

Stakeholder Transportation Scorecard: Reviewing Nevada's Recommendations for Enhancing the Safety and Security of Nuclear Waste Shipments – 13518

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ABSTRACT

As a primary stakeholder in the Yucca Mountain program, the state of Nevada has spent three decades examining and considering national policy regarding spent nuclear fuel and high-level radioactive waste transportation. During this time, Nevada has identified 10 issues it believes are critical to ensuring the safety and security of any spent nuclear fuel transportation program, and achieving public acceptance. These recommendations are: 1) Ship the oldest fuel first; 2) Ship mostly by rail; 3) Use dual-purpose (transportable storage) casks; 4) Use dedicated trains for rail shipments; 5) Implement a full-scale cask testing program; 6) Utilize a National Environmental Policy Act (NEPA) process for the selection of a new rail spur to the proposed repository site; 7) Implement the Western Interstate Energy Board (WIEB) “straw man” process for route selection; 8) Implement Section 180© assistance to affected States, Tribes and localities through rulemaking; 9) Adopt safety and security regulatory enhancements proposed states; and 10) Address stakeholder concerns about terrorism and sabotage.

This paper describes Nevada’s proposals in detail and examines their current status. The paper describes the various forums and methods by which Nevada has presented its arguments and sought to influence national policy. As of 2012, most of Nevada’s recommendations have been adopted in one form or another, although not yet implemented. If implemented in a future nuclear waste program, the State of Nevada believes these recommendations would form the basis for a successful national transportation plan for shipments to a geologic repository and/or centralized interim storage facility.

INTRODUCTION

Since enactment of the Nuclear Waste Policy Act (NWPA) in 1982, Nevada has been an important stakeholder in the nation’s struggle to find a suitable repository for spent nuclear fuel. The Department of Energy (DOE) prepared a transportation institutional plan in 1986 that

highlighted 16 issues essential to the success of the program. From this plan, Nevada identified ten critical issues and has pursued the objective of making a positive contribution to policy discussion about relevant issues.

Stakeholders raised transportation issues at a time when DOE was evaluating candidate sites in more than 20 states for two geologic repositories and a monitored retrievable storage facility. By 1986, transportation safety and security had emerged as major public concerns in the debate over restructuring of the federal nuclear waste program established four years earlier.

As the policy discussions about transporting spent nuclear fuel have evolved, Nevada's initial recommendations have been proven to be durable and Nevada's position has been supported by the activities of other states, agencies, boards, and organizations. This paper reports on the status of Nevada's initial recommendations. It describes the ways in which the recommendations have been accepted or adopted by the National Academy of Sciences study "Going the Distance," by the Blue Ribbon Commission on America's Nuclear Future (BRC) in its Final Report , and by the Department of Energy (DOE) in its Final Supplemental Environmental Impact Statement for Yucca Mountain (FSEIS) and its National Transportation Plan. In several instances Nevada's recommendations have also been adopted by the U.S. Nuclear Regulatory Commission (NRC).

NEVADA RECOMMENDATIONS

DOE published a Transportation Institutional Plan in 1986. In the preface, DOE explained the importance of transportation issues as a factor in the credibility of its overall waste management program:

"The Department of Energy (DOE) recognizes that the success of its program to develop and implement a national system for nuclear waste management and disposal, as directed by the Nuclear Waste Policy Act of 1982 (NWPA), depends not only on safety, but on broad-based public understanding of and confidence in program activities and objectives. While each program element has its particular sensitivity, the transportation of the waste to facilities developed under the NWPA may be the most visible element nationwide. Therefore, DOE's Office of Civilian Radioactive Waste Management (OCRWM) has developed this Transportation Institutional Plan to lay the foundation for interaction among all interested parties for the purpose of productive cooperation and resolution of issues related to establishment and operation of the NWPA transportation system." [1]

The DOE 1986 Transportation Institutional Plan presented 16 issues papers. The major institutional issues addressed in these papers are:

- Transportation of Defense Waste
- Prenotification
- Physical Protection Procedures
- Highway Routing
- Rail Routing
- Inspection and Enforcement
- Emergency Response
- Liability Coverage

- Cask Design and Testing
- Overweight Truck Shipments
- Rail Service Analysis
- Mixture of Modes
- Infrastructure Improvements
- OCRWM Training Standards
- Transportation Operational Procedures
- State, Tribal, and Local Regulation of Transportation

In response, the State of Nevada Agency for Nuclear Projects (NANP) reviewed these institutional issues in a 1988 report, known as the ACR 8 Report, prepared at the direction of the Nevada Legislature. In the report, Nevada adopted its own positions on each of the 16 institutional issues, and began a process of continuous monitoring of developments in the DOE nuclear waste transportation program. NANP staff and contractors revisit these issues regularly.

