REPORT ON THE STATE OF NEVADA’S RESPONSE TO THE JULY 1998 SHIPMENT OF FOREIGN RESEARCH REACTOR SPENT NUCLEAR FUEL THROUGH NORTHERN NEVADA

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FOREWORD

The report which follows summarizes the State of Nevada’s response to a high-profile shipment of spent nuclear fuel by the U.S. Department of Energy through northern Nevada in July, 1998. It describes the actions taken by a number of State agencies, acting together in a cooperative manner over an expended period, to assure that the highly radioactive and potentially hazardous cargo made the transit of Nevada in a safe and routine manner. Only the hard work, dedication, and diligence of individual State employees over many months made the effort successful.

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Introduction

The shipment of radioactive spent nuclear fuel rods across northern Nevada in July, 1998 provided challenges for State of Nevada policymakers and agencies charged with protecting public health and safety. The high profile nature of the shipment, the fact that the radioactive material came from nuclear reactors in foreign countries, the highly publicized non-proliferation objectives of the fuel repatriation program, and level of media attention and public concern all contributed to require a coordinated and effective State response.

In retrospect, the shipment has provided a valuable opportunity for Nevada agencies to gain experience in dealing with the low probability, high consequence risks associated with the transport of these types of materials. It also serves as a useful basis for policy and operational recommendations for future shipments. The purpose of this report is to examine the process used by the State to plan for and carry out its responsibilities with respect to this specific federal spent fuel shipment and identify key lessons learned for future undertakings of this type.

Background

In February, 1995, the U.S. Department of Energy (DOE) issued a draft Environmental Impact Statement (EIS) evaluating alternatives for dealing with spent nuclear fuel from foreign research reactors that had been provided to 41 countries through the Atmos for Peace program in the 1960s and 1970s. Under the terms of the agreements by which nuclear reactors were made available to these nations, all of the spent fuel generated as a result of reactor operations was to be returned to the United States for storage and disposal. The purpose of this condition was to assure that the spent fuel could not be diverted for weapons purposes.

DOE issued the final EIS and Record of Decision (ROD) for a “Nuclear Weapons Non-proliferation Policy Concerning Foreign Research Reactor Spent Nuclear Fuel” in May, 1996. The ROD specified that the spent fuel would be returned to the United States and stored at DOE facilities in Savannah River, South Carolina and Idaho Falls, Idaho. Spent fuel from reactors located in Europe and the Middle East would enter the Unites States through the Port of Charleston, South Carolina, while fuel from Pacific Rim countries would pass through the Port of Concord, California.

In June, 1996, DOE met with the Western Governors’ Association working group on nuclear waste transportation and announced that it was considering shipping foreign reactor spent
fuel from Concord to Idaho Falls via a route that would take the shipments across northern Nevada (see map- Attachment I). The first of no more than 4 to 5 shipments was tentatively scheduled for the summer of 1997. DOE’s schedule calls for at a minimum of a two year hiatus between the first and second shipments.1

With the Union Pacific - Southern Pacific merger that occurred in 1996, the railroad had the option of shipping the spent fuel either along the Donner Pass route through Reno or north along the Feather River route of the Southern Pacific line. The Feather River route was preferred by both DOE and the State of Nevada since it avoids the Reno area entirely, but it does cross the Pyramid Lake Indian Reservation and runs parallel to the UP line through Lovelock, Winnemucca, Carlin, Elko. However, the rail line through Reno remained the principal back up route in the event of problems along the primary route.

Using funds provided by DOE, the Western Governors’ Association established a working group comprised of representatives from California, Nevada, Utah, and Idaho to assess the possible impacts of these shipments and coordinate planning, training, and related activities. The State of Nevada forcefully advocated the position that the shipments could not begin until adequate emergency response training and preparation had been done along the route, and that such training and preparation were DOE responsibilities. The State also insisted that there be adequate participation in planning for the shipments, including the provision of funds for State, local government, and Indian tribe involvement.

In April, 1997, Governor Bob Miller wrote to Secretary of Energy Federico Peña and indicated that, while the non-proliferation goals of DOE’s foreign reactor spent fuel repatriation program were clearly important, certain specific conditions must be met before the shipment across Nevada could go forward. These conditions included the conduct of a comprehensive risk assessment for the available shipping routes, the identification of potential problem areas along the routes, public meetings in each community along the route to advise citizens and public officials of DOE’s plans and to obtain local input, appropriate mitigating actions for any risks or impacts that were identified, and the provision of sufficient financial resources to assure that State and local emergency response personnel were adequately trained all along the route (see Attachment II).

