



# State of Utah

DEPARTMENT OF ENVIRONMENTAL QUALITY  
OFFICE OF THE EXECUTIVE DIRECTOR

(17)

Michael O. Leavitt  
Governor  
Dianne R. Nielson, Ph.D.  
Executive Director  
Brent C. Bradford  
Deputy Director

168 North 1950 West  
P.O. Box 144810  
Salt Lake City, Utah 84114-4810  
(801) 536-4400 Voice  
(801) 536-0061 Fax  
(801) 536-4414 T.D.D.

DOCKET # 17

'00 JAN 23 P 3:26

OF  
AD

January 27, 2000

Express Mail

DOCKET NUMBER  
PETITION RULE PRM 73-10  
(64FR49410)

Secretary for the Commission  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555-0001  
Attention: Rulemakings and Adjudications Staff

re: State of Utah's Comments on Petition for Rulemaking, State of Nevada  
Docket No. PRM-73-10

Dear Secretary:

Attached are the State of Utah's comments on the State of Nevada's Petition for Rulemaking to Amend Regulations Governing Safeguards for Shipments of Spent Nuclear Fuel Against Sabotage and Terrorism and to Initiate a Comprehensive Assessment.

If you have any questions or need further clarification on any comment please contact me at 801-366-0523.

Sincerely,

Connie S. Nakahara

enclosure: as stated

cc: Sherwin E. Turk, NRC Office of the General Counsel  
Paul A. Gaukler, Shaw, Pittman, Potts & Trowbridge

DS10

**Comments by the State of Utah**  
**In Support of the Rulemaking Petition by the State of Nevada**  
**Docket No. PRM 73-10**  
**January 2000**

The State of Utah, with assistance from Marvin Resnikoff, Ph.D. and Matthew Lamb, M.S. of Radioactive Waste Management Associates, submits these comments on the Petition to Institute Rulemaking and to initiate a Comprehensive Assessment filed by the State of Nevada (NRC docket number PRM 73-10). The State of Utah agrees with and supports the State of Nevada in its petition request that the current physical protection regulations contained in 10 C.F.R. Part 73 should be strengthened as they relate to the protection of spent nuclear fuel (SNF) shipments against sabotage and terrorism. The State maintains that a comprehensive assessment of the consequences of sabotage and terrorist events involving SNF is necessary before the forthcoming large-scale transport to any public or private interim storage facility or the proposed geologic repository at Yucca Mountain.

The State of Utah has a substantial interest in the outcome of this proceeding. First, although transportation routes have not yet been designated, the Utah will likely be a main corridor state for the transportation of SNF and high level waste (HLW) to the proposed Yucca Mountain repository and/or interim storage facility. The State of Nevada estimates that 20,200 shipments (13,900 by rail and 6,300 by truck) will occur over 30 years or possibly 56,600 to 104,500 shipments will occur over 40 years for a combined repository and interim storage facility.<sup>1</sup> Many of the SNF and HLW shipments en route to Yucca Mountain will traverse the State of Utah. In fact, rail lines and some highway routes will transport the irradiated fuel across major watersheds and through the Wasatch Front where the majority of Utahns reside.

Second, a centralized dry storage facility for commercial SNF has been proposed for Skull Valley, Utah by Private Fuel Storage, L.L.C. (PFS), a consortium of private utilities.<sup>2</sup> Beginning in 2002, the PFS facility plans to begin shipping and storing up to 40,000 MTU of SNF.<sup>3</sup> On a national scale, this volume of SNF is significant; it represents approximately half of the nation's projected volume of SNF that has been or will be generated from commercial nuclear reactors. Furthermore, as part of its storage plans, PFS may also build an intermodal transfer facility adjacent to an essential east-west thoroughfare, Interstate 80. None of the SNF to be transported to or stored at the PFS facility will originate in Utah. Thus, even without the Yucca Mountain shipments,

---

<sup>1</sup> 64 Federal Register 176, 49410.

<sup>2</sup> A license application is pending before the NRC, docket no. 72-22-ISFSI.

<sup>3</sup> In fact, the volume of fuel shipped into and out of PFS may exceed 40,000 MTU because PFS requested license is only restricted from having 40,000 MTU of fuel at any one time.

potentially over 40,000 MTU of SNF will be transported across the country from various reactors to Utah.