STATE OF NEVADA SAFETY AND SECURITY RECOMMENDATIONS

Since enactment of the NWPA, and adoption of Assembly Concurrent Resolution 8 by the Nevada Legislature in 1987, NANP has made numerous recommendations to DOE regarding nuclear waste transportation safety and security. Since 1997, Nevada has consistently recommended the ten measures summarized below:

1. Oldest Fuel First
2. Mostly Rail (65-75%)
3. Dual-Purpose Casks
4. Dedicated Trains
5. Full-scale Cask Testing (Regulatory & Extra-regulatory)
6. NEPA Process for Selection of Rail Spur
7. WIEB “Straw Man” Routing Process
8. Sec 180(c) Program Rulemaking
9. State Regulatory Enhancements (Safety & Perception)
10. Terrorism and Sabotage Concerns

Taken together, these measures emphasize the development of a repository transportation system that is sensitive to the dangerous nature of these materials. Nevada has consistently sought the development of a repository transportation system that assesses risks in a comprehensive manner, that seeks to understand and reduce the risks of the system, and that will work with stakeholders to communicate risks effectively. Since 1997 Nevada has communicated these recommendations to the U.S. Nuclear Regulatory Commission (NRC), the NRC Advisory Committee on Nuclear Waste, the U.S. General Accounting Office (GAO), the U.S. Nuclear Waste Technical Review Board, the National Academy of Sciences (NAS) Study Committee on Transportation of Radioactive Waste, the National Association of Regulatory Utility Commissioners, and the Blue Ribbon Commission on America’s Nuclear Future (BRC)

As of January 2013, policy discussion of these issues has been substantially resolved. There is widespread agreement about the desirability of virtually all of these proposals. In some instances resolution came about through the adoption of Nevada's recommendations by national study groups. In other instances, resolution came through the federal rule making process or through industry actions. The recommendations are discussed below.

Oldest Fuel First.

Nevada has recommended that DOE ship the oldest fuel first, or at least ship older fuel first. Shipping fuel 50 years out of reactor, compared to shipping 5-year-cooled fuel, could reduce radiological hazards 65-85 percent. The reason for controversy about spent fuel shipments at all is due to the substantial radiological hazard posed by the waste. Older fuel rods are much easier to manage. Currently the shipment order for the waste is governed by standard contracts between the utilities and the DOE. These standard contracts (established by the NWPA) award places in the line for the waste to be shipped. Both the NAS and the BRC have seen the benefits of shipping the older fuel first and the difficulties imposed by the standard contract framework currently in place. The NAS made it one of their recommendations: "DOE should negotiate with commercial spent fuel owners to ship older fuel first to a federal repository or federal interim storage." (NAS P238) The BRC endorsed the NAS recommendation in their 2012 Final Report. (Pp. 81, 83)

DOE's response is that the current contracts do not require DOE to receive the oldest fuel first. (FSEIS, Vol. 3, CR-255) An additional difficulty with this recommendation is posed by utility practice. Utilities are bundling newer with older fuel, in welded canisters prepared for dry storage. This intermixture of fuel older and newer fuel assemblies in dry storage makes it impractical to repackage fuel for transportation. As more and more fuel is packaged in these in this manner, it will become more difficult to repackage or change fuel configurations. Shipping oldest, or even older, fuel first, could require changes to the NWPA or a mediated agreement with the utilities.

Modal Mix.

Nevada has recommended that DOE select rail as the preferred mode of transportation, acknowledging the serious impediments to developing rail access to Yucca Mountain and to 24 of the 76 shipping sites. Based on shipping site current capabilities, the share of SNF that could realistically be shipped by rail may be 65-75 percent. (HALSTEAD ET AL, 2011)

Generally speaking, the smaller the number of shipments, the safer and more secure the shipping campaign will be. Shipping SNF and HLRW by rail will reduce the total number of shipments, perhaps by a factor of seven or eight. This recommendation was also adopted by the NAS. The NAS found that "Transport of spent nuclear fuel and high-level radioactive waste by rail has clear safety, operational, and policy advantages over highway transport for large quantity shipping programs." (NAS p 217) The NAS went so far as to say that it did not endorse development of a large-scale truck shipping campaign. The BRC endorsed the NAS recommendation in its Final Report. (Pp. 81,83)