At the same time, a Governor’s Policy Directive was issued to potentially affected State of Nevada agencies setting forth specific activities to be undertaken to assure the safety of the shipment within Nevada. That directive (see Attachment III) addressed the areas of escorts, inspections, radiological emergency response, overall emergency preparedness, training for State and local response personnel, shipment tracking, and reimbursement of costs by DOE. The Nevada Agency for Nuclear Projects, a component of the Governor’s Office, was designated as the lead agency for coordinating the State’s preparations for proposed spent fuel shipments.

1 A shipment is defined as one train carrying several spent fuel shipping containers.
The focus of the Governor’s policy direction was, first, to articulate, in an unambiguous manner, State policy with respect to the proposed shipment; second, to clearly communicate that policy framework to State agencies with operational roles and responsibilities; third, to provide effective coordination among the various agencies (state and local) involved; and, fourth, to assure that Nevada’s efforts were adequately coordinated and integrated with efforts of the other three states affected by the shipment. The policy directive was specific enough to clearly delineate those activities that were required but general enough to permit agencies sufficient latitude and discretion in implementing them.

Specifics of the Shipment

The actual shipment of foreign research reactor spent fuel occurred on July 22, 1998, approximately one year later than initially estimated by DOE. The delay was due to a number of factors, including the need to obtain Nuclear Regulatory Commission certification for changes needed in the shipping container to hold the smaller research reactor fuel elements; the limited numbers of the approved transport containers that were available for use; longer than expected time requirements for characterizing the fuel assemblies at the reactor sites; and the need to provide adequate training for responders along the primary and alternate transportation routes.

Initially, the first shipment from the Pacific Rim was to have been comprised of spent fuel from reactors in Indonesia and South Korea. However, due to civil unrest occurring in Indonesia at the time when preparations for shipment were being made, DOE made the decision to defer picking up that country’s spent fuel for the time being. Instead, the initial shipment consisted only of three containers or casks of spent reactor fuel from Korean reactors.

The three casks were loaded onto a dedicated ship (i.e., one chartered by DOE’s shipping agent solely for this purpose) at a port in South Korea. The ship proceeded directly to the United States, passing into San Francisco Bay enroute to the Port of Concord on July 21, 1998. At the port, the casks were unloaded by crane onto three flat cars. A locomotive and support cars were connected, and the shipment left Concord for INEEL at a few minutes past midnight on July 22nd. The train proceeded east to Sacramento then northeast through Portola, CA, entering Nevada southwest of Gerlach on the Union Pacific Railroad’s Feather River route. The train then crossed the Black Rock Desert and Pyramid Lake Indian Reservation and proceeded through

2 DOE selected the Nuclear Assurance Corporation legal weight truck cask (NAC/LWT) as the shipping container for the research reactor spent fuel. This cask is certified by the Nuclear Regulatory Commission, but changes in the internal “basket” that holds the fuel elements required NRC approval before the cask could be used for shipping the research reactor spent fuel. There were less than six NAC/LWT casks in operation nationwide at the time DOE began planning for the foreign reactor program and none with the requisite basket modifications and certifications.

3 DOE plans to combine the Indonesian spent fuel - approximately enough to fill one NAC/LWT shipping cask - with a future shipment from the Far East. That shipment will not occur until after 2000 and possibly not until 2002 or 2003.
Winnemucca, Battle Mountain, Carlin, and Elko, exiting the State just west of Montello. The total transit time from the Nevada border with California to the Nevada/Utah border was approximately eleven and one half hours.

State of Nevada Preparations for the Shipment

To prepare for the shipment, a working group comprised of all potentially affected State agencies was established specifically for the foreign research reactor spent fuel shipment project. The intent in creating the group was to be as inclusive as possible, so that agencies with even peripheral involvement in the operational aspects of the undertaking participated. When fully constituted, the working group included the Health Division’s Radiological Health Section (Rad. Health), the Division of Emergency Management (DEM), the Nevada Highway Patrol (NHP), the State Fire Marshall’s Office, the Nevada Public Utilities Commission (PUC), the Division of Forestry (DOF), the Department of Transportation (NDOT), the Division of Environmental Protection (DEM), the State Emergency Response Commission (SERC), and the Governor’s Office (the Agency for Nuclear Projects and, later, the Governor’s public information officer). The State Office of the Military/Nevada National Guard was involved through contacts and communication with the NHP and the Department of Motor Vehicles and Public Safety.