Third, if the PFS facility is built and operated, Utah will become a state of origin for irradiated fuel. Accordingly, the State of Utah has a high interest in protecting its citizens from the risks of transporting and storing SNF and HLW. Moreover, the PFS centralized storage facility will contain a large stockpile of SNF and may become a target for terrorism and sabotage.

The State of Utah calls on the Commission to amend its regulations to reflect the changing nature of the terrorist threat and the changing nature of population growth in western states, including Utah. The State believes it is critical that NRC regulations be amended to at least require SNF be shipped by dedicated train; shipments of SNF avoid populated areas; and escort requirements for shipments of SNF through urban and rural areas be strengthened. by conducting a comprehensive assessment of transportation safeguards regulations. Further, Utah urges the Commission to re-examine the definition of "radiological sabotage" and the design basis threat against radiological sabotage.

Utah believes that the current regulations do not provide adequate protection for SNF and HLW shipments against acts of terrorism and sabotage. The current regulations are predicated on outdated assessments. The last assessments concerning such events were performed in the early 1980s, well before significant quantities of SNF were shipped. Moreover, the last comprehensive Environmental Impact Statement on the impact of SNF shipments occurred in 1977.<sup>4</sup> Thus, similar to the Petitioner, Utah also believes the nature of the terrorist threat has significantly changed since the Commission last assessed the adequacy of its SNF transportation safeguard regulations. Hence, prior to drastic increases, both, in the amount of irradiated fuel being transported and in the frequency of shipments, it is imperative that the physical protections for these shipments against sabotage be instituted using reliable data concerning the susceptibility of such shipments to attack and the consequences of a successful sabotage event.

Also to better evaluate the risks from terrorism and sabotage, the Commission should prepare a new EIS on the transportation of irradiated nuclear fuel. This EIS should address the impact of transporting irradiated nuclear fuel in truck and large rail shipping casks, including the likely effects of successful sabotage attempts in terms of short and long-term health effects, cleanup, decontamination, disposal costs, opportunity costs from lost workdays and sick days, healthcare costs, environmental costs (including the human effects on environmental losses stemming from crop impoundment and water supply contamination), costs to ecosystems, and socio-psychological costs associated with trauma and stigma effects.

---

<sup>4</sup> NUREG-0170, *Final Environmental Statement on the Transportation of Radioactive Material by Air and Other Modes*, December 1977.

In its petition, the State of Nevada identify two critical changes regarding sabotage since the Commission last reviewed the adequacy of the current safeguards in 1984. These significant changes are, in part, why the current regulations are no longer adequate. The two new developments include 1) changes in the nature of the terrorist threat; and 2) the increased vulnerability of shipping casks to terrorists attacks involving high-energy explosive devices. As discussed below, the State of Utah agrees that addressing these two issues are important in ensuring that SNF and HLW are properly safeguarded. The State urges the Commission to reconsider the regulations.

1. Changes in the nature of the terrorist threat.

Changes in the nature of the terrorist threat have not been sufficiently addressed in any of the government studies relating to sabotage and irradiated fuel transportation. In the government studies in which idealized shipping casks were subjected to mock detonations by high energy devices<sup>5</sup> (SAND82-2365), and in the recent Sandia study using computer simulations to estimate the radiological consequences of missile impacts on current shipping casks<sup>6</sup> (SAND99-0963), it was asserted that, because terrorist attacks are not random, no assessment of the probability of such attacks can occur. Nevertheless, the Sandia studies still state that these probabilities are "very small."

While it may be true that a proper probabilistic risk assessment of the potential for terrorist attack against irradiated fuel shipments cannot be made, this should not relieve the DOE and the Commission from their responsibilities to consider the recent increase in terrorist attacks in the United States and develop a realistic consequence assessment. Simply stating that the probability of terrorist attacks cannot be addressed should not be an excuse for not assessing the current climate with respect to terrorism. Rather, such events as the Oklahoma City and World Trade Center bombings and the bombings on American embassies in Africa should prompt the NRC, DOE, and DOT to ensure that shipments of irradiated fuel are properly safeguarded.

