of domestic University research reactor SNF from 35 university reactors; and 1,007 intrafacility shipments of DOE-owned SNF from 8 DOE weapons complex facilities.

In addition, under the Nuclear Waste Policy Act, it is anticipated that a total of approximately 297,000 commercial reactor SNF assemblies will eventually be transported from 119 facilities, at 74 locations in 34 states, to an interim storage facility and/or repository. With a projected high-capacity (approximately 400,000 lbs) multi-purpose canister (MPC), there would be a need for at least 10,000 rail shipments (excluding truck shipments at truck-only reactors) over a 40-year period. If a high-capacity MPC is not available (Federal funding for the project has currently been canceled after the initial design phase), and transport is mainly dependent on a new generation of high-capacity, not-yet-certified truck casks (the GA 4/9) and on currently limited certified rail package capacity, the anticipated number of shipments could increase to over 40,000.

The heavy volume and national scope of these anticipated shipments presents some unique issues that must be addressed in light of the legal precedents to date. DOE has already introduced a more comprehensive approach in its recent EISs, including: (1) the introduction of specific, state-level routing and accident parameters to fine-tune the analysis; (2) the incorporation of consequence analysis (i.e., the use of the RISKIND code) to address potentially severe, but low-frequency scenarios (while RADTRAN has continued to be used for the long-haul risk analysis); and (3) the maintenance of consistency (including major assumptions and parameters) among its EISs. (The same approach has been adopted by the Department of the Navy in its recent draft EIS on the container system for the management of Naval SNF). This approach has enabled DOE to address many concerns raised by stakeholders with regard to its previous NEPA assessments.

Because many of the above anticipated shipments will be made by different programs from several sites, and traverse the country most likely using the same transportation corridors, it will also be important that an analysis carefully and adequately examine the cumulative radiological exposure risks to transportation crews, cask handlers, and persons residing along the transportation routes.

The great distances to be travelled (through several states) by many of these shipments will widely expand the transportation alternatives available (i.e., modal, intermodal, and routing alternatives). Consequently, the "full spectrum" of transportation alternatives that should be considered in a NEPA analysis will increase, as will the depth and complexity of the analysis necessary to produce a "reasoned choice" among the alternatives. The increased depth and complexity of necessary analyses, along with the effort/cost involved in obtaining detailed mode and route-specific data for use in such analyses, may induce DOE to attempt to limit the number of alternatives considered. It may also induce greater DOE reliance on bounding values in computing associated risks. However, with the high level of public interest and concern regarding such shipments, and the history of litigation in the area, such actions by DOE would
likely result in further litigation, particularly if the actions would tend to limit consideration of feasible transportation alternatives or tend to lessen or to eliminate perceived differences among alternatives.

REFERENCES


5. Fritiofson v. Alexander, 772 F.2d 1225, 1236 (5th Cir. 1985).