Planning for and implementation of the State’s response was carried out in six specific areas, including training, escorts, inspections, radiological emergency response, overall emergency preparedness, and shipment tracking/communications. Each area is discussed in more detail below.

(1) Training

A major concern for the State and for local governments along the primary and alternative shipping routes was the need to train response personnel to deal with incidents and accidents involving radioactive materials. This was a concern for State agencies, such as the Nevada Highway Patrol and Division of Forestry (whose personnel often function in a first responder capacity), as well as for local police, fire departments, and hazardous materials responders. To address this problem, in August, 1997, the Agency for Nuclear Projects, in conjunction with the Division of Emergency Management, surveyed relevant State agencies and local governments along the route with respect to radiological training needs. As a result of the survey findings, it was determined that a substantial effort would be needed to bring local responders to a satisfactory level of confidence and competence in dealing with potential spent fuel emergencies. The Agency subsequently prepared a set of training recommendations for DOE, which were implemented over the next 11 months (see Attachment IV).4

4 Initially, a program of State-provided training for local responders, paid for with funds to be made available by DOE, was considered. However, the difficulties of gearing up for such a major training program in the short time available (at the time, DOE was projecting the shipment to begin within six months) suggested that an approach whereby DOE implemented the necessary training with close oversight and input by appropriate State
Between January and July, 1998, DOE trained over 1,073 responders in eight counties. Training included basic radiological awareness, advanced radiological response, train-the-trainer (requested by several counties as a way of institutionalizing the training locally), and specialized rail response and medical personnel training. DOE was also asked to provide awareness level training for State agencies’ and local governments’ public information officers to enable them to better respond to media needs in the event of an incident or emergency. A summary of the training provided by county is included as Attachment V.

Personnel from the Nevada Highway Patrol, State Division of Forestry, and Nevada Health Division (Radiological Health) also participated in advanced and/or specialized trainings provided by DOE and the Union Pacific in the areas of TRANSCOM (the computerized shipment tracking system) and rail-related emergency response. Training costs were borne by DOE under agreements worked out with each local jurisdiction. State agencies’ training costs were reimbursed either using funds DOE provided to the WGA for this purpose or directly by DOE to the affected agency.

The Nevada Health Division’s Radiological Health Section was tasked with assuring that DOE’s training was factually accurate and operationally adequate. Radiological Health personnel reviewed and made needed improvements to course materials, outlines, and presentations; regularly monitored DOE-implemented training sessions in the local jurisdictions; and provided State-specific input into the training process. Tasking DOE to directly provide training while having Nevada radiological health professionals oversee the effort proved, overall, to be very effective.

(2) Escorting the Shipment

Early on in the process of planning for the shipment, it was recognized that escorting the train was the single most effective way to assure a safe and uneventful transit through Nevada. The Governor directed the Nevada Highway Patrol to work with appropriate State, local, and federal agencies to develop a plan for effecting such escort. Had the shipment been via truck, the escort function would have been relatively straightforward, since NHP has the requisite jurisdiction over the State’s interstate highways. However, the fact that the shipment was being made by rail, and that a portion of the primary route was located in an extremely remote and inaccessible area of northern Nevada (i.e., the section of rail line between the California border and Gerlach and between Gerlach and Winnemucca), posed a significant challenge for NHP.

Since railroads operate as private companies over private rights of way, there were procedural and jurisdictional questions with respect to stationing NHP personnel on the train itself. The Union Pacific Railroad was not amenable to having security personnel from Nevada agencies (especially the Health Division’s Radiological Health Section) would be more expeditious and more efficient.
(and the other states) accompany the shipment as onboard escorts. UP did agree, after
recommendations from WGA and substantial prodding of DOE by the affected states, to have
armed UP police positioned on the train for the full length of the trip. However, it was not at all
certain that the Nevada would be successful in challenging UP’s decision not to allow State
security escorts on the train.

Instead, the NHP worked with DOE, UP, and other State agencies to design an alternative
escort approach specific to this shipment. That approach involved shadowing the train during the
entire time it was in Nevada and maintaining direct communications with the train’s crew. To
accomplish this, NHP utilized its Northern Command aircraft (the airplane normally used for
highway surveillance and speed control) to maintain visual contact with the train in the remote
areas of the route between the California border and Winnemucca. When the train reached
Winnemucca, where the tracks roughly parallel Interstate 80 to just east of Wells and SR 233 to
the Utah border, NHP maintained visual contact with the train using patrol units on the highway.
For the entire length of the trip, NHP had made arrangements to maintain radio communications
with the train. While some problems arose with communications (see “Shipment Tracking”
below), for the most part NHP escorts were able to adequately monitor the train’s progress and
communicate with train personnel.