The State of Nevada's Petition provides ample evidence of a climate in which the number and deadliness of terrorist attacks are increasing in the United States. Utah agrees with the Petitioner that the current safeguards are not sufficient to adequately protect SNF shipments against terrorist attack in this new climate. Therefore, the State of Utah urges the Commission to conduct a comprehensive assessment of the consequences of sabotage events involving irradiated nuclear fuel transportation and to modify its current regulations as appropriate.

---

<sup>5</sup> SAND82-2365, 1983. Sandoval et al. *An Assessment of the Safety of Spent Fuel Transportation in Urban Environs*, Sandia National Laboratories, Albuquerque, NM.

<sup>6</sup> SAND99-0963, 1999. Luna, Neuhauser, and Virgil, *Projected Source Terms for Potential Sabotage Events Related to Spent Fuel Shipments to a Yucca Mountain High Level Waste Repository*, Sandia National Laboratories, Albuquerque, NM. [MOL.19990609.0160]

2. Increased vulnerability of shipping casks to terrorist attacks involving high energy explosive devices.

The most recent Sandia report (SAND85-0708) on sabotage of shipping acknowledges the differences between modern casks and those used in previous experiments to estimate the amount of radioactive material released in the event of a shaped charge explosion.<sup>7</sup> The same report also acknowledges the availability of portable, armor-penetrating devices for use in terrorist attacks.

However, the computer model employed by Sandia is not properly benchmarked and may not be adequate for estimating the consequences of a sabotage event. New experimental studies must be conducted by Sandia to properly benchmark computer codes for new high-energy devices and the new generation of shipping casks. In its report, Sandia utilizes the Shaped Charge Analysis Program (SCAP), a computer model that calculates the penetration depth in order to determine the possible damage caused by two high energy density devices (HEDDs) on state-of-the-art shipping casks.

Nonetheless, as Sandia admits, multi-layered targets, such as shipping casks containing layers of steel, water, uranium, lead, air, and plastic, are not well modeled using the SCAP code. Furthermore, the Sandia study "benchmarks" the SCAP code against a previous experiment in which a M3A1 shaped charge was detonated against an older cask, not the type of casks that will be used at Yucca Mountain or the PFS site in Skull Valley, Utah. The Sandia benchmarking resulted in an underestimation by the computer model of the size of the hole created by the penetration. In an attempt to remedy this error, the Sandia study multiplied the predicted hole size by a factor of 2.0 to obtain asserted "correct" results. Then the Sandia study proceeded to apply the same correction factor when modeling other, more modern cask designs. This approach is seriously flawed. Multiplying all results by the same factor assumes that the SCAP code will model all cask layer arrangements, including different numbers of layers, consistently. With no experimental data to prove this, this assertion is unacceptable.

For example, a computer code which, when used to model multi-layered targets resulted in "serious difficulties in comparing SCAP modeling output and experimental data"<sup>8</sup> The SCAP should not be expected to model a lead-steel interface with the same degree of incorrectness as a lead-uranium interface.<sup>9</sup> Therefore, until experimental proof of the merits of using the SCAP code to model the behavior of a shaped charge strike on a uranium-shielded or new generation casks, including HI-STAR or Transtor rail casks, are

---

<sup>7</sup> *Ibid.*

<sup>8</sup> SAND85-0708, 1985. Robinson, A.C. *SCAP—A Shaped Charge Analysis Program—User's Manual for SCAP 1.0*, Sandia National Laboratories, Albuquerque, NM.

<sup>9</sup> *Ibid.*

performed, the code cannot be considered valid. Further, whereas the code underestimated the true size of the hole in the older experiments, it cannot be assumed that this code will provide a conservative approximation of penetration damage. Thus, to correctly assess the impacts, a full set of experiments designed to determine the true effect of a HEDD explosion on cask integrity must be performed.

Accordingly, the State of Utah agrees with the Petitioner in stating that new, more vulnerable casks must be subjected to a consequence assessment. These casks should be experimentally tested for response against a variety of potential terrorist devices, including high-energy explosives and armor-penetrating missiles such as the MILAN or US TOW-2. As previously discussed, SAND85-0708 cannot be considered to be an appropriate assessment of cask response to sabotage attacks, since no experiments were performed and the mathematical model the assessment relies on is insufficiently benchmarked and unable to effectively model multilayered targets.

