

**TRANSPORTATION OF SPENT FUEL
TO THE PROPOSED YUCCA MOUNTAIN STORAGE FACILITY**

**U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE
JOINT HEARING
SUBCOMMITTEES ON
HIGHWAYS AND TRANSPORT
&
RAIL**

**Testimony of
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Washington, D.C.**

Mr. Chairman:

NAC International, an Atlanta-headquartered company specializing in nuclear fuel transportation, spent fuel technology and management, non-proliferation, fuel cycle and strategic consulting, is pleased to provide its views on the transportation of spent nuclear fuel to the proposed Yucca Mountain, Nevada, storage facility. Our statement also reflects the views of the U.S. Transport Coalition, of which NAC is a co-founding member along with Edlow International Company, which has a broad experience base over four decades specializing in nuclear materials transportation management, including fresh fuel and spent fuel, and import/export licensing.

As longtime stewards of the nuclear energy industry, we strongly support President Bush's February 15, 2002, recommendation to proceed with the licensing and development of Yucca Mountain. This decision was based on Secretary Abraham's determination that the site is scientifically and technically suitable for the development of a repository, a finding that embraced the bipartisan work of four Presidents, eight Secretaries of Energy and ten Congresses. On the other hand, given our firsthand involvement in the nuclear transportation arena, we find no basis for claims made by opponents of Yucca Mountain that transportation of nuclear spent fuel to Yucca Mountain is a threat to national security and an impediment serious enough to warrant discarding 20 years of scientific and technical work towards development of a federal storage facility. We agree with the *New York Times*, which in an April 21, 2002, editorial concluded that "spent fuel rods have been shipped in small quantities for decades now with no obvious harm to the public, and whatever new risks may emerge with more numerous shipments in an age of terrorism will have to be addressed in detail by federal regulators before they approve the burial plan." They further opined that this "hyperbole provides no reason for Congress to abort a promising plan before the issues can be closely analyzed."

NAC's own perspective is premised in large part on our 30 years of worldwide experience in the nuclear energy industry and our spent fuel management operations portfolio, which today makes NAC the largest U.S.-owned nuclear spent fuel storage and

transportation company in the world. Our experience includes design, testing, licensing, operation and maintenance of a fleet of spent fuel casks used to transport nuclear material all over the world by public highway, rail, barge, ocean vessels and air. NAC's transportation experience includes more than 3,500 shipments over more than 6 million miles internationally. NAC is also a principal U.S. contractor for the important U.S. Department of Energy-sponsored foreign research reactor fuel return program, as well as other key U.S. transportation-related, non-proliferation initiatives in North Korea, Russia, Kazakhstan and the Republic of Georgia. In the next several years alone, NAC, which helped pioneer one of the first dry storage systems at Virginia Power's Surry facility, will deliver over 150 transportable spent nuclear fuel dry storage canisters to U.S. utilities. Our flagship multi-purpose systems include the new generation Universal Multi-Purpose Canister System (UMS); the U.S.'s first NRC licensed dual-purpose transportable storage system (NAC-STC) and its companion canister-based MPC system, as well as the NAC-LWT cask system, which is the workhorse for our truck transportation cask fleet. Recently, we completed the manufacturing of the first phase of 16 transport packages for the Energy Department's Waste Isolation Pilot Plant (WIPP).

Based on these many decades of experience, we are fully confident that spent nuclear fuel can be safely and routinely transported to Yucca Mountain on a scale envisaged by the U.S. Department of Energy and the Nuclear Waste Policy Act, as amended. The transportation-related aspects of the Yucca Mountain repository are entirely manageable using existing technology. Given the years of successful experience and the performance of current transportation cask technology, transportation of spent fuel should not be a barrier to the successful operation of the repository.

The fact is that nuclear materials transportation has an impressive safety and operations track record over 40 years, both in the United States and internationally. In the U.S., more than 3,000 shipments of spent fuel have been carried out safely and successfully over an estimated 1.7 million miles of rails and roads. Internationally, more fuel has already been safely and successfully transported than is scheduled to be shipped to Yucca Mountain. Spent fuel has been and will be shipped in robust, state-of-the-art Nuclear

Regulatory Commission-certified containers with tons of steel and radiation shielding. These containers must meet demanding impact, thermal, submersion and puncture tests. Shipments to Yucca Mountain will travel along pre-approved transportation routes, which are coordinated closely with state authorities and governed under U.S. Department of Transportation regulations. Only several hundred shipments will be required annually -- the overwhelming majority by rail -- to move fuel to Yucca Mountain. Emergency response preparedness and training are already in place as are security and safeguards procedures. Terrorist threats are not new to nuclear materials transportation. Our companies -- and others -- have already met the challenge of shipping nuclear materials under a climate of terrorism and other comparable conditions.