Apart from creating the capability for dealing immediately with any accident that might
occur, the principal reason for escorting the shipment was to have appropriate security and law
enforcement personnel readily available to assist local authorities in the event of any unplanned
incident or other occurrence. This included planning for crowd control (in the event of
demonstrations or civil disobedience - which did not occur), monitoring highway-rail crossings
ahead of the shipment, surveillance of the route for obstacles or other obstructions or suspicious
materials, and providing other assistance to local law enforcement personnel upon request. In
addition to maintaining direct surveillance of the train, NHP also developed contingency plans
whereby additional NHP units were on stand-by for rapid deployment, using Nevada National
Guard helicopters, in the event they were needed along the route. Such deployment was not
required, but the capability was available.

(3) Inspections

Although DOE and the Federal Rail Administration (FRR) planned to (an, in fact, did)
perform radiological and mechanical inspections on the shipping casks and train prior to
departure from Concord, it was deemed important that Nevada inspections also be conducted at
the time the shipment entered the State and at any stops made while the train was in Nevada.
Such inspections would assure that nothing had occurred in transit to put workers, response
personnel, or the public at risk.

Inspection responsibilities were divided among two State agencies - the Health Division’s
Radiological Health Section (which performed the radiological inspections of the cargo) and the
Nevada Public Utilities Commission Rail Inspection Section (which carried out mechanical and
hazardous materials inspections on the locomotive and rail cars). Radiological Health and PUC
personnel operated in teams and carried out inspection duties in three locations - at the rail yard in Concord prior to departure, in Portola, California, and in Elko, Nevada. DOE reimbursed both agencies for costs incurred in carrying out the inspections. Inspectors communicated with each other, DOE, and UP via cellular telephones.

Radiological Health and PUC inspectors first participated in the DOE and FRA-run inspections of the train and casks in Concord. From there, State inspection teams met the train in Portola for the Nevada port of entry inspection and proceeded to Elko to carry out a final inspection while the train was stopped for refueling.

Initial plans had called for halting the train in Gerlach (the first place in Nevada where the inspections could be carried out) in order to perform the requisite inspections. After discussions with DOE and Union Pacific, and California, it was determined that the Nevada inspections would take place in Portola, California. Since the train was scheduled to stop in Portola for a required crew change and since Portola is located just west of the Nevada border, it was determined that performing the inspections there would eliminate the need to stop the train in western Nevada and would suffice for the port of entry inspections Nevada required.

(4) Standby Radiological Emergency Response

In addition to providing for inspection of the casks, the Health Division’s Radiological Health Section was tasked with maintaining a standby radiological response capability during the time the shipment was in Nevada. To accomplish this, Radiological Health positioned trained radiological response personnel with the Forestry Division’s stand-by helicopter in Reno for ready deployment to any incident that might occur while the shipment was in remote areas of eastern Nevada inaccessible by land vehicle. State radiological response personnel were also stationed in Winnemucca. From there they were able to shadow the train from the time it reached the Winnemucca area to the Utah border. During the entire time the train was in Nevada, State radiological emergency response assets were never more than 15 to 45 minutes away.

Costs for the State’s radiological response (overtime for inspectors, travel expenses, costs for communications equipment) were reimbursed to the Health Division by DOE.

(5) Overall Emergency Preparedness

In addition to standby radiological response capabilities, plans were developed and implemented to heighten emergency preparedness at the State level and along the transportation route. NHP deployed additional troopers along the I-80 corridor to be available in the event of an accident or incident. Similarly, Division of Forestry personnel located in areas along the rail line
were placed on alert during the shipment.\(^5\)

To assure adequate communications and coordination among State and local entities in the event of an accident or incident, the State Emergency Operations Center (EOC), operated by the Division of Emergency Management, was put on standby during the time the spent fuel train was in Nevada. This action assured that there would be immediate access to the full State emergency response system in the event that something went wrong during the shipment. If a large scale coordinated response had been needed, personnel and equipment needed to manage it at the State level were available.

(6) **Shipment Tracking**

A major concern when dealing with mobile hazardous or nuclear materials risks, such as those posed by the foreign spent fuel shipment, is knowing exactly where the shipment is at any given time and being able to accurately anticipate and plan for it progress. It is critical to know not only where the shipment is, but also whether or not it has stopped unexpectedly or is ahead of or behind schedule.

