Jones

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Statement of Robert H. Jones in the Matter of Used Nuclear Fuel/High-Level Waste Transportation. Prepared for the YMP/EIS Public Hearing

My name is Robert H. Jones I am a Consultant in the field of radioactive material handling, packaging, storage, transportation, and disposal. My principal expertise is in used nuclear fuel and high-level radioactive waste. I have been in the nuclear field for 34 years, the last 21 years as a Consultant. My clients include: the nuclear industry, select National Laboratories, and the U.S. Department of Energy. This statement is being offered on behalf of the nuclear energy industry.

I will direct my comments in two areas. The first is the general subject of used nuclear fuel and high-level waste transportation safety. The second is the related issue of sabotage and terrorist assaults on used nuclear fuel and high-level waste shipments.

Transportation Safety

1... The transportation of used fuel and high-level radioactive waste has an enviable record of safety, one that is unmatched in the transportation business. In 50 years (1949 – 1999) of transporting these materials there have been no content releases and no injuries or deaths due to the hazardous nature of the materials. There have been a few events that might be called "routine" transportation accidents, unrelated to the cargo. Thirteen such accidents, 6 rail and 7 highway, have occurred out of many thousands of shipments. Only one actually could be regarded as life-threatening, and none of the accidents were sufficiently severe as to even approach the design basis of the packages, or casks as they are called. The international record is equally impressive and the number of shipments is in the tens of thousands, greatly exceeding our domestic activity.

This superb safety record did not happen by chance, there are many factors that collectively contributed to it.

First, there is a comprehensive regulatory environment governing the design, construction, testing, operation, and maintenance of these containers and their transport systems. The U.S. Nuclear Regulatory Commission (NRC) and the U.S. Department of Transportation (DOT) both promulgate regulations relating to the spectrum of activities associated with packaging and shipping of radioactive materials. State and local agencies also participate in the regulation of some of these activities. The casks are designed to Federally mandated accident conditions that include: high-speed impact, puncture, high temperature fire, and water submergence. Acceptance criterion is no release of the radioactive contents and complete nuclear criticality safety under the sequential application of the drop, puncture, fire, and submergence tests. International regulations under the International Atomic Energy Agency (IAEA) mirror those of the United States.

1 cont. Second, the design and analysis of the packages are to National Standards using state-of-the-art, proven numerical methods that have been benchmarked against real-world conditions. The designer's Safety Analysis Report for the package is independently reviewed by the Nuclear Regulatory Commission, and only when the NRC is satisfied that the package complies with the regulations will it issue a "license" or Certificate of Compliance. This allows qualified organizations to use the containers. To survive the regulatory accident environment, the casks must be extremely rugged. These containers are of thick-walled metallic construction, with massively bolted lids; often there are two lids. The lids and other components are protected by so-called impact limiters. These are large crushable structures fixed to the casks. These devices deform on impact thus protecting vital components.

Third, all the activities from design and analysis through operation and maintenance are governed by a rigorous quality assurance program. This QA program is based on National Standards and is approved by the NRC. The QA program for packages is as stringent as that applied to nuclear power plant construction.

Fourth, there is an audit program conducted by the NRC that periodically examines the records and operations of those who design, construct, and operate radioactive material shipping packages. This program is in addition to the internal audit commitment made and executed by each cask licensee under its QA program.

Lastly, the operators of the transportation system, i.e., cask owners, transporters, etc., have a well-developed "safety culture." All are keenly aware of the nature of the commodities being transported. They understand the responsibility they have to industry workers and to the public, and they take this responsibility very seriously.

These factors have served the industry and the general public well for the past 50 years and will continue to do so. Continuing advances in analytical methods, materials research, construction techniques, tracking and logistics, and transportation systems, together with a refined regulatory environment will assure that future used fuel and high-level waste shipping will be as safe or safer then experienced to date. This safety is a certainty even in light of the greater shipping volumes that will be associated with the operation of the Yucca Mountain Repository.