The State of Utah urges the Commission to consider the development of a comprehensive assessment of the consequences of sabotage events involving irradiated nuclear fuel transportation. This assessment should include experimentally determined estimations of the amount of irradiated fuel released from current generation shipping casks in the event of attack by an anti-tank missile such as the MILAN or US TOW-2.

Moreover, the temporary storage casks proposed for use at the PFS facility in Skull Valley, Utah are also particularly vulnerable to attack. These structures are mostly concrete. In fact, analyses have show that these structures can be penetrated by aircraft crashes. Experiments subjecting these storage casks to anti-tank missile penetration should also be performed to assess the vulnerability of the PFS site containers to terrorist strike. The NRC has never subjected dry storage casks, such as the Transtor or HI-STAR casks, to full-scale tests employing the MILAN or TOW-2 type anti-tank missiles.

### **Proposed Amendments to Existing Regulations**

The State of Utah believes that the above differences between conditions at the time of the last assessment of these regulations and current conditions warrant a reconsideration of the regulations themselves. Furthermore, Utah agrees with the Petitioner that the Commission must reexamine the design basis threat, reexamine radiological sabotage, develop regulations that require shipments of irradiated nuclear fuel to avoid populated areas, and strengthen the escort requirements for shipments through urban and rural areas. The following comments address each proposed rule change individually.

**A. Reexamine the Design Basis Threat: “Radiological Sabotage.”**

Utah supports the Petitioner in its assertion that “the Commission should reexamine the design basis threat used to design safeguards systems to protect shipments of SNF against acts of radiological sabotage.”<sup>10</sup>

*Clarify the meaning of “hand carried equipment.”*

First, Utah agrees that the Commission should clarify the meaning of “hand-carried equipment.” It is imperative to know exactly what types of weapons the regulations consider when evaluating the possible consequences of a successful sabotage attack. For example, it is unclear whether the design basis threat considers anti-tank missiles capable of being fired multiple times. It is important that this be clarified, since all documents assessing possible consequences from a terrorist attack refer to this definition as the one bounding their choice of device.

The US TOW2 anti-tank missile system, for example, can be fired using a tripod, or from the back of a truck, and can launch 3 missiles in 90 seconds.<sup>11</sup> An attack using this type of device should be included in the definition of hand-carried and the design basis threat because it can be easily be carried in a vehicle. These anti-tank missiles can also be fired with precision at a distance up to 1 km from a target. This makes transportation routes particularly vulnerable to sabotage with these devices.

By clarifying the definition of “hand carried,” the State of Utah believes that the regulations will act as a better guide in determining whether current assessments and safeguards concerning sabotage of irradiated fuel are sufficient. It is our opinion that a proper definition of “hand carried” will show the need for an updated assessment of the consequences of sabotage events, including attacks involving simultaneous fire and cask compromise, multiple missile strike events, and attacks with truck bombs and other equipment capable of being mobilized by a few dedicated individuals.

*Expand definition to include other, non-“hand carried” devices*

The State of Utah concurs with the Petitioner in suggesting that the Commission should preform a comprehensive reassessment of the consequences of terrorist attacks using explosive devices and other weapons larger those commonly considered to be hand carried. Utah is concerned with the possibility of a terrorist or sabotage attack on transportation vehicles and/or on the proposed PFS facility at Skull Valley, Utah. Moreover, Utah agrees with the Petitioner in believing that temporary storage facilities storing waste en route to a DOE-operated nuclear repository may be an attractive target

---

<sup>10</sup> Nevada Petition to Amend Physical Protection Regulations, June 22, 1999, at 2.

<sup>11</sup> Military Analysis Network, <http://www.fas.org>.

for potential saboteurs. If the proposed PFS facility is licensed, it will become an integral part of national transportation of irradiated nuclear fuel to the Yucca Mountain repository. The shipping casks will be particularly vulnerable to terrorist attack during their temporary storage at the PFS facility.

Further, the proposed PFS site is located near a critical military training range and other military installations (including biological and chemical agent storage). The presence of military installations may make the PFS site or casks transported through Utah an attractive target to a terrorist attack.