To assure that such information would be available to Nevada security and response personnel, the Agency for Nuclear Projects, working with the WGA, arranged to have DOE’s TRANSCOM\(^6\) shipment tracking system installed at the NHP dispatch center in Reno. DOE provided a computer and the required software for accessing the system. DOE also provided training for NHP communications personnel in operating TRANSCOM. The TRANSCOM system was activated and operated, albeit with some glitches, from the time the train left Concord until arrival at INEEL.

Prior to the foreign spent fuel shipment, TRANSCOM had been tested in preparation for its use in tracking shipments of transuranic waste to the Waste Isolation Pilot Plant (WIPP) facility in New Mexico (an unrelated program). In those tests, numerous serious problems were uncovered. Because many of the western states, including Nevada, were aware of the tests and the problems through WGA’s involvement in the WIPP program, it was determined that TRANSCOM was not adequate to serve as the sole method for tracking the shipment in Nevada. Consequently, NHP worked with DOE and UP to obtain equipment and authorization to maintain direct radio communications with the train in Nevada using UP communication.

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\(^5\) State Forestry personnel often are called upon to act as first responders in rural areas since they may be first on the scene of an accident in remote areas. Forestry field personnel are trained in emergency response, and the Forestry Division maintains a capability to respond to hazardous materials incident.

\(^6\) TRANSCOM is a satellite tracking system that utilizes transponders located on the train (or truck) being tracked to beam signals to a satellite, which relays them to DOE’s TRANSCOM Center in Oak Ridge, Tennessee. Messages can also be sent back and forth between the train/truck and the TRANSCOM Center via computer messaging. State officials tracking the shipment log on to the DOE computer via phone links to Oak Ridge. The system is designed to provide real time tracking capability for any system user. Access codes and passwords are used to deny unauthorized access.
facilities. UP provided equipment and information on frequencies, etc. to the NHP Dispatch Center to do this. Arrangements were also made with DOE to have satellite cellular telephone communication between the train and NHP escorts as a backup communications capability.

**Problems Encountered by State of Nevada Agencies and Lessons Learned**

For the most part, the shipment transited Nevada uneventfully, although there were several unexpected occurrences and relatively minor problems along the way. The fact that extensive federal, State, and local preparations were made to keep risks to a minimum and contributed significantly to the lack of major problems. In addition, the use of rail (as opposed to truck) transport kept the shipment from coming into direct contact with motorists and helped to minimize population risks. Especially significant was the selection of a rail route that avoided the populous Reno-Sparks metropolitan area. The use of the UP Feather River route represented trade offs between slightly more difficult terrain characteristics on the one hand and the avoidance of heavily populated areas on the other. It also posed additional problems for maintaining surveillance and emergency response in the remote areas of northeastern Nevada (between the state line and Winnemucca). However, all things considered, the use of rail and the decision to move the shipment on the Feather River route lowered population risk significantly.

Specific issues, concerns, and problems that were encountered during the course of the shipment are detailed in the attached reports prepared by the Nevada Highway Patrol, the Health Division Radiological Health Section, and the Nevada Public Utilities Commission (see Attachment VI). The key cross cutting “lessons learned” from the effort are briefly discussed below.

1. **Training**

Requiring DOE to directly implement the actual training for local first responders proved, generally, to be an effective and efficient method that eliminated the need for the State of Nevada to engage in a major hands on training effort for local responders. However, there were problems early on with the content of some of the DOE-sponsored training courses and with assuring that all of the appropriate local response agencies were involved in the trainings.

State Radiological Health Section personnel found that the contractors DOE employed to provide the training were not knowledgeable about the various State resources available to local responders in the form of direct and indirect technical assistance. This was corrected through the use of State-provided informational materials and contact information.

State personnel also found that some of the DOE/INEEL materials and information being made available tended to be designed more to downplay possible risks of nuclear materials than to help local responders understand the nature of the risks posed by spent reactor fuel and deal with real world incidents that might occur. There was a tendency by the trainers to overly generalize the topic of radiation exposures. Oversight by the State Radiological Health Section proved effective in mitigating this problem, but it persisted to a lesser degree throughout the
training. For future shipments, DOE training courses and materials need to be closely scrutinized and monitored both for accuracy and relevance to the type of materials and risks involved, and Nevada Radiological Health personnel should be involved early in actual course development.