The DOE, in its FSEIS, made the decision to ship most of the waste by rail. However, the impediments to this recommendation are substantial and increasing. One of the main impediments to rail shipment is the deterioration of near-site transportation infrastructure. The alternative, intermodal transfer of large rail casks to the nearest railhead by heavy haul truck (HHT) and/or barge, would create additional challenges. The time and expense needed to develop near-site rail access could delay shipment. The complications posed by repackaging and preparing rods for shipment are also substantial. Nevada, DOE, NAS, and BRC are in substantial agreement over the desirability of a mostly rail modal mix; the major area of disagreement is between Nevada and DOE regarding the maximum credible portion of shipments by rail to be used in impact assessment and operational planning.

Dual-Purpose Casks.

Nevada has recommended that DOE base its transportation system on use of dual-purpose (transportable storage) casks of a standardized design, with a range of capacities resulting in loaded cask weights of about 125, 100, and 70 tons. In 1995, Nevada endorsed the DOE proposal for a similar approach using a multi-purpose canister (MPC) system for storage and transport. The advantages of a dual-purpose cask are substantial. Waste inspected and packaged at the generating site can then be stored on-site, shipped off-site, and then stored again if necessary, without further handling of bare assemblies. The DOE MPC was as a kind of dual purpose cask in which the spent fuel was first sealed in a stainless-steel canister. The canister would then be inserted into specific overpacks for storage, transport, and perhaps disposal. By 2008 when the Yucca Mountain FSEIS was published, this concept had evolved into what DOE called the transport, aging, and disposal (TAD) canister system. However, even with optimal deployment of the proposed TAD system, DOE planned to use single-purpose (transport-only) casks for more than 10 percent of shipments, and did not fully endorse development of a standardized TAD design in small, medium, and large capacities, that would accommodate interface and infrastructure challenges at various reactor sites. Neither the NAS nor the BRC specifically endorsed dual-purpose as opposed to single-purpose casks, although both endorsed maximum use of rail as a means of accommodating the larger weight of dual-purpose or multi-purpose cask systems. At the present time, there are a number of different designs for dry storage systems, most of which would not have been compatible with DOE's proposed TAD system. Action on this recommendation is incomplete at best, and little progress on this issue seems possible until a new waste program is formed.

Dedicated Trains.

Nevada has recommended that DOE use dedicated trains for all rail shipments. The NAS defined a dedicated train as "A train that transports only spent fuel or high-level waste and no other cargo." [p.325] The Burlington Northern Santa Fe railroad describes dedicated trains as: "the most efficient and economical way to move high-volumes of single commodities from a single origin to a single destination." (BNSF – need better citation). In general freight rail shipping, SNF and HRLW would be intermixed with other commodities and rail cars carrying SNF and HRLW would be delayed in rail classification yards as new trains assembled. In dedicated rail shipment, the waste would be placed onto "key trains" that would be sent directly to a repository. These kinds of shipments would also be easier to secure and to equip with the most sophisticated safety and security systems.

The NAS found that there were: “clear operational, safety, security, communications, planning, programmatic, and public preference advantages that favor the use of dedicated trains,” and recommended “DOE should fully implement its dedicated train decision before commencing” large scale shipments to a federal repository (NAS, 232-3). The BRC endorsed this NAS recommendation, and noted that “The BRC is unaware of any recent or proposed spent fuel rail shipments that would not involve use of dedicated trains.” (p.83) Even before the NAS recommendation, the DOE had made the decision to use dedicated trains to ship waste to Yucca Mountain (DOE FSEIS) Additionally, the American Association of Railroads (AAR) amended its shipping standards for radiological materials. The standards require the use of “key trains” for the movement of these radioactive materials. They also specify particular routes, yard operating practices and storage procedures to be used for these materials (AAR OT55E)

The NAS, state and regional groups, the possible, shipper, and the industry organization all have made it clear that dedicated train is the best method of transportation for these materials. The standard contracts make the shipping queue uncertain. The economics of shipping one or two casks, or casks less than fully loaded, by dedicated train because of the standard contract may be problematic. However, use of dedicated trains has clearly been endorsed by DOE, the NAS, the BRC, and by the nuclear power and railroad industries.

Cask Testing.

Nevada has recommended that DOE and/or NRC conduct a meaningful full scale cask testing program. DOE or NRC should conduct full-scale regulatory tests on each cask design (or in cases of similar designs, test one cask from each representative grouping). DOE or NRC should also conduct a combination of extra-regulatory, full-scale testing (fire), scale model testing, component testing, and computer simulations to determine cask failure thresholds. In addition, DOE and/or NRC must ensure meaningful stakeholder participation in all aspects of the cask testing program.