The presence of military installations also make the use of stolen military aircraft or military weapons plausible as one means of terrorist attack. Calculations estimating the damage caused on the temporary storage casks to be used at the proposed PFS facility suggest that these casks can be breached in the event of an airplane crash or munitions impact. The presence of military installations in the immediate vicinity of the proposed PFS facility, and along the transportation routes through Utah to the proposed geologic repository mandates that proper safeguards should be in place to protect against attack with stolen military weapons or aircraft. Therefore, the State of Utah agrees with the Petitioner in requesting that an attack involving stolen military aircraft or weapons be considered in the regulations.

#### **B. Re-examine the definition of “Radiological Sabotage”**

The State of Utah also agrees with the Petitioner that the Commission should reexamine the definition of “radiological sabotage” to include deliberate actions which are intended to cause economic damage or social disruption regardless of the extent to which public health and safety are actually endangered by exposure to radiation. In many cases, potential saboteurs choose their targets based on the ability to obtain exposure. Thus, the goal of a terrorist attack is not always human casualties. Other effects contributing to economic losses, social disruption, and perception must be considered. This includes (but is not limited to) attempts to disrupt economic, social, or transportation systems in addition to any desire to cause human health effects or casualties.

Consider the following hypothetical example:

A rail shipment containing three shipping casks of irradiated nuclear fuel, each holding 24 pressurized-water reactor assemblies, is subjected to terrorist attack. This attack occurs in Salt Lake City, Utah (en route to the proposed PFS storage facility in Skull Valley, Utah or the geologic repository at Yucca Mountain). The casks are attacked with an anti-tank missile strike (or strikes) causing a release of irradiated fuel to the environment. This release will cause health effects to the surrounding area in addition to widespread contamination. Concentrating only on



radiogenic casualties in the definition overlooks the casualties caused from the blast itself, which could be extremely significant in a heavily populated area such as Salt Lake City. In addition, the economic costs of such an event would be astronomical, including loss of tourism, decontamination costs, cleanup and disposal costs, loss income due to cleanup, etc.

In the scenario described above, the cost to Utah's tourism and recreation industry would be crippling. The long-term costs due to stigma affects would be especially harmful in a tourism-driven city such as Salt Lake City. Therefore, these factors must be included in a definition of radiological sabotage. Because many terrorism attacks are aimed at disruption rather than death, the definition of such an attack should be expanded to consider activities aimed at upsetting societal function.

If the proposed PFS facility is constructed near Skull Valley, Utah, 40,000 MTU or approximately half of the nation's projected fuel will be shipped to this location, and then potentially shipped to the proposed geologic repository at Yucca Mountain. This storage and transportation will introduce a significant volume of irradiated nuclear fuel into the high population areas known as the Wasatch Front (i.e, Salt Lake, Davis, and Weber Counties). Approximately 61 percent of the Utah's population is concentrated along the Wasatch Front. Even if the PFS facility is not constructed, the Petitioner estimates that 92% of the nation's irradiated fuel designated for Yucca Mountain will travel through Utah, much of this through the Wasatch Front, including the Salt Lake City area.

Salt Lake City may be a particularly attractive target for potential saboteurs, owing to its high population density. Further, Salt Lake City plays host to many internationally recognizable events, such as international sporting competitions and national conventions. These events provide an attractive stage for a publicized attack. In the event of a terrorist attack on a shipment through Salt Lake City, the economic costs would be crippling. Thus, economic costs also need to be considered. Disruption of such an event should be considered as radiological sabotage, regardless of the radiologically induced health effects. In order to ensure the safety of irradiated fuel shipments, the definition should be expanded to include other, non-health related effects. A proper definition of "radiological sabotage" should include intent to disrupt the economy through attack.

Further, the PFS facility has proposed an alternative to operate an intermodal transfer facility at Timpie, Utah to transfer SNF casks from rail cars to heavy haul trucks. Rail shipping casks may sit on a rail siding at an intermodal transfer facility for several days while casks are transferred from rail car to heavy-haul truck. This transfer facility is adjacent to a critical east-west corridor, Interstate-80, and presents an inviting target to potential saboteurs. Expanding the definition of radiological sabotage to include events designed at upsetting the social, economic, or psychological functioning through

tampering with SNF transportation and storage functions is essential to adequately protect against such events.