Early on the planning process for training, there were disconnects between DOE and local response agencies in certain jurisdictions. This was most pronounced in Washoe County, but it occurred to a certain extent in other counties. DOE would offer training sessions, working with designated representatives from police, sheriff’s, and fire departments; schedule and implement the sessions based on numbers of personnel expected to attend; and find that many fewer local personnel showed up for the trainings. This created tensions between DOE and Washoe County and could have impacted the effectiveness of the training effort. The problems had to do with scheduling of training, work schedules for local people, and communications problems among and within departments. For future shipments, more up front effort needs to be made to engage local department personnel effectively, obtain their input about the nature, timing, and location of the trainings, and forge effective communications channels from the top down.

There were also problems getting training to volunteer personnel, especially in rural counties. In addition, there was a least one instance where hospital and emergency medical technicians (volunteers) balked at participating due to time constraints and philosophical opposition to the shipment. Providing training for volunteer emergency response personnel is always difficult because of the many conflicting demands on volunteers’ time. Holding trainings in easily accessible locations and scheduling them for convenient times, even if that means doing extra sessions, can mitigate the problem to some degree.

The oversight of DOE’s training effort by the State Health Division’s Radiological Health Section proved crucial to the success of the training. It also provided a mechanism whereby State decision makers could judge how well DOE was adhering to the pre-set requirement that local responders be adequately prepared for the shipment. For future shipments, Radiological Health should be involved earlier and more directly in the design of training courses and the selection of course materials.

(2) Escorting the Shipment

The NHP performed exceptionally in providing security and escorts for the shipment. NHP employed aerial surveillance combined with ground based shadowing of the train and its cargo to assure an immediate Nevada security presence in the event of an incident. NHP used the Northern Command’s Air 1 to maintain visual contact with the train from the border with California to Winnemucca. From Winnemucca to the Utah border, where the train tracks roughly parallel I-80 and SR 233, State troopers shadowed the train from the highways. NHP found that it would have been more effective to used two NHP aircraft to provide continuous air coverage of the shipment from border to border. Nevertheless, the innovative and flexible approach
developed and implemented by the NHP made it possible to maintain visual and radio contact with the shipment without placing State personnel physically on the train, something that has inherent procedural, legal, and jurisdictional problems.

The approach to escorting employed by the NHP also assured that State assistance would be readily available to local law enforcement in the event of an accident or incident, without being intrusive. The use of NHP aircraft, combined with a helicopter provided by the Forestry Division, also allowed State emergency response personnel to team with security personnel and be on the scene of any potential out-of-the-ordinary occurrence in a matter of minutes. The surveillance aircraft also functioned as an airborne radio relay platform, relaying information and communications to and from the train, units on the ground, and NHP Dispatch. In the more remote sections of the rail route, this capability was essential to the surveillance.

For future shipments, the same approach to escorts and security, modified by the recommendations contained in the NHP After Action Report (Attachment VI) should be maintained. In addition, the Nevada National Guard, which provided standby helicopters in the event of an accident or incident, needs to be involved earlier in the planning process and integrated into the State agencies’ working group.

(3) Inspections

For the most part, the inspection process established for the spent fuel shipment worked effectively and enabled Nevada rail and radiological inspectors to conduct necessary inspections to ensure that the train and its cargo were not a threat to public health and safety and the environment. As noted above, rail inspectors from the PUC inspected train equipment at the point of origin (in conjunction with FRA inspectors), prior to entry into Nevada (at Portola, CA), and at the refueling stop in Elko just prior to the train’s exiting Nevada. The Health Division’s Radiological Health inspectors teamed with PUC personnel in Portola and Elko to carry out radiological inspections of the cargo.

Inspections went off largely as planned, with several procedural problems noted by both PUC and Radiological Health inspection personnel. The timing of the locomotive and rail car inspections at the point of origin, for example, was changed at the last minute (by UP), causing some confusion and leaving little time to correct defects or address exceptions had any been discovered. Likewise, there was some confusion as to the proper labeling for the shipment which resulted in a disagreement between parties as to what current requirements applied to the shipment. This was determined to be the result of communication disconnects between the Nevada PUC, Radiological Health, the FRA, and the NRC on-site inspectors and will need to be corrected (through prior discussions) before the next shipment occurs (see Attachment VI - PUC Post Operations Summary). There were also problems in obtaining information on the initial radiological inspection conducted by DOE, NRC, and the State of California in Concord.
Consequently, Nevada inspectors in Portola did not have the benefit of those inspection interpretations (see Attachment VI - Health Division Radiological Health Section Comments). While this did not pose a safety problem, it did have implications for procedural disagreements over placarding that occurred in Portola.