Progress on this issue has been uneven and difficult, yet substantial. The NAS 2006 report “strongly endorses the use of full-scale testing to determine how packages will perform under both regulatory and credible extra-regulatory conditions.” (NAS, Pp. 107-108) The NRC in 2005 approved a staff proposal for full-scale testing of a rail cask of a design likely to be used for repository shipments. The BRC Final Report also endorses full-scale cask testing by the NRC, with testing program costs funded from the Nuclear Waste Fund. DOE’s is not opposed to full-scale testing, but has taken the position that the current NRC cask certification process (which does not require full-scale testing) is sufficiently rigorous to assure safety. (FSEIS, Vol. 3, CR-252)

There is substantial agreement that full-scale cask testing is desirable, and agreement on how tests can be conducted effectively. There is less agreement on why the tests should be done, and who should design the tests.. Further progress on this issue will probably remain in limbo until a new repository program is developed.

Rail Access.

Nevada has recommended that DOE use a credible National Environmental Policy Act (NEPA) process to select a preferred Yucca Mountain rail access corridor and rail alignment in Nevada. The State of Nevada filed a lawsuit challenging the process used by DOE to select a rail route as part of the 2002 FEIS for the now defunct Yucca Mountain site. The court order in that case would allow Nevada to resume its objection to the selection of the Caliente rail alignment at a future date. Nevada has also challenged DOE's selection of the Caliente rail alignment under NEPA in its application to the Surface Transportation Board (STB) for a Certificate of Public Convenience and Necessity (CPCN), in the 2008 FSEIS for Yucca Mountain, and as part of DOE's repository license application to the NRC for a repository license. If the licensing proceeding for Yucca Mountain were to be restarted, Nevada would resume all of these NEPA challenges.

The NAS 2006 report implicitly accepted DOE's selection of the Caliente rail alignment, calling for DOE to "fully implement its mostly rail decision by completing construction of the Nevada rail spur... ." (NAS, 217) The BRC did not address this issue in its Final Report. The NRC staff adopted DOE's FSEIS, which includes selection of Caliente as the preferred rail alignment, as part of DOE's license application. However, the NRC Construction Authorization Board accepted several contentions filed by Nevada challenging the adequacy under NEPA of DOE's Caliente rail alignment selection and impact assessment.

Shipment Routes.

Nevada has recommended that DOE select routes for the national transportation system following a three-step process proposed by the Western Interstate Energy Board (WIEB): 1) DOE would designate "straw man" routes, preferably in the Yucca Mountain FEIS or another NEPA document; 2) WIEB member states would individually and collectively evaluate the DOE routes, and then designate preferred routes on a regional basis; 3) DOE would then formally adopt the routes selected by WIEB, and designate these routes (allowing exceptions for use of designated alternative routes in emergency situations) in DOE contracts with rail and highway carriers. Selecting routes for HLRW and SNF was a problem never resolved by the now-defunct Yucca Mountain program. It remains one of the most substantial areas where states may expect to influence a disposal program in a way that will minimize any potential impacts from the proposed shipments.

The Western Interstate Energy Board, supported by the State of Nevada, first suggested an approach to route selection in 1988. This selection process is in diagram below:

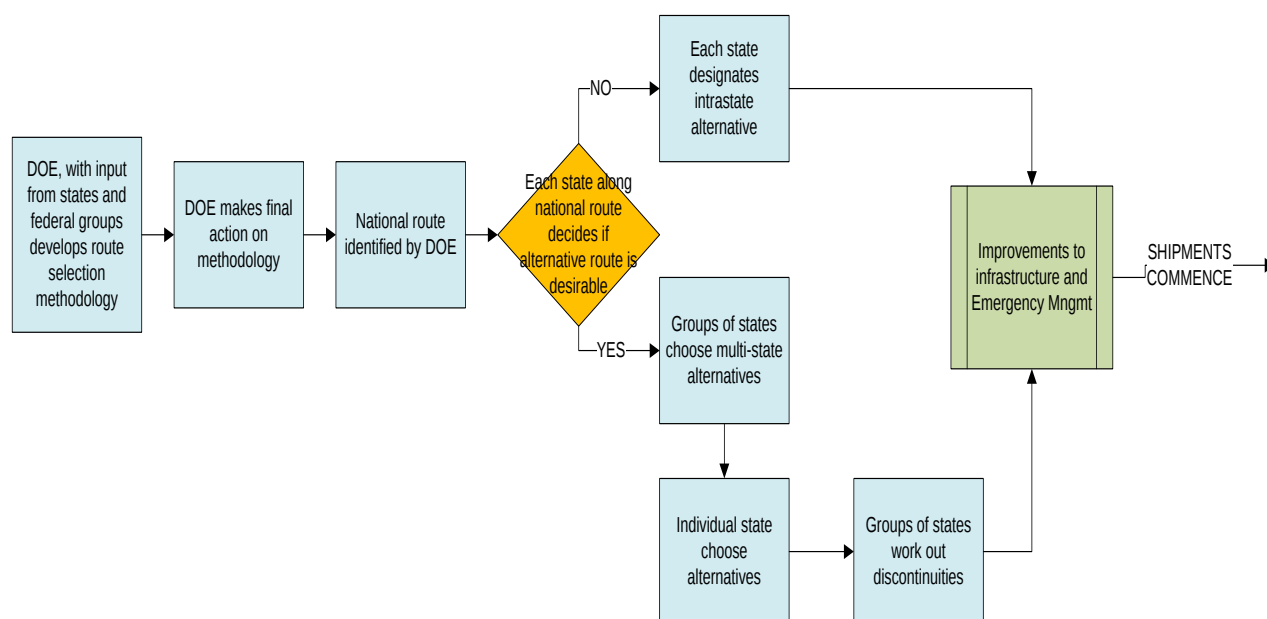


Figure 1 WIEB Straw Man routing process

This recursive process was designed to ensure states (and their stakeholders) had a role to play in selecting routes for SNF and HLRW while at the same time ensuring the process would result in the selection of useable routes. The WIEB process describes a cooperative process between the states and the DOE. The NAS recommended a similar process in its report. They said: “DOE should identify and make public its suite of preferred highway and rail routes for transporting spent fuel and high-level waste to a federal repository.” (NAS p2w28)

The BRC recommended a cooperative process for site selection. Implicit in this recommendation is the idea that routes to a repository site will also be selected in a cooperative manner. The weight of opinion confirms Nevada’s recommendation in this area. Clearly, states have a large interest in which routes are selected for transposing these materials. This interest should ensure that any process for route selection will be cooperative.

A major potential limitation on the state role may come in the form of preexisting federal rules. The Department of Homeland Security (DHS) issued rules regarding the transportation of hazardous materials in 2008 (HM232). Because of the novelty of these rules, it is unclear how they will affect any potential routing agreements among stakeholders. The Federal rules may preempt any state efforts to arrive at a negotiated route selection. This could readily trigger litigation and create delays in shipping.

Section 180(c).

Nevada has recommended that DOE implement the transportation planning and emergency response training program, required under Section 180 (c) of the NWPA, through formal rulemaking. Absent rulemaking, the State of Nevada believes that congressional action might be needed to implement the program, as was the case

with the Waste Isolation Pilot Plant (WIPP) DOE-State cooperative transportation planning program. The issues related to spent fuel transportation are complex. The potential vulnerabilities of states, localities, and tribes are substantial. The need to assist these stakeholders would impose an unfunded mandate on them.

The NWPAA of 1987 established a program for assistance to some affected local governments and tribes. The NWPAA also established the section 180c process which provided to planning grants and assistance to states and tribes prior to the commencement of shipping. The DOE began a rulemaking process to develop guidelines for the management of this program, but the program was halted when Yucca Mountain was ended. The NAS saw the need for assistance of this type. It is unlikely that any new program would not include assistance for affected stakeholders. A challenge to implementing this program would be the failure to identify routes early on. It is clear that some states are more heavily affected than other states by the shipment of these materials. The failure to identify routes early would be a substantial impediment to providing assistance to the affected areas.

State, Local, & Tribal Regulation.

