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National Waste Terminal Storage Program: Potential Problems in the Waste Transportation System

J. G. DeSteese
R. E. Rhoads

December 1977

Prepared for the U.S. Department of Energy
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NATIONAL WASTE TERMINAL STORAGE PROGRAM: POTENTIAL PROBLEMS IN THE WASTE TRANSPORTATION SYSTEM

J. G. DeSteese
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Richland, WA 99352

FOREWORD

This report was prepared under an agreement between the DOE Operations Offices in Richland and Oak Ridge. This agreement involved two DOE prime contractors, Union Carbide Corporation, Nuclear Division, and Battelle, Pacific Northwest Laboratory. The working agreement was administered by the Office of Waste Isolation (OWI) and is part of the National Waste Terminal Storage (NWTS) Program. The principal objective of the NWTS Program is to provide facilities in various deep geologic formations at multiple locations in the United States which will safely dispose of commercial radioactive waste. According to federal regulations such waste must be transported to a federal repository for terminal storage. The OWI Transportation/Logistics Study addresses problems associated with shipping these wastes to NWTS facilities.

The objective of the Transportation/Logistics Study is to assure the availability of a viable system to transport the wastes to federal repositories. In order to accomplish this objective, a systems analysis of waste transportation is being performed by Oak Ridge National Laboratory (ORNL). A comprehensive report on this systems analysis will be prepared by ORNL. The work presented in this report is a part of this systems analysis and this information will be utilized in the ORNL report.

Several classes of material will be transported to a federal repository for storage or disposal. These are spent fuel, high-level waste (HLW), intermediate-level waste (ILW), and low-level transuranic-contaminated waste (LLT). Recommendations in this report apply to the generic problems in the transportation of all these types of materials.

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NATIONAL WASTE TERMINAL STORAGE PROGRAM: POTENTIAL PROBLEMS IN THE WASTE TRANSPORTATION SYSTEM

1.0 SUMMARY

Potential problems are identified which may impact the planning, organization, and operation of nuclear waste transportation systems serving federal repositories. These system-level problems have the potential of seriously interfering with the overall OWI Transportation/Logistics Study objective of having a viable nuclear waste transportation system in 1985. This report includes recommended action and priority judgments to address these problems and minimize their impact. Potential problems associated with equipment and hardware are not covered.

The potential problems identified as most important have consequences which may impact the overall state of future preparedness for transporting nuclear waste. Other important concerns relate to the imposition of unnecessarily severe and costly restrictions on nuclear waste transportation, public and carrier acceptance, and the involvement of interested parties in planning and decision-making.

The major recommendation of this report is that the planning and development of the waste transportation system should be controlled by a central planning activity which anticipates the impact of uncertainties and undesirable events.

1.1 POTENTIAL PROBLEM IDENTIFICATION AND PRIORITIES

The identification of potential problems in nuclear waste transportation is based on analyses of over 100 problem issues anticipated to impact nuclear material transportation in the U.S., between now and the year 2000. These analyses were performed in the related project "Energy Material Transportation Now Through 2000". This project, sponsored by the Department of Energy, Division of Environmental Control Technology, generated the list of problem issues used as a starting point for this task.

The most important problem issues were reviewed and selected for their relevance to the OWI Transportation/Logistics Study. Emphasis was placed on

severe to moderately severe potential problems expected to occur between now and 1985, the target date for initiating the transportation of waste to a repository. The priority of these issues was determined by judging the degree to which problems could alter and/or delay the planning and scheduling of the waste transportation program. Some of these problems are in areas that are the responsibility of DOE or other federal agencies and therefore may not be the direct responsibility of the OWI Transportation/ Logistics Study.

1.2 MAJOR POTENTIAL PROBLEMS AND CONSEQUENCES

The following specific problems and their potential consequences are identified as important current concerns. These concerns are listed in the order of estimated priority with respect to their anticipated immediacy and impact on the OWI Study objectives.

- Uncertainty about future fuel cycle options, regulations and other constraints may result in a lack of preparedness for transporting waste materials to a federal repository.
- Railroad industry reluctance to carry nuclear materials in general must be resolved to establish confidence that crucial railroad service will be available for the future transport of nuclear waste.
- The lack of a methodology for establishing reasonable limits for new safety and radiation standards may result in the imposition of unrealistically severe restrictions on nuclear waste transportation.
- The current lack of a policy on acceptable risk levels and on tradeoffs between safety and economics may permit the imposition of stringent safety requirements which could make the cost of transporting nuclear waste unnecessarily expensive.
- Measures to improve the cargo security of nuclear waste shipments may impose severe and costly restrictions, and cause further public reaction.
- Uncertainty about the extent of accident response preparedness and liability could result in increasing carrier and public reaction to the transportation of nuclear waste materials.