Industry Experience

Experience is the best indicator of the success of the disciplined process applied to spent fuel transport. Transportation of nuclear materials is hardly novel, although the public is largely unaware of the excellent safety record of transportation of nuclear materials over the past 40 years. The United Kingdom, France, Switzerland, Sweden and Japan have a long history of successfully transporting spent fuel, largely in support of their reprocessing efforts. In the United States, there have been thousands of spent fuel shipments during this same period. These range from single fuel element shipments transported in a legal weight truck container across the country, a fleet of five to eight of casks transporting research reactor fuel back to the United States or from the Far East, South America and Europe, or larger containers used for commercial and Naval Reactor spent fuel shipments. In just three years, the WIPP facility, the nation's first radioactive waste storage facility, has successfully completed about 700 shipments and registered 1.5 million miles of safe transportation. About 400 rail shipments have been registered in support of the U.S. Navy spent fuel shipment program. According to the Energy Department, since the 1960s, over 100 million miles of national security shipments have been completed. A testament to the safety of spent fuel and nuclear materials transportation lies in the fact that there have been no accidents resulting in the release of radioactive material to the environment.

To date, more than 90,000 MT of spent fuel has been shipped worldwide. The current proposal is to license Yucca Mountain for 77,000 MT of spent fuel. It is reasonable to expect the same level of safe transportation will be achieved for Yucca Mountain as has been achieved worldwide for the past 40 years.

Transportation Container Safety

Spent fuel transportation safety has its foundation in the design and manufacture of the transportation container. A fundamental precept of the governing standards for spent fuel transport requires the container to be sufficiently robust that safety is preserved regardless of the insults imposed by normal transport or by extremes of potential accidents. The standards for transportation containers are regulated by Federal law and enforced by the U.S. Nuclear Regulatory Commission (NRC) for domestic shipments and by the IAEA for international shipments. These standards include every aspect of the design, manufacturing, quality assurance, operation and maintenance of transportation containers. The standards are open to the public for review and comment and have been developed over the past 40 years based on the best engineering practices, full scale and model tests, and an acute awareness of the public's sensitivity to the potential for harm should there be any accidents that threaten the integrity of the transportation packages.

Each candidate material to be shipped in a particular container must be specifically analyzed to verify that safety standards are achieved. Shielding, temperature and mechanical shock are evaluated for all of the designated accident conditions. In contrast to what one might believe based on Hollywood depictions, spent fuel is shipped in the absence of any liquids as solid metallic or ceramic elements which, in themselves, have a highly robust character. The overwhelming majority of the fuel destined for Yucca Mountain is a uranium ceramic, having properties similar to porcelain. The fuel is hard, temperature resistant, and totally inconsistent with visions of dripping, flowing or

blowing clouds of toxic material as claimed by many of those opposed to Yucca Mountain.

Transportation Container Engineering and Manufacturing

Consistent with regulatory requirements, the containers designed and manufactured for transportation are based on engineering principles internationally accepted for high hazard application. This includes use of proven, well-characterized materials, a consistent set of design codes with conservative safety factors, internationally accepted design accident scenarios, and rigorous design and manufacturing quality control. The design methods are codified by the American Society of Mechanical Engineers and other respected independent engineering organizations and are the same as used by NASA, the nuclear navy, and other failure intolerant industries. Comparable design and manufacturing philosophies have resulted in the historic public confidence in the boiler and pressure vessel industry and the civil engineering bridge and tunnel construction.

The design codes have been proven by years of mechanical property, laboratory and confirmatory testing to be conservative for the intended application. Confirmatory testing is used to validate the design process in much the same way that other high value and potentially hazardous applications have been designed and tested. Indeed, the cost of a typical transport container is dominated by the design, testing, quality control, and regulatory approval aspects rather than the actual material costs and fabrication time. The rigor of the codes, standards and regulations are such that only a few companies have the credentials to participate in the design and manufacturing of transportation containers.