Nevada has recommended that DOE support state regulatory enhancements to manage transportation risks and address public perception of transportation risks. These would include, but not be limited to, port-of-entry inspections and state escorts for DOE shipments at DOE expense. States, in conjunction with local governments, may also impose seasonal, day-of-week, and time-of-day restrictions on DOE to address unique local conditions. Tribal governments may also regulate DOE Shipments in similar ways. Nevada's recommendations are incorporated into a Western Governors' Association (WGA) policy resolution that calls on DOE or any other operator of a repository or storage facility to consider specific elements of the WIPP transportation program, including: (1) a safety and public information program similar to that developed with Western states; (2) the WIPP Transportation Safety Program Implementation Guide; (3) the WIPP example of working through its regional cooperative-agreement groups to propose a set of shipping routes to affected states and tribes for their review and comment, resulting in identification of a set of primary and secondary routes; (4) a tracking system, such as TRANSCOM, capable of notifying the vehicle operator, DOE, states and tribes of current location, potential bad weather and road conditions, and occurrence of incidents; and (5) the responsibility of the generators of spent nuclear fuel and HLW and the federal government, not the states and tribes, to pay for all costs associated with assuring safe transportation, including emergency response, shipment escorts and inspections, and route evaluations.

The NAS and the BRC both generally endorse the WIPP transportation program extra-regulatory protocols cooperatively developed by the WGA and DOE EM, and Nevada considers this a satisfactory endorsement of Nevada's recommendations. DOE OCRWM on various occasions discussed the WIPP transportation program as a possible model for repository operations, but failed to commit to such a program in its FSEIS for Yucca Mountain nor in its 2009 National Transportation Plan.

Terrorism and Sabotage.

Nevada has recommended that DOE address acts of sabotage and terrorism against repository shipments. DOE has acknowledged, in the FSEIS for Yucca Mountain, the potential

vulnerability of shipping casks to such attacks. However, analyses by Nevada contractors have concluded that the releases and consequences could be many times greater than DOE estimates, resulting in catastrophic cleanup and recovery costs. DOE shipments would not be subject to NRC physical protection regulations (10 CFR 73.37), and therefore DOE needs to fully address terrorism issues in development of repository transportation operational protocols. In many cases the NRC has satisfactorily responded to the specific requests made in Nevada's 1999 petition for rulemaking (Docket PRM 73-10). The NAS and BRC reports acknowledge the threat of terrorism and sabotage, but fell short of making specific recommendations for managing terrorism and sabotage risks.

The Scorecard

To summarize the status of Nevada's recommendations, the authors assembled a scorecard. The grading is subjective and reflects the opinion of the authors on behalf of one stakeholder only. A "satisfactory" score means that there is agreement between Nevada and the other organization. "N/A" means that the issue does not fall within the purview of that organization. An "incomplete" score means that the issue has not yet been resolved. The score of "unsatisfactory" indicates disagreement between the State of Nevada and that organization on the issue.

Organization Issue	Endorsement by National Academy of Sciences	Endorsement by Blue Ribbon Commission	Adoption by Dept of Energy FSEIS)	Adoption by NRC
Oldest fuel first	Satisfactory	Satisfactory	Unsatisfactory	N/A
Dual Purpose Casks	Incomplete	Incomplete	Incomplete	N/A
Mostly rail	Satisfactory	Satisfactory	Satisfactory	N/A
Dedicated Trains	Satisfactory	Satisfactory	Satisfactory	Incomplete
Cask Testing	Satisfactory	Satisfactory	Incomplete	Satisfactory
Rail Access/NEPA	Unsatisfactory	Incomplete	Unsatisfactory	Satisfactory
Shipment Routes	Satisfactory	Satisfactory	Unsatisfactory	N/A
Section 180(c)	Satisfactory	Satisfactory	Incomplete	N/A
State, Local, & Tribal Regulation	Satisfactory	Satisfactory	Incomplete	N/A
Terrorism and Sabotage	Incomplete	Incomplete	Incomplete	Satisfactory

Table 1 Stakeholder Scorecard

The scorecard reveals that despite the lack of resolution on some issues, many of the issues identified by Nevada have been favorably supported by other organizations.

CONCLUSION

Since enactment of the NWPA in 1982, efforts have been made to develop a national nuclear waste transportation program that would be workable, safe, secure, and accepted by the affected stakeholders. The State of Nevada has been an active participant in these efforts, recommending

ten specific actions to enhance transportation safety and security. The National Academy of Sciences 2006 report satisfactorily endorsed seven of Nevada's ten recommendations, and partially endorsed two others. The Blue Ribbon Commission on America's Nuclear Future 2012 final report satisfactorily endorsed seven of Nevada's ten recommendations, and partially endorsed the remaining three. The US Nuclear Regulatory Commission satisfactorily endorsed three of the four Nevada recommendations within its jurisdiction. If implemented in a future nuclear waste program, the State of Nevada believes these recommendations would form the basis for a successful national transportation plan. It should be noted, however, that the US Department of Energy FSEIS for Yucca Mountain National satisfactorily endorsed only two of Nevada's recommendations.

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