- A lack of involvement of all interested parties in planning and decision-making may result in significant opposition to nuclear waste transportation which might otherwise be avoided.
- Regulations imposed on nuclear waste shipments at state and local levels may be unnecessarily restrictive and impose severe economic and logistic burdens.
- The lack of public understanding of nuclear safety and accident probabilities and consequences may cause an escalating reaction to nuclear power in general, leading to severely restrictive regulations on nuclear fuel and waste transportation.
- The lack of a sufficiently broad spectrum of demonstrated accident severity/cask integrity data for shipping containers appears to be an important reason for carrier and public criticism of current nuclear transportation safety and risk analyses.

1.3 RECOMMENDED ACTION AND PRIORITIES

The concerns summarized above warrant immediate attention to minimize their potential impact on the objectives of the OWI Transportation/Logistics Study. The following recommendations should be considered:

- Organize a control center task activity to identify, assess, and respond to major uncertainties anticipated to impact the planning, development, and operation of the future nuclear waste transportation system. This should have the highest priority.
- Develop a working relationship with the railroads and involve railroad specialists in the logistics planning task of the program. This is a high priority item.
- Establish awareness and an informed position on the implications of more severe safety and radiation standards. A task to develop criteria for establishing acceptable risk levels based on safety and economic tradeoffs should be included to establish a position for possible use in future regulatory proceedings. These items should have high priorities.

- Apply results of related DOE and NRC programs to achieve an appropriate level of security for the nuclear waste transportation system. A high priority is recommended.
- Develop emergency plans and assist local emergency response preparedness along nuclear waste transportation routes to repositories. This should have a high priority.
- Involve outside interested parties in program planning, establish liaison with local authorities and provide public information to maximize the potential acceptance of the planned routing and operation of the waste transportation system. Involvement and contact with local authorities is a high priority. A lower priority is indicated for direct contact or communication with the public.
- Encourage effort in related DOE programs to develop risk assessments based on demonstrated damage severity/cask integrity relationships for waste casks. Routine contact with related programs is recommended as part of the program management function.

The concerns and recommendations summarized above are discussed in more detail in Section 2.

2.0 POTENTIAL PROBLEM IDENTIFICATION AND RECOMMENDATIONS

This section contains a review of important potential problems and recommendations which should be considered in the OWI Transportation/Logistics Study. Specific major problems and their consequences are addressed in concern summaries presented below as independent subsections. The concern summaries are organized as follows:

- Concern
- Background
- Recommended Action
- Priority

A concern is a statement of a potential problem and its consequences which may impact the planning and development of nuclear waste transportation systems serving federal repositories. The background evaluation includes identification of the situations or trends tending to cause the potential problem. Recommendations are made for programmatic and task-level effort to address these problems in the OWI Transportation/Logistics Study. A judgment of priority and timing of the recommended effort are included in the concern summary for each potential problem. Subsections 2.7 through 2.10 present concerns that require action on the part of DOE and/or other federal agencies, but should be supported and monitored by the OWI Transportation/Logistics Study.

There are strong interactions between several of the potential problems and recommended actions as noted in the following subsections.

2.1 MANAGEMENT OF UNCERTAINTIES

- CONCERN

Uncertainty about future fuel cycle options, regulations and other constraints may result in a lack of preparedness for transporting waste materials to a federal repository.

- BACKGROUND

Uncertainties about future circumstances relating to the transportation

of nuclear waste are anticipated to impact logistic planning and system development. As an example, under current regulations, nontransuranic wastes can be disposed of at commercial burial grounds. The potential imposition of regulations defining low limits at which waste is classified as requiring shipment to a repository may result in a substantial increase in the amount of waste material to be transported. A limit such as a 10 nCi/gm on TRU-contamination could place reactor waste in the TRU-waste category requiring repository disposal.(1) The volume of this waste is projected at 60,000 m^3 in 1990 and 2000, respectively.(2) The impact of this in conjunction with other uncertainties associated with fuel cycle options and potentially more severe operating restrictions (stated in other concerns) may result in an inadequate logistic system being available in the future for the transportation of nuclear waste.