The extraordinary duration of the shipment posed problems for Nevada inspection teams, especially for the PUC inspectors. The PUC team was required to start their work two days before the shipment (for the planned point of origins rail inspections) and then “leap frog” the train first to Portola and then to Elko for the enroute inspections. This made for a grueling work schedule and considerable travel time. Likewise, Radiological Health inspectors were required to put in long hours carrying out two inspections over a period of some 15 hours (not counting the initial travel time from Carson City to Portola). The use of two radiological inspection teams mitigated this problem to some degree, but the length of time it took the train to travel from Portola to Elko and the distances involved for the inspectors made for a significant commitment in staff resources.

For future shipments, it may be advantageous to utilize additional rail inspection personnel and divide up the inspection duties by location. Under such an arrangement, separate rail/radiological teams would be used to cover (1) the point of origin inspections, (2) the Nevada port of entry inspections, and (3) the Nevada exit/Elko inspections. This would allow teams to be pre-positioned in each area and avoid the need for having the same team follow the train from point to point.

(4) *Stand By Radiological Emergency Response*

The Health Division’s Radiological Health Section positioned radiological personnel trained in assessment and response with the standby Forestry Division helicopter in Reno. In addition, the Nevada National Guard, working closely with NHP, maintained a larger Chinook helicopter on standby at its Stead facility north of Reno to transport additional NHP security personnel to the scene of an accident or incident if needed. While nothing occurred to require deployment of the standby teams, their availability provided assurance that State assistance could be provided rapidly had there been an accident or incident involving the shipment. The three State agencies involved - Forestry, NHP, and Radiological Health - combined to field an effective multi-disciplinary rapid response team capable of providing security, assessment, and response capabilities.

The use of standby airborne response team is a cost effective means of providing expertise and resources that might not be available along the shipping route. It permits an acceptably rapid response to an unexpected occurrence without having to commit large manpower and equipment resources along the entire route.
(5) **Overall Emergency Preparedness**

The use of the Division of Emergency Management in its broad coordination and planning role proved effective in pulling together an overall State Action Plan for the shipment (see Attachment VII) and in maintaining readiness to deal with the coordination aspects of a statewide response to a radiological accident had one occurred. DEM put together a plan setting forth the various elements of the State’s overall effort in dealing with the shipment. The Plan was disseminated to each of the participating agencies as well as to affected local governments. It provided for a common understanding of what was being done and contained information on what agencies were responsible for specific aspects of the State response. The Plan also contained contact information for all State agencies involved in the shipment.

DEM also arranged for the State Emergency Operations Center (EOC) to be staffed and maintained on a standby basis during the shipment. This did not require a major commitment of resources, yet it assured that the ability to coordinate a major State/local/federal response was readily available had such an effort been required.

(6) **Shipment Tracking**

The TRANSCOM system proved to be less than adequate for tracking the foreign spent fuel shipment. While DOE fulfilled commitments to provide the State of Nevada with the hardware, software, and training needed to operate TRANSCOM, there remain deficiencies in the system itself that prevent it from being acceptable as the primary method for tracking spent fuel shipments and maintaining communications linkages with the shipment while enroute.

NHP was able to successfully install TRANSCOM at the Reno Dispatch Center, and NHP personnel were trained in its use. However, the system has inherent limitations that affect its performance. For example, TRANSCOM provides updates only every 15 minutes on the shipment’s location, and there are times when the system “freezes up” and does not reflect shipment movement for longer periods. Should a shipment encounter problems and be stopped in a remote area, NHP might not be able to recognize this fact for at least 15 minutes, seriously delaying the required response. In addition, TRANSCOM does not permit real time, voice communications with the train. Computer messaging is provided for, but this is cumbersome, time consuming, and inefficient.

By the time NNP Dispatch received TRANSCOM updates, the train was already significantly ahead of where TRANSCOM was reporting it to be (100 miles or more). Had NHP and other Nevada personnel been relying solely on TRANSCOM to estimate the shipment’s arrival at various points along the route, this lag time would have caused problems.