**C. Re-examine Requirements for Advanced Approval of Routes**

In support of the Petitioner, Utah also believes that the Commission should consider amending the advance route approval requirement to 1) require shippers and carriers to identify primary and alternative routes which minimize highway and rail shipments through heavily populated areas and 2) to adopt the route selection criteria in NUREG-0561. Because many terrorist attacks are designed to be highly visible, they often occur in highly populated areas. To reduce the probability of this happening, it is desirable for the U.S. Department of Transportation to ensure that shipments of irradiated fuel spend as little time in populated areas as can be achieved. In addition, train routes involving steep grades or sharp turns, where safety issues are at stake, should also be minimized. The transportation of irradiated nuclear fuel has the potential to be extremely dangerous if subjected to severe accident scenarios or terrorist attacks. Because of this potential, the most conservative routing requirements are necessary to increase safety. Therefore, the Interim Guidance in NUREG-0561 should be followed with regards to the choice of routes.

**D. Amend Escort Requirements for Shipments by Road**

The State of Utah agrees with the Petitioner that the Commission should reexamine its regulations requiring armed escorts and 1) eliminate the differential armed escort requirements based on population and 2) consider increasing the armed escort requirements for truck shipments. Like the Petitioner, Utah believes that those residents living outside of "heavily populated" areas are entitled to the same level of protection as residents in urban areas. The likely SNF and HLW transportation routes traverse through various small cities and towns in rural Utah. In addition, the selected transportation routes maybe located in critical water sheds, and near key surface waters and recreational areas.

**E. Amend Escort Requirements for Shipments by Rail**

Utah concurs with the Petitioner in asserting that the Commission should reexamine its regulations requiring armed escorts for rail shipments. The current regulations require a different amount of escort protection depending on population density. As indicated above, Utah believes that residents residing in rural area deserve equal protection as those residents in urbanize areas.

For both truck and rail routes, the transportation route itself is an attractive terrorist target. For railroads, there are relatively few mainline tracks crossing the Rocky Mountains towards California. As the Petitioner astutely raises, the Union Pacific Salt

Lake City-Los Angeles mainline is a rail route of national economic significance. Thus, potential saboteurs could gain visibility by attempting to destroy a part of the Salt Lake City-Los Angeles main line or other critical rail lines. As stated in the previous section, the same motivation may also hold for key east-west highway routes such as Interstate 80.

Further, there exist concentrated population centers within the definition of "rural," such as communities based on rail routes, interstate exits, shopping centers, etc. where a significant population could be an attractive target. Like Nevada, rail lines in Utah run through river valleys adjacent to water supplies. Furthermore, rail routes cross major watersheds and important recreational areas. Contamination of major watersheds or surface waters could devastate the Wasatch Front. Without the same escort requirements demanded for urban areas, potential terrorists could be attracted to the more vulnerable targets. Vehicles containing irradiated nuclear fuel are extremely visible targets. The current escort requirements could provide a comparatively easy avenue through which to forcefully gain control of an irradiated fuel shipment, perhaps as a means of taking it into an urban area.

The State of Utah feels that the lax escort requirements for vehicles traveling in rural areas do not adequately protect its citizens, both rural and urban, from potential sabotage attempts. Therefore the State agrees with the Petitioner in requesting the elimination of the differential escort requirements between rural and urban areas.

The State of Utah also agrees with the Petitioner's request that the Commission consider requiring continuous, real-time aircraft surveillance of all train shipments of irradiated nuclear fuel. Because there are many stretches of rail line that are not easily accessible by land vehicle, these isolated stretches provide areas of particular vulnerability to terrorist attack. In addition, trains are much less agile than trucks in their ability to avoid, for example, deliberately compromised tracks or blown-out bridges. Aircraft surveillance and pre-shipment safety checks along rail lines prior to shipment would enable train shipments to prepare for such attacks before it is too late. Therefore, this should be given serious consideration in a comprehensive assessment of sabotage preparedness.