- RECOMMENDED ACTION

The OWI Transportation/Logistics Study should emphasize the identification and assessment of major uncertainties which may impact the planning and establishment of the waste transportation system. This task should include:

- Alternative growth/change scenarios for nuclear waste transportation
- Contingency planning for future fuel cycle options, possible regulatory changes and other potential constraints.
- Cross impact analysis of alternative scenarios.
- Continuous updating of problem identification and assessment.
- Input of recommendations to other program tasks to preclude or mitigate the consequences of undesirable events.

The task should include the development of a program control plan for guiding the overall program and subprogram plans.

- PRIORITY

This task should have the highest priority and be the control center activity for managing the consequences of uncertain and potentially undesirable events during the course of the program.

2.2 RAILROAD RELUCTANCE TO CARRY NUCLEAR MATERIALS

- CONCERN

Railroad industry reluctance to carry nuclear materials in general must be resolved to establish confidence that crucial railroad service will be available for the future transport of nuclear waste.

- BACKGROUND

Railroad reluctance to carry nuclear material appears to be based on several concerns. One factor is that, from the railroad's point of view, nuclear shipments may involve disproportionately higher risks than the volume of business can justify. These perceived risks relate to accident consequences, liability and security requirements. A second factor is the adversary relationship that has developed between the nuclear and railroad industries as a result of the railroad's not being involved in decision- and policy-making processes.[3]

A significant concern of railroads is whether they will be liable for damages resulting from an accident or sabotage of nuclear material in transit. A related concern is whether an accident with nuclear material might close down a section of track for an extended period of time, and thereby seriously disrupt operation and also create public relations problems. Finally, the railroads identify the lack of sufficient data on accident severity/cask integrity relationships for shipping containers (see Section 2.10) as an important reason to question the adequacy of nuclear material transportation safety in the railroad environment.

The Board of Directors of the Association of American Railroads has recommended the use of special trains[4] for shipment of spent fuel from nuclear reactors to storage or reprocessing sites. These special trains would be subject to speed, passing, and no-other-freight restrictions. If the nuclear fuel cycle were expanded to include the reprocessing of spent fuel, it would be necessary to ship solidified high-level waste, fuel bundle residues (cladding wastes), and low-level TRU wastes from reprocessing

plants to federal repositories. These shipments could also be subject to special train restrictions.

- RECOMMENDED ACTION

Several aspects of the OWI Transportation/Logistics Study should be organized to address the concerns of the railroad industry as they apply to nuclear waste transportation. Railroad technical specialists should be involved (as recommended also in Section 2.7). Risk assessment based on demonstrated accident severity/cask integrity relationships should be encouraged as recommended in Section 2.10. To supplement this effort, the program should emphasize transportation system planning and development based on optimizing railroad logistics. This includes consideration of routing and other options which minimize overall system risks.

- PRIORITY

High priority is placed on developing a working relationship with railroads. The above recommended action is a normal part of the logistics planning task of the program and should be thoroughly integrated with the control center task activities.

2.3 REASONABLE LIMITS FOR NEW STANDARDS

- CONCERN

The lack of a methodology for establishing reasonable limits for new safety and radiation standards may result in the imposition of unrealistically severe restrictions on nuclear waste transportation.

- BACKGROUND

Shipments of nuclear materials essentially all move in routine commerce via conventional transportation systems and are subject to the same accident environment as non-radioactive cargo. Packaging standards and shipping regulations designed to protect the public and transportation workers from excessive exposure to radiation during shipments of nuclear fuel and waste are found in Title 10 and Title 49 of the Code of Federal Regulations. The

regulations include certification tests for packaging used for Type B and large quantity shipments.

At the present time, biomedical effects of human exposure to radiation levels of about 10 rem and upward are understood. In occupational exposure, the area of concern is with the consequences of annual exposures between a few tenths of a rem and a few rem. For the general public, the effects from a tenth of a rem down to very small exposures are of concern.

It will be impossible in this century to get competent technical proof of the effect of low dose rates on the population; therefore, the best available downward extrapolations of dose-effect curves are relied upon. Current theories postulate that radiation has a non-threshold effect; even low doses have some small deleterious effects.[5] This leads to the so-called ALARA (as low as reasonably achievable) position that all exposures should be minimized whenever possible. Implementation of the ALARA concept for radiation protection may lead to a tightening of radiation dose standards.