Quality Assurance and Licensing

Transporters must possess the expertise and credentials to produce, operate and maintain spent fuel containers. In order to participate in these activities, an organization's quality assurance program must comply with the requirements specified in the Code of Federal Regulations (10CFR71 Subpart H). The NRC must certify a transporter's quality

assurance program to these requirements. The NRC, along with customers, conduct frequent inspections and audits to verify that our capabilities, processes and practices are consistent with the demanding requirements necessary to transport spent nuclear fuel. The design, fabrication, operation and maintenance requirements for our spent fuel containers are documented in a Safety Analysis Report that is scrutinized by the NRC. An exhaustive series of reviews, questions, answers and discussions are involved in the licensing process. This long and arduous licensing process typically takes years to complete. Moreover, any changes to the design, fabrication, operation or maintenance of the package throughout its lifetime must undergo the same scrutiny and approval process.

Transportation Container Operation and Maintenance

While container design and manufacture provide the first and most fundamental level of a “defense in depth” approach to safety, the container must also be consistently operated and maintained for its regulatory approval to remain in effect. Container maintenance, testing and operational controls are a part of the NRC package certification. They are subject to periodic review during the mandated five-year cask re-certification process or during periodic quality audits by NRC of designer/owner organizations. Maintenance and operating procedures dictate performance testing of critical container components such as seals and shielding. Prior to the initiation of a specific fuel movement, container seal integrity and radiation levels are tested and verified as meeting the cask certificate of compliance and regulatory requirements. Loading operations are not only subject to the conditions of the container certificate but also to those imposed by the nuclear facility operator and their license.

Transportation Campaign Planning and Execution

Both the NRC and the Department of Transportation regulate spent fuel transportation planning and execution. Requirements are imposed on the route of travel, the equipment selected for transport and the personnel performing the transportation function. Routes must be selected in advance, using interstate highways or state designated alternatives. The route application is subjected to NRC approval following its formal assessment for

safety hazards, “safe havens”, designated safety inspection locations, emergency contacts, and maintenance and refueling sources. Vehicles must meet safety requirements and must include mandated communications and safeguards provisions.

The safeguards and security aspects involved in the transportation of spent fuel are of particular concern and sensitivity. While the horrific events of this past September may have focused attention on these issues, stringent safeguards and security measures as a normal condition of transport for spent fuel have long been in place. Since September 11th, we have further enhanced our safeguards and security efforts commensurate with mandated additional requirements. The transportation safeguards and security requirements for spent fuel transportation are delineated in the Code of Federal Regulations (10CFR73), and security organizations within the United States Government have implemented additional requirements since last September.

Expanded transportation campaign planning and communications involves a variety of stakeholders, especially state and local governments. These have included the Northern and Central States Councils of Governments, Southern States Energy Board, and Western Governors’ Association. Campaign planning is used to solicit the views of involved organizations into the route, timing and special provisions integrated into the transportation plan and to describe the operation, provide emergency contacts, and inform the authorities who need to be aware of the shipment. It typically includes participating transportation companies (railroads, trucking companies, etc.) to facilitate the integration of the specific and strict requirements associated with shipment of radioactive material. Extra-regulatory safety and security measures such as enhanced vehicle inspection and real time global positioning satellite tracking are often included in such plans.

We anticipate that a similar process of campaign planning will be utilized for Yucca Mountain. This level of planning and communication allows for proper consideration of any state and local input and sensitivities that may influence the shipments. It also

promotes confidence on the part of the public officials in the localities through which the shipments pass. This experience leads us to believe that the shipments to Yucca Mountain will be carefully planned and conducted under NRC, as well as other federal, state agency regulatory oversight.

To this end, we believe stakeholders would be well served by seeing a portion of the Nuclear Waste Fund directed to the transportation-related program necessary to ultimately remove the spent fuel – and encourage your efforts to direct resources to this area during the appropriations cycle. Moreover, we also encourage the Department of Energy to begin planning now to expedite near-term actions to prepare for fuel acceptance and to resolve outstanding fuel acceptance issues such as conforming waste forms and acceptance of Greater than Class C (GTCC) waste.

Summary

In short, we believe that opening of Yucca Mountain is in the national interest and serves to enhance our nation's safety and security. Safe and secure transport of spent fuel is fundamental to the viability of Yucca Mountain's mission. The engineering methods, manufacturing processes, transportation plans and implementing procedures are proven and have a commendable record and history of safety. There is ample, existing evidence to conclude that spent fuel transportation should not be a barrier to successful opening and operation of Yucca Mountain.