#### **F. Adopt Additional Planning and Scheduling Requirements**

The State of Utah supports the Petitioner in its suggestion that the Commission should adopt the planning and scheduling requirements of 10 C.F.R. § 73.26(b)(1). Utah is in a unique position of vulnerability with regard to potential accidents or terrorist attacks involving irradiated fuel shipments. If the proposed PFS facility is constructed at Skull Valley, Utah, 40,000 MTU or half of the nations projected commercial irradiated nuclear fuel will be stored here in Utah. This would involve the transportation of irradiated nuclear fuel through major population centers in and around Salt Lake City.

The PFS facility should be considered as a “final delivery point” in the manner used in 10 CFR § 73.26(b)(1).

Because of the quantity of fuel to be shipped to the PFS facility, it is imperative that the shipment be timed so that a receiver is present at the time of delivery to minimize the duration of stops. In addition, because of the enormous volumes of SNF anticipated, PFS has proposed potential shipments on a weekly and bi-weekly basis. Routine schedules will only increase the vulnerability of the SNF shipments. In addition, as discussed above, an intermodal transfer facility may be used to off load rail casks to heavy haul trucks. An intermodal transfer facility operation may leave SNF casks idle awaiting for transfer. Moreover, because of the potentially large amount of waste in one location, as many safeguards as possible are necessary to minimize, to the extent possible, the attractiveness of irradiated fuel as a target for terrorism.

In addition, the State of Utah agrees with the Petitioner in its request that the Commission consider amending the general requirements for physical protection of irradiated reactor fuel in transit to follow the rules governing irradiated nuclear material in transit. This request simply makes sense to make sure preventable accidents and exposures do not happen.

**G. Amend Regulations to Require that All Rail Shipments in Dedicated Trains**

The State of Nevada petition declares that the performance objectives set forth in 10 C.F.R. § 73.37(a)(1) can only be met by requiring all rail shipments to be made in dedicated trains. Utah agrees.

The performance objectives in the C.F.R. cited are as follows:

- (i) Minimize the possibilities for radiological sabotage of irradiated fuel shipments, especially within heavily populated areas.
- (ii) Facilitate the location and recovery of irradiated fuel shipments that may have come under the control of unauthorized persons.

As a likely thoroughfare for over 90% of the nation’s irradiated nuclear fuel, the State has a duty to protect the health and well being of its citizens. According to the Petitioner, Yucca Mountain may receive in excess of 12,000 SNF and 1,000 HLW rail shipments. In addition, well over 4,000 casks could be transported by rail to and from either the PFS storage or intermodal transfer facilities. This results in a high volume of rail shipments throughout Utah.

It is well known that the use dedicated trains will decrease the hazard involved in SNF and HLW because it will minimize the exposure of the population to these shipments. Otherwise, irradiated fuel casks could be stuck in rail yards across the country, including the Salt Lake City rail yard, awaiting transfers and reconfigurations. The State of Utah also believes that the different types of risks involved in such a requirement must be fully assessed, including the potential disadvantages from a physical protection standpoint.

#### **H. Conduct a Comprehensive Assessment of the Consequences of Terrorist Attacks That Have the Capability of Radioactive Sabotage**

The State of Utah believes that an updated and more complete assessment of the consequences of terrorist attacks involving irradiated fuel transportation is essential to assess the safety of plans to begin shipping fuel to the proposed geologic repository or any temporary storage facilities. The last experiments designed to estimate a shipping cask's susceptibility to attack by a military device were conducted in the early 1980s, using an outdated cask design and an unspecialized attack device. A more recent study (SAND 99-0963) attempts to assess the response of modern shipping casks to newer attack devices. However, as discussed earlier, this new study uses a flawed computer simulation to arrive at unsubstantiated conclusions that are not backed up by experiment.

Furthermore, there has not been any determination, experimental or computer-simulated, of the effects of multiple strikes on the same shipping cask by an anti-tank missile such as the US TOW2. It is likely that certain High Energy Density Devices (HEDDs) can completely penetrate current design shipping casks. It is even more likely that several consecutive missile strikes using HEDDs will cause considerable damage. Until a probabilistic risk assessment of the chances of a terrorist event has been performed, it cannot simply be dismissed as not reasonably foreseeable. The Commission should consider multiple consecutive strikes in its comprehensive assessment.