The tightening of radiation dose standards could result in changes in the definitions of Type A and Type B quantities of radioactive materials (49 CFR 173.389[ℓ]), or in changes in package dose rate specifications (49 CFR 173.393 [i] and [j]). Such changes could have serious implications for the design, construction and capacity of packaging used to transport nuclear waste.

Similarly, the imposition of more severe package certification criteria could result in design changes which reduce the capacity of waste casks and, in turn, impact the logistics of waste transportation.

- RECOMMENDED ACTION

Two aspects of this concern are reflected in recommendations for the OWI Transportation/Logistics Study:

1) Program planning and system development should anticipate the uncertainty of safety and radiation standards through contingency planning.

2) Program activity should contribute input to a rational methodology for establishing new safety and radiation standards.

The action recommended in Section 2.1 addressed the uncertain impact of potential changes in safety and radiation standards. The second of the above recommendations may be achieved by system studies to evaluate transportation requirements for nuclear wastes from various fuel cycle options. These studies would form the bases for estimating radiation doses to the public and to transport workers from routine shipments of nuclear waste materials and from transportation accidents. This information could then be used to place in perspective the need for and the impact of proposed changes in dose rate standards. Studies are also recommended to identify approaches to make package certification criteria more relevant to cargo characteristics and accident environments of different transport modes.

It is recognized that these studies may be the responsiblity of other DOE and NRC programs and outside the basic scope of the OWI program. A modest level of activity is recommended, however, to research the consequences of ALARA and other potentially new requirements to establish an informed OWI position for possible use in future regulatory proceedings.

- PRIORITY

A high priority is recommended for this effort. A strong interaction with activities recommended in Section 2.1 is indicated.

2.4 ACCEPTABLE RISK LEVELS

- CONCERN

The current lack of a policy on acceptable risk levels and on trade-offs between safety and economics may lead to the imposition of stringent safety requirements which could make the cost of transporting nuclear waste unnecessarily expensive.

- BACKGROUND

This concern is strongly linked to Section 2.3. The consequences of

Section 2.3 are the operational restrictions which may result from unnecessarily severe safety regulations for nuclear waste packages. This concern indicates the need for a policy on acceptable risk levels based on safety standards which are (1) reasonable, (2) based on safety/economic value comparisons, and (3) generally consistent with standards for all nuclear and non-nuclear hazardous materials.

- RECOMMENDED ACTION

Action recommended in Section 2.1 will account for the uncertainty associated with the imposition of new and more stringent safety requirements. Additional effort is warranted to emphasize the reduction of overall system risks in the OWI logistics planning activity. A task to develop the necessary information for establishing risk levels based on safety and economic tradeoffs should be included to establish an OWI position in future regulatory proceedings.

- PRIORITY

A high priority is recommended for this effort.

2.5 SECURITY OF NUCLEAR WASTE SHIPMENTS

- CONCERN

Measures to improve the cargo security of nuclear waste shipments may impose severe and costly restrictions and cause further public reaction.

- BACKGROUND

The extent of the security problem is closely tied to the choice of reactor technology and fuel cycle alternatives. With light water reactors (LWR) and no fuel reprocessing, the security issue is confined to the threat of sabotage. The threat of sabotage to a spent fuel cask is considered to be small because of the penetration resistence of the shield. Nevertheless, a saboteur, given enough time or sophistication could possibly compromise the integrity of a cask. If fuel reprocessing begins and special nuclear material is separated and purified, the threat of theft is also important.

A major problem in the consideration of cargo security for nuclear waste shipments is the uncertainty about the optimum choice of measures to provide acceptable protection. A potential overreaction to the problem with stringent security could significantly increase transportation costs and be conspicuous enough to excite public and news media coverage. This, in turn, could lead to increased public awareness and reaction and provide more incentive for terrorists to attack these shipments.

- RECOMMENDED ACTION

The OWI Transportation Program should consider this concern and direct efforts to identify reasonable measures for the security of waste shipments in transit. The question of which transport modes and routes minimize safety and security risks is an important one which merits more attention. Each mode has particular advantages and disadvantages in terms of vulnerability, accident likelihood, response capability, and other factors. Many of the issues associated with this question are being addressed in the NRC Special Safeguards Study and in studies being performed by the DOE Division of Safeguards and Security. OWI effort should apply the results of these programs to achieve an appropriate level of security for the nuclear waste transportation system serving a federal repository.