In dealing with DOE’s TRANSCOM system and planning for the spent fuel shipment, it
became readily apparent that TRANSCOM was much better suited to the role of back up to other forms of shipment tracking, including air surveillance, shadowing, and real time radio communications with the train. Where TRANSCOM was somewhat useful was in monitoring shipment progress prior to its entry into the Nevada and serving as a check on other reports of shipment location. This permitted NHP to know, at given time intervals, where the train was and, by deduction, how long before it reached the Nevada border. For the most part, however, the shipment could have been made, and Nevada’s response would have been just as effective, without the use of TRANSCOM. It was even suggested at several WGA planning meetings that there are commercial shipment tracking systems available on the market that are more effective and have greater capabilities (i.e. real time, two way communications; continuous positioning; etc.).

**Recommendations for Future Shipments**

While the July, 1998 shipment of foreign research reactor spent nuclear fuel presented the State of Nevada with significant challenges, it also provided the opportunity to “field test” the State’s capabilities for dealing with spent fuel shipments and establish precedents for future DOE shipments based on real world experience. As a result of Nevada’s involvement with the July shipment, the following recommendations are made:

1. The basic process outlined in the Governor’s directive to State agencies represents a sound approach to minimizing risk and assuring public health and safety and should be utilized for future spent fuel shipments.

2. The Western Governors’ Association provided valuable assistance to affected states, especially in the early planning stages of the effort, in identifying issues, energizing DOE and its contractors to deal productively with states, local governments, and Indian tribes, and coordinating activities among key participants. For future shipments, the WGA role should be maintained and expanded to encompass more active coordination of activities in the later phases of undertaking. 

3. The selection of a shipping mode and route that minimizes population risk is the single most important intervention available for managing risks associated with spent fuel shipments. In the case of the July, 1998 shipment, the decision to transport the spent fuel by rail and to use the somewhat longer but less populous Feather River route kept the material out of the densely populated Reno-Sparks metro area, thereby substantially reducing population risk within Nevada and lessening opportunities for shipment

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7 WGA played a major role in initially empowering states, initiating planning for the shipment, and serving as a conduit for DOE funds to the affected states. However, WGA’s role diminished considerably as DOE chose to deal exclusively with the individual states and local governments as the project moved from planning to implementation. DOE balked at continuing the WGA coordination meetings that had been helpful in the early stages of the effort. As a result, something of a vacuum was created in the area of coordination among various states’ implementing agencies, who were dealing with DOE and other agencies/jurisdictions within their respective states, but often were hampered in their ability to share information and coordinate efforts with counterparts in the other affected states.
disruption. Future foreign spent fuel shipments to INEEL from Concord should be done only by rail and should use the Feather River route if continue to be routed through Nevada.

(4) Training of State and local response personnel should continue to be a DOE responsibility, with close oversight and supervision by Nevada Radiological Health experts. Since the next shipment is not scheduled to take place for another three or more years and considerable turnover will have occurred at the State and local levels among emergency response personnel, DOE must be prepared to initiated a complete, new training program that assures adequate training and preparation for responders along the route.

(5) Radiation detection Equipment provided by DOE to local responders along the shipping routes must be adequately maintained and calibrated in order for it to be of use for future shipments. It should be DOE’s responsibility to put in place a program for regularly monitoring the status of equipment and providing for period calibration.

(6) Escorting the shipment using coordinated aerial and ground based surveillance proved to be extremely effective in monitoring the shipment and should be implemented for any future shipments of spent nuclear fuel. If future shipments are made using the State’s highways (something that is not recommended), NHP patrol units escorting the truck(s) will suffice. However, in order to adequately shadow shipments in remote locations along certain rail routes, aircraft surveillance remains the most effective option.

(7) Inspections of the train and its cargo at the point of entry into Nevada (or as close to it as possible) and at any stopping points within the State are important for assuring public health and safety and minimizing risk during transit. All future shipments should be subject to such inspections. The use of teams comprised if PUC rail inspectors and Health Division radiological inspectors to carry out the inspections worked well and should be further developed for future shipments.

(8) Due to the length of time it takes a spent fuel train to transit Nevada (11 hours or more), planning for future shipments might include augmented staffing in areas where personnel were overly taxed during the July shipment. These include the inspection teams (rail and radiological), NHP dispatch and communications staff, standby personnel (NHP, Radiological Health, PUC), and Forestry personnel. Plans also need to take account of crew flight time limitations for the surveillance aircraft, including the possible use of a second airplane to cover the shipment in the eastern portion of the State.

(9) The use of a multi-agency working group that includes representatives from the Governor’s Office as well as from all affected operational agencies is an effective coordinating vehicle and should be maintained for future shipments.