In addition, the State of Utah believes that a sabotage attack involving deliberate fire in addition to missile strike needs to be considered in the comprehensive assessment of the design basis threat. In the event of a cask penetration, heat input will cause an increase in the pressure inside the shipping cask. This will cause a drastic increase in the percentage of materials released in inhalable or respirable form from the shipping cask, as the increased pressure will blow more particles out of the cask and into the environment. In addition, heat input itself, coupled with the presence of oxygen, will provide favorable conditions for a chemical reaction leading to the production of even more respirable aerosol. Under these circumstances, there will be a continual supply of oxygen provided to the inner core of the cask. This oxygen will then react with the uranium dioxide irradiated fuel, oxidizing it to  $U_3O_8$ . This process is exothermic at slightly elevated temperatures, and results in the formation of a fine powder of respirable size. In the event

of simultaneous penetration and high-temperature fire, heat will be made available to the inside of a cask without having to first heat the surrounding shielding, since the penetration will provide clear access to the fuel area. This will result in a quick elevation of the irradiated fuel temperature, providing more oxidation and thus more respirable aerosol production.

Additionally, a shipping cask subjected to fire before attack with an anti-tank missile (or missiles) will also be more susceptible to penetration. Increasing the temperature of a metal cask will result in an increase in the metal's ductility. This results in a weaker resistance to penetration in the same manner as plastic becomes more fluid when heated. This type of attack should be considered as foreseeable and the consequences of it should be assessed.

Finally, Utah echo's the Petitioner propositions that 1) "[t]he Commission should conduct its comprehensive reassessment of terrorism/sabotage consequences in a forum conducive to meaningful participation by all affected stakeholders," including creating a stakeholder advisory group; and 2) "[t]he Commission should publish a full report on all unclassified findings of its consequence reassessment."<sup>12</sup>

## **Grounds and Interest**

As indicated in the beginning, the State of Utah, like the State of Nevada, has a special interest in ensuring the transport and storage of the nation's irradiated nuclear fuel be adequately safeguarded. As a key corridor state, potentially 90 percent of the nation's SNF and HLW will be transported through Utah on its way to the proposed Yucca Mountain repository. In addition, the proposed PFS facility is designed to store up to 40,000 MTU or half of the nation's projected commercial SNF. Moreover, the Petitioner quotes the U.S. Nuclear Waste Technical Review Board as stating that "a single facility with a large stockpile of spent fuel might be a more tempting and visible target."<sup>13</sup> The proposed PFS facility would in fact have a large stockpile of SNF.

Because of the significant quantities of irradiated nuclear fuel potentially stored or transported through the state, Utah has an interest in and is responsible for protecting its citizens from the risks of transporting SNF and HLW. Also similar to Nevada, Utah has an interest in ensuring that transporters of SNF have adequately prepared for potential emergencies.

---

<sup>12</sup> Nevada Petition at 26-27.

<sup>13</sup> Nevada Petition at 12-13 (*quoting Disposal and Storage of Spent Nuclear Fuel - Finding the Right Balance: A Report to Congress and the Secretary of Energy* at 20 (March 1996)).

Moreover, Salt Lake City is the host of the 2002 Winter Olympics. In addition, it often hosts events of international significance, such as political conventions, sporting events, and conferences. These events make the city particularly attractive for terrorist attacks, as the visibility of these events provides a desirable stage for highly visible statements. Furthermore, the Utah has a number of military installations which may make Utah a favorable target for attacks. Therefore, Utah remains particularly concerned about sabotage scenarios.

## **Conclusions**

With a dry storage facility for half the nation's projected commercial irradiated fuel being proposed for Skull Valley, Utah and potentially 90 percent of the nations SNF and HLW traversing Utah en route to Yucca Mountain, the State of Utah is vitally concerned about strengthened safeguard regulations and supports the petition by the State of Nevada. In addition, the State strongly believes that a comprehensive EIS on transportation and storage of irradiated nuclear fuel should be prepared by the NRC that fully evaluates the likelihood and consequences of sabotage. It is essential that the Commission adequately address safeguard concerns now because PFS proposes to initiate cross country shipments in 2002 and shipments en route to Yucca Mountain could begin as early as 2004.<sup>14</sup>

---

<sup>14</sup> Nevada Petition at 11.