In examining the transportation portions of the Yucca Mountain Project EIS, I find that even with conservative assumptions, the results clearly demonstrate that the transportation of used nuclear fuel and high-level radioactive waste presents an acceptably low risk to the general public.

Terrorist Assault/Sabotage

2... One specific issue that has been raised in recent years by those in opposition to nuclear power is terrorist assault or acts of sabotage directed against used nuclear fuel and high-level radioactive waste shipments. Although this country has been sensitized to the terrorist potential ever since the World Trade Center bombing, I am convinced that used

2 cont. nuclear fuel and high-level waste shipments are a remote target for such acts. Having said that, if for some rare reason a shipment might be singled out for assault I am confident that the design basis of the package (cask) and the nature of the contained radioactive material would make the attack either unsuccessful or in the worst case a limited, manageable event. Clearly not one postulated by the preposterous "Mobile Chernobyl" term that the anti-nuclear factions have incorrectly used to characterize the shipping of these materials.

From the design point of view, the Federally mandated accident conditions bound the conditions that would be expected in an assault such as those in Oklahoma City, New York City, Atlanta, and a few other locations. These have been "homemade" large explosive devices that are effective against structures such as buildings, or against people. However, the blast effects and even the objects propelled by such blasts may dislocate a cask and its transporter (e.g., overturn) but in my judgment are bounded by the design conditions for the package. That is, package integrity will be maintained.

Our opponents cite high-energy weapons such as anti-tank missiles as having the ability to penetrate a cask wall. I cannot quarrel with this, since such was demonstrated by the NRC and the DOE in the 70's and 80's in a comprehensive testing program. [It is worth noting that there have been no terrorist assaults in this country where such weaponry has been used.] But the significance of the earlier testing program and the update of that program performed by Sandia in support of the YMP/EIS (SAND99-0963) is that even with a penetration of the cask the amount of material released is a small fraction of the total cask contents. Estimates range from 0.0003% to 0.01% depending on the size of the cask. Of this amount roughly 0.5% of it is estimated to be of aerosol size capable of being dispersed beyond the immediate vicinity. Regardless of cask size, this is a small amount of material. It will result in a highly localized contamination event with limited effects outside the immediate area. Both are quite manageable.

Of course the radiological consequences, as manageable as they are projected to be, can only occur if one accepts the assertion of the anti-nuclear activists that these shipments are a likely target. I am convinced that just the opposite is true.

Those dedicated to terrorism are making a statement through their acts. Such a statement demands a successful outcome of the assault, something that is highly unlikely when used nuclear fuel or high-level radioactive waste shipments are the target. Indeed, a failed attempt is essentially a confirmation of the safety that is inherent in the cask design and the shipment of these commodities, a strong deterrent in itself. There are many factors that make attempts likely to fail.

Initially, there are Federal regulations in 10 CFR 73 that address in-transit security. These speak to the security of shipping information, transport personnel qualifications, escort requirements, communications requirements, and transportation equipment features. Shipments will be continuously tracked via satellite thus assuring constant monitoring of shipment parameters.

2 cont. Additionally, there is the issue of a successful assault. As stated previously, a large explosive device is not going to be successful in disrupting cask integrity, even though it may result in dislocation of the transport system. An attack using some form of high-energy penetrating weapon has a number of associated problems as outlined in the recent Sandia report. These include: weapon portability, training, targeting, weapon functioning, cask construction features, transporter speed, and meteorological conditions. These all contribute to the high likelihood of an unsuccessful attempt.

Realistically there are countless targets through which a terrorist can make a statement with reasonable confidence of a successful assault. A used nuclear fuel or high-level radioactive waste shipment, in my opinion, is not one of them. Even an anti-nuclear terrorist would select a target with greater assurance of success.

My bottom line is: Federal regulations and the planned operations of the transportation system together with the rugged design of the shipping casks and the success uncertainty of any assault makes terrorist attacks or acts of sabotage against used fuel or high-level waste shipments extremely unlikely. And, in the event of a successful assault, the effects are projected to be acceptable low.

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