- PRIORITY

Issues relating to security are high priority.

2.6 ACCIDENT RESPONSE PREPAREDNESS AND LIABILITY

- CONCERN

Uncertainty about the extent of accident response preparedness and liability could result in increasing carrier and public reaction the the transportation of nuclear waste materials.

- BACKGROUND

Accident response preparation is necessary to mitigate health and property

damage, and there must be compensation for those who suffer loss as a result of an accident through no fault of their own.

Uncertainty exists about the potential effectiveness of accident response plans, particularly at state and local levels. The NRC Radiological Emergency Response Operations Course provides an educational program for participants from local authorities and public safety services.[a] The question remains whether enough trained personnel may be available at the site and in a timely manner should a serious nuclear transportation accident occur. This concern may become an important basis for carrier and public reaction to the transportation of nuclear waste materials.

The Price-Anderson Act (42 U.S.C. 2210) provides financial protection for both the licensee and the public. Licensees of nuclear facilities are required to have private insurance available through insurance pools. Currently the pools provide a maximum of $125 million in coverage. Beyond this level the Federal Government will indemnify licensees up to a maximum of $560 million, the absolute limit of liability. Currently, nuclear materials traveling to or from power reactors and fuel reprocessing plants are covered under the "omnibus" feature of the licensee's financial protection. Carriers of the nuclear material do not participate in the insurance pool, and the maximum extent of their liability is uncertain. The NRC is currently considering whether the Price-Anderson system should be extended to specifically provide for separate indemnity agreements to cover nuclear materials in transit. However, the Price-Anderson Act was declared unconstitutional by a U.S. District Court.

The above are also major concerns of the railroads and influence their willingness to transport nuclear material (Section 2.2). Railroads are specifically concerned about their potential liability and the possibility of extended track closure or blockage which could arise from an accident involving nuclear materials.

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[a] The course is jointly sponsored by NRC and DOE; it is conducted by the Reynolds Electric Co., DOE-Las Vegas.

- RECOMMENDED ACTION

The overall program to design and operate a federal repository should include the establishment of emergency plans which address the concerns of the railroads, other carriers, and all interested parties. The Transportation/ Logistics Study should identify areas along transport routes to the repository which may require further consideration. Emphasis should be placed on working with local officials (Sections 2.7 and 2.8) to make them aware of plans for shipping nuclear waste materials through their areas. A task in the program should be planned to provide assistance, if requested, to establish or upgrade local emergency response preparedness programs and plans. A program management task should provide liaison with, and support to, programs of other agencies addressing these concerns.

- PRIORITY

The recommended effort should have a high priority.

2.7 INVOLVEMENT IN PLANNING AND DECISION-MAKING

- CONCERN

A lack of involvement of all interested parties in planning and decision-making may result in significant opposition to nuclear waste transportation which might otherwise be avoided.

- BACKGROUND

Apparently there have been few opportunities to date for the public, the nuclear industry, carrier personnel, and other interested parties to share their concerns and provide input to nuclear material transportation planning and development. The communication that has taken place has often occurred in conjunction with judicial or quasi-judicial proceedings which has not facilitated free and open discussion. To a lesser extent, the lack of a forum for discussion has also hampered communication between governmental agencies and between carriers and the agencies.

- RECOMMENDED ACTION

The OWI program plan should include input provided by representatives of parties who may be affected by nuclear waste transportation to repositories. Specifically, provisions should be made for technical assistance from specialists representing the utilities and carriers and for consultation in areas of public concern and interaction with local agencies. This effort would complement activities recommended in Sections 2.2, 2.6, 2.8, and 2.9.

- PRIORITY

Involvement of outside interested parties in program planning and development is a high priority.

2.8 EFFECTS OF STATE AND LOCAL REGULATIONS

- CONCERN

Regulations imposed on nuclear waste shipments at state and local levels may be unnecessarily restrictive and impose severe economic and logistic burdens.

- BACKGROUND

The Hazardous Materials Transportation Act (49 U.S.C. 1801) which became effective in January, 1975, delegates very broad authority to the Department of Transportation (DOT) to issue and enforce regulations to insure the safe transportation of hazardous materials, including radioactive materials. The Act provides that any state or local regulation which is inconsistent with a DOT regulation is preempted unless: (1) the local regulation affords an equal or greater level of protection and (2) does not unreasonably burden commerce.

It is likely that the application of these criteria to particular laws and regulations will be litigated in the future. Many state and local governments seem determined to regulate the transportation of nuclear materials through their jurisdiction and are unlikely to give up control without legal battles.[6] The trend toward greater federal control seems likely to continue,

however. While anticipated litigation is in progress, locally imposed restrictions may create logistic problems or severe economic penalties for nuclear waste transportation.

- RECOMMENDED ACTION

The task recommended in Section 2.1 which assesses future impact of uncertainties should include effort addressing this concern. In conjunction with action recommended in Section 2.7, program effort should be applied to monitor and support the activities of the responsible federal agencies in achieving liaison with appropriate authorities with jurisdiction in crucial regions of the planned waste transportation network. This liaison should provide the basis for communication and cooperation to maximize the potential acceptance of planned routing and operation of the waste transportation system.

- PRIORITY

The assessment of future uncertainty should have the high priority recommended in Section 2.1. The liaison task also should be considered a high priority.

2.9 PUBLIC REACTION TO NUCLEAR WASTE TRANSPORTATION

- CONCERN

The lack of public understanding of nuclear safety and accident probabilities and consequences may cause an escalating reaction to nuclear power, in general, with severely restrictive regulations on nuclear fuel and waste transportation.

- BACKGROUND

Much concern has been expressed about nuclear power in general and especially the safety and security issues related to it.[7] Concern about nuclear materials transportation is likely to grow as the volume of waste increases and especially if fuel reprocessing begins. A significant problem relating to public acceptance of nuclear power and transportation of nuclear materials is the difficulty of communicating subjects such as nuclear technology,

safety performance, accident probability and consequences, and economics-safety tradeoffs.

The vast majority of the public appear to be neutral and apathetic to nuclear power and material transportation issues. This situation may be changed under a number of influences, such as biased press coverage of nuclear antagonist activities, the potential occurrence of a nuclear accident or an attempt to sabotage or steal nuclear material. The potential results of a negative change in public opinion on nuclear issues may be increased pressure for more restrictive regulations and even physical interference with the operations of nuclear plants and transportation systems.

- RECOMMENDED ACTION

The OWI Transportation/Logistics Study should monitor and support DOE programs for public education and information in communities near the repository and along nuclear waste transportation routes. The uncertainty assessment task recommended in Section 2.1 should address scenarios involving the consequences of public reaction to nuclear waste transportation.

- PRIORITY

Contributions and support to provide public information should be at the level permitted by opportunity and convenience. Liaison activities recommended in Sections 2.6, 2.7, and 2.8 should be vehicles for the dissemination of information. As indicated in Section 2.1, the uncertainty assessment task is high priority.

2.10 ACCIDENT SEVERITY/CASK INTEGRITY RELATIONSHIPS

- CONCERN

The lack of a sufficiently broad spectrum of data on demonstrated accident severity/cask integrity relationships for shipping containers is an impediment to public and carrier acceptance of nuclear material shipments.

- BACKGROUND

This is among the important concerns expressed by railroads (Section 2.2)

and is a significant reason for their reluctance to carry nuclear materials in general. The most important concern in the transportation of nuclear materials is whether radioactive material is released at any time. There is general acceptance that this will not occur during normal operation. Public and carrier acceptance of nuclear material transportation safety appears to demand a demonstration that the accident severity causing a breach in a cask exceeds the severity of all potential accident environments possible in the transport mode. This kind of demonstration is impossible. However, the development and use of data covering a broader range of accident severity/cask integrity demonstrations than has currently been achieved have the potential of reducing the level of criticism which has been directed at current risk assessment methods.

- RECOMMENDED ACTION

The OWI Transportation/Logistics Study should encourage effort in DOE programs to demonstrate accident severity/cask integrity relationships for accident stress levels that may compromise cask containment integrity. The cask design activity in the OWI program should include consideration of the transport environment and apply accident data involving non-nuclear materials to the design of waste cask hardware. This design philosophy should provide an approach for accommodating the impact caused by the possible tightening of future regulations.

- PRIORITY

Contact with related program activities sponsored by the DOE can be maintained as part of the program management. The accommodation of future regulatory requirements is a part of the container design and development task, which should be coordinated with the output of action recommended in Section 2